



## **IP Transfer Point**

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**Overview of ITP 31**

- SS7oIP Technology Overview 32
  - Introduction to SS7oIP 32
  - Stream Control Transmission Protocol (RFC2960) 32
  - Sigtran M2PA - SS7 MTP2-User Peer-to-Peer Adaptation Layer 32
  - Sigtran M3UA - SS7 MTP3-User Adaptation Layer 33
  - Sigtran SUA - SS7 SCCP-User Adaptation Layer 33
- Benefits 34

**Planning to Configure ITP 37**

- Supported Platforms 37
- Supported Standards, MIBs, and RFCs 38
- Related Documents 40

**Configuring ITP Basic Functionality 43**

- Configuring RPR+ (Cisco 7500 Series Only) 44
  - Copying an Image onto an RSP 45
  - Setting the Config-Register Boot Variable 46
  - Configuring RPR+ 47
- Specifying the SS7 Variant 49
- Specifying National Options and Network Indicator 49
- Specifying the Point Code 50
  - Specifying the Point Code Representation 50
  - Specifying the Primary Local Point Code 51
  - Specifying a Secondary Point Code 51
  - Specifying the Capability Point Code 51
- Specifying the Interface and Encapsulation 52
  - Configuring a Serial Interface and MTP2 Encapsulation 53
  - Configuring T1/E1 Controller Settings 53
    - Configuring BITS Network Clocking 54
    - Providing BITS Network Clocking to SS7 ATM High Speed Links 55
  - Configuring SS7 over ATM High Speed Links (HSL) 57
    - Enabling a T1/E1 ATM Interface 57
    - Enabling an OC3 ATM Interface 57
    - Enabling an ATM Interface to Receive BITS Clocking for HSLs 58
    - Configuring a Permanent Virtual Circuit (PVC) 59
- Configuring Local Peers 59
- Configuring Linksets 60
- Configuring Multiple Linksets to Adjacent Nodes 60
- Specifying the Cisco ITP Route Table 62
  - Specifying the Default Route Table 62
  - Loading the Route Table Contents 62

|                                                 |    |
|-------------------------------------------------|----|
| Adding Routes to the Route Table                | 62 |
| Saving the Route Table                          | 63 |
| Assigning Links to Linksets                     | 63 |
| Traditional SS7 Links                           | 63 |
| High-Speed Signaling Links                      | 63 |
| SS7 Over IP Links (Peers)                       | 64 |
| Indicating the Route Table for Input Linkset    | 64 |
| Shutting Down and Restarting Linksets and Links | 65 |
| Where to Go Next                                | 66 |

## **Configuring Multiple Instances and Instance Translation 69**

|                                                                        |    |
|------------------------------------------------------------------------|----|
| Contents                                                               | 69 |
| Information About Multiple Instances and Instance Translation          | 70 |
| Understanding Virtual Linksets                                         | 70 |
| How to Configure Multiple Instances                                    | 71 |
| How to Configure Instance Translation                                  | 72 |
| Configuring Point Code Conversion                                      | 73 |
| Configuring Global Title Conversion                                    | 74 |
| Overview of Global Title Conversion                                    | 74 |
| Creating a GTI Conversion Table                                        | 75 |
| Creating a Subsystem Mapping Table                                     | 75 |
| Creating a GTA Prefix Conversion Table                                 | 75 |
| Assigning a Conversion Table to an Instance                            | 76 |
| Configuring Instance Conversion After Global Title Translation         | 77 |
| Verifying the Multiple Instances Configuration                         | 77 |
| Configuration Examples for Multiple Instances and Instance Translation | 78 |
| Instance Translation Configuration Examples                            | 79 |
| Where to Go Next                                                       | 81 |
| Technical Assistance                                                   | 82 |

## **Configuring ITP Group 83**

|                                                    |    |
|----------------------------------------------------|----|
| Contents                                           | 83 |
| Prerequisites for ITP Group Operation              | 83 |
| Restrictions for ITP Group Operation               | 84 |
| Information about ITP Group Operation              | 84 |
| How to Configure the ITP Group Feature             | 85 |
| Configuring the Inter-Device Redundancy Parameters | 86 |
| SUMMARY STEPS                                      | 86 |
| DETAILED STEPS                                     | 87 |
| What to Do Next                                    | 88 |



|                                                                                  |           |
|----------------------------------------------------------------------------------|-----------|
| Enabling the ITP Group Feature                                                   | 88        |
| Prerequisites                                                                    | 88        |
| SUMMARY STEPS                                                                    | 88        |
| DETAILED STEPS                                                                   | 89        |
| What to Do Next                                                                  | 89        |
| Configuring the Group SCTP Parameters                                            | 89        |
| Commands for Configuring SCTP Parameters                                         | 90        |
| What to Do Next                                                                  | 91        |
| Defining Linksets that Span Group Peers                                          | 91        |
| Prerequisites                                                                    | 91        |
| SUMMARY STEPS                                                                    | 91        |
| DETAILED STEPS                                                                   | 91        |
| Configuration Example for ITP Group                                              | 93        |
| Where to Go Next                                                                 | 94        |
| Technical Assistance                                                             | 95        |
| <b>Configuring Global Title Translation</b>                                      | <b>97</b> |
| Contents                                                                         | 97        |
| Overview of GTT Components                                                       | 98        |
| GTT Selectors                                                                    | 98        |
| GTT Global Title Address Entries                                                 | 99        |
| GTT Application Groups                                                           | 100       |
| GTT Mated Application Entries                                                    | 101       |
| Storing and Loading GTT Configuration Data                                       | 101       |
| Loading a GTT Table from a Remote File Server or Flash (No existing GTT Data)    | 102       |
| Loading a GTT Table from a Remote File Server or Flash (Existing GTT Data)       | 103       |
| Bulk Loading/Replacing GTT Database                                              | 103       |
| Syntax and Format Rules for Creating a GTT Database Download File                | 103       |
| Command Identifiers in a GTT Database Download File                              | 104       |
| Parameter Values in GTT Database Download Files                                  | 104       |
| Examples of Entries in a GTT Database Download File                              | 106       |
| Displaying Current GTT Configuration                                             | 109       |
| Configuring GTT: 6 Scenarios                                                     | 109       |
| Configuring Intermediate GTT To Route MSUs to a Single Point Code                | 110       |
| Provisioning the ITP                                                             | 110       |
| Configuring the ITP GTT Database                                                 | 111       |
| Configuring Intermediate GTT To Load Balance MSUs Across Two Or More Point Codes | 113       |
| Provisioning the ITP                                                             | 113       |
| Configuring the ITP GTT Database                                                 | 114       |
| Configuring Final GTT To Route MSUs to a Solitary Point Code                     | 116       |
| Provisioning the ITP                                                             | 116       |
| Configuring the ITP GTT Database                                                 | 116       |
| 117                                                                              |           |

|                                                                                                |            |
|------------------------------------------------------------------------------------------------|------------|
| Configuring Final GTT To Route MSUs to a Primary and Backup Point Code and SSN (Dominant Mode) | 119        |
| Provisioning the ITP                                                                           | 119        |
| Configuring the ITP GTT Database                                                               | 120        |
| Configuring Final GTT To Load Balance MSUs Across a Group of Point Codes and Subsystems        | 122        |
| Provisioning the ITP                                                                           | 122        |
| Configuring the ITP GTT                                                                        | 123        |
| Configuring Final GTT to an SUA AS with a Backup Point Code (Dominant Mode)                    | 125        |
| Provisioning the ITP                                                                           | 125        |
| Configuring the ITP GTT                                                                        | 126        |
| Configuring Global Title Address Conversion                                                    | 127        |
| Verifying Global Title Translations                                                            | 129        |
| GTT Measurements                                                                               | 129        |
| SCCP Accounting                                                                                | 130        |
| Subsystem Status                                                                               | 130        |
| Logging GTT Errors with the ITP Logging Facility                                               | 131        |
| GTT Error Log                                                                                  | 132        |
| Where to Go Next                                                                               | 133        |
| Technical Assistance                                                                           | 134        |
| <b>Configuring M3UA and SUA SS7 Over IP Signaling Gateways</b>                                 | <b>135</b> |
| Contents                                                                                       | 135        |
| Information About M3UA and SUA ITP Signaling Gateways                                          | 136        |
| M3UA                                                                                           | 136        |
| SUA                                                                                            | 137        |
| SGMP and Mated SGs                                                                             | 138        |
| Application Server (AS)                                                                        | 139        |
| Application Server Process (ASP)                                                               | 139        |
| AS Route Table                                                                                 | 139        |
| Point Code Assignment and Management                                                           | 139        |
| Routing Keys                                                                                   | 140        |
| AS Load-sharing Support                                                                        | 140        |
| AS Fail-over support                                                                           | 141        |
| SCCP Traffic Processing for M3UA                                                               | 142        |
| ITP SG Quality Of Service (QoS)                                                                | 142        |
| How to Configure Signaling Gateways                                                            | 142        |
| Performing Basic ITP Configuration                                                             | 142        |
| Enabling and Disabling M3UA or SUA on the ITP SG                                               | 143        |
| Enabling M3UA and M3UA SCTP Offload                                                            | 143        |
| Disabling M3UA                                                                                 | 144        |
| Enabling SUA and SUA SCTP Offload                                                              | 144        |

|                                                                    |            |
|--------------------------------------------------------------------|------------|
| Disabling SUA                                                      | 144        |
| Defining an SG Mated Pair                                          | 145        |
| Defining an Application Server Process (ASP)                       | 146        |
| Defining Application Servers (AS) and Routing Keys                 | 147        |
| Defining an AS Route Table and Routing Key (M3UA Only)             | 148        |
| Where to Go Next                                                   | 149        |
| Technical Assistance                                               | 151        |
| <b>Configuring Gateway Screening</b>                               | <b>153</b> |
| Contents                                                           | 153        |
| Information About Gateway Screening                                | 153        |
| SCCP Screening                                                     | 154        |
| How to Configure Gateway Screening                                 | 154        |
| SUMMARY STEPS                                                      | 154        |
| DETAILED STEPS                                                     | 154        |
| Where to Go Next                                                   | 154        |
| Technical Assistance                                               | 156        |
| <b>Multi-Layer SMS Routing and Screening</b>                       | <b>157</b> |
| Contents                                                           | 157        |
| Information About Multi-Layer SMS Routing and Screening            | 158        |
| Multi-Layer SMS Routing Triggers and the Multi-layer Routing Table | 158        |
| Trigger Search Order                                               | 159        |
| Destination Selection                                              | 159        |
| Weighted Round Robin Distribution                                  | 160        |
| How to Configure MLR-Based Routing                                 | 160        |
| Define the Multi-layer Result Group                                | 160        |
| Creating and Managing Address Tables                               | 161        |
| Creating and Loading an Address Table File Using the CLI           | 161        |
| SUMMARY STEPS                                                      | 161        |
| Detailed Steps                                                     | 161        |
| Creating and Loading a Stored Address Table File                   | 164        |
| SUMMARY STEPS                                                      | 166        |
| Detailed Steps                                                     | 166        |
| Replacing an Address Table File                                    | 167        |
| SUMMARY STEPS                                                      | 167        |
| Detailed Steps                                                     | 167        |
| Examples                                                           | 167        |
| Define One or More Multi-layer SMS Rulesets                        | 167        |
| Define the Multi-Layer SMS Routing Table                           | 169        |
| Configuration Examples of Multi-layer SMS Routing                  | 170        |

|                                                                               |            |
|-------------------------------------------------------------------------------|------------|
| Examples of Configuring Routing based on Operation types                      | 170        |
| Example of Combined Multi-layer Routing and Distributed Short Message Routing | 171        |
| What to Do Next                                                               | 172        |
| How to Configure MLR-Based Screening                                          | 172        |
| Blocking Based on SCCP CdPA and CgPA                                          | 172        |
| Blocking Based on CgPA, CdPA, and SMS MAP Operation Code                      | 173        |
| Blocking Based on CgPA, CdPA and SMS MO/MT Routing Parameters                 | 174        |
| Verifying and Monitoring Multi Layer SMS Routing                              | 175        |
| Where to Go Next                                                              | 175        |
| Technical Assistance                                                          | 177        |
| <b>ITP Distributed Short Message Routing (DSMR)</b>                           | <b>179</b> |
| Contents                                                                      | 179        |
| Prerequisites for DSMR                                                        | 180        |
| Restrictions for DSMR                                                         | 180        |
| Information About DSMR                                                        | 180        |
| How to Configure DSMR                                                         | 182        |
| Configuring a Call Detail Record (CDR) Archival System                        | 182        |
| SUMMARY STEPS                                                                 | 182        |
| DETAILED STEPS                                                                | 183        |
| Examples                                                                      | 184        |
| What to Do Next                                                               | 184        |
| Configuring SMPP or UCP Connectivity                                          | 184        |
| Configuring SMPP or UCP Connectivity                                          | 184        |
| SUMMARY STEPS                                                                 | 185        |
| DETAILED STEPS                                                                | 185        |
| What to Do Next                                                               | 185        |
| Tuning SMPP or UCP Session Parameters                                         | 185        |
| Creating an SMPP or UCP Profile                                               | 185        |
| SUMMARY STEPS                                                                 | 186        |
| DETAILED STEPS                                                                | 186        |
| What to Do Next                                                               | 187        |
| Tuning SMPP or UCP Session Parameters for a Session                           | 187        |
| SUMMARY STEPS                                                                 | 187        |
| DETAILED STEPS                                                                | 188        |
| Examples                                                                      | 189        |
| What to Do Next                                                               | 189        |
| Configuring SMS Result Groups                                                 | 189        |
| Prerequisites                                                                 | 189        |
| Configuring an ESME Result Group for Defined SMPP or UCP Sessions             | 189        |
| SUMMARY STEPS                                                                 | 190        |

|                                                                   |     |
|-------------------------------------------------------------------|-----|
| DETAILED STEPS                                                    | 190 |
| What to Do Next                                                   | 191 |
| Configuring an ESME Result Group for Dynamic SMPP or UCP Sessions | 191 |
| SUMMARY STEPS                                                     | 191 |
| DETAILED STEPS                                                    | 193 |
| Examples                                                          | 194 |
| Configuring an SMSC Result Group                                  | 194 |
| SUMMARY STEPS                                                     | 194 |
| DETAILED STEPS                                                    | 195 |
| Examples                                                          | 195 |
| What to Do Next                                                   | 195 |
| Creating and Managing SMS Address Tables                          | 195 |
| Creating and Loading an Address Table Using the CLI               | 196 |
| SUMMARY STEPS                                                     | 196 |
| Detailed Steps                                                    | 196 |
| Creating and Loading a Stored Address Table File                  | 199 |
| SUMMARY STEPS                                                     | 201 |
| Detailed Steps                                                    | 201 |
| Replacing an Address Table                                        | 202 |
| SUMMARY STEPS                                                     | 203 |
| Detailed Steps                                                    | 203 |
| Examples                                                          | 203 |
| What to Do Next                                                   | 203 |
| Configuring an SMS MSC Table                                      | 203 |
| SUMMARY STEPS                                                     | 204 |
| Detailed Steps                                                    | 204 |
| Configuring SMS Rulesets                                          | 204 |
| Prerequisites                                                     | 205 |
| Restrictions                                                      | 205 |
| SUMMARY STEPS                                                     | 205 |
| DETAILED STEPS                                                    | 206 |
| Examples                                                          | 209 |
| What to Do Next                                                   | 210 |
| Configuring SMS Route Table                                       | 210 |
| SUMMARY STEPS                                                     | 210 |
| DETAILED STEPS                                                    | 211 |
| Examples                                                          | 214 |
| Monitoring DSMR                                                   | 214 |
| SUMMARY STEPS                                                     | 214 |
| DETAILED STEPS                                                    | 215 |
| Configuration Example for DSMR                                    | 217 |

## **Configuring IP Security (IPSec) 219**

Contents 219

Restrictions for IPSec 219

Information About IPSec 220

How to Configure IPSec 220

    Create an IPSEC Tunnel 220

        SUMMARY STEPS 220

        DETAILED STEPS 221

    What to Do Next 222

    Configure a CS7 Peer Link over the Tunnel 223

        SUMMARY STEPS 223

        DETAILED STEPS 223

Configuration Examples for IPSec 223

Where to Go Next 224

## **Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service 227**

Contents 227

Information About MAP Proxy 227

    GSM MAP Authentication 228

    Multimedia Message Service Center Gateway 229

How to Configure MAP Proxy 229

    Performing Basic ITP Configuration 230

    Implementing a GSM MAP Authentication Service 230

        SUMMARY STEPS 230

        Detailed Steps 231

    Provisioning MAP Proxy Parameters for GSM MAP Authentication Service 232

    Example 233

    Implementing an MMSC Gateway Service 234

        SUMMARY STEPS 234

        Detailed Steps 234

    Provisioning MAP Proxy Parameters for An MMSC Gateway Service 235

    Example 236

    Enabling and Disabling MAPUA 236

Where to Go Next 237

    Technical Assistance 238

## **Configuring MTP3 Offload 239**

Contents 239

Restrictions for MTP3 Offload 239

|                                                 |            |
|-------------------------------------------------|------------|
| Information About MTP3 Offload                  | 240        |
| How to Configure MTP3 Offload                   | 240        |
| Verifying MTP3 Offload                          | 240        |
| Where to Go Next                                | 240        |
| Technical Assistance                            | 242        |
| <b>Configuring ITP Non-Stop Operation (NSO)</b> | <b>243</b> |
| Contents                                        | 243        |
| Restrictions for ITP NSO                        | 243        |
| Information About ITP NSO                       | 244        |
| How to Configure ITP NSO                        | 244        |
| Configuring MTP3 Offload                        | 244        |
| MTP3 Offload                                    | 244        |
| SUMMARY STEPS                                   | 244        |
| DETAILED STEPS                                  | 245        |
| What to Do Next                                 | 245        |
| Configuring M2PA Offload                        | 245        |
| M2PA Offload                                    | 245        |
| SUMMARY STEPS                                   | 245        |
| DETAILED STEPS                                  | 246        |
| What to Do Next                                 | 246        |
| Configuring xUA SCTP Offload                    | 246        |
| xUA SCTP Offload                                | 246        |
| SUMMARY STEPS                                   | 246        |
| DETAILED STEPS                                  | 247        |
| What to Do Next                                 | 247        |
| Configuring Stateful Switchover Redundancy Mode | 247        |
| Understanding Redundancy Modes                  | 247        |
| SUMMARY STEPS                                   | 248        |
| DETAILED STEPS                                  | 249        |
| What to Do Next                                 | 249        |
| Configuring ITP NSO                             | 249        |
| SUMMARY STEPS                                   | 249        |
| DETAILED STEPS                                  | 250        |
| Configuration Example for ITP NSO               | 250        |
| Where to Go Next                                | 251        |
| Technical Assistance                            | 252        |
| <b>Configuring ITP QoS</b>                      | <b>253</b> |
| Contents                                        | 253        |
| Information About ITP QoS                       | 253        |

|                                                             |            |
|-------------------------------------------------------------|------------|
| ITP QoS Components                                          | 254        |
| ITP QoS Functionality                                       | 254        |
| How to Configure ITP QoS                                    | 255        |
| Specifying Packet Classification                            | 256        |
| Specifying Input Linkset Classification                     | 256        |
| Specifying Access List Classification                       | 257        |
| Specifying Service Indicator Classification                 | 258        |
| Specifying SCCP Packet Classification                       | 260        |
| Specifying Destination Point Code Classification            | 261        |
| Specifying a QoS classification for an ASP                  | 262        |
| Specifying QoS Routing Over M2PA Links                      | 263        |
| Verifying ITP QoS                                           | 263        |
| Where to Go Next                                            | 264        |
| Technical Assistance                                        | 266        |
| <b>Configuring SCCP Load Sharing</b>                        | <b>267</b> |
| Contents                                                    | 267        |
| Information About SCCP Load Sharing                         | 267        |
| How to Configure SCCP Load Sharing                          | 268        |
| Where to Go Next                                            | 270        |
| Technical Assistance                                        | 271        |
| <b>Configuring Summary Routing and ANSI Cluster Routing</b> | <b>273</b> |
| Contents                                                    | 273        |
| Information About Summary Routing and ANSI Cluster Routing  | 273        |
| How Point Codes Are Used in Summary Routing                 | 274        |
| Assigning Point Codes                                       | 274        |
| Specifying Summary Destinations                             | 275        |
| Summary Routes and the Routing Table                        | 275        |
| How to Configure Summary Routes                             | 276        |
| How to Configure ANSI Cluster Routing                       | 278        |
| Where to Go Next                                            | 279        |
| Technical Assistance                                        | 281        |
| <b>Verifying, Monitoring, and Tuning the ITP</b>            | <b>283</b> |
| Verifying RPR+                                              | 284        |
| Verifying ITP                                               | 284        |
| Monitoring RPR+ on the Cisco 7500 Series Router             | 294        |
| Monitoring ITP                                              | 295        |
| Configuring ITP for Event Logging to an External Server     | 295        |
| Configuring the CS7 Monitor Feature                         | 296        |



|                                                 |     |
|-------------------------------------------------|-----|
| Enabling Simple Network Management Protocol     | 297 |
| Monitoring the Cisco ITP                        | 299 |
| Monitoring CPU/Memory                           | 299 |
| Monitoring Linksets and Links                   | 300 |
| Monitoring MTP2 Links/Interfaces                | 302 |
| Monitoring M2PA Links/Interfaces                | 307 |
| Monitoring GTT Measurements                     | 310 |
| Monitoring M3UA or SUA                          | 311 |
| Monitoring M3UA                                 | 311 |
| Monitoring SUA                                  | 311 |
| Monitoring Point Code Status                    | 312 |
| Monitoring AS, ASP, Mated-SG                    | 312 |
| Monitoring AS                                   | 312 |
| Monitoring ASP                                  | 313 |
| Monitoring SGMP and Mated SG Pairs              | 316 |
| Monitoring AS Route Table                       | 317 |
| Monitoring Routes                               | 317 |
| Monitoring Gateway Screening Violations         | 318 |
| Monitoring System Messages                      | 319 |
| Monitoring Accounting                           | 319 |
| Summary of Commands to Monitor Cisco ITP        | 320 |
| Tuning ITP                                      | 321 |
| Tuning HSL Parameters                           | 321 |
| Create a Profile to Support HSL                 | 321 |
| Specify HSL Parameters on a Link                | 323 |
| Tuning MTP3 Timers                              | 324 |
| Tuning MTP2 Parameters                          | 324 |
| Understanding the MTP2 Parameters               | 324 |
| Specifying MTP2 Parameters in a CS7 Profile     | 326 |
| Specifying MTP2 Parameters Individually         | 327 |
| Tuning SCTP Parameters                          | 328 |
| How SCTP Parameters Work                        | 328 |
| Tuning SCTP Parameters for M2PA                 | 331 |
| Tuning SCTP Parameters for M3UA, SGMP, and SUA  | 332 |
| Tuning SCTP Parameters for an ASP               | 333 |
| Tuning AS Options                               | 333 |
| Tuning SCTP Parameters for a Mated SG           | 334 |
| Tuning SCTP Parameters for Satellite Channels   | 335 |
| Overview of SCTP and Satellite Channels         | 335 |
| Tuning SCTP on Satellite Channels               | 336 |
| Verifying SCTP Parameters on Satellite Channels | 338 |

## **ITP Configuration Examples 341**

- RPR+ Configuration Example 341
- ITP Basic Functionality Configuration Example 343
- ITP GTT Configuration Example 352
- Multi-Layer Routing Configuration Examples 362
- Multiple Instance Configuration Example 368
- Instance Translation Configuration Examples 369
- ITP QOS Configuration Example 372
  - Example 1 386
  - Example 2 386
  - Example 3 386
  - Example 4 387
- ITP Signaling Gateway Configuration Examples 388
  - M3UA Configuration Example 388
  - SUA Configuration Example 389
  - ITP Signaling Gateway: ASPs with Unique Point Codes Configuration Example 390
  - ITP SG Mated-SG Configuration Example 391
  - ITP SG GTT Configuration Example 392
  - ITP SG QoS Configuration Examples 394
    - Example 1 394
    - Example 2 394
    - Example 3 394
    - Example 4 395
- ITP MAP Proxy Example 396
- CS7 Monitor Configuration Example 396

## **ITP Command Set: A - D 397**

- access-group 402
- access-list 403
- accounting 406
- active-asps-target 407
- addr (cs7 mlr address-table) 408
- addr (cs7 sms address-table) 410
- adjacent-sp-restart 412
- allow-multi-message-dialogue 413
- asname (cs7 gtt application group) 414
- asname (cs7 mlr result) 416
- asp 418
- assoc-retransmit (cs7 asp) 420
- assoc-retransmit (cs7 link) 421

|                                        |     |
|----------------------------------------|-----|
| assoc-retransmit (cs7 mated-sg)        | 422 |
| assoc-retransmit (cs7 m3ua)            | 423 |
| assoc-retransmit (cs7 sgmp)            | 424 |
| assoc-retransmit (cs7 sua)             | 425 |
| assoc-retransmit (group peer)          | 426 |
| association                            | 427 |
| atm cs7monitor                         | 428 |
| atm nni                                | 429 |
| authorize                              | 430 |
| bind-type (cs7 sms profile parameters) | 434 |
| bind-type (CS7 sms session parameters) | 436 |
| block                                  | 438 |
| broadcast                              | 439 |
| bundling (cs7 asp)                     | 441 |
| bundling (CS7 Link)                    | 442 |
| bundling (cs7 mated-sg)                | 444 |
| bundling (cs7 m3ua)                    | 445 |
| bundling (cs7 profile)                 | 446 |
| bundling (cs7 sgmp)                    | 448 |
| bundling (cs7 sua)                     | 449 |
| burst-recovery-timeout                 | 450 |
| bundling (group peer)                  | 451 |
| cache-size                             | 452 |
| cdpa                                   | 453 |
| cdr-service                            | 456 |
| cdr-service-queue                      | 457 |
| cgpa                                   | 458 |
| clear cs7 accounting                   | 461 |
| clear cs7 all                          | 462 |
| clear cs7 as                           | 463 |
| clear cs7 asp                          | 464 |
| clear cs7 asroute                      | 465 |
| clear cs7 dynamic-route                | 466 |
| clear cs7 gtt-meas                     | 467 |
| clear cs7 mapua statistics             | 468 |

|                                   |     |
|-----------------------------------|-----|
| clear cs7 mated-sg statistics     | 469 |
| clear cs7 monitor                 | 470 |
| clear cs7 mtp3 event-history      | 471 |
| clear cs7 pointcode event-history | 472 |
| clear cs7 offload mtp3            | 473 |
| clear cs7 statistics              | 474 |
| clear cs7 tcap statistics         | 476 |
| client                            | 477 |
| clock source (controller)         | 479 |
| clock source (interface)          | 481 |
| congestion-threshold              | 483 |
| cs7 accounting                    | 484 |
| cs7 address-table replace         | 485 |
| cs7 as                            | 486 |
| cs7 asp                           | 488 |
| cs7 asroute                       | 490 |
| cs7 capability-pc                 | 492 |
| cs7 cdr destination               | 494 |
| cs7 cdr service                   | 495 |
| cs7 clii                          | 496 |
| cs7 description                   | 497 |
| cs7 display-name                  | 498 |
| cs7 distribute-sccp-unsequenced   | 499 |
| cs7 fast-restart                  | 500 |
| cs7 group                         | 501 |
| cs7 gtt address-conversion        | 502 |
| cs7 gtt application-group         | 503 |
| cs7 gtt concern-pclist            | 504 |
| cs7 gtt load                      | 506 |
| cs7 gtt map                       | 507 |
| cs7 gtt map sp                    | 510 |
| cs7 gtt map ss                    | 511 |
| cs7 gtt replace-db                | 513 |
| cs7 gtt selector                  | 514 |
| cs7 host                          | 516 |

|                                    |     |
|------------------------------------|-----|
| cs7 inhibit                        | 518 |
| cs7 instance pc-conversion         | 519 |
| cs7 instance pc-conversion default | 520 |
| cs7 linkset                        | 522 |
| cs7 local-peer                     | 524 |
| cs7 log                            | 526 |
| cs7 log checkpoint                 | 527 |
| cs7 m3ua                           | 528 |
| cs7 mapua                          | 530 |
| cs7 mated-sg                       | 532 |
| cs7 max-dynamic-routes             | 534 |
| cs7 mlr address-table              | 535 |
| cs7 mlr result                     | 536 |
| cs7 mlr ruleset                    | 538 |
| cs7 mlr table                      | 540 |
| cs7 monitor                        | 542 |
| cs7 mtp3 event-history             | 543 |
| cs7 mtp3 timer                     | 545 |
| cs7 mtp3 tuning                    | 551 |
| cs7 multi-instance                 | 553 |
| cs7 national-options               | 554 |
| cs7 network-indicator              | 556 |
| cs7 network-name                   | 557 |
| cs7 nso                            | 558 |
| cs7 offload mtp3                   | 559 |
| cs7 offload mtp3 restart           | 560 |
| cs7 paklog                         | 561 |
| cs7 point-code                     | 563 |
| cs7 point-code delimiter           | 564 |
| cs7 point-code format              | 565 |
| cs7 profile                        | 567 |
| cs7 prompt enhanced                | 569 |
| cs7 qos class                      | 570 |
| cs7 remote-congestion-msgs         | 571 |
| cs7 route-mgmt-sls                 | 572 |

|                               |     |
|-------------------------------|-----|
| cs7 route-table               | 574 |
| cs7 save address-table        | 575 |
| cs7 save gtt-table            | 576 |
| cs7 save log                  | 577 |
| cs7 save route-table          | 578 |
| cs7 sccp gti-conversion       | 579 |
| cs7 sccp instance-conversion  | 580 |
| cs7 sccp ssn-conversion       | 582 |
| cs7 secondary-pc              | 583 |
| cs7 sg-event-history          | 584 |
| cs7 sgmp                      | 585 |
| cs7 sls-shift                 | 587 |
| cs7 sms address-table         | 588 |
| cs7 sms msc-table             | 589 |
| cs7 sms result-group          | 590 |
| cs7 sms route-table           | 592 |
| cs7 sms ruleset               | 593 |
| cs7 sms smpp                  | 594 |
| cs7 sms smpp profile          | 595 |
| cs7 sms ucp                   | 597 |
| cs7 sms ucp profile           | 598 |
| cs7 snmp dest-max-window      | 600 |
| cs7 snmp mgmt-max-window      | 601 |
| cs7 sua                       | 602 |
| cs7 sua-allow-xudt-request    | 604 |
| cs7 summary-routing-exception | 605 |
| cs7 tcp tid-timer             | 606 |
| cs7 tfc-pacing-ratio          | 607 |
| cs7 uninhibit                 | 608 |
| cs7 util-abate                | 609 |
| cs7 util-plan-capacity        | 610 |
| cs7 util-sample-interval      | 611 |
| cs7 util-threshold            | 612 |
| cs7 variant                   | 613 |
| cs7 xua-as-based-congestion   | 615 |

|                                       |     |
|---------------------------------------|-----|
| cs7 xua-ssnm-filtering                | 616 |
| cs7 xua-tfc-allowed                   | 617 |
| cumulative-sack (CS7 ASP)             | 618 |
| cumulative-sack (CS7 Link)            | 619 |
| cumulative-sack (cs7 mated-sg)        | 620 |
| cumulative-sack (CS7 M3UA)            | 621 |
| cumulative-sack (CS7 SGMP)            | 622 |
| cumulative-sack (cs7 sua)             | 623 |
| cumulative-sack (group peer)          | 624 |
| default                               | 625 |
| description (cs7 link)                | 627 |
| description (cs7 linkset)             | 628 |
| dest-port (cs7 mlr ruleset rule)      | 629 |
| dest-port (cs7 sms set rule)          | 630 |
| dest-sme (cs7 mlr ruleset rule)       | 632 |
| dest-sme (cs7 sms set rule)           | 635 |
| dest-sme-table (cs7 mlr ruleset rule) | 637 |
| dest-sme-table (cs7 sms set rule)     | 639 |
| dest-smsc (cs7 mlr ruleset rule)      | 641 |
| dest-smsc (cs7 sms set rule)          | 643 |
| destination (cs7 cdr service)         | 645 |
| destination (cs7 sms smpp)            | 646 |
| destination (cs7 sms ucp)             | 647 |
| digits                                | 648 |
| display-name (cs7 link)               | 650 |
| display-name (cs7 linkset)            | 651 |

#### **ITP Command Set: E - R** 653

|                                         |     |
|-----------------------------------------|-----|
| encapsulation cs7monitor                | 659 |
| encapsulation mtp2                      | 660 |
| esme cdr consolidation (cs7 sms result) | 661 |
| esme id (cs7 sms result)                | 662 |
| false-congestion                        | 663 |
| fast-cwnd-rate (cs7 asp)                | 664 |
| fast-cwnd-rate (cs7 link)               | 665 |
| fast-cwnd-rate (cs7 m3ua)               | 666 |

|                                               |     |
|-----------------------------------------------|-----|
| fast-cwnd-rate (cs7 mated-sg)                 | 667 |
| fast-cwnd-rate (cs7 sgmp)                     | 668 |
| fast-cwnd-rate (cs7 sua)                      | 669 |
| fast-start                                    | 670 |
| get-imsi                                      | 671 |
| get-msrn                                      | 673 |
| gprs-delivery prefer-sgsn                     | 675 |
| gsm-authent-vlr                               | 677 |
| gsm-map (cs7 sms route table)                 | 678 |
| gta app-grp                                   | 680 |
| gta asname                                    | 681 |
| gta pcssn                                     | 683 |
| gta qos-class                                 | 685 |
| gtt-accounting                                | 687 |
| hsl                                           | 688 |
| idle-cwnd-rate (cs7 asp)                      | 689 |
| idle-cwnd-rate (cs7 link)                     | 690 |
| idle-cwnd-rate (cs7 mated-sg)                 | 691 |
| idle-cwnd-rate (cs7 m3ua)                     | 692 |
| idle-cwnd-rate (cs7 sgmp)                     | 693 |
| idle-cwnd-rate (cs7 sua)                      | 694 |
| inactivity-timer (cs7 sms profile parameters) | 695 |
| inactivity-timer (cs7 sms session parameters) | 697 |
| init-cwnd-size (cs7 asp)                      | 699 |
| init-cwnd-size (cs7 link)                     | 700 |
| init-cwnd-size (cs7 m3ua)                     | 701 |
| init-cwnd-size (cs7 mated-sg)                 | 702 |
| init-cwnd-size (cs7 sgmp)                     | 703 |
| init-cwnd-size (cs7 sua)                      | 704 |
| init-ip-dscp                                  | 705 |
| init-ip-precedence                            | 706 |
| init-retransmit (cs7 link)                    | 707 |
| init-retransmit (cs7 m3ua)                    | 708 |
| init-retransmit (cs7 sgmp)                    | 709 |
| init-retransmit (CS7 SUA)                     | 710 |



|                                               |     |
|-----------------------------------------------|-----|
| init-retransmit (group)                       | 711 |
| init-timeout (CS7 Link)                       | 712 |
| init-timeout (CS7 M3UA)                       | 713 |
| init-timeout (CS7 SGMP)                       | 714 |
| init-timeout (CS7 SUA)                        | 715 |
| init-timeout (group)                          | 716 |
| invoke-timer (cs7 authent-vlr)                | 717 |
| invoke-timer (cs7 sms gsm smsmo)              | 718 |
| ip                                            | 719 |
| ip-dscp                                       | 720 |
| ip-precedence                                 | 721 |
| ipc zone default                              | 722 |
| keepalive (CS7 ASP)                           | 723 |
| keepalive (CS7 Link)                          | 724 |
| keepalive (CS7 Mated-SG)                      | 725 |
| keepalive (CS7 M3UA)                          | 726 |
| keepalive (CS7 Monitor)                       | 727 |
| keepalive (CS7 SGMP)                          | 728 |
| keepalive (CS7 SUA)                           | 729 |
| keepalive (group peer)                        | 730 |
| keepalive-timer (CS7 SMS profile parameters)  | 731 |
| keepalive-timers (CS7 SMS session parameters) | 732 |
| link (CS7 linkset)                            | 734 |
| link (CS7 monitor)                            | 736 |
| link-test                                     | 737 |
| link-timer                                    | 738 |
| load (cs7 route table)                        | 741 |
| load (CS7 SMS address-table)                  | 743 |
| local-ip (CS7 local peer)                     | 745 |
| local-ip (CS7 M3UA)                           | 746 |
| local-ip (CS7 MAPUA)                          | 747 |
| local-ip (CS7 SGMP)                           | 748 |
| local-ip (CS7 SUA)                            | 749 |
| local-ip (group)                              | 750 |
| local-ip (local IPC SCTP)                     | 751 |

|                                        |     |
|----------------------------------------|-----|
| local-port                             | 752 |
| map-dest-addr                          | 753 |
| map-source-addr (cs7 mapua)            | 755 |
| map-source-addr (cs7 sms smsmo)        | 757 |
| match access-group                     | 759 |
| match any (CS7 ASP)                    | 760 |
| match any (CS7 Linkset)                | 761 |
| match ip (cs7 sms result)              | 762 |
| match si (cs7 asp))                    | 763 |
| match si (cs7 linkset)                 | 764 |
| match smpp id (cs7 sms result)         | 765 |
| match ucp id (cs7 sms result)          | 766 |
| max-inbound-streams (CS7 M3UA)         | 767 |
| max-inbound-streams (CS7 SGMP)         | 768 |
| max-inbound-streams (CS7 SUA)          | 769 |
| max-messages (CS7 SMS SMSMO MSC PROXY) | 770 |
| maxQdepth                              | 771 |
| max-return                             | 772 |
| max-streams (group)                    | 773 |
| mnp                                    | 774 |
| modify-prefix                          | 775 |
| msc-proxy-addr (cs7 sms smsmo)         | 777 |
| mtp2                                   | 779 |
| mtp2-timer                             | 780 |
| mtp2-timer ttc enable                  | 782 |
| multi-message-dialogue                 | 783 |
| multiplicity                           | 784 |
| nai                                    | 785 |
| network-appearance                     | 786 |
| new-name                               | 787 |
| np                                     | 788 |
| orig-imsi (cs7 mlr ruleset rule)       | 789 |
| orig-imsi (cs7 sms set rule)           | 790 |
| orig-imsi-table (cs7 mlr ruleset rule) | 792 |
| orig-imsi-table (cs7 sms set rule)     | 794 |

|                                       |     |
|---------------------------------------|-----|
| orig-sme (cs7 mlr ruleset rule)       | 796 |
| orig-sme (cs7 sms set rule)           | 798 |
| orig-sme-table (cs7 mlr ruleset rule) | 800 |
| orig-sme-table (cs7 sms set rule)     | 802 |
| orig-smsc                             | 804 |
| path-retransmit (CS7 ASP)             | 806 |
| path-retransmit (CS7 Link)            | 807 |
| path-retransmit (CS7 Mated-SG)        | 808 |
| path-retransmit (CS7 M3UA)            | 809 |
| path-retransmit (CS7 SGMP)            | 810 |
| path-retransmit (CS7 SUA)             | 811 |
| path-retransmit (group peer)          | 812 |
| pc (cs7 gtt application group)        | 813 |
| pc (cs7 mlr result)                   | 814 |
| pc (cs7 sms result)                   | 816 |
| peer (group)                          | 817 |
| peer-timer                            | 818 |
| pid (cs7 mlr ruleset rule)            | 819 |
| pid (cs7 sms set rule)                | 820 |
| ping cs7                              | 822 |
| plan-capacity-rcvd                    | 824 |
| plan-capacity-send                    | 825 |
| port                                  | 826 |
| post-gtt-address-conversion           | 827 |
| pre-gtt-address-conversion            | 828 |
| preventive-txp                        | 829 |
| protocol sctp                         | 830 |
| proxy-error-use (cs7 sms smsmo)       | 831 |
| qos-access-group                      | 832 |
| qos-class (CS7 AS)                    | 833 |
| qos-class (CS7 ASP)                   | 834 |
| qos-class (CS7 gtt selector)          | 835 |
| qos-class (CS7 link)                  | 836 |
| qos-class (CS7 Mated-SG)              | 837 |
| qos-ip-dscp                           | 838 |

|                                        |     |
|----------------------------------------|-----|
| qos-ip-precedence                      | 839 |
| queue-depth (cs7 cdr service)          | 840 |
| queue-limit                            | 841 |
| queue-timer                            | 842 |
| receive-window (CS7 local peer)        | 843 |
| receive-window (CS7 M3UA)              | 845 |
| receive-window (CS7 SGMP)              | 846 |
| receive-window (CS7 SUA)               | 847 |
| receive-window (group)                 | 848 |
| recovery-timeout                       | 850 |
| redundancy                             | 851 |
| remote-ip (CS7 ASP)                    | 852 |
| remote-ip (CS7 Mated-SG)               | 853 |
| remote-ip (group peer)                 | 854 |
| remote-ip (remote IPC SCTP)            | 855 |
| remote port (local IPC SCTP)           | 856 |
| remove route (CS7 AS route)            | 857 |
| remove route (route table)             | 858 |
| response-timer (cs7 sms profile parms) | 859 |
| response-timer (cs7 sms session parms) | 861 |
| result (cs7 mlr ruleset rule)          | 863 |
| result (cs7 sms set rule)              | 865 |
| retransmit-cwnd-rate (CS7 ASP)         | 867 |
| retransmit-cwnd-rate (CS7 Link)        | 869 |
| retransmit-cwnd-rate (CS7 Mated-SG)    | 871 |
| retransmit-cwnd-rate (CS7 M3UA)        | 873 |
| retransmit-cwnd-rate (CS7 SGMP)        | 875 |
| retransmit-cwnd-rate (CS7 SUA)         | 877 |
| retransmit-timeout (CS7 ASP)           | 879 |
| retransmit-timeout (CS7 Link)          | 881 |
| retransmit-timeout (CS7 Mated-SG)      | 883 |
| retransmit-timeout (CS7 M3UA)          | 885 |
| retransmit-timeout (CS7 SGMP)          | 887 |
| retransmit-timeout (CS7 SUA)           | 889 |
| retransmit-timeout (group peer)        | 891 |

reuse-count   **893**  
 rotate-sls   **894**  
 routing-key (CS7 AS)   **895**  
 routing-key (CS7 AS Route)   **899**  
 rule (cs7 mlr ruleset)   **900**  
 rule (cs7 sms set)   **903**  
 ruleset (cs7 sms smsmo)   **905**

## **ITP Command Set: S - Z   907**

send-window (cs7 sms profile parms)   **911**  
 send-window (cs7 sms session parms)   **912**  
 session-init-timer(cs7 sms profile parms)   **914**  
 session-init-timer (cs7 sms session parms)   **916**  
 set   **918**  
 share-mode (cs7 cdr service)   **920**  
 show cs7   **921**  
 show cs7 access-lists   **923**  
 show cs7 accounting   **924**  
 show cs7 as   **927**  
 show cs7 asp   **930**  
 show cs7 asroute   **935**  
 show cs7 cdr destination   **937**  
 show cs7 cdr service fda   **938**  
 show cs7 group   **940**  
 show cs7 gtt address-conversion   **942**  
 show cs7 gtt application-group   **943**  
 show cs7 gtt concern-pclist   **944**  
 show cs7 gtt config   **945**  
 show cs7 gtt consistency   **947**  
 show cs7 gtt gta   **949**  
 show cs7 gtt map   **951**  
 show cs7 gtt measurements   **953**  
 show cs7 gtt selector   **956**  
 show cs7 linkset   **957**  
 show cs7 log   **962**  
 show cs7 m2pa   **963**

|                                   |      |
|-----------------------------------|------|
| show cs7 m3ua                     | 970  |
| show cs7 mapua                    | 972  |
| show cs7 mated-sg                 | 974  |
| show cs7 mlr address-table        | 976  |
| show cs7 mlr result               | 977  |
| show cs7 mlr statistics           | 978  |
| show cs7 mlr table                | 979  |
| show cs7 monitor link             | 982  |
| show cs7 monitor tcp              | 984  |
| show cs7 mtp2                     | 985  |
| show cs7 mtp3 error               | 993  |
| show cs7 mtp3 event-history       | 998  |
| show cs7 mtp3 timers              | 999  |
| show cs7 nso                      | 1000 |
| show cs7 offload mtp3             | 1002 |
| show cs7 pc-conversion            | 1004 |
| show cs7 ping                     | 1005 |
| show cs7 point-codes              | 1006 |
| show cs7 qos                      | 1008 |
| show cs7 route                    | 1010 |
| show cs7 sccp gti-conversion      | 1015 |
| show cs7 sccp instance-conversion | 1017 |
| show cs7 sccp ssn-conversion      | 1018 |
| show cs7 sgmp                     | 1019 |
| show cs7 smpp                     | 1020 |
| show cs7 sms address-table        | 1023 |
| show cs7 sms result               | 1025 |
| show cs7 sms route-table          | 1026 |
| show cs7 sms ruleset              | 1028 |
| show cs7 sms smpp                 | 1031 |
| show cs7 sms statistics           | 1032 |
| show cs7 sms ucp                  | 1034 |
| show cs7 sua                      | 1035 |
| show cs7 tcap                     | 1037 |
| show cs7 ucp                      | 1039 |

|                                     |      |
|-------------------------------------|------|
| show cs7 virtual linkset            | 1042 |
| show hosts                          | 1045 |
| show ip sctp                        | 1047 |
| show redundancy inter-device        | 1054 |
| show sscf-nni                       | 1056 |
| show sscop                          | 1058 |
| show tech-support                   | 1061 |
| shutdown (CS7 AS)                   | 1063 |
| shutdown (CS7 AS Route)             | 1064 |
| shutdown (CS7 ASP)                  | 1065 |
| shutdown (CS7 link)                 | 1066 |
| shutdown (CS7 linkset)              | 1067 |
| shutdown (CS7 M3UA)                 | 1069 |
| shutdown (CS7 MAPUA)                | 1070 |
| shutdown (CS7 Mated-SG)             | 1071 |
| shutdown (CS7 Monitor)              | 1072 |
| shutdown (CS7 SGMP)                 | 1073 |
| shutdown (CS7 SUA)                  | 1074 |
| shutdown (group)                    | 1075 |
| shutdown (IPC association)          | 1076 |
| sls-shift                           | 1077 |
| smpp (cs7 sms result)               | 1078 |
| smpp inactivity-timer               | 1079 |
| smpp keepalive-timer                | 1080 |
| smpp response-timer                 | 1081 |
| smpp send-window                    | 1082 |
| smpp session-init-timer             | 1083 |
| smsc-map-version (cs7 sms smsmo)    | 1084 |
| snmp-server enable traps bits-clock | 1085 |
| snmp-server enable traps cs7        | 1086 |
| snmp-server enable traps sctp       | 1089 |
| sscf-nni                            | 1090 |
| sscop                               | 1092 |
| teleservice                         | 1094 |
| threshold-receive                   | 1095 |

|                                     |      |
|-------------------------------------|------|
| threshold-send                      | 1096 |
| timer (CS7 Linkset)                 | 1097 |
| timer (CS7 Profile)                 | 1100 |
| traffic-mode                        | 1102 |
| traffic-rate-timer                  | 1104 |
| trigger cdpa                        | 1105 |
| trigger cgpa                        | 1109 |
| trigger default                     | 1112 |
| trigger mtp3                        | 1114 |
| tth                                 | 1116 |
| ttmap                               | 1117 |
| tx-queue-depth (CS7 ASP)            | 1118 |
| tx-queue-depth (CS7 link)           | 1119 |
| tx-queue-depth (CS7 Mated-SG)       | 1120 |
| tx-queue-depth (CS7 M3UA)           | 1121 |
| tx-queue-depth (CS7 Profile)        | 1122 |
| tx-queue-depth (CS7 SGMP)           | 1123 |
| tx-queue-depth (CS7 SUA)            | 1124 |
| tx-queue-depth (group peer)         | 1125 |
| tx-window (cs7-cdr-dest)            | 1126 |
| ucp (cs7 SMS result)                | 1127 |
| unordered-priority (CS7 M3UA)       | 1128 |
| unordered-priority (CS7 SGMP)       | 1129 |
| unordered-priority (CS7 SUA)        | 1130 |
| update (CS7 GTT Address Conversion) | 1131 |
| update (CS7 SCCP GTI Conversion)    | 1132 |
| update route (CS7 AS route)         | 1134 |
| update route (route-table)          | 1135 |
| variant                             | 1137 |
| wait-timeout                        | 1138 |

## **ITP Debug Commands 1139**

|                          |      |
|--------------------------|------|
| debug cs7 cdr            | 1140 |
| debug cs7 group chkpt    | 1141 |
| debug cs7 group mgmt     | 1143 |
| debug cs7 group mtp3ctrl | 1144 |



|                               |      |
|-------------------------------|------|
| debug cs7 group transport     | 1145 |
| debug cs7 gsm-map             | 1146 |
| debug cs7 m2pa                | 1148 |
| debug cs7 m3ua                | 1149 |
| debug cs7 mapua               | 1150 |
| debug cs7 mlr                 | 1152 |
| debug cs7 monitor             | 1154 |
| debug cs7 mtp2                | 1155 |
| debug cs7 mtp3                | 1156 |
| debug cs7 mtp3 paklog         | 1159 |
| debug cs7 nso                 | 1161 |
| debug cs7 nso chkpt           | 1162 |
| debug cs7 offload mtp3        | 1163 |
| debug cs7 sccp                | 1164 |
| debug cs7 sgmp                | 1166 |
| debug cs7 smpp                | 1167 |
| debug cs7 snmp                | 1168 |
| debug cs7 sua                 | 1169 |
| debug cs7 tcap                | 1170 |
| debug redundancy inter-device | 1171 |

## **ITP System Messages 1173**

|                              |      |
|------------------------------|------|
| How This Manual Is Organized | 1173 |
| How to Read System Messages  | 1174 |
| CS7ADDRTBL Messages          | 1174 |
| CS7CDR Messages              | 1175 |
| CS7CHKPT Messages            | 1176 |
| CS7GROUP Messages            | 1177 |
| CS7HSL Messages              | 1179 |
| CS7M2PA Messages             | 1180 |
| CS7MAPUA Messages            | 1182 |
| CS7MLR Messages              | 1184 |
| CS7MONITOR Messages          | 1185 |
| CS7MTP2 Messages             | 1187 |
| CS7MTP3 Messages             | 1189 |
| CS7NSO Messages              | 1207 |
| CS7PING Messages             | 1209 |
| CS7RF Messages               | 1211 |

|                   |             |
|-------------------|-------------|
| CS7ROUTE Messages | <b>1212</b> |
| CS7SCCP Messages  | <b>1215</b> |
| CS7SMS Messages   | <b>1222</b> |
| CS7TCAP Messages  | <b>1224</b> |
| CS7XUA Messages   | <b>1224</b> |
| DCS7 Messages     | <b>1228</b> |



## Overview of ITP

---

Cisco IP Transfer Point (ITP) is a hardware and software SS7-over-IP (SS7oIP) solution. ITP provides a highly reliable, cost effective medium for migrating Signaling System 7 (SS7), the telecommunications network signaling technology, to the mobile wireless industry IP environment.

By leveraging its leadership role in the high-end switch/router industry, Cisco has created a carrier class router with a transparent SS7oIP convergence solution. The result is a seamless solution that is managed identically as other Cisco devices in large wide area networks and leverages existing Cisco skill sets within the service provider's organization. In many cases, the provisioning, management, and tools training are already available.

This chapter introduces the Signal System 7 (SS7) protocol and the Cisco ITP technology and describes the benefits this merged technology brings to the telecommunications network. This chapter includes the following sections:

- SS7oIP Technology Overview, page 32
- Benefits, page 34

# SS7oIP Technology Overview

## Introduction to SS7oIP

The IETF Signaling Transport (Sigtran) Working Group is a multi-vendor organization that is developing and standardizing protocols to transport SS7 over IP. The primary purpose of this working group is to address the transport of packet-based mobile/PSTN signaling over IP networks, accounting for functional and performance requirements of mobile/PSTN signaling. For internetworking with a mobile/PSTN network, IP networks will need to transport signaling such as Q.931 or SS7 ISDN User Part (ISUP) messages. To view the IETF Sigtran standards, please see <http://www.ietf.org/html.charters/sigtran-charter.html>.

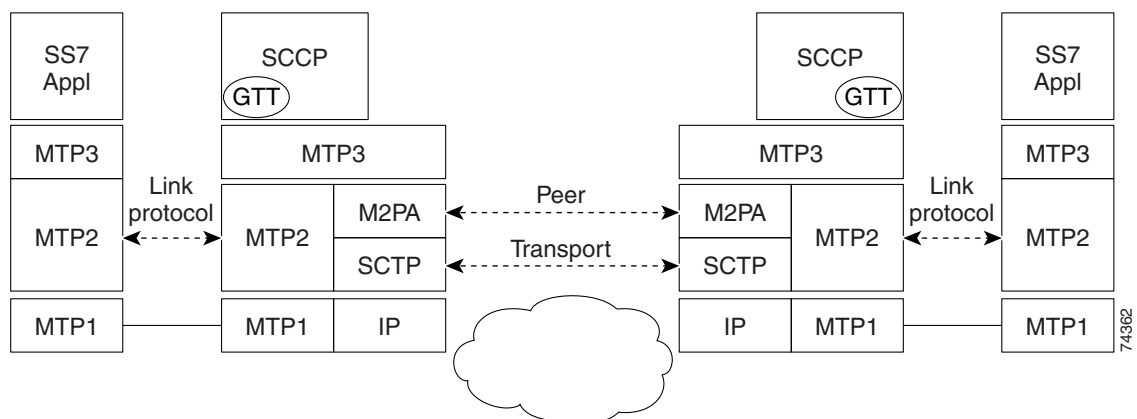
## Stream Control Transmission Protocol (RFC2960)

The Stream Control Transmission Protocol (SCTP) is a reliable transport protocol that operates on top of a potentially unreliable connectionless packet service such as IP. It offers acknowledged error-free non-duplicated transfer of MSUs. Detection of data corruption, loss of data, and detection of duplicate data are achieved by using checksums and sequence numbers. A selective retransmission mechanism is applied to correct loss or corruption of data. SCTP provides the function and measurements in an architecturally identical manner to MTP2. The SCTP standard can be found at <http://www.ietf.org/rfc/rfc2960.txt>.

## Sigtran M2PA - SS7 MTP2-User Peer-to-Peer Adaptation Layer

M2PA is designed for peer-to-peer signaling gateway (SG) communications. The analogy in legacy networks is STP-to-STP communication. Figure 1 provides a protocol architecture diagram.

**Figure 1** M2PA Protocol Architecture



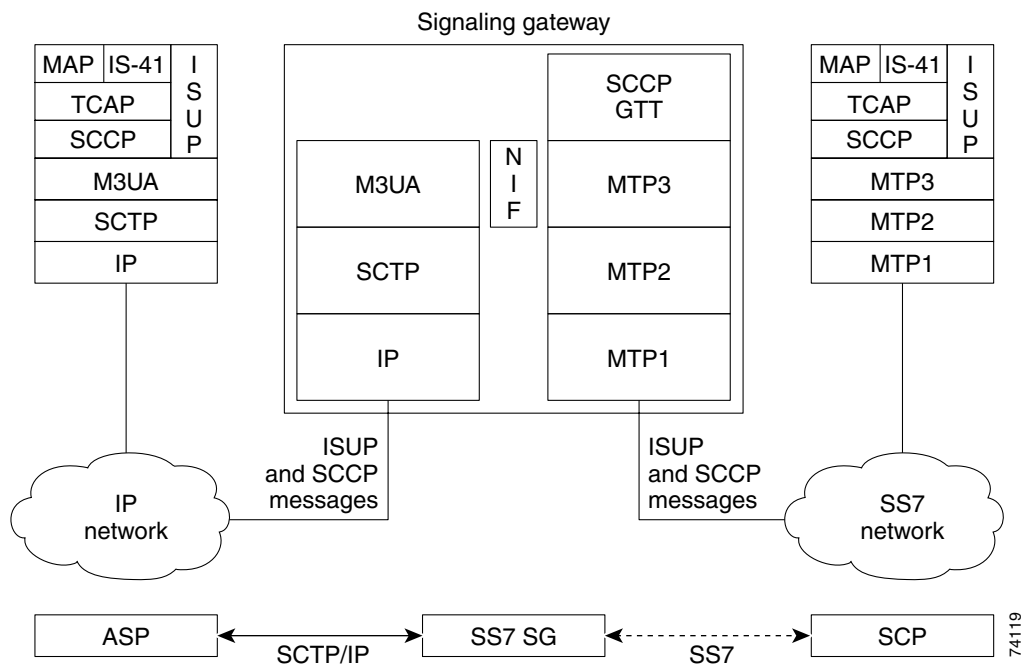
M2PA offers a protocol high availability similar to an STP. The MTP3 implementation layer in an M2PA SG is unaware of whether a link is TDM or IP. Therefore, all MTP3 high-availability features run equally over TDM or IP links. Congestion, Layer2 failure detection, changeover, change-back, load balancing via SLS, screening, and other MTP3 features are preserved.

## Sigtran M3UA - SS7 MTP3-User Adaptation Layer

Message Transfer Part, Level 3, User Adaptation Layer protocol (M3UA) describes a transport mechanism for delivering SS7 Message Transfer Part, Level 3 (MTP3) User Part messages as well as certain MTP network management events over Stream Control Transmission Protocol (SCTP) transport to IP-based application processors or databases. The M3UA SG terminates the SS7 MTP2 and MTP3 protocol layers and delivers ISDN User Part (ISUP), Signaling Connection Control Part (SCCP) and/or any other MTP3-User protocol messages. The Application Server Process (ASP) is the IP-based instance of an application process or database such as Call Agents, Home Location Registers (HLRs), etc.

Figure 2 depicts the relationship between the legacy SS7 Service Control Point, the M3UA SG, the IP-based Application Server Process (ASP), and the protocol stacks.

**Figure 2** M3UA Signaling Gateway Protocol Stacks

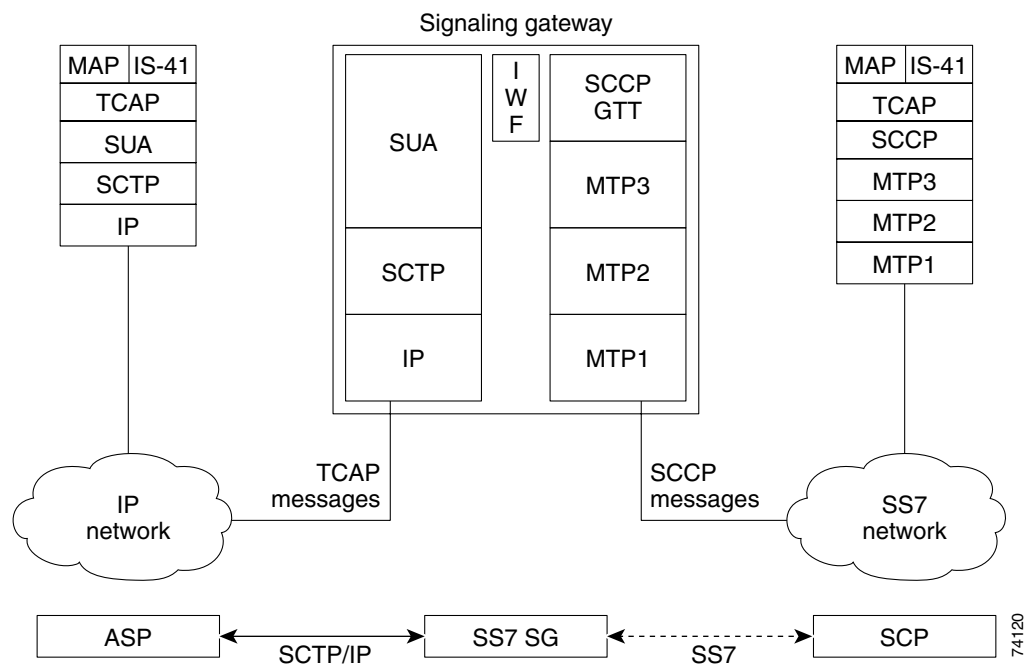


In Figure 2, the legacy SS7 SCP on the far right uses MTP1, MTP2, and MTP3 for transporting SCCP and ISUP messages into the network. The SG terminates the SS7 links, translates the MTP3 messages into M3UA messages, and transports them to the ASP over SCTP/IP. M3UA at the ASP delivers SCCP and ISUP messages.

## Sigtran SUA - SS7 SCCP-User Adaptation Layer

SUA describes a transport mechanism for delivering SS7 SCCP-User Part messages as well as certain SCCP network management events over SCTP transport to IP-based application processors or databases. The SUA SG terminates the SS7 MTP2, MTP3, and SCCP protocol layers and delivers TCAP, RANAP and/or any other SCCP-User protocol messages. The Application Server Process (ASP) is the IP-based instance of an application process or database (e.g. HLRs, SMSCs, etc.).

Figure 3 depicts the relationship between the legacy SS7 Service Control Point, the SUA SG, the IP-based Application Server Process (ASP), and the protocol stacks.

**Figure 3** *SUA Signaling Gateway Protocol Stacks*

In Figure 3, the legacy SS7 SCP on the far right uses MTP1, MTP2, and MTP3 for transporting SCCP messages into the network. The SG terminates the SS7 links, translates the SCCP messages into SUA messages, and transports them to the ASP over SCTP/IP. SUA at the ASP delivers TCAP messages.

## Benefits

The Cisco ITP Router provides the following benefits:

- Lower incremental investment via cost effective IP network
- Reduced number of links
- Reduced STP ports
- Reduced processor occupancy for STP
- Support for the full suite of Cisco routing protocols and QoS technologies
- Non-intrusive and transparent to SS7 network end point devices
- Full set of high-end routing protocols and IP media
- Integrated SS7 and IP management using IP-based industry standard tools

Cisco ITP offers enhancements of High Availability and increased link density for SS7 line cards via a new SS7 Port Adapter:

- Support for the SS7 Port Adapter (Product number PA-MCX-8TE1-M)

The SS7 Port Adapter is a single-width, eight-port T1/E1 port adapter with a custom hardware-assist engine to support SS7 signaling. The PA features full channelization of up to 127 HDLC-encoded SS7 (or DS0) channels at 56 Kbps or 64 Kbps. Performance monitoring, Drop and Insert, BERT

functionality, external clocking (with multiple backups), internal clocking, and standard alarm integration are also supported. The hardware-assist engine provides a 30% MSU per second performance improvement on the VIP under typical conditions.

For more information about the SS7 Port Adapter, refer to the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/core/cis7507/portadp/multicha/mcx8te1/index.htm>

- RPR+

The Route Processor Redundancy (RPR+) feature increases the availability of the 7500 system by limiting potential downtime due to a primary Route-Switch Processor (RSP) software fault. Specifically, this release allows a backup RSP to recover faster from a primary RSP failure. RPR+ for the ITP requires no new hardware and provides greater ITP system availability. Enhancements to RPR+ address the following ITP scenarios:

- **Unplanned RSP Outage.** RPR+ enables a quicker switchover between an active and a standby RSP in the event of a hardware or software fault on the active RSP. When you configure RPR+, the standby RSP loads a Cisco IOS image on bootup and initializes itself in standby mode. When you configure RPR+ you must also issue the **hw-module secondary-cpu reset** command to boot the standby RSP. In the event of a fatal error on the active RSP, the system switches to the standby RSP, which reinitializes itself as the active RSP, reloads all of the line cards, and performs an MTP3 restart of the SS7 links.
- **Planned Software Upgrade.** The Fast Software Upgrade (FSU) feature uses RPR+ to enable the administrator to configure the system to switch over to a standby RSP that is preloaded with an upgraded Cisco IOS software image.

For more information about configuring RPR+, RPR, and FSU, refer to the following URLs:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st19/st\\_rpr2.htm#xtocid0](http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st19/st_rpr2.htm#xtocid0)

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st16/st\\_rpr7x.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st16/st_rpr7x.htm)







## Planning to Configure ITP

---

This chapter describes the prerequisites to installing the Cisco ITP product, including supported hardware and software. The chapter includes references to related documentation.

### Supported Platforms

- Cisco 2650 Router
- Cisco 2651 Router
- Cisco 2650XM Modular Access Router
- Cisco 2651XM Modular Access Router
- Cisco 7204 Router
- Cisco 7206 Router
- Cisco 7301 Router
- Cisco 7507 Router
- Cisco 7513 Router
- Versatile Interface Processor (VIP4-80)
- Versatile Interface Processor (VIP6-80)
- Cisco 7500 Route Switch Processor 16 (RSP8)
- Cisco 7500 Route Switch Processor 16 (RSP16)



#### Note

ATM HSL is supported on the Cisco 7301 and Cisco 7500 routers. ATM is supported on the Loki 8 port T1/E1 port adapter with IMA support (PA-A3-8T1IMA and PA-A3-8E1IMA). On the Cisco 7500, ATM HSL is also supported on the ATM PA-A3 adapters (PA-A3-OC3-MM, PA-A3-OC3-SMI, PA-A3-OC3-SML.)



#### Note

We recommend that you do not mix link types (low speed links, high speed links, M2PA/XUA) on the same VIP.

## Supported Standards, MIBs, and RFCs

### Standards

- ANSI 1996
- ITU white 1996
- M2PA-User Peer-to-Peer Adaptation Layer [draft-ietf-sigtran-m2pa-02.txt, March 2, 2001]
- SS7 MTP3-User Adaptation Layer (M3UA) Sigtran M3UA RFC number 3332
- SS7 SCCP-User Adaptation Layer (SUA) Sigtran SUA draft version 14

### MIBs

- CISCO-BITS-CLOCK-MIB.my

MIB provides information on Building Integrated Timing Supply (BITS) clocking sources and modes of operations. It is used to generate notifications to indicate when clocking sources change roles or become unavailable.

#### NOTIFICATIONS

- ciscoBitsClockSource
- ciscoBitsClockFreerun
- ciscoBitsClockHoldover

- CISCO-IETF-SCTP-EXT-MIB.my

Cisco Systems extensions for the Stream Control Transmission Protocol MIB (RFC 2960). This MIB is based on the IETF document draft-ietf-sigtran-sctp-mib-04.txt.

#### NOTIFICATIONS

- 1 cSctpExtDestAddressStateChange

- CISCO-IETF-SCTP-MIB.my

Cisco Systems implementation of Stream Control Transmission Protocol MIB (RFC 2960). This MIB is based on the IETF document draft-ietf-sigtran-sctp-mib-04.txt.

- CISCO-ITP-ACL-MIB.my

MIB for managing access lists that control messages transported over the SS7 network via Cisco ITP.

- CISCO-ITP-ACT-MIB.my

*Deprecated and replaced by CISCO-ITP-GACT-MIB.my*

- CISCO-ITP-GACT-MIB.my

MIB for providing information specified in ITU Q752 Monitoring and Measurements for the SS7 network. This management information base replaces CISCO-ITP-ACT-MIB.my and provides support for multiple instances of signaling points on the same device.

- CISCO-ITP-GRT-MIB.my

MIB for managing the route table used to control messages transported over the SS7 network via Cisco ITP. This management information base replaces CISCO-ITP-RT-MIB.my and provides support for multiple instances of signaling points on the same device.

#### NOTIFICATIONS

- 1 ciscoGrtDestStateChange

- 2 ciscoGrtMgmtStateChange
- 3 ciscoGrtRouteTableLoad

- CISCO-ITP-GSCCP-MIB.my

MIB for Signalling Connection Control Part (SCCP) messages transported over the SS7 network via Cisco ITP. This management information base replaces CISCO-ITP-SCCP-MIB.my and provides support for multiple instances of signaling points on the same device.

NOTIFICATIONS

- 1 ciscoGsccpGttMapStateChange
- 2 ciscoGsccpGttLoadTable
- 3 ciscoGsccpGttErrors

- CISCO-ITP-GSP-MIB.my

MIB for managing signalling points and associated messages transported over SS7 via Cisco ITP. This management information base replaces CISCO-ITP-SP-MIB.my and provides support for multiple instances of signaling points on the same device.

NOTIFICATIONS

- 1 ciscoGspLinksetStateChange
- 2 ciscoGspLinkStateChange
- 3 ciscoGspCongestionChange
- 4 ciscoGspLinkRcvdUtilChange
- 5 ciscoGspLinkSentUtilChange

- CISCO-ITP-GSP2-MIB.my

MIB for providing Quality of Service (QOS) information for the ITP environment. Also, provides event history for SS7 events. This management information base replaces CISCO-ITP-SP-MIB.my and provides support for multiple instances of signaling points on the same device.

- CISCO-ITP-MLR-MIB.my

The MIB for providing information about Multi-layer Routing(MLR). This MIB will provide information used to control and measure SS7 messages signalling units in a SS7 Network. Message Signalling Units are routed based on information found in the SCCP, TCAP, MAP, and MAP-user layers.

NOTIFICATIONS

- ciscoMlrTableLoad

- CISCO-ITP-MONITOR-MIB.my

The MIB for providing information related to monitoring SS7 links. This information can be used to manage the state of software used to collect all packets transported and received over a SS7 link.

NOTIFICATIONS:

- ciscoItpMonitorCongestion
- ciscoItpMonitorState

- CISCO-RF-MIB.my

This MIB provides configuration control and status for the Redundancy Framework (RF) subsystem.

NOTIFICATIONS

- ciscoRFSwactNotif
- ciscoRFProgressionNotif
- CISCO-ITP-RT-MIB.my  
*Deprecated and replaced by CISCO-ITP-GRT-MIB.my*
- CISCO-ITP-SCCP-MIB.my  
*Deprecated and replaced by CISCO-ITP-GSCCP-MIB.my*
- CISCO-ITP-SP-MIB.my  
*Deprecated and replaced by CISCO-ITP-GSP-MIB.my*
- CISCO-ITP-SP2-MIB.my  
*Deprecated and replaced by CISCO-ITP-GSP2-MIB.my*
- CISCO-ITP-TC-MIB.my

MIB defining textual conventions used to manage devices related to the SS7 network. The relevant ITU documents describing this technology are the ITU Q series, including ITU Q.700: Introduction to CCITT Signalling System No. 7 and ITU Q.701: Functional Description of the Message Transfer Part (MTP) of Signalling System 7.

- CISCO-ITP-XUA-MIB.my  
MIB for managing ASPs, ASs, Mated Pair Signaling Gateways for M3UA and SUA.

#### NOTIFICATIONS

- 1 ciscoItpXuaAspStateChange
- 2 ciscoItpXuaSgmStateChange
- 3 ciscoItpXuaAsStateChange
- 4 ciscoItpXuaAspCongChange
- 5 ciscoItpXuaSgmCongChange

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco.com at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

#### RFCs

- BSD Syslog Protocol (RFC 3164)
- Remote Authentication Dial-In User Service (RADIUS) (RFC 2865)
- Stream Control Transmission Protocol (RFC 2960)
- User Datagram Protocol, STD 6 (RFC 768)

## Related Documents

For information about the Cisco 2650 Router or Cisco 2651 Router, refer to the documentation that was shipped with the router or refer to the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/access/acs\\_mod/cis2600/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis2600/index.htm)

For information about the Cisco 7507 Router or the Cisco 7513 Router, refer to the documentation that was shipped with the router or refer to the following URLs:

<http://www.cisco.com/univercd/cc/td/doc/product/core/cis7507/index.htm>

<http://www.cisco.com/univercd/cc/td/doc/product/core/cis7513/index.htm>

For information about the SS7 Port Adapter (PA-MCX-8TE1-M), refer to the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/core/cis7507/portadp/multicha/mcx8te1/index.htm>





## Configuring ITP Basic Functionality

---



### Note

IP routing is enabled on the ITP by default, and must not be disabled. Disabling IP routing can result in connection errors.

---

This chapter describes the specific tasks and commands to configure basic Cisco ITP functionality.

For information about configuring the IOS software, beyond the specific ITP configuration instructions that are included in this document, refer to the Cisco IOS Release 12.2 documentation at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/index.htm>

For information about configuring interfaces, refer to the Cisco IOS 12.2 Interface Configuration Guide at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/finter\\_c/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/finter_c/index.htm)



### Note

Most of the commands that are shown in the configuration task sections of this chapter are described in detail in the ITP Command Set chapter. Some general IOS configuration commands are not included in the ITP Command Set chapter. For those commands, a footnote indicates the IOS document where more information can be found.

For a sample configuration that includes the tasks described in this chapter, see the “ITP Basic Functionality Configuration Example” section on page 343 of the “ITP Configuration Examples” chapter.

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This chapter discusses the following topics and describes the associated configuration tasks:

- Configuring RPR+ (Cisco 7500 Series Only), page 44
- Specifying the SS7 Variant, page 49
- Specifying National Options and Network Indicator, page 49
- Specifying the Point Code, page 50
- Specifying the Interface and Encapsulation, page 52
- Configuring Local Peers, page 59
- Configuring Linksets, page 60
- Configuring Multiple Linksets to Adjacent Nodes, page 60
- Specifying the Cisco ITP Route Table, page 62

- Assigning Links to Linksets, page 63
- Indicating the Route Table for Input Linkset, page 64
- Shutting Down and Restarting Linksets and Links, page 65
- Where to Go Next, page 66

## Configuring RPR+ (Cisco 7500 Series Only)

The Route Processor Redundancy Plus (RPR+) feature is an enhancement of the RPR feature on Cisco 7500 series routers. RPR+ reduces the amount of unplanned downtime of a Cisco 7500 series router by enabling a faster switchover time to the standby Route Switch Processor (RSP). RPR+ keeps the Virtual Interface Processors (VIPs) from being reset and reloaded when a switchover occurs between the active and standby route switch processors (RSPs). Because VIPs are not reset and microcode is not reloaded on the VIPs, and the time needed to parse the configuration is eliminated, switchover time is reduced to 10 to 30 seconds.

| Feature                        | Switchover Time  | Notes                                           |
|--------------------------------|------------------|-------------------------------------------------|
| High System Availability (HSA) | 8 to 10 minutes  | System default.                                 |
| RPR                            | 4 to 5 minutes   | VIPs and legacy interface processors supported. |
| RPR+                           | 10 to 30 seconds | VIPs supported. <sup>1</sup>                    |

1. Legacy Interface Processors default to RPR. A message similar to the following is displayed during switchover:  
%HA-2-NO\_Quiesce: Slot 11 did not quiesce, it will be disabled and then reloaded.

- RPR+ requires a Cisco 7500 series router loaded with two RSP8s.
- RPR+ operates only in a system with VIPs as the line cards. Systems with legacy Interface Processors default to RPR.
- In RPR+ mode, configuration changes done through SNMP may not be automatically configured on the standby RP after a switchover occurs.
- RPR+ does not work on routers configured with MPLS.

See the following sections for the configuration tasks required to run RPR+:

- Copying an Image onto an RSP, page 45 (required)
- Setting the Config-Register Boot Variable, page 46 (optional)
- Configuring RPR+, page 47 (required)



## Copying an Image onto an RSP

Use TFTP to copy a high availability Cisco IOS image onto the active and standby RSPs:

| Command                                                                                                                                                                                                                                                                                                                                                                                                                                      | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b><br>Router# <b>copy tftp slotslot-number:</b><br><br>Address or name of remote host []? <i>ip-address</i><br><br>Name of file to copy []? <i>imagename</i> <Return><br>writing<br>filename!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!<br><br>Destination file name? [ <i>imagename1</i> ] <Return><br>Accessing file 'imagename' on ip-address.. found !<br><br>Loading imagename from ip-address (via<br>Ethernet1/0/0): !    | Uses TFTP to copy a high availability Cisco IOS image onto the Flash memory card of the active RSP. <sup>1</sup> <ul style="list-style-type: none"> <li><b>slotslot-number</b>—Specifies the Flash memory card of the active RSP.</li> </ul> The router prompts you for the IP address of the TFTP server. <ul style="list-style-type: none"> <li><b>ip-address</b>—Specifies the IP address of the TFTP server that contains the new image.</li> </ul> The router prompts you for the name of the image file you are copying to the Flash memory card. <ul style="list-style-type: none"> <li><b>imagename</b>—Indicates the name of the image to be loaded onto the Flash memory card.</li> </ul> The router prompts you to enter the name under which you want the file to appear at the destination. <ul style="list-style-type: none"> <li><b>imagename1</b>—Indicates the name of the image as it appears at the destination.</li> </ul> |
| <b>Step 2</b><br>Router# <b>copy tftp slaveslotslot-number:</b><br><br>Address or name of remote host []? <i>ip-address</i><br><br>Name of file to copy []? <i>imagename</i> <Return><br>writing<br>filename!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!<br><br>Destination file name? [ <i>imagename1</i> ] <Return><br>Accessing file 'imagename' on ip-address.. found !<br><br>Loading imagename from ip-address (via Ethernet1/0):<br>! | Uses TFTP to copy a high availability Cisco IOS image onto the Flash memory card of the standby RSP. <ul style="list-style-type: none"> <li><b>slaveslotslot-number</b>—Specifies the Flash memory card of the standby RSP.</li> </ul> The router prompts you for the IP address of the TFTP server. <ul style="list-style-type: none"> <li><b>ip-address</b>—Specifies the IP address of the TFTP server that contains the new image.</li> </ul> The router prompts you for the name of the image file you are copying to the Flash memory card. <ul style="list-style-type: none"> <li><b>imagename</b>—Indicates the name of the image to be loaded onto the Flash memory card.</li> </ul> The router prompts you to enter the name under which you want the file to appear at the destination. <ul style="list-style-type: none"> <li><b>imagename1</b>—Indicates the name of the image as it appears at the destination.</li> </ul>       |

- Before you copy a file to Flash memory, be sure there is ample space available in Flash memory. Compare the size of the file you are copying to the amount of available Flash memory shown. If the space available is less than the space required by the file you will copy, the copy process will not continue and an error message similar to the following will be displayed;

```
%Error copying tftp://image@server/tftpboot/filelocation/imagename (Not enough space on device).
```

## Setting the Config-Register Boot Variable

Though it is not required, we recommend that you modify the software configuration register boot field so that the system boots the same image that the **hw-module slotslot-number image file-spec** command specified in the “Configuring RPR+” section.

|        | Command                                                                 | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Router# <b>show version</b>                                             | Obtains the current configuration register setting.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Step 2 | Router# <b>configure terminal</b>                                       | Enters configuration mode, selecting the terminal option.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Step 3 | Router(config)# <b>boot system flash<br/>slotslot-number:[imagenam]</b> | Specifies the filename of an image stored in Flash memory. <ul style="list-style-type: none"> <li><i>imagenam</i>—It is recommended that you set the boot variable so that the system boots the same image specified by the <b>hw-module slot slot-number image file-spec</b> command. See Step 2 of the “Configuring RPR+” section on page 47.</li> <li><i>slot-number</i>—Specifies the active RSP slot where the Flash memory card is located. Valid numbers are slot 2 or slot 3 for a Cisco 7507 router and slot 6 or slot 7 for a Cisco 7513 router.</li> </ul> |
| Step 4 | Router(config)# <b>config-register 0x2102</b>                           | Modifies the existing configuration register setting to reflect the way in which you want to load a system image.<br><i>value range</i> —0x0 to 0xFFFFFFFF                                                                                                                                                                                                                                                                                                                                                                                                            |
| Step 5 | Router# <b>Ctrl-Z</b>                                                   | Exits configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Step 6 | Router# <b>reload</b>                                                   | Reboots the router to make your changes take effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## Configuring RPR+



### Note

RPR+ should be configured on the ITP before any global SS7 configuration is done. This will allow Cisco IOS to save all configuration including route and GTT tables on both RSP cards.

If a second RSP is added and configured for RPR+ then it is necessary to perform the following steps after RPR+ is enabled:

|               | Command                                               | Purpose                                                                                                                                                                                                                                               |
|---------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | Router# copy running-config startup-config            | Populate and save the current configuration on both primary and secondary RSP.                                                                                                                                                                        |
| <b>Step 2</b> | Router# copy slot0:mtp3-routes slaveslot0:mtp3-routes | Copy the MTP3 routing table (saved as slot0:mtp3-routes) to the flash card on the secondary RSP. This step can be omitted if no routing table has been saved. "slot0:" will have to be replaced with "disk0:" if a 128 MByte ATA pcmcia disk is used. |
| <b>Step 3</b> | Router# copy slot0:gtt-table slaveslot0:gtt-table     | Copy the GTT table (saved as slot0:gtt-table) to the flash card on the secondary RSP. This step can be omitted if no GTT is configured. "slot0:" should be replaced with "disk0:" if a 128 MByte ATA pcmcia disk is used.                             |
| <b>Step 4</b> | Router# hw-module sec-cpu reset                       | This step is mandatory if one of the two previous copy commands was entered. It will restart the secondary RSP and ensure that in the unlikely event of a switchover, correct tables are available.                                                   |

To configure RPR+, enter the commands as shown below:

|        | Command                                                                                       | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Router# <b>configure terminal</b>                                                             | Enters configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Step 2 | Router(config)# <b>hw-module slot</b> <i>slot-number</i> <b>image</b><br><i>file-spec</i>     | <p>Verifies that the specified image is compatible with RPR+ and exists on the standby RSP. If a high availability image is found, the running configuration is updated.</p> <ul style="list-style-type: none"> <li>• <i>slot-number</i>—Specifies the standby RSP slot where the Flash memory card is located. Valid numbers are slot 2 or slot 3 for a Cisco 7507 router or slot 6 or slot 7 for a Cisco 7513 router.</li> <li>• <i>file-spec</i>—Indicates the Flash device and the name of the image on the standby RSP.</li> </ul> <p><b>Note</b> The image indicated by the <i>file-spec</i> attribute must be available on the local Flash device. Remote protocols such as Trivial File Transfer Protocol (TFTP) and remote copy protocol (RCP) are not available.</p> |
| Step 3 | Router(config)# <b>hw-module slot</b> <i>slot-number</i> <b>image</b><br><i>file-spec</i>     | <p>Verifies that the specified image is compatible with RPR+ and exists on the active RSP. If a high availability image is found, the running configuration is updated.</p> <ul style="list-style-type: none"> <li>• <i>slot-number</i>—Specifies the active RSP slot where the Flash memory card is located. Valid numbers are slot 2 or slot 3 for a Cisco 7507 router or slot 6 or slot 7 for a Cisco 7513 router.</li> <li>• <i>file-spec</i>—Indicates the Flash device and the name of the image on the active RSP.</li> </ul> <p><b>Note</b> The image indicated by the <i>file-spec</i> attribute must be available on the local Flash device. Remote protocols such as Trivial File Transfer Protocol (TFTP) and remote copy protocol (RCP) are not available.</p>    |
| Step 4 | Router(config)# <b>service single-slot-reload-enable</b>                                      | Enable single line card reloading.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Step 5 | Router(config)# <b>redundancy</b>                                                             | Enters redundancy mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Step 6 | Router(config-r)# <b>mode rpr-plus</b><br>Operating mode is RPR, configured mode is rpr-plus. | <p>Sets the redundancy mode to RPR+ on both the active and standby RSPs. HSA is the default redundancy mode.</p> <p><b>Note</b> If the active and standby RSPs are running different IOS images and have Fast Software Upgrade configured, the default redundancy mode is RPR.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

|        | Command                                | Purpose                                                                                                                                                                                                                                                                          |
|--------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 7 | Router(config-r)# <b>end</b>           | Exits configuration mode.                                                                                                                                                                                                                                                        |
| Step 8 | Router# <b>hw-module sec-cpu reset</b> | Resets and reloads the standby RSP with the specified Cisco IOS image and executes the image.<br><br><b>Note</b> If you do not specify a Cisco IOS image in Step 2, this command loads and executes the bundled default IOS standby image. The system then operates in HSA mode. |

## Specifying the SS7 Variant

The SS7 variant specifies which variation of SS7 the router is running. The variant configured on the ITP must match the variant of the connected SS7 network. To specify one of these variants, use the following command in global configuration mode:

| Command                                                       | Purpose                                            |
|---------------------------------------------------------------|----------------------------------------------------|
| Router(config)# <b>cs7 variant</b> {ansi   itu   china   ttc} | Specifies which SS7 variant the router is running. |



### Note

If you must change the variant **after you have completed ITP configuration**, you must first remove all linksets and the local point-code. After reconfiguring the variant, you must first reconfigure the point code and then the linkset.

## Specifying National Options and Network Indicator



### Note

Previous to Release 12.2(25)SW1, all SS7 variants used an enhanced loadsharing algorithm for distributing messages across the available links within a linkset and combined linkset. (This algorithm allows for efficient load balancing when an unequal number of available links exist in the two linksets that comprise the combined linkset.) In Release 12.2(25)SW1, the TTC variant reverted to using the A/B linkset selection bit that exists as part of the SLS in the MSU routing label.

The **cs7 national-options combined-linkset-loadsharing** command allows ITPs that are configured with the TTC variant to use the enhanced loadsharing algorithm.

To specify national options, use the following command in global configuration mode:

| Command                                                                                                                                                          | Purpose                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 national-options</b> { <b>TFR</b>   <b>multiple-congestion</b>   <b>route-set-congestion-test</b>   <b>combined-linkset-loadsharing</b> } | Specifies national options.<br><br>The national options apply to the variants as follows: <ul style="list-style-type: none"> <li>• <b>TFR</b>: ITU and China SS7 Variants</li> <li>• <b>multiple-congestion</b> ITU and China SS7 Variants</li> <li>• <b>route-set-congestion-test</b> TTC SS7 Variant</li> <li>• <b>combined-linkset-loadsharing</b> TTC SS7 Variant</li> </ul> |

The network indicator on the ITP must match the network indicator in use in the rest of the SS7 network. To specify the network indicator, use the following command in global configuration mode:

| Command                                                                                                                  | Purpose                           |
|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Router(config)# <b>cs7 network-indicator</b> { <b>international</b>   <b>national</b>   <b>reserved</b>   <b>spare</b> } | Specifies this network indicator. |

## Specifying the Point Code

Each signaling point (also called an SS7 node) in the SS7 network is identified with a unique address called a point code (PC). PCs are carried in signaling messages exchanged between signaling points to identify the source and destination of each message. Operators can assign their own PCs in private SS7 networks.

## Specifying the Point Code Representation

The format of the point code can be represented according to either the ANSI, ITU, China or Japan TTC standard. The ANSI and China standard for point code representation is 24 bits partitioned into 3 components that specify network.cluster.member, with a default representation of 8.8.8. The ITU standard for point code representation is 14 bits partitioned into 3 components that specify zone.region.signaling point (sp), with a default point code representation of 3.8.3. The TTC standard for point code representation is 16 bits partitioned into 3 fields with a default representation of 5.4.7. The delimiter that will appear between each segment (when you show output of the configuration) can be either a dot or a dash. You can modify the default point code bit format and the default delimiter at any time during configuration, without prior removal of links and linksets.

You can change the partitioning of the bits to any configuration of 1, 2, or 3 components that total the 24-bit ANSI and China standard or 14-bit ITU standard. To modify the ANSI or ITU point code format, or to return to either standard's default format, use one of the following commands in global configuration mode:

| Command                                                                                          | Purpose                                                                                          |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 point-code format</b> 1-24 [1-23 [1-22]] <b>description</b> <i>string</i> | Specifies the point code representation.                                                         |
| Router(config)# <b>cs7 point-code format default</b>                                             | Resets the point-code format to the default 8.8.8 (ANSI and China), 3.8.3 (ITU), or 5.4.7 (TTC). |

The default delimiter between components of the point code is a dot. To change the delimiter to a dash, or to return to the default delimiter (dot), use one of the following commands in global configuration mode:

| Command                                                      | Purpose                                                        |
|--------------------------------------------------------------|----------------------------------------------------------------|
| Router(config)# <b>cs7 point-code delimiter</b> [dot   dash] | Specifies the delimiter between bits as either dots or dashes. |
| Router(config)# <b>cs7 point-code delimiter default</b>      | Resets the delimiter to dots.                                  |

## Specifying the Primary Local Point Code



### Note

You must specify the SS7 variant before you can specify the local point code.

Each Cisco ITP must have a unique local point code that is used to send management messages to adjacent signaling points. To specify the point code, use the following command in global configuration mode:

| Command                                                 | Purpose                                       |
|---------------------------------------------------------|-----------------------------------------------|
| Router(config)# <b>cs7 point-code</b> <i>point-code</i> | Specifies the primary point code for the ITP. |

## Specifying a Secondary Point Code

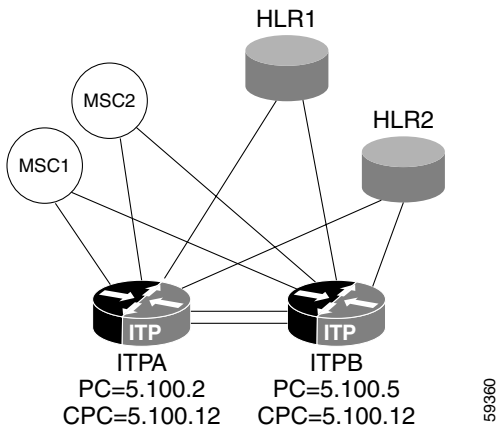
If you intend to configure a second linkset between the ITP and an adjacent node, you must specify a secondary local point code. To specify the secondary point code, use the following command in global configuration mode:

| Command                                                   | Purpose                                       |
|-----------------------------------------------------------|-----------------------------------------------|
| Router(config)# <b>cs7 secondary-pc</b> <i>point-code</i> | Specifies a secondary point code for the ITP. |

## Specifying the Capability Point Code

The ITP supports configuration of up to 200 capability point-codes (CPC) per instance. CPC configuration is optional, but recommended for certain networks. The prime example for use of a CPC is when a mated pair of ITP nodes shares the same GTT database for redundancy purposes. In this configuration, all SCCP messages are directed to a single “capable” point-code; either ITP can handle the SCCP processing. The figure below shows a mated pair of ITPs with identical capability point-codes and a common GTT database for selecting the appropriate HLR.

Figure 4 Mated Pair of ITPs With the Same Capability Point Codes



In Figure 4, each of the MSCs have two routes to the mated pair of ITPs. The MSCs can either load-share all GTT messages between the mated pair of ITPs, or use one ITP as a backup should the primary fail. All messages requiring GTT can be routed to the same destination point-code. In this case the DPC is the CPC, which is 5.100.12. The benefit of CPC usage in this case is that if a single ITP is unreachable, the MSCs are unaware of this event.

To specify the capability point code, use the following command in global configuration mode:

| Command                                             | Purpose                                                                                                                           |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 capability-pc</b> point-code | Specifies the capability point code for the ITP. ITP supports the configuration of up to 200 capability point codes per instance. |

  
**Note**

The previously defined point code format must be used to enter the capability point-code.

All messages requiring GTT processing can be routed to either the local point-code or the capability point-code.

## Specifying the Interface and Encapsulation

Depending on your network configuration, you can configure the ITP to accommodate channelized T1/E1 links and High Speed Signaling Links (HSL) over ATM. The following sections describe these tasks:

- Configuring a Serial Interface and MTP2 Encapsulation, page 53
- Configuring T1/E1 Controller Settings, page 53
  - Configuring BITS Network Clocking, page 54
  - Providing BITS Network Clocking to SS7 ATM High Speed Links, page 55
- Configuring SS7 over ATM High Speed Links (HSL), page 57
  - Enabling a T1/E1 ATM Interface, page 57



- Enabling an OC3 ATM Interface, page 57
- Enabling an ATM Interface to Receive BITS Clocking for HSLs, page 58
- Configuring a Permanent Virtual Circuit (PVC), page 59


**Note**

We recommend that you do not mix link types (low speed links, high speed links, M2PA/XUA) on the same VIP.

## Configuring a Serial Interface and MTP2 Encapsulation

The ITP supports SS7 links over serial interfaces on the router. MTP2 encapsulation must be set on the entire serial interface.

To configure the serial interface and specify the required MTP2 encapsulation on the interface, use the following commands, beginning in global configuration mode:

|        | Command                                               | Purpose                                                                                             |
|--------|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Step 1 | Router(config)# <b>interface serial</b> <i>number</i> | Configures a serial interface in global configuration mode and enters interface configuration mode. |
| Step 2 | Router(config-if)# <b>encapsulation mtp2</b>          | Configures the serial interface to use MTP2 encapsulation.                                          |

## Configuring T1/E1 Controller Settings

The ITP supports SS7 links over T1/E1 router interfaces. These are router interfaces where the CSU/DSU functionality is integrated into the router card. In this configuration, the T1/E1 controller parameters must be set appropriately with the device on the other side of the T1/E1 link. This example uses a T1 interface with T1 cross over cable to an STP. The framing and linecode are set to match the STP values.

Multiple SS7 links can be configured per T1/E1 interface in this configuration. On a 7500, all slots on the T1/E1 can be used for SS7 links. On a 2600, because of the two SS7 links per WIC restriction, up to two slots on any T1/E1 interface can be used for SS7 links. A separate channel group statement is necessary for each traditional SS7 link to be mapped to the specific T1/E1 link. Here, two SS7 links are being configured over the same T1 interface, one on timeslot 1 and the other on timeslot 2.


**Note**

An SS7 port adapter that is configured to be E1 cannot use port 7 timeslot 31.

To configure the T1 interface as indicated in the above scenario, use the following commands beginning in global configuration mode:

|        | Command                                                                                                                                                                                          | Purpose                                                            |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Step 1 | <pre>Router(config)# <b>controller</b> {t1   e1} slot/port-adapter-num/port</pre> <p><b>Example:</b><br/> <pre>Router(config)# <b>controller</b> t1 1/1/1</pre></p>                              | Specifies the controller and enters Controller configuration mode. |
| Step 2 | <pre>Router(config-controller)# <b>framing</b> {sf   esf}</pre> <p><b>Example:</b><br/> <pre>Router(config)# <b>framing</b> esf</pre></p>                                                        | Specifies the framing format for T1.                               |
| Step 3 | <pre>Router(config-controller)# <b>clock source</b> {line {primary   secondary}   internal}</pre> <p><b>Example:</b><br/> <pre>Router(config-controller)# <b>clock source</b> internal</pre></p> | Specifies the clock source as internal.                            |
| Step 4 | <pre>Router(config-controller)# <b>linecode</b> {ami   b8zs   hdb3}</pre> <p><b>Example:</b><br/> <pre>Router(config-controller)# <b>linecode</b> b8zs</pre></p>                                 | Specifies the line code type as B8ZS.                              |
| Step 5 | <pre>Router(config-controller)# <b>channel-group</b> channel-group-num <b>timeslots</b> range</pre> <p><b>Example:</b><br/> <pre>channel-group 0 <b>timeslots</b> 1</pre></p>                    | Specifies the channel group.                                       |
| Step 6 | <pre>Router(config-controller)# <b>channel-group</b> channel-group-num <b>timeslots</b> range</pre> <p><b>Example:</b><br/> <pre>channel-group 1 <b>timeslots</b> 2</pre></p>                    | Specifies the channel group.                                       |

**Note**

M2PA supports only 1 timeslot per serial link.

**Note**

If you use a T1/E1 card for your SS7 connectivity, each channel group statement under the controller automatically produces a serial subinterface for that channel. To complete connectivity over the T1/E1 interface, you must enable MTP2 encapsulation on those serial sub-interfaces.

For more information about configuring channelized T1/E1 interfaces or configuring controllers, refer to the “Configuring Interfaces” section of the Cisco IOS Configuration Fundamentals Guide, at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios112/112cg\\_cr/1cbook/1cintrfc.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios112/112cg_cr/1cbook/1cintrfc.htm)

## Configuring BITS Network Clocking

Building Integrated Timing Supply (BITS) is a method of ensuring network synchronization. With BITS, a single master timing source supplies the clock reference for all nodes.


**Note**

A controller that is configured for BITS clocking cannot be used to carry data. If BITS clocking has been set, no channel groups can be configured. If channel groups have been configured, BITS cannot be configured.

To configure BITS network clocking, use the following commands, beginning in global configuration mode:

|               | Command                                                                                                                                                                                                        | Purpose                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>Step 1</b> | <pre>Router(config)# <b>controller</b> {t1   e1} slot/port-adapter-num/port</pre> <p><b>Example:</b></p> <pre>Router(config)# <b>controller</b> t1 1/1/1</pre>                                                 | Specifies the controller and enters Controller configuration mode. |
| <b>Step 2</b> | <pre>Router(config-controller)# <b>framing</b> {sf   esf}</pre> <p><b>Example:</b></p> <pre>Router(config)# <b>framing</b> esf</pre>                                                                           | Specifies the framing format for T1.                               |
| <b>Step 3</b> | <pre>Router(config-controller)#<b>clock source</b> {bits {primary   secondary priority}   internal   line}</pre> <p><b>Example:</b></p> <pre>Router(config-controller)# <b>clock source</b> bits primary</pre> | Specifies the clock source as BITS primary source.                 |
| <b>Step 4</b> | <pre>Router(config-controller)# <b>linecode</b> {ami   b8zs   hdb3}</pre> <p><b>Example:</b></p> <pre>Router(config-controller)# <b>linecode</b> b8zs</pre>                                                    | Specifies the line code type as B8ZS.                              |

### Providing BITS Network Clocking to SS7 ATM High Speed Links

This feature requires the SS7 Port Adapter (PA-MCX-8TE1-M=), with the controller configured for BITS clock.

If you prefer to use a common, reliable clock source over several links, you can deliver a BITS clock to the SS7 ATM high speed links. To do so, you must configure BITS clocking on the SS7 port adapter controller. Then, connect a T1 crossover cable from the SS7 port adapter controller to a T1 Inverse Multiplexing for ATM (IMA) port adapter interface. The IMA port adapter interface receives the BITS clock source for all other interfaces on that IMA port adapter. All other interfaces on the IMA port adapter accept the BITS clock by specifying **clock source common interface-number**, where *interface-number* is the IMA port adapter interface that is crossover cabled to the SS7 port adapter.

This section describes the task of providing a BITS clock on the SS7 port adapter controller. The section after this one contains a task for Enabling an ATM Interface to Receive BITS Clocking for HSLs.

To provide a BITS clock source to the SS7 ATM high speed links, use the following commands, beginning in global configuration mode:

|        | Command                                                                                                                                                                                          | Purpose                                                                                                                                                                        |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Router(config)# <b>controller t1 slot/port-adapter-num/port</b><br><br><b>Example:</b><br>Router(config)# <b>controller t1 2/0/0</b>                                                             | Specifies controller 0 on the SS7 port adapter and enters controller configuration mode.                                                                                       |
| Step 2 | Router(config-controller)# <b>clock source {bits {primary   secondary priority}   internal   line}</b><br><br><b>Example:</b><br>Router(config-controller)# <b>clock source bits primary</b>     | Specifies controller 0 on the SS7 port adapter as the primary source of the BITS clock.                                                                                        |
| Step 3 | Router(config-controller)# <b>exit</b><br><br><b>Example:</b><br>Router(config-controller)# <b>exit</b>                                                                                          | Exits from controller configuration mode to global configuration mode.                                                                                                         |
| Step 4 | Router(config)# <b>controller t1 slot/port-adapter-num/port</b><br><br><b>Example:</b><br>Router(config)# <b>controller t1 2/0/1</b>                                                             | Specifies controller 1 on the SS7 port adapter and enters controller configuration mode.                                                                                       |
| Step 5 | Router(config-controller)# <b>clock source {bits {primary   secondary priority}   internal   line}</b><br><br><b>Example:</b><br>Router(config-controller)# <b>clock source bits secondary 1</b> | Specifies controller 1 on the SS7 port adapter as the first secondary source of the BITS clock.                                                                                |
| Step 6 | Router(config-controller)# <b>exit</b><br><br><b>Example:</b><br>Router(config-controller)# <b>exit</b>                                                                                          | Exits from controller configuration mode to global configuration mode.                                                                                                         |
| Step 7 | Router(config)# <b>controller t1 slot/port-adapter-num/port</b><br><br><b>Example:</b><br>Router(config)# <b>controller t1 2/0/2</b>                                                             | Specifies controller 2 on the SS7 port adapter and enters controller configuration mode.                                                                                       |
| Step 8 | Router(config-controller)# <b>clock source {bits {primary   secondary priority}   internal   line}</b><br><br><b>Example:</b><br>Router(config-controller)# <b>clock source internal</b>         | Specifies controller 2 internal clocking.<br><br>Note: This controller will provide BITS clock to the high speed links via the T1 crossover cable to the SS7 ATM port adapter. |
| Step 9 | Router(config-controller)# <b>exit</b><br><br><b>Example:</b><br>Router(config-controller)# <b>exit</b>                                                                                          | Exits from controller configuration mode to global configuration mode.                                                                                                         |

## Configuring SS7 over ATM High Speed Links (HSL)



### Note

HSL allows full bandwidth utilization of a 1.55Mbps T1 or a 2.048 Mbps E1 for a single SS7 link. With the OC3 adapters, full bandwidth utilization of 155Mbps can be obtained for a single SS7 link. ITP HSL is compliant with both ANSI per Telcordia GR-2878-CORE and ITU per Q.2100 and includes the following protocol stack components: AAL5, SSCOP, SSCF-NNI and MTP3b.

On the Cisco 7301 and Cisco 7500 routers, ATM is supported on the Loki 8 port T1/E1 port adapter with IMA support (PA-A3-8T1IMA and PA-A3-8E1IMA). On the Cisco 7500 router, ATM is also supported on the enhanced ATM port adapter (PA-A3-OC3-MM, PA-A3-OC3-SMI, PA-A3-OC3-SML.)

For more information about PA-A3 ATM commands, see:

[http://www.cisco.com/univercd/cc/td/doc/product/core/cis7505/portadpt/atm\\_port/pa\\_a3/5117cfg.htm](http://www.cisco.com/univercd/cc/td/doc/product/core/cis7505/portadpt/atm_port/pa_a3/5117cfg.htm)

ITP ATM HSL capability provides broadband SS7 support. HSL capability can be used to replace the traditional MTP1 and MTP2 layers of the SS7 protocol stack with SAAL, to provide ATM at DS1 rates. The following sections describe the required and optional tasks for configuring an ITP for ATM HSL support:

- Enabling a T1/E1 ATM Interface, page 57 (Required)
- Enabling an OC3 ATM Interface, page 57
- Enabling an ATM Interface to Receive BITS Clocking for HSLs, page 58
- Configuring a Permanent Virtual Circuit (PVC), page 59 (Required)

### Enabling a T1/E1 ATM Interface

To enable a T1/E1 ATM interface for HSL, use the following commands, beginning in global configuration mode:

|        | Command                                                                                       | Purpose                                                                    |
|--------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Step 1 | Router(config)# <b>interface atm</b> <i>interface-num</i>                                     | Specifies an ATM interface and enters interface configuration mode.        |
| Step 2 | Router(config-if)# <b>no shutdown</b>                                                         | Enables the interface.                                                     |
| Step 3 | Router(config-if)# <b>framing esfadm</b><br>-OR-<br>Router(config-if)# <b>framing crc4adm</b> | Specifies frame type (T1 only).<br>-or-<br>Specifies frame type (E1 only). |
| Step 4 | Router(config-if)# <b>clock-source</b> { <b>common</b>   <b>internal</b>   <b>line</b> }      | (Optional) Specifies the clock source.                                     |

### Enabling an OC3 ATM Interface

To enable an OC3 ATM interface for HSL, use the following commands, beginning in global configuration mode:

|        | Command                                                   | Purpose                                                             |
|--------|-----------------------------------------------------------|---------------------------------------------------------------------|
| Step 1 | Router(config)# <b>interface atm</b> <i>interface-num</i> | Specifies an ATM interface and enters interface configuration mode. |

|        | Command                                     | Purpose                        |
|--------|---------------------------------------------|--------------------------------|
| Step 2 | Router(config-if) # <b>no shutdown</b>      | Enables the interface.         |
| Step 3 | Router(config-if) # <b>atm sontet stm-1</b> | Specifies SDH (STM-1) framing. |

### Enabling an ATM Interface to Receive BITS Clocking for HSLs

The section “Providing BITS Network Clocking to SS7 ATM High Speed Links” described how to configure BITS clocking on the SS7 port adapter controllers and connect the primary BITS clock from the SS7 port adapter to the IMA port adapter. This section continues the scenario and describes how to configure the ATM interfaces on the IMA port adapter to receive the BITS clock. Use the following commands, beginning in global configuration mode:

|        | Command                                                                                                                                                                                       | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Router(config) # <b>interface atm interface-num</b>                                                                                                                                           | Specifies ATM interface 12/0/0 and enters interface configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|        | <b>Example:</b><br>Router(config) # <b>interface atm 12/0/0</b>                                                                                                                               | <p><b>Note:</b> A T1 crossover cable delivers the BITS clock from the configured SS7 port adapter controller to this interface.</p> <p>This interface will relay the BITS clock to every other ATM interface that is configured with <b>clock source common interface-num</b>, where <i>interface-num</i> is the interface physically connected to the SS7 PA.</p> <p>Because this interface is receiving the BITS clock from the SS7 PA, it cannot be used as an SS7 link to send or receive traffic. It is reserved for receiving and distributing the BITS clock to the other interfaces on the IMA PA.</p> <p>Also, the clock source on this interface must be configured as <b>clock source line</b>. This is the default, so you do not need to add this command unless it was previously set to some other value. If you are not sure, the output of the <b>show running-config</b> command will indicate if the clock source for this interface is configured for a value other than line. (Default states are not shown in the show run output.)</p> |
| Step 2 | Router(config-if) # <b>no ip address</b><br>Router(config-if) # <b>no ima-group</b><br>Router(config-if) # <b>no atm ilmi-keepalive</b><br>Router(config-if) # <b>exit</b>                    | Disables IP addressing.<br>Disables inverse multiplexing over ATM (IMA) group.<br>Disables ILMI keepalives.<br>Exits from interface configuration mode to global configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|        | <b>Example:</b><br>Router(config-if) # <b>no ip address</b><br>Router(config-if) # <b>no ima-group</b><br>Router(config-if) # <b>no atm ilmi-keepalive</b><br>Router(config-if) # <b>exit</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|        | Command                                                                                  | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 3 | Router(config)# <b>interface atm</b> <i>interface-num</i>                                | Specifies ATM interface 12/0/1 and enters interface configuration mode.                                                                                                                                                                                                                                                                                                                                                                    |
|        | <b>Example:</b><br>Router(config)# <b>interface atm 12/0/1</b>                           |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Step 4 | Router(config-if)# <b>clock source</b> { <b>common</b>   <b>internal</b>   <b>line</b> } | Specifies that this interface will receive the common BITS clock resource.<br><br>Note: Steps 3 - 4 can be repeated as needed to configure ATM interfaces. The ATM physically connected to the SS7 PA (in this case atm 12/0/0 will relay the BITS clock to every ATM interface that is configured with <b>clock source common</b> <i>interface-num</i> , where <i>interface-num</i> is the interface physically connected to the SS7 PA). |
|        | <b>Example:</b><br>Router(config-if)# <b>clock source common 0</b>                       |                                                                                                                                                                                                                                                                                                                                                                                                                                            |

### Configuring a Permanent Virtual Circuit (PVC)

You must configure one permanent virtual circuit (PVC) on the ATM interface before you can define the interface as a link. To configure the PVC, use the following commands, beginning in interface configuration mode:

|        | Command                                                                                                                                | Purpose                                                                                                                                          |
|--------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Router(config-if)# <b>atm nni</b>                                                                                                      | Selects service specific coordination function for Network Node Interface.                                                                       |
|        | <b>Example:</b><br>Router(config-if)# <b>atm nni</b>                                                                                   |                                                                                                                                                  |
| Step 2 | Router(config-if)# <b>pvc</b> [name] { <i>vpi/vci</i> } [ <b>ces</b>   <b>ilmi</b>   <b>qsaal</b>   <b>smds</b>   <b>l2transport</b> ] | Specifies the PVC. The default/recommended PVC number is 0/5.<br><b>qsaal</b> is a signaling-type PVC used for setting up and tearing down SVCs. |
|        | <b>Example:</b><br>Router(config-if)# <b>pvc 0/5 qsaal</b>                                                                             |                                                                                                                                                  |

To specify or tune optional HSL bundling, SSCF-NNI, or SSCOP parameters, refer to the “Tuning HSL Parameters” section on page 321 of the “Verifying, Monitoring, and Tuning the ITP” chapter.

For details about the above commands, refer to the Cisco IOS Wide-Area Networking Command Reference, Release 12.2, ATM Commands, at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fwan\\_r/atmcmds/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fwan_r/atmcmds/index.htm)

## Configuring Local Peers

A Cisco ITP peer has two end-points: a local end-point and a remote end-point. (Peer end-points are also referred to as *instances*.) A local peer is the local end-point for SS7 over IP with Stream Control Transmission Protocol (SCTP) connections<sup>1</sup>.

1. For more information, refer to Stream Control Transmission Protocol, RFC 2690.

A local peer is identified by its local-port-number. You must configure one (and may configure up to four) local IP address for each local-peer. Cisco ITP will use one of the four local IP addresses for a primary local end-point instance and use the other three IP addresses as backups.

The M2PA/SCTP protocol can be offloaded onto a VIP, enabling management of peer links on the VIP and freeing the RSP CPU for MTP3 management and routing.

M2PA/SCTP offload is supported on the Cisco 7500 router only.

To configure the local peer, and, optionally, configure M2PA/SCTP offload, use the following commands, beginning in global configuration mode:

|               | Command                                                                                   | Purpose                                                                                                                                                                           |
|---------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | Router(config)# <b>cs7 local-peer</b> <i>local-port-number</i><br>[ <b>offload slot</b> ] | Specifies the local peer and puts you in local-peer submode. The keyword <b>offload</b> offloads link management of peer links to the VIP specified by the argument <i>slot</i> . |
| <b>Step 2</b> | Router(config-cs7-lp)# <b>local-ip</b> <i>address</i>                                     | Configures the IP address for this local peer instance. You can repeat this step to configure backup IP addresses for this local end-point.                                       |

## Configuring Linksets



### Note

You must specify the SS7 variant and the point code before you can configure linksets.

A link is either a serial or ATM interface or a peer (virtual link) to a remote Cisco ITP node. Multiple links are grouped in a linkset. Each link must be assigned to one linkset and multiple links can be assigned to the linkset. Links within the same linkset must be parallel between the same nodes.

To configure a linkset you must name the linkset and specify the point code of the adjacent signaling point. To specify a linkset, use the following command in global configuration mode:

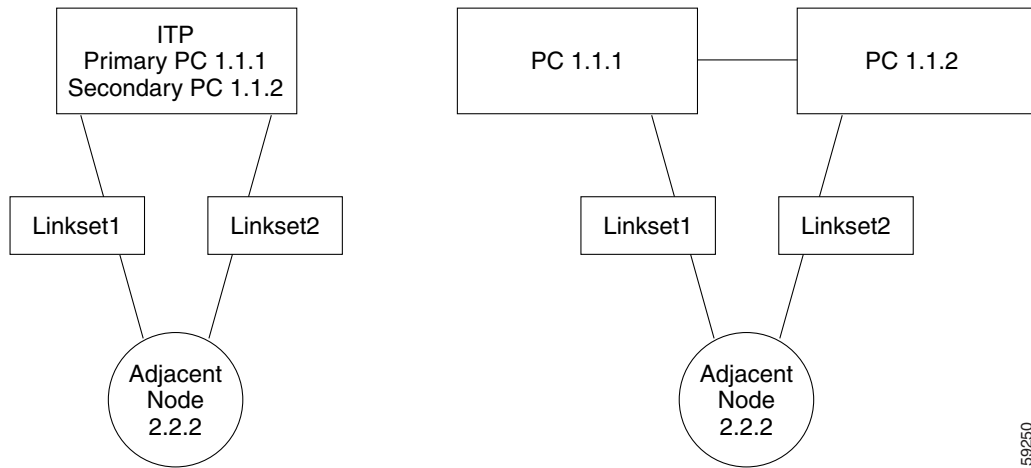
| Command                                                               | Purpose                                                                                                         |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 linkset</b> <i>ls-name adjacent-point-code</i> | Specifies a linkset to an adjacent node and enters linkset configuration mode. Linkset names are case-specific. |

## Configuring Multiple Linksets to Adjacent Nodes

This optional feature allows you to configure 2 linksets between the ITP and an adjacent node. Each linkset can have 16 links, so a total of 32 links can be configured between an ITP and an adjacent node. To the adjacent node, it appears that it is connected to two different ITPs. Figure 5 represents the actual network on the left and the adjacent node's view of the network on the right. Point codes 1.1.1 and 1.1.2 appear to be two separate nodes, but they are actually the same ITP.



**Figure 5 Multiple Linksets**



59250

Before you can configure multiple linksets to an adjacent node, you must add a secondary local point code to the ITP. (This was discussed in an earlier section.) If you have not already done so, configure a secondary point code using the following command in global configuration mode:

| Command                                            | Purpose                                    |
|----------------------------------------------------|--------------------------------------------|
| Router(config)# <b>cs7 secondary-pc</b> point-code | Specifies a second point code for the ITP. |

Configure two linksets between the ITP and the adjacent node, using the following commands in global configuration mode:

| Command                                                                                                 | Purpose                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 linkset</b> ls-name adjacent-point-code<br>[ <b>local-pc</b> primary-point-code] | Specifies a linkset between the adjacent point code and the ITP primary point code and enters linkset configuration mode. If the [ <b>local-pc primary-point-code</b> ] option is omitted, the primary local point code is used on this linkset. If the [ <b>local-pc primary-point-code</b> ] is specified, either primary or secondary point code can be explicitly assigned to the linkset. |

The combination of adjacent point code and local point code must be unique. So for any adjacent point code, the user can configure two linksets - one using the primary local pc, and one using the secondary pc. An example of configuring this is:

```
cs7 linkset linkset1 2.2.2 local-pc 1.1.1
  link 0 serial 1/1/1:0
  ..
  link 15 serial 1/1/1:15

cs7 linkset linkset2 2.2.2 local-pc 1.1.2
  link 0 serial 1/1/2:0
  ..
  link 15 serial 1/1/2:15
```

The two linksets to the adjacent node are automatically entered as a combined route to the adjacent node. Traffic going to the adjacent node will be divided between the two linksets based on SLS.

**Note**

In ANSI, if the two linksets each have 16 links, traffic is automatically distributed across all 32 links based on SLS.

In ITU, because there are only 16 SLS combinations, only half the links would carry traffic in the default configuration. If the traffic is SCCP unsequenced, you can configure the **cs7 distribute-sccp-unsequenced** command, and the ITP will then use all 32 links.

## Specifying the Cisco ITP Route Table

The Cisco ITP uses a route table to select the appropriate signaling path for each message, or signal unit, that it must forward. The route table maps the destination point code (DPC) of the message to an output linkset name that is used to forward the packet.

### Specifying the Default Route Table

On the Cisco ITP router, a route table named “system” is configured by default. The system route table keeps a record of routes to all adjacent signaling points. To specify the Cisco ITP route table, use the following command in global configuration mode:

| Command                                               | Purpose                                                            |
|-------------------------------------------------------|--------------------------------------------------------------------|
| Router(config)# <b>cs7 route-table</b> <i>rt-name</i> | Specifies the name of the route table and enters route table mode. |

**Note**

You must specify **system** as the route table name (*rt-name*).

### Loading the Route Table Contents

Route table contents can be loaded from a URL that locates a binary version of the route table. To add route table contents, use the following command in route table configuration mode:

| Command                                                                  | Purpose                                |
|--------------------------------------------------------------------------|----------------------------------------|
| Router(config-cs7-rt)# <b>load {flash   ftp   rcp   tftp}</b> <i>URL</i> | Loads the contents of the route table. |

### Adding Routes to the Route Table

Additional routes can be added to the system route table.

To update a Cisco ITP route table use the **update route** command in Cisco CS7 route table configuration mode:

| Command                                                                                                                                                                                                                | Purpose                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Router(config-cs7-rt)# <b>update route</b> <i>point-code</i> [ <i>mask</i>   <i>length</i> ]<br><b>linkset</b> <i>ls-name</i> [ <b>priority</b> <i>priority-value</i> <sup>1</sup> ] [ <b>qos-class</b> <i>class</i> ] | Updates a route in the routing table. |

1. The smaller the number, the higher the priority. See the **update route** ITP Command Set entry for an example.

## Saving the Route Table

You can save an active route table into a file. The newly created file can be used with the **load** route-table sub-command to populate the route table upon ITP startup. Note that all **update route** or **remove route** route-table sub-commands are removed from the system configuration after the save is completed. This is done because those commands have been applied to the actual route-table **before** the save and, therefore, are included in the saved file.

We recommend that you save the router configuration to non-volatile memory after generating a new route-table file because the configuration has changed (update/remove route commands may have been removed from the configuration).

To save an active route table to a file, use the following command in privileged EXEC mode:

| Command                                             | Purpose                         |
|-----------------------------------------------------|---------------------------------|
| Router# <b>cs7 save route-table</b> <i>name url</i> | Save the route table to a file. |

## Assigning Links to Linksets

After specifying linksets, you can assign links to the linkset. You will assign links to adjacent legacy SS7 devices as well as links to adjacent Cisco ITP peer nodes.

### Traditional SS7 Links

You must configure a link to the legacy SS7 devices. To configure an SS7 link within a linkset, make sure that the interface encapsulation is MTP2, then use the following command in linkset configuration mode:

| Command                                                                   | Purpose                                                                         |
|---------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Router(config-cs7-ls)# <b>link</b> <i>slc</i> <b>serial</b> <i>number</i> | Configures an SS7 link within a linkset and enters CS7 link configuration mode. |

### High-Speed Signaling Links

You must configure a link to HSL devices. To configure an HSL link within a linkset, make sure that the ATM interface has NNI selected and a QSAAL PVC defined, then use the following command in linkset configuration mode:

| Command                                                  | Purpose                                                                    |
|----------------------------------------------------------|----------------------------------------------------------------------------|
| Router(config-cs7-ls)# <b>link</b> <i>slc atm number</i> | Configures a link to an HSL device and enters CS7 link configuration mode. |

## SS7 Over IP Links (Peers)

As discussed in the section, “Configuring Local Peers,” a Cisco ITP peer has two end-points: a local and a remote end-point.

The local end-point is identified by the local-port-number, which you specified earlier with the **cs7 local-peer** *local-port-number* command.

The remote end-point is simply the local-peer on a remote router. In the link definition shown in the following task table, the remote router’s *local-port-number* is the *remote-port-number* and the (up to) four IP addresses of the remote router’s local-peer are the *remote-ip-addrs*.

The **passive** keyword (which is optional) can be used to indicate that the remote router must establish the peer connection.



### Note

IP routing is automatically enabled in the ITP and should not be disabled. If IP routing has been disabled, process suspending behavior can occur in M2PA, M3UA, or SUA configurations. To re-enable IP routing if it has been disabled, use the **ip routing** command in global configuration mode.

To configure an SS7 link within a linkset, use the following command in linkset configuration mode:

| Command                                                                                                                                                                                   | Purpose                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Router(config-cs7-ls)# <b>link</b> <i>slc sctp remote-ip-addr</i><br>[ <i>backup-remote-ip-addr ...</i> ] <i>remote-port-num</i> <sup>1</sup> <i>local-port-num</i><br>[ <b>passive</b> ] | Configures SS7 over IP peers for a linkset and enters Cisco CS7 link configuration mode. |

1. remote-port-num is the local port number of the adjacent Cisco ITP peer.

There are several SCTP parameters that you can adjust, such as tuning SCTP parameters for satellite channels. Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Indicating the Route Table for Input Linkset

The destination point code of an incoming packet is compared to the Cisco ITP router’s local point code. If it does not match, the Cisco ITP must indicate the route table to use to locate an output linkset for the packet. Cisco ITP extracts the Service Indicator (SI) of the incoming packet, and uses its value to determine which route table should be used to locate an output linkset for the packet.

To specify which route table to use for a given Service Indicator (SI), use the following commands, beginning in global configuration mode:

|        | Command                                                               | Purpose                                                    |
|--------|-----------------------------------------------------------------------|------------------------------------------------------------|
| Step 1 | Router(config)# <b>cs7 linkset</b> <i>ls-name adj-pc</i>              | Specifies a linkset and enters linkset configuration mode. |
| Step 2 | Router(config-cs7-ls)# <b>route</b> <i>si-specifier table rt-name</i> | Specifies a Service Indicator and route table.             |


**Note**

You must specify **all** as the Signaling Indicator (*si-specifier*) and **system** as the route table name (*rt-name*).

## Shutting Down and Restarting Linksets and Links


**Note**

The **cs7 prompt enhanced** command is an optional global configuration command that changes the prompt in linkset configuration mode to display the linkset (and where applicable, the link) that is currently being configured. This command is intended to help avoid the possibility of inadvertently shutting down the wrong linkset/link.

To inhibit a link, use the following commands in EXEC mode:

| Command                                          | Purpose                                                           |
|--------------------------------------------------|-------------------------------------------------------------------|
| Router# <b>cs7 inhibit</b> <i>linkset link</i>   | Takes a link out of service without risking loss of connectivity. |
| Router# <b>cs7 uninhibit</b> <i>linkset link</i> | Returns the link to service.                                      |

To disable or reactivate a linkset, use one of the following commands, beginning in global configuration mode:

| Command                                                      | Purpose                                                         |
|--------------------------------------------------------------|-----------------------------------------------------------------|
| Router(config)# <b>cs7 linkset</b> <i>ls-name point-code</i> | Specifies a linkset and puts you in linkset configuration mode. |
| Router(config-ls)# <b>shutdown</b>                           | Disables the linkset.                                           |
| Router(config-ls)# <b>no shutdown</b>                        | Brings the linkset back into the active state.                  |

To disable or reactivate a link, use the following commands, beginning in global configuration mode:

| Command                                                                                                                                                  | Purpose                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Router(config)# <b>cs7 linkset</b> <i>ls-name point-code</i>                                                                                             | Specifies a linkset and puts you in linkset configuration mode. |
| Router(config-ls)# <b>link</b> <i>slc</i><br>-OR-<br>Router(config-ls)# <b>link</b> <i>slc sctp remote-peer remote-instance local-instance [passive]</i> | Specifies a link and puts you in link configuration mode.       |
| Router(config-ls-link)# <b>shutdown</b>                                                                                                                  | Disables the link.                                              |
| Router(config-ls-link)# <b>no shutdown</b>                                                                                                               | Brings the link back into the active state.                     |

**Note**

A link can be brought back into the active state with the **no shutdown** command only if its parent linkset is in the active state.

## Where to Go Next

You have completed the tasks specific to configuring basic ITP functionality. Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.

- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.







# Configuring Multiple Instances and Instance Translation

---

The Multiple Instances feature makes it possible to connect the ITP to different networks with specific variant and network indicators. Instance translation enables the conversion and transfer of MSUs between different instances.

## Feature History for Multiple Instances

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB10 | This feature was introduced. |

## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Information About Multiple Instances and Instance Translation, page 70
- How to Configure Multiple Instances, page 71
- How to Configure Instance Translation, page 72
- Verifying the Multiple Instances Configuration, page 77
- Where to Go Next, page 81

For an example Multiple Instances configuration, refer to the “Multiple Instance Configuration Example” section on page 368 of the “ITP Configuration Examples”



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# Information About Multiple Instances and Instance Translation

The ITP Multiple Instance feature makes it possible to connect the ITP to different networks at one time, each with specific variant and network indicator values. The ITP treats each combination of variant and network indicator as a separate “instance.” Each instance acts as a separate logical ITP. Each instance is a separate domain with a defined variant, network indicator, ITP point code, optional capability point code, and optional secondary point code. Each instance also has its own routing table and Global Title Translation (GTT) table.

You can configure up to 8 different instances on the ITP. Instances are numbered 0 to 7.

Instance translation is the conversion of packets between instances of ANSI or ITU variants.

## Understanding Virtual Linksets

A virtual linkset is a connection from one instance to another. There are two virtual linksets between any two instances in the ITP. For example, between instanceX and instanceY, there are virtual linksets VirtualLSx-y and VirtualLSy-x. VirtualLSx-y appears to be a linkset in Instance x, and it will appear in Instance x’s route table, for alias destinations whose true point code exists in Instance y. VirtualLSy-x appears to be a linkset in Instance y, and it will appear in Instance y’s route table, for alias destinations whose true point code exists in Instance x.

Virtual linksets are not the same as real linksets. Virtual linksets do not have queues, and are not bandwidth limited.

Virtual linksets are created automatically when a new instance is created. When an alias point code is defined, the alias point code is automatically entered in the alias instance’s routing table using the virtual linkset. For example, the following command enters an alias point code in instance 5 for a real point code in instance 6:

```
cs7 instance 6 pc-conversion 3.4.5 alias-pc 5 5.6.7
```

This creates a route in instance 5 for the alias point code 5.6.7. The linkset shown in the Virtual Linkset that goes from Instance 5 to Instance 6.

```
#show cs7 5 route 5.6.7 detailed
Routing table = system5 Instance = 5
Destination      C Q P Linkset Name      Linkset Non-adj Route
-----
5.6.7/14         acces  1 VirtualLS5-6         avail  allowed avail
```

Virtual linksets are available if the destination Instance has completed MTP Restart. They are Unavailable when the destination instance is doing an MTP Restart. For example, when instance 6 is isolated or going through an MTP Restart, here is the output of show cs7 route for the alias point code.

```
#show cs7 5 route 5.6.7 detailed
Routing table = system5 Instance = 5
Destination      C Q P Linkset Name      Linkset Non-adj Route
-----
5.6.7/14         INACC  1 VirtualLS5-6         UNAVAIL allowed UNAVAIL
```

# How to Configure Multiple Instances

To enable Multiple Instances, use the following command in global configuration mode:

| Command                                   | Purpose                               |
|-------------------------------------------|---------------------------------------|
| Router(config)# <b>cs7 multi-instance</b> | Enable the Multiple Instance feature. |

For the commands that require an instance number, anything configured before Multiple Instances is turned on (such as variant, point-code, linksets, routes) is considered to be in the default instance (instance 0) once Multiple Instances is turned on.

Also, after you turn on Multiple Instances, the ITP begins displaying the instance number when it displays a point code. The ITP displays the point code, then a colon, then the instance number. For example, 1.2.3:0 means point code 1.2.3 in instance 0.

To configure an additional instance (after the default) specify the instance, the variant, and the instance network name, using the following commands in interface configuration mode:

| Command                                                                                                                               | Purpose                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 instance</b> <i>instance-number</i><br><b>variant</b> { <b>ansi</b>   <b>china</b>   <b>itu</b>   <b>ttc</b> } | Identify an instance and indicate which of the SS7 variations the ITP is running on the instance. Instance numbers are used only to configure the information specific to each instance and do not need to match across devices.                                                                                                                                   |
| Router(config)# <b>cs7 instance</b> <i>instance-number</i><br><b>network-name</b> <i>network-name</i>                                 | Specify a network name for the instance<br>The network-name is used to qualify information per signaling point in related management information bases. It is used to correlate instances into the same network by network management applications. In order for instances in the same network to be properly managed they must be assigned the same network name. |

If you enable the Multiple Instances feature, the **instance** keyword and *instance-number* argument are mandatory with the commands listed below:

- **cs7 capability-pc**
- **description** (cs7 link)
- **cs7 display-name**
- **cs7 fast-restart**
- **cs7 gtt address-conversion**
- **cs7 gtt application-group**
- **cs7 gtt concern-pelist**
- **cs7 gtt load**
- **cs7 gtt map**
- **cs7 gtt map sp**
- **cs7 gtt map ss**
- **cs7 gtt replace-db**
- **cs7 gtt selector**
- **cs7 linkset**

- **cs7 mtp3 event-history**
- **cs7 mtp3 timer**
- **cs7 mtp3 tuning**
- **cs7 national-options**
- **cs7 network-indicator**
- **cs7 network-name**
- **cs7 instance pc-conversion**
- **cs7 point-code**
- **cs7 point-code delimiter**
- **cs7 point-code format**
- **cs7 qos class**
- **cs7 remote-congestion-msgs**
- **cs7 route-mgmt-slss**
- **cs7 route-table**
- **cs7 secondary-pc**
- **cs7 sls-shift**
- **cs7 summary-routing-exception**
- **cs7 tfc-pacing-ratio**
- **cs7 variant**

## How to Configure Instance Translation



### Note

---

Prior to IOS Release 12.2(20)SW, the Instance Translation feature and the MTP3 Offload feature could not be configured simultaneously. That restriction has been removed with IOS Release 12.2(20)SW.

---

This section include the following tasks and information:

- **Configuring Point Code Conversion**, page 73
- **Configuring Global Title Conversion**, page 74
- **Configuring Instance Conversion After Global Title Translation**, page 77

## Configuring Point Code Conversion



### Note

Prior to IOS Release 12.2(20)SW, point code conversion was limited to instances with the same variant. That limitation now pertains to default conversions only. However, conversion from ANSI or ITU to China or TTC variant is not supported. In the case of conversion between ITU and either ANSI or China variants, the MSU size will change as a result of the different point code size. If the conversion causes the MSU size to grow beyond the maximum MSU size of 273 bytes, the MSU is discarded.

The ITP performs point code conversion for the following point codes:

- DPC
- OPC
- Concerned Point Code
- SCCP Called Party PC
- SCCP Calling Party PC
- SCMG Concerned PC

To configure point code conversion, use the following command in global configuration mode:

| Command                                                                                                                    | Purpose                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 instance</b> <i>instance-number</i> <b>pc-conversion</b> <i>pc alias-pc alias-instance alias-pc</i> | Configures a mapping between <i>pc</i> in instance <i>instance-number</i> , and <i>alias-pc</i> in <i>alias-instance</i> . If an MSU arrives destined for <i>alias-pc</i> in instance <i>alias-instance</i> , it will be sent to instance <i>instance</i> and the DPC converted to <i>pc</i> . |

To configure default point code conversion, use the following command in global configuration mode:

| Command                                                                                                       | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 instance</b> <i>instance-number</i> <b>pc-conversion default</b> <i>alias-instance</i> | Allows MSUs with unknown point codes in one instance to be another instance. Enables default conversion for point codes between instance <i>orig-instance</i> and <i>dest-instance</i> . If point code conversion between the two instances is required, and the point code does not match a specified <i>pc</i> conversion, or the ITP's point code, then the point code is unchanged in the new instance and conversion still succeeds |

## Configuring Global Title Conversion



### Note

This section describes specifying changes to Global Title fields when configuring the Instance Translation feature. If you are looking for information about specifying Global Title Address (GTA) conversion mapping, see the “Configuring Global Title Address Conversion” section on page 127 of the “Configuring Global Title Translation” chapter.

The following sections describe the purpose of Global Title conversion, three methods of converting the SCCP Global Title information, and how to assign a conversion table from one instance to another. These methods are optional, and can be used separately, combined, or not at all. The methods are applied to both the Calling and Called Party Addresses.

Overview of Global Title Conversion, page 74

Creating a GTI Conversion Table, page 75

Creating a Subsystem Mapping Table, page 75

Creating a GTA Prefix Conversion Table, page 75

Assigning a Conversion Table to an Instance, page 76

### Overview of Global Title Conversion

The optional Global Title Conversion feature enables you to specify changes to SCCP Global Title fields when performing conversion between instances. Two typical scenarios for Global Title Conversion are:

- GTT is required, MSUs are destined for local point-code. The result of GTT is an application group in a different instance.
- MSUs are destined for an alias point-code in a different instance.

If the Global Title Conversion feature is not configured, the MSUs going from one instance to another will have no change in the global title data. However, Calling and Called Party point codes will be converted, if they exist.

The fields that can be changed are:

- Global Title Indicator (GTI) - ANSI networks normally use GTI 2. ITU networks typically use GTI 4.
- Translation Type (TT)
- Subsystem Number (SSN)
- Global Title Address (GTA) - This field uses the existing ITP GTA prefix conversion feature.
- Encoding Scheme - This field is used if GTI is 4, does not exist for GTI 2.
- Numbering Plan - This field is used if GTI is 4, does not exist for GTI 2.
- Nature of Address - This field is used if GTI is 4, does not exist for GTI 2.



### Note

Global Title conversion is supported for SCCP UDT, XUDT, UDTS, XUDTS message types only.

## Creating a GTI Conversion Table

The GTI conversion method can be used to update the GTI, TT, SSN, Encoding Scheme (ES), Numbering Plan (NP), and Nature of Address Indicator (NAI) in an SCCP address. You name the table, and then specify sets of input parameters and output parameters. When an MSU comes in, the ITP finds the most specific match. If no match is found, the fields in the MSU are unchanged. For ANSI, GTI 2 is supported. For ITU, GTI 2 and 4 are supported.

To create a GTI Conversion Table perform the following tasks, beginning in global configuration mode:

|        | Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Purpose                                                                                                                                                                                                                      |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Router(config)# <b>cs7 sccp gti-conversion</b> <i>tablename</i>                                                                                                                                                                                                                                                                                                                                                                                                                 | Names the GTI Conversion table and enables CS7 SCCP GTI conversion mode.                                                                                                                                                     |
| Step 2 | Router(config-cs7-sccp-gticonv)# <b>update</b> [ <b>gti-in</b> <i>gti-in</i> ] [ <b>tt-in</b> <i>tt-in</i> ] [ <b>ssn-in</b> <i>ssn-in</i> ] [ <b>es-in</b> <i>es-in</i> ] [ <b>np-in</b> <i>np-in</i> ] [ <b>nai-in</b> <i>nai-in</i> ] [ <b>gti-out</b> <i>gti-out</i> ] [ <b>tt-out</b> <i>tt-out</i> ] [ <b>ssn-out</b> <i>ssn-out</i> ] [ <b>es-out</b> <i>es-out</i> ] [ <b>np-out</b> <i>np-out</i> ] [ <b>nai-out</b> <i>nai-out</i> ] [ <b>addr-conv</b> <i>addr</i> ] | Specifies the input and output parameters for the table.<br>If the <b>addr-conv</b> keyword is specified, this GTT conversion takes precedence over any GTT address conversion table specified per instance conversion rule. |

## Creating a Subsystem Mapping Table

The subsystem mapping method converts a subsystem in one instance to a different subsystem in another instance. To create a subsystem mapping table, use the following command in global configuration mode:

| Command                                                                                       | Purpose                                                                    |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Router(config)# <b>cs7 sccp ssn-conversion</b> <i>tablename in-ssn in-ssn out-ssn out-ssn</i> | Creates a subsystem mapping table, specifying input and output SSN values. |

If no match is found in the SSN conversion table, the SSN in the MSU is unchanged. If both GTI Conversion and Subsystem Mapping are used, and a GTI conversion specifies a new subsystem for the MSU, the subsystem specified by the GTI conversion is used.

## Creating a GTA Prefix Conversion Table

The GTA prefix conversion method uses the existing ITP address-conversion feature. This feature allows for conversion of addresses that use different prefixes or codes, such as converting between E212 and E214 addressing schemes. Address conversion is an optional part of GTT conversion and will only be applied when configured.



### Note

Both the address conversion command here and the GTI conversion command described earlier, allow the user to specify a numbering plan and nature of address values. Any NP or NAI specified by address conversion overrides those specified by GTI conversion.

To define a address conversion table and enter GTT address conversion submode, use the following commands, beginning in global configuration mode:

| Command                                                                                                                                                                             | Purpose                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt address-conversion</b> <i>tablename</i>                                                                                                                  | Specifies a GTT address conversion table name (1-12 characters) and enables CS7 GTT address conversion table submode. |
| Router(config-cs7-gtt-conv-tbl)# <b>update in-address</b> <i>input-address</i> [ <b>out-address</b> <i>output-address</i> ] [ <b>np</b> <i>newnp</i> ] [ <b>nai</b> <i>newnai</i> ] | Defines input and (optionally) output address entries.                                                                |

### Assigning a Conversion Table to an Instance

This task assigns gti-conversion, subsystem mapping, and address-conversion tables for conversion from one instance to another. All three conversion methods can be used, or just one or two. If no conversion methods are assigned, the GTT in the MSUs will not be changed.

To assign a conversion table for conversion, use the following commands, beginning in in global configuration mode:

| Command                                                                                                             | Purpose                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 sccp instance-conversion in-instance</b> <i>instance</i> <b>out-instance</b> <i>instance</i> | Specifies the input and output instances.                                                                                                                                                                                                                                                                              |
| Router(config-cs7-sccp-insconv)# <b>set gti-conversion</b> <i>tablename</i>                                         | Assigns GTI conversion table to be assigned from one instance to another.                                                                                                                                                                                                                                              |
| Router(config-cs7-sccp-insconv)# <b>set ssn-conversion</b> <i>tablename</i>                                         | Assigns subsystem mapping table to be assigned from one instance to another.                                                                                                                                                                                                                                           |
| Router(config-cs7-sccp-insconv)# <b>set address-conversion</b> <i>tablename</i>                                     | Assigns address-conversion table to be assigned from one instance to another.                                                                                                                                                                                                                                          |
| Router(config-cs7-sccp-insconv)# <b>set message-handling</b> <i>option</i>                                          | Specifies the message handling option to be used. The following are valid options:<br>0               no special options<br>1-7             spare values (ie unassigned)<br>9-15            additional spare values (ie unassigned)<br>no change      leave field unchanged<br>return-on-error return [x]udts on error |
| Router(config-cs7-sccp-insconv)# <b>set national-indicator</b> <i>natl-ind</i>                                      | Specifies the SCCP national indicator to be used. The following are valid options:<br>0               international<br>1               national<br>no change      leave field unchanged                                                                                                                                |



## Configuring Instance Conversion After Global Title Translation

To enable Instance Conversion with global title, configure an application group in an instance and then assign point codes in other instances to the application group.

The application group has an optional parameter **instance**. If you do not specify an instance, a point code that is entered has the same instance as the application group. By using the instance parameter, you can specify a point code in a different instance.

To configure instance translation with GTT use the following command in global configuration mode:

| Command                                                                                                          | Purpose                                                         |
|------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Router(config)# <b>cs7 instance</b> <i>instance-number</i> <b>gtt application-group</b> <i>application-group</i> | Configures an application group in an instance.                 |
| Router(config-cs7-gtt-app-grp)# <b>instance</b> <i>instance-number</i> <b>pc</b> <i>pc ssn ssn cost pcssn</i>    | Assign point codes in other instances to the application group. |

The following example creates a GTT entry for instance 0 that will convert the MSU to instance 1. If the ITP receives an SCCP MSU in instance 0, destined for the ITP, route on global title with TT 250 and GTA 919, the ITP will convert the MSU to instance 1 and send the MSU to point code 1.1.1 in instance 1 if 1.1.1/10 is available.

```
Router(config)#cs7 instance 0 gtt application-group app-group0
Router(config-cs7-gtt-app-grp)#instance 1 pc 1.1.1 ssn 10 1 pcssn
Router(config-cs7-gtt-app-grp)#pc 2.2.2 ssn 20 2 pcssn
Router(config-cs7-gtt-app-grp)#exit
Router(config)#cs7 instance 0 gtt selector selector0 tt 250
Router(config-cs7-gtt-selector)#gta 919 app-grp app-group0
Router(config-cs7-gtt-selector)#
```

You can also configure an application group that contains an asname that is in a different instance. In this case, the ITP will convert the MSU to the new instance, then send the MSU to the as.

```
dancer(config)#cs7 instance 1 gtt application-group as-appl
dance(config-cs7-gtt-app-grp)#asname as-0 1 pcssn
dance(config-cs7-gtt-app-grp)#exit
dancer(config)#cs7 instance 1 gtt selector selector0 tt 10
danc(config-cs7-gtt-selector)#gta 336 app-grp as-appl
```

## Verifying the Multiple Instances Configuration

To verify the Multiple Instances configuration, use the following command in Privileged EXEC mode:

| Command                                                                                                                                           | Purpose                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Router# <b>show cs7 virtual-linkset</b> [ <i>linkset-name</i> ] [ <b>brief</b> ] [ <b>routes</b> ] [ <b>statistics</b> ]   [ <b>utilization</b> ] | Displays information about virtual linksets. |

You can also indicate the instance-number in any of the following Privileged EXEC show commands:

- **show cs7 access-lists**
- **show cs7 accounting**
- **show cs7 gtt address-conversion**
- **show cs7 gtt application-group**
- **show cs7 gtt concern-pclist**

- `show cs7 gtt config`
- `show cs7 gtt gta`
- `show cs7 gtt map`
- `show cs7 gtt measurements`
- `show cs7 gtt selector`
- `show cs7 linkset`
- `show cs7 mtp3 event-history`
- `show cs7 mtp3 timers`
- `show cs7 point-codes`
- `show cs7 qos`
- `show cs7 route`

## Configuration Examples for Multiple Instances and Instance Translation

In the following example, the Multiple Instances feature is used to configure STPs in two SS7 networks.

Network 1 has variant ANSI and network indicator national. All instances in this network will have network name specified as ANSI-NAT.

Network 2 has variant ANSI and network indicator international. All instances in this network will have network name specified as ANSI-INT.

### Configuration for ITP1

```
cs7 multi-instance
cs7 instance 0 variant ANSI
cs7 instance 0 network-name ANSI-NAT
cs7 instance 0 point-code 5.5.1
cs7 instance 1 variant ANSI
cs7 instance 1 network-name ANSI-INT
cs7 instance 1 network-indicator international
cs7 instance 1 point-code 15.5.1
.
.
.
```

### Configuration for ITP2

```
cs7 multi-instance
cs7 instance 0 variant ANSI
cs7 instance 0 network-name ANSI-INT
cs7 instance 0 network-indicator international
cs7 instance 0 point-code 7.3.2
cs7 instance 1 variant ANSI
cs7 instance 1 network-name ANSI-NAT
cs7 instance 1 point-code 11.6.2
```

## Instance Translation Configuration Examples

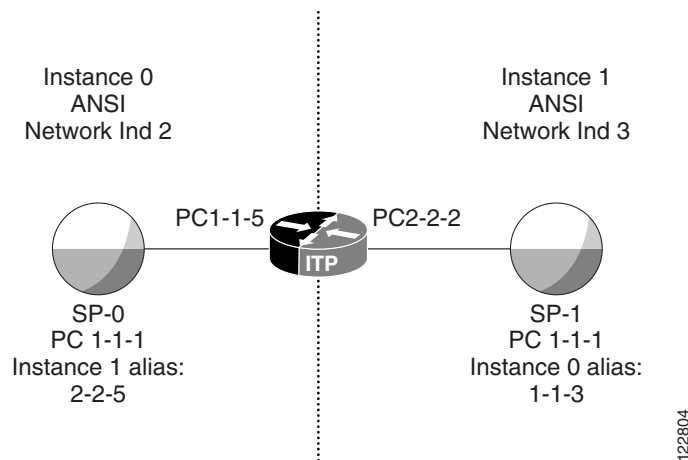
This section includes two examples:

- Instance Translation: Instances with the Same Variant, page 79
- Instance Translation: Instances with Different Variants, page 81

### Instance Translation: Instances with the Same Variant

The following example configuration is illustrated in Figure 6.

**Figure 6** Instance Translation Configuration Example



In the network above, SP-0 sees the ITP with PC 1-1-5, and also sees a remote SP with PC 1-1-3. SP1 sees the ITP with PC 2-2-2, and also sees a remote SP with PC 2-2-5. The CLI to configure the alias point codes is shown below:

```
ITP#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ITP(config)#cs7 instance 0 pc-conversion 1.1.1 alias-pc 1 2.2.5
ITP(config)#cs7 instance 1 pc-conversion 1.1.1 alias-pc 0 1.1.3
```

When SP-0 sends an MSU to SP-1, it sets:

- DPC: 1-1-3
- OPC: 1-1-1
- Network Indicator: 2

When the ITP receives the MSU, it determines that 1-1-3 in Instance 0 is an alias for 1-1-1 in Instance 1, so it converts the MSU to Instance 1. Since Instance 1 uses Network Indicator 3, the MSU's Network Indicator is changed to 3. The converted MSU has:

- DPC 1-1-1
- OPC 2-2-5
- Network Indicator: 3

If the MSU is SCCP and contains a Calling Party PC, this PC is converted using the alias PC table. If the Calling Party PC is 1-1-1, this is converted to 2-2-5

The following show command output sections show the status before and after the configuration of Instance Translation:

ITP#**show cs7 linkset brief**

```
lsn=SP-0          apc=1.1.1:0      state=avail      avail/links=1/1
lsn=SP-1          apc=1.1.1:1      state=avail      avail/links=1/1
```

ITP#**show cs7 route**

Routing table = system Instance = 0

| Destination | Prio | Linkset | Name | Route |
|-------------|------|---------|------|-------|
| 1.1.1/24    | aces | 1       | SP-0 | avail |

Routing table = system1 Instance = 1

| Destination | Prio | Linkset | Name | Route |
|-------------|------|---------|------|-------|
| 1.1.1/24    | aces | 1       | SP-1 | avail |

ITP#**show cs7 route**

Routing table = system Instance = 0

| Destination | Prio | Linkset | Name         | Route |
|-------------|------|---------|--------------|-------|
| 1.1.1/24    | aces | 1       | SP-0         | avail |
| 1.1.3/24    | aces | 1       | VirtualLS0-1 | avail |

Routing table = system1 Instance = 1

| Destination | Prio | Linkset | Name         | Route |
|-------------|------|---------|--------------|-------|
| 1.1.1/24    | aces | 1       | SP-1         | avail |
| 2.2.5/24    | aces | 1       | VirtualLS1-0 | avail |

ITP#**show cs7 linkset brief**

```
lsn=SP-0          apc=1.1.1:0      state=avail      avail/links=1/1
lsn=SP-1          apc=1.1.1:1      state=avail      avail/links=1/1
```

ITP#**show cs7 pc-conversion**

PC ALIAS PCs

```
1.1.1:0  2.2.5:1
1.1.1:1  1.1.3:0
```

ITP#**show cs7 0 pc-conversion 1.1.1**

PC ALIAS PCs

```
1.1.1:0  2.2.5:1
```

ITP#**show cs7 1 pc-conversion 1.1.1**

PC ALIAS PCs

```
1.1.1:1  1.1.3:0
```

### Instance Translation: Instances with Different Variants

The following GTI conversion and instance conversion tables convert E.164 global title addresses from ANSI to ITU and ITU to ANSI:

```
cs7 sccp gti-conversion ANSI2ITU
  update gti-in 2 tt-in 10 gti-out 4 tt-out 0 np-out 1 nai-out 4 es-out 2
cs7 sccp gti-conversion ITU2ANSI
  update gti-in 4 tt-in 0 np-in 1 nai-in 4 gti-out 2 tt-out 10
cs7 sccp instance-conversion in-instance 0 out-instance 2
  set gti-conversion ITU2ANSI

cs7 sccp instance-conversion in-instance 2 out-instance 0
  set gti-conversion ANSI2ITU
```

Default conversion sends any MSUs with unknown point codes in one instance to another instance. Also, any PCs in the MSU that require conversion but do not have an alias point code assigned, will be unchanged in the new instance.

In the following example, MSUs can be sent for any point code from instance 0 to instance 1:

```
cs7 instance 1 pc-conversion default 0
```

The above example will not allow MSUs to be sent from instance 1 to instance 0, however. To only allow MSUs with a DPC of 2.2.4 or 2.2.5 to be sent from instance 1 to instance 0, enter the following commands:

```
cs7 instance 0 pc-conversion 2.2.4 alias-pc 1 2.2.4
cs7 instance 0 pc-conversion 2.2.5 alias-pc 1 2.2.5
```

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.

- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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## Configuring ITP Group

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The ITP Group feature allows two ITPs to appear as a single network entity. The two ITPs share the same local point codes and support SS7 linksets that span both ITPs. In the event of a failure of one of the ITPs, the other is capable of maintaining the availability of the local point codes and linksets and continuing with message forwarding. This feature provides inter-device redundancy, high availability, and reduced point code usage.

### Feature History for ITP Group

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This feature was introduced. |

### Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Prerequisites for ITP Group Operation, page 83
- Restrictions for ITP Group Operation, page 84
- How to Configure the ITP Group Feature, page 85
- Configuration Example for ITP Group, page 93

## Prerequisites for ITP Group Operation

Proper ITP Group operation requires that both group members have a consistent ITP configuration such that each has the same understanding of the group point code(s) and linkset membership.

Each peer must be configured independently with the parameters necessary to participate in a group.



---

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## Restrictions for ITP Group Operation

When two ITPs are interacting as ITP Group peers the physical communication link between them is of critical importance. The ITPs must share real time state information through this link and some SS7 traffic handled by the pair may traverse this link.

It is suggested that the ITPs be directly attached via a back-to-back Ethernet cable connection. Connecting the ITPs via an Ethernet hub or switch is supported as long as traffic between the ITPs does not incur a delay of more than 25 milliseconds within the device. The introduction of a hub or switch between ITPs also introduces a potential point of failure in the communication link.

Connecting the ITPs via WAN links is not supported.

Both ITPs must run the identical version of IOS.

## Information about ITP Group Operation

### Group Roles

An ITP that is a member of an ITP Group operates in one of two redundancy roles, Active or Standby. The ITP operating in the Active role is referred to as the group Manager and is responsible for maintaining all MTP3 and SCCP state information for the ITP Group. The ITP operating in the Standby role is referred to as the group Alternate and relies on the Manager for the state information it needs for handling traffic for its links. Any MTP3 and SCCP management messages received by the Alternate are forwarded to the Manager, which runs the SS7 management procedures for both ITPs. The Alternate takes over the role of Manager in the event of a failure of the Manager.

The Manager has a redundancy state of ACTIVE. The Alternate, under steady state conditions, has a redundancy state of STANDBY HOT, meaning that it is prepared to take over the Manager (Active) role if the current Manager fails. Other Standby states are STANDBY COLD, which indicates that Alternate just assumed the Standby role and STANDBY COLD-BULK, which indicates that the Alternate is in the process of being updated by the Manager with the state information it needs to become STANDBY HOT.

The group role information is displayed in the output of the **show cs7 group state** command:

```
ITP Group state information:
  Redundancy Facility state:
    RF State:                ACTIVE
    RF Peer State:           STANDBY HOT

  Group role information:
    Current State:          Manager
```

The SNMP notification ciscoRFProgressionNotif is generated by an ITP Group member whenever its redundancy state, or that of its peer, transitions to STANDBY COLD, STANDBY HOT or ACTIVE.

### Group Member Isolation

An ITP Group member detects the presence of its group peer by monitoring the state of the group control transport (configured under the **cs7 group** command) and the redundancy state transport (configured under the **ipc zone default** and **association** commands). When both of these transports fail a group member must assume that the group peer has failed and that it is working in isolation as a group Manager.



In order to improve system availability and prevent the loss of both of these transports due a single component failure, it is recommended that the group control and redundancy state transports be configured as dual-homed SCTP associations running over two interfaces on each group member. This can be achieved by specifying two **local-ip** addresses and two **remote-ip** addresses when configuring the group control and redundancy state transports.

If a network failure causes both transports to come down, both group members assume the role of Manager. If communication between the two group members is re-established, then one of the ITPs is forced to assume an Alternate role and be reloaded in order for it to achieve the proper Standby state. The following messages is issued in this situation:

```
%CS7GROUP-5-ACTIVETOSTANDBY: Redundancy state transition from Active to Standby -
reload required
%RF_INTERDEV-4-RELOAD: % RF induced self-reload
```

### Group Transport Configuration Changes

Changes in the group control and redundancy state transports are disruptive events when there are two ITP Group members present and handling traffic. It is suggested that transport configuration changes be made at times of minimal impact.

Configuration changes to the group control transport require the user to shutdown the transport when making the changes. When this transport is shutdown the Manager and Alternate are unable to exchange ITP control information or forward SS7 traffic between them. For this reason traffic forwarding on the Alternate is stopped and its links placed in a system-shutdown state until the transport is re-established:

```
ITP1#show cs7 linkset
lsn=to_STP1          apc=3.4.5          state=avail    avail/links=2/4
  SLC  Interface      Service  PeerState    Inhib
   00   10.0.0.1 6666 5555    avail    -----    -----
   01   11.0.0.1 6666 5555    avail    InService    -----
  *02   (on ITP2)    sys-shut -----    -----
  *03   (on ITP2)    sys-shut -----    -----
```

Configuration changes to the redundancy state transport also require the user to shutdown the transport when making the changes. When this transport is shutdown the Manager is unable to update the SS7 management state on the Alternate. For this reason traffic forwarding on the Alternate is stopped and its links placed in a system-shutdown state while the transport is shutdown. When the transport is re-established (with the **no shutdown** command) the redundancy infrastructure in the Alternate has no way of knowing whether it has missed any state updates, so it issues an *%RF\_INTERDEV-4-RELOAD: % RF induced self-reload* message and reload. On reload, the Alternate receives a complete set of redundancy and SS7 state information from the Manager.

## How to Configure the ITP Group Feature

Configuring the ITP Group feature consists of the following tasks:

- Configuring the Inter-Device Redundancy Parameters, page 86
- Enabling the ITP Group Feature, page 88
- Configuring the Group SCTP Parameters, page 89
- Defining Linksets that Span Group Peers, page 91

## Configuring the Inter-Device Redundancy Parameters

### SUMMARY STEPS

Perform these steps on both ITP group members.

1. **enable**
2. **configure terminal**
3. **redundancy [inter-device]**
4. **exit**
5. **ipc zone default**
6. **association** *association-id*
7. **protocol sctp**
8. **local-port** *port-number*
9. **local-ip** *ip-address*
10. **exit**
11. **remote-port** *port-number*
12. **remote-ip** *ip-address*

## DETAILED STEPS

|        | Command or Action                                                                                      | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>ITP> enable                                                    | Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>ITP# configure terminal                            | Enables global configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Step 3 | <b>redundancy inter-device</b><br><br><b>Example:</b><br>ITP(config)# redundancy inter-device          | Enables interdevice redundancy submode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Step 4 | <b>exit</b><br><br><b>Example:</b><br>ITP(config-red-interdevice)# exit                                | Returns to global configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Step 5 | <b>ipc zone default</b><br><br><b>Example:</b><br>ITP(config)# ipc zone default                        | Configures the Inter-device Peer Communication protocol (IPC). Enables the IPC zone mode, in which you configure the communication link between the two devices.                                                                                                                                                                                                                                                                                                                                                                                                |
| Step 6 | <b>association association-id</b><br><br><b>Example:</b><br>ITP(config-ipczzone)# association 1        | Configures an association between the two devices. Enable IPC association mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Step 7 | <b>protocol sctp</b><br><br><b>Example:</b><br>ITP(config-ipczzone-assoc)# protocol sctp               | Configures SCTP protocol to be used as the transport protocol for this association. Enables the SCTP protocol mode.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Step 8 | <b>local-port port-number</b><br><br><b>Example:</b><br>ITP(config-ipc-protocol-sctp)# local-port 1111 | Specifies the local SCTP port. Enables IPC Transport SCTP local mode. <p><b>Note</b> The port number for the local IPC SCTP association can not be the same as the port number for the CS7 group association. When you define a local IPC SCTP port number (for example port number 1024) the next available port number (in this example port number 1025) is automatically created for the IPC SCTP association used for checkpointing. Neither of these port numbers (in this example, neither 1024 nor 1025) may be used for the CS7 group port number.</p> |
| Step 9 | <b>local-ip ip-address</b><br><br><b>Example:</b><br>ITP(config-ipc-local-sctp)# local-ip 1.1.1.1      | Specifies the local IP address that will be used in the SCTP association.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|         | Command or Action                                                                                            | Purpose                                                                    |
|---------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Step 10 | <b>remote-port</b> <i>port-number</i><br><br><b>Example:</b><br>ITP(config-ipc-local-sctp)# remote-port 2222 | Specifies the remote SCTP port. Enables IPC Transport SCTP remote mode.    |
| Step 11 | <b>remote-ip</b> <i>ip-address</i><br><br><b>Example:</b><br>ITP(config-ipc-remote-sctp)# remote-ip 1.1.1.2  | Specifies the remote IP address that will be used in the SCTP association. |

## What to Do Next

Enable the ITP Group feature

## Enabling the ITP Group Feature

The ITP Group feature allows two ITPs to share an SS7 point code and appear as a single entity. This section describes the steps to configure two ITPs as members of a group.

## Prerequisites

Proper group operation requires that both ITP group members have a consistent ITP configuration. Each member must have the same understanding of the group point code(s) and linkset membership. Both peers must be the same physical Cisco platform.

## SUMMARY STEPS

Perform these steps on both ITP group members.

1. **enable**
2. **configure terminal**
3. **cs7 group** *name port-number*
4. **local-ip** *ip-address*
5. **peer** *peer-name port-number*
6. **remote-ip** *ip-address*

## DETAILED STEPS

|        | Command or Action                                                                               | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>ITP> enable                                             | Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>ITP# configure terminal                     | Enters global configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Step 3 | <b>cs7 group name port-number</b><br><br><b>Example:</b><br>ITP(config)# cs7 group ITP1 33333   | Configures the ITP group name and port number and enables the group configuration mode. Valid port numbers range from 1024 to 49151. <p><b>Note</b> The port number for the local IPC SCTP association can not be the same as the port number for the CS7 group association. When you define a local IPC SCTP port number (for example port number 1024) the next available port number (in this example port number 1025) is automatically created for the IPC SCTP association used for checkpointing. Neither of these port numbers (in this example, neither 1024 nor 1025) may be used for the CS7 group port number.</p> |
| Step 4 | <b>local-ip ip-address</b><br><br><b>Example:</b><br>ITP(config-group)# local-ip 1.1.1.1        | Specifies up to four local IP addresses for the association.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Step 5 | <b>peer port-number</b><br><br><b>Example:</b><br>ITP(config-group)# peer ITP2 4444             | Enables the ITP to initiate the SCTP association with its peer and enables group peer mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Step 6 | <b>remote-ip ip-address</b><br><br><b>Example:</b><br>ITP(config-group-peer)# remote-ip 2.2.2.2 | Specifies up to four remote IP addresses for the association.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## What to Do Next

Configure the group SCTP Parameters.

## Configuring the Group SCTP Parameters

There are several commands for managing the association and tuning the SCTP parameters. To configure group SCTP parameters, use the following commands, as appropriate:

## Commands for Configuring SCTP Parameters

| Command                                                            | Mode       | Purpose                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>assoc-retransmit</b> <i>retries</i>                             | Group Peer | Configures the number of consecutive retransmissions SCTP will perform before failing an association. Using the <b>no</b> form of the command sets the association retransmission threshold to its default value.                                                                        |
| <b>bundling</b> <i>msec</i>                                        | Group Peer | Configures the amount of time that SCTP will wait for messages from RF for purposes of bundling multiple RF messages into a single SCTP message. Bundling is enabled by default with a 20 milliseconds delay. Using the <b>no</b> form of the command disables SCTP bundling.            |
| <b>cumulative-sack</b> <i>msec</i>                                 | Group Peer | Configures the amount of time SCTP will wait before sending a selective acknowledgement (SACK) to the peer in the absence of other conditions that would generate a SACK. Using the <b>no</b> form of the command sets the SACK timeout back to its default value.                       |
| <b>init-retransmit</b> <i>max-retries</i>                          | Group      | Configures the number of consecutive retransmissions SCTP will perform when attempting to establish an association with a peer before the peer is considered unreachable. Using the <b>no</b> form of the command sets the initialization retransmission threshold to its default value. |
| <b>init-timeout</b> <i>msec</i>                                    | Group      | Configures the timeout value for association setup messages. Using the <b>no</b> form of the command sets the initialization timeout value to its default value.                                                                                                                         |
| <b>keepalive</b> <i>msec</i>                                       | Group Peer | Configures the amount of time SCTP will wait before retransmitting a keepalive message in the absence of data traffic. Using the <b>no</b> form of the command sets the keepalive interval back to its default value.                                                                    |
| <b>max-streams</b> <i>inbound-number</i><br><i>outbound-number</i> | Group      | Configures the maximum number of streams SCTP will allow in the inbound and outbound direction. Using the <b>no</b> form of the command sets the maximum inbound stream limit back to its default value.                                                                                 |
| <b>path-retransmit</b> <i>max-retries</i>                          | Group Peer | Configures the number of consecutive retransmissions SCTP will perform before failing a path within an association. Using the <b>no</b> form of the command sets the path retransmission threshold to its default value.                                                                 |
| <b>receive-window</b> <i>bytes</i>                                 | Group      | Configures the initial advertised received window size in bytes for the association. Using the <b>no</b> form of the command sets the receive window size to its default value.                                                                                                          |

| Command                               | Mode       | Purpose                                                                                                                                                                                |
|---------------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>retransmit-timeout</b> <i>msec</i> | Group Peer | Configures the maximum amount of time SCTP will wait before retransmitting data. Using the <b>no</b> form of the command sets the maximum retransmission timeout to its default value. |
| <b>tx-queue-depth</b> <i>depth</i>    | Group Peer | Configures the maximum transmit queue depth for new SCTP associations established with the local port.                                                                                 |

## What to Do Next

Define Linksets that span group peers.

## Defining Linksets that Span Group Peers

To configure a linkset you must name the linkset and specify the point code of the adjacent signaling point.

## Prerequisites

You must specify the SS7 variant and the point code before you can configure linksets.

## SUMMARY STEPS

Perform these steps on both ITP group members.

1. **enable**
2. **configure terminal**
3. **cs7 linkset** *ls-name adjacent-point-code*
4. **link** *slc peer-name*

## DETAILED STEPS

|        | Command or Action                                                           | Purpose                                                                                                             |
|--------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>ITP> enable                         | Enables privileged EXEC mode.<br><ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul> |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>ITP# configure terminal | Enters global configuration mode.                                                                                   |

|        | Command or Action                                                                                          | Purpose                                                                                                                                |
|--------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Step 3 | <b>cs7 linkset</b><br><br><b>Example:</b><br>ITP(config)# cs7 linkset to-STP 5.5.5                         | Specifies a linkset to an adjacent node and enables linkset configuration mode. Linkset names are case-specific.                       |
| Step 4 | <b>link</b><br><br><b>Example:</b><br>ITP(config-ls)# link 0 ITP1 s1/0<br>ITP(config-ls)# link 1 ITP2 s1/0 | Specifies a link and enables link configuration mode. The <i>peer-name</i> specifies the group peer on which the physical link exists. |

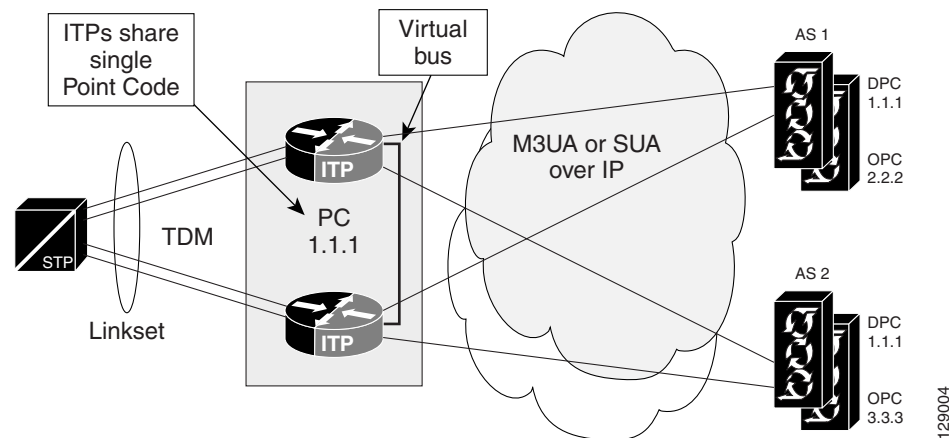


# Configuration Example for ITP Group

This configuration example shows the operation of two ITPs sharing point code 1.1.1. The STP has four links connected to 1.1.1, two to each of the ITPs. The ITPs maintain a communication path that is used for exchanging redundancy information, checkpointing information and a separate path for distributed link traffic. Each ITP has path to AS1 and AS2, in this case these are attached via M3UA or SUA.

The configuration is illustrated in Figure 7. The configuration follows the illustration.

**Figure 7** ITP Group



## Configuration for ITP1

Configuration for ITP1 in the example above is as follows:

```

redundancy inter-device
!
ipc zone default
association 1
  no shutdown
  protocol sctp
  local-port 11111
  local-ip 1.1.1.1
  remote-port 22222
  remote-ip 1.1.1.2
!
cs7 variant ITU
cs7 point-code 1.1.1

cs7 group ITP1 33333
  local-ip 1.1.1.1
  peer ITP2 44444
  remote-ip 1.1.1.2

cs7 linkset to_STP 5.5.5
  link 0 ITP1 s1/0
  link 1 ITP1 s1/1
  link 2 ITP2 s1/0
  link 3 ITP2 s1/1

```

### Configuration for ITP2

Configuration for ITP2 in the example above is as follows:

```

redundancy inter-device
!
ipc zone default
  association 1
  no shutdown
  protocol sctp
  local-port 22222
  local-ip 1.1.1.2
  remote-port 11111
  remote-ip 1.1.1.1
!
cs7 variant ITU
cs7 point-code 1.1.1

cs7 group ITP2 44444
  local-ip 1.1.1.2
  peer ITP1 33333
  remote-ip 1.1.1.1

cs7 linkset to_STP 5.5.5
  link 0 ITP1 s1/0
  link 1 ITP1 s1/1
  link 2 ITP2 s1/0
  link 3 ITP2 s1/0

```

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.

- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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# Configuring Global Title Translation

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A global title is an application address, such as an 800 number, calling card number, or mobile subscriber identification number. Global Title Translation (GTT) is the process by which the SCCP translates a global title into the point code and subsystem number of the destination SSP where the higher-layer protocol processing occurs.

## Feature History for Global Title Translation

| Release    | Modification                              |
|------------|-------------------------------------------|
| 12.2(4)MB2 | This feature was introduced.              |
| 12.2(25)SW | ITP logging facility implemented for GTT. |

## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Overview of GTT Components, page 98  
This section describes the functional components of GTT and provides the basic commands to enable them.
- Storing and Loading GTT Configuration Data, page 101  
GTT configuration data is stored and loaded differently than traditional router configuration data. This section describes how storing and loading works for GTT data files.
- Configuring GTT: 6 Scenarios, page 109  
This section describes the specific tasks and commands for configuring GTT, using 6 real-world scenarios.
- Configuring Global Title Address Conversion, page 127



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This section describes the tasks and commands for specifying Global Title Address (GTA) conversion mapping.

For information about specifying changes to Global Title fields when configuring the Instance Translation feature, see the “Configuring Global Title Conversion” section on page 74 of the “Configuring Multiple Instances and Instance Translation” chapter.

- Verifying Global Title Translations, page 129

This section describes the methods and commands for determining if GTT is performing properly.

- Logging GTT Errors with the ITP Logging Facility, page 131

This section describes the commands for logging GTT errors to a specified local or remote destination.

A full ITP GTT Configuration Example is included in the “ITP Configuration Examples” chapter.

**Note**

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The GTT provisioning syntax and structure is based on GR-82 STP Generic Requirements - Telcordia Technologies, Issue 3 December 1999.

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## Overview of GTT Components

A global title is an application address, such as an 800 number, calling card number, or mobile subscriber identification number. Global Title Translation (GTT) is the process by which the SCCP translates a global title into the point code and subsystem number of the destination SSP where the higher-layer protocol processing occurs.

The two forms of GTT are described in detail in the “Configuring GTT: 6 Scenarios” section on page 109:

- Intermediate GTT -- A subsequent global title is required by another node, thus the routing indicator is set to zero, indicating *route by global title (gt)*.
- Final GTT -- No subsequent global title is required by another node, thus the routing indicator is set to 1, indicating *route by point code and ssn (pcssn)*.

The main components of GTT are described in the following sections:

- GTT Selectors, page 98
- GTT Global Title Address Entries, page 99
- GTT Application Groups, page 100
- GTT Mated Application Entries, page 101

## GTT Selectors

A GTT Selector defines the parameters that select the translation table used to perform the translation of an SCCP message to its next or final destination. A GTT selector comprises a mandatory name, Translation Type (TT), and Global Title Indicator (GTI - only mandatory for ITU). In addition, an optional Numbering Plan (NP), Nature of Address Indicator (NAI), and Quality of Service (QOS) may be specified in certain cases.

GTT Selectors have 2 configuration modes:

- The global configuration mode allows configuration of new selectors or is used to enter the submode for modifying/updating an existing selector.

- The gtt selector configuration submode is used to modify certain attributes of the selector or used to update GTAs in the referenced selector.

### Rules for Creating GTT Selectors

The following rules apply when configuring a GTT Selector:

- NP and NAI can not be specified if the variant is ANSI.
- GTI can be specified only if the variant is ITU.
- NP and NAI must be specified if GTI=4.
- The selector name must be unique and from 1 to 12 characters long.

To create a GTT selector, use the following command in global configuration mode:

| Command                                                                                                               | Purpose                                                                     |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt selector</b> <i>selector</i> <b>tt</b> <i>tt</i> <b>gti</b> <i>gti</i> <b>np</b> <i>np</i> | Names and configures the GTT selector and enables CS7 GTT selector submode. |

### Rules for Modifying GTT Selectors

- A selector's TT, GTI, NP and NAI cannot be modified once they have been added. A selector must be completely deleted to change these values.
- If a QoS class is entered for a selector, it must have been defined prior to being used by the selector.
- If a new name is given for the selector, it must be unique and not longer than 12 characters.

### Rules for Deleting GTT Selectors

- The selector name must exist.
- A selector cannot be deleted if it contains Global Title Address (GTA) entries.

## GTT Global Title Address Entries

A Global Title Address (GTA) entry defines the result of a translation for a particular address mask. GTA entries are configured from the CS7 GTT selector submode. The result of a translation consists of:

- A new MTP3 Destination Point Code
- A new SCCP CDPA Routing Indicator (RI)
- A new SCCP CDPA Subsystem Number (SSN)
- A new SCCP CDPA Translation Type (TT) (mutually exclusive with SSN)
- A GTT Application Group (mutually exclusive of all of the above)
- A QoS Class
- An M3UA or SUA AS name

### Rules for Adding GTA Entries

- A solitary GTT Mated Application (MAP) entry is automatically created when the routing indicator keyword is **pcssn** and a subsystem number (*ssn*) is specified.
- There must be room to add the MAP entry if required, since there is a maximum of 9 subsystems per point code in the GTT Mated Application table. (See GTT Mated Application Entries, page 101.)

- The routing indicator keyword must be **gt** if a new translation type (**ntt**) is specified.
- A TT and SSN cannot both be specified.
- The PC can not be equal to the node's self PC, capability point code, or secondary PC.
- 1 to 15 digits may be specified for the GTA. (Valid range is 0 through F hexadecimal.)
- The GTA digits must be unique for the GTA Table.
- If a GTT Application group name is specified, it must already exist in the GTT Application Group table.
- If the routing indicator is **pcssn**, indicating final GTT, but no SSN is specified, then at least one GTT MAP entry must exist for the specified PC.

To specify a GTA, use the following commands as appropriate to your needs, in CS7 GTT selector submode:

| Command                                                                                                                                                      | Purpose                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>gta gta app-grp app-grp</b>                                                                                              | Defines a GTA that translates to a GTT application group.                          |
| Router(config-cs7-gtt-selector)# <b>gta gta asname as-name</b> { <b>gt</b>   <b>pcssn</b> } [ <b>ssn ssn</b> ] [ <b>ntt newtt</b> ] [ <b>qos-class qos</b> ] | Defines a GTA that translates to an M3UA or SUA Application Server name.           |
| Router(config-cs7-gtt-selector)# <b>gta gta pcssn pc</b> { <b>gt</b>   <b>pcssn</b> } [ <b>ssn ssn</b> ] [ <b>ntt newtt</b> ]                                | Defines a GTA entry that translates to a point code and optional subsystem number. |

## GTT Application Groups

A GTT Application group is an alternative result for the explicit PC and SSN in a GTA entry. A GTT application group should be used instead of the PC/SSN result in the following cases:

- When more than 1 backup is required for a destination
- When load sharing across more than 2 destinations is required
- When load sharing for intermediate GTT destinations is required
- When a different backup is required for the same primary destination dependent on the GTA
- When a different RI value is desired dependent on the destination selected from the application group
- When a point code backup is required for an M3UA or SUA AS, or vice versa
- When performing a weighted loadsharing with traffic received with the same calling party address routed to the same destination

GTT Application groups have 2 configuration modes:

- The top-mode allows configuration of new group names or is used to enter the submode for modifying/updating an group or group item.
- The submode is used to modify certain attributes of the group or used to update entries in the group.



## GTT Mated Application Entries

A GTT Mated Application (MAP) entry has two main purposes. It is used internally by the SCCP application to track point code and SSN states such as congestion and availability. In addition it is used to define backups or alternates for a particular PC/SSN combination. An entry in the GTA table that contains a PC and SSN will have a corresponding entry in the MAP table. The entry in the MAP table may be modified to work in 1 of 3 modes:

- Solitary - no alternate if PC and/or SSN is not available
- Shared - load share equally across the primary PC/SSN and backup PC/SSN
- Dominant - always translate to primary PC/SSN if available, and only translate to backup if primary is unavailable.

### Rules for Configuring GTT MAP Entries

The following rules apply:

- A backup point-code and subsystem must be specified if mode (multiplicity) is shared or dominant.
- A backup point-code and subsystem cannot be specified if mode (multiplicity) is solitary.
- A PC/SSN entry cannot be deleted if it is being used as a backup by another PC/SSN entry.
- A PC/SSN entry cannot be deleted if it is referenced by an entry in the GTA table.
- The primary and backup point-code cannot be identical.
- There is a maximum of 9 subsystems per point-code allowed.
- The PC can not be equal to the node's self PC, capability PC, or secondary PC.

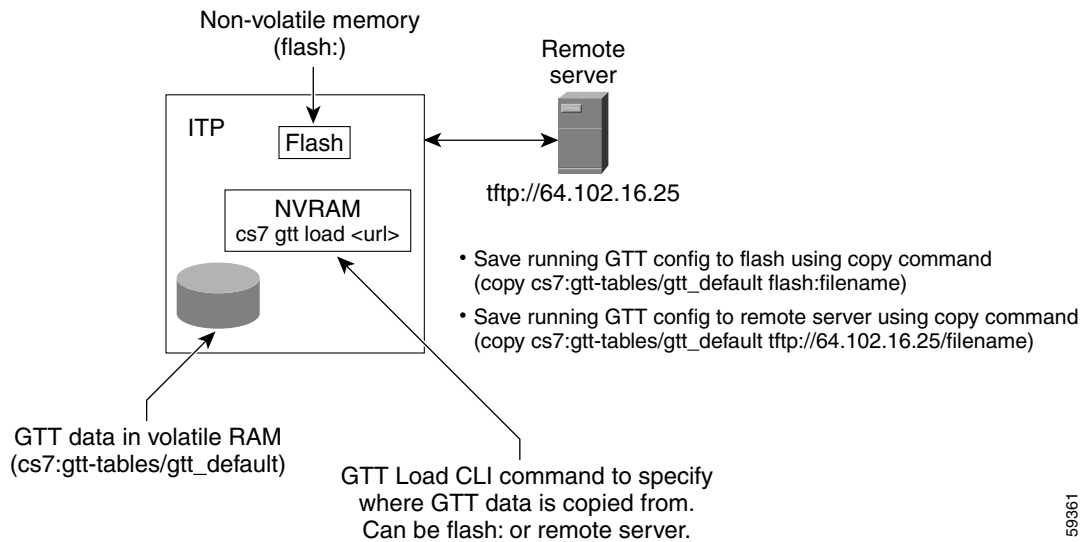
To configure a GTT MAP entry, use the following command in global configuration mode:

| Command                                                                      | Purpose                  |
|------------------------------------------------------------------------------|--------------------------|
| Router(config)# <b>cs7 gtt map</b> <i>ppc pssn [flags] mult [bpc] [bssn]</i> | Specify a GTT MAP entry. |

## Storing and Loading GTT Configuration Data

GTT configuration data is stored and loaded differently than traditional router configuration data. GTT configuration commands are not stored in non-volatile RAM (NVRAM), so commands such as **write memory** and **show running config** have no effect. Figure 8 shows the GTT data relationships on an ITP. This section describes:

- Loading a GTT Table from a Remote File Server or Flash (No existing GTT Data), page 102
- Loading a GTT Table from a Remote File Server or Flash (Existing GTT Data), page 103
- Bulk Loading/Replacing GTT Database, page 103

**Figure 8 GTT Table Loading**

59361

In order to preserve a GTT configuration across ITP reloads, you must use the GTT Table Loading feature.

**Warning**

**All GTT data will be lost during a router reboot if you do not use the GTT Table Loading procedure.**

## Loading a GTT Table from a Remote File Server or Flash (No existing GTT Data)

The steps for loading a GTT table when the ITP has no existing GTT data are as follows:

- Step 1** Determine the desired default location for the GTT file to be loaded during ITP reloads. The default location can be either Flash or a remote server. For example, if the GTT file is to be loaded from Flash, the URL would be similar to the following:

```
flash:gttdata.txt.
```

If the GTT file is to be loaded from a remote server, the URL would be similar to the following:

```
tftp://64.102.16.25/gttdata.txt
```

- Step 2** Specify that the GTT file is to be loaded into RAM during subsequent ITP reloads

:

| Command                                 | Purpose                                                                                |
|-----------------------------------------|----------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt load</b> URL | Specify the URL location from which, upon ITP reload, the GTT database will be loaded. |

For example, using the default location and filename flash:gttdata.txt, the command would be:

```
cs7 gtt load flash:gttdata.txt
```

- Step 3** Save the **cs7 gtt load** definition to NVRAM with a **write memory** command.

- Step 4** Configure all desired GTT data using the CLI.
- Step 5** Save the GTT data to the file specified in step 2 using the **copy** command or the **cs7 save gtt-table** privileged EXEC command as in the following example:

```
cs7 save gtt-table flash:gttdata.txt
```

**Note**

The file “cs7:gtt-tables/gtt\_default” is a machine generated file. Its format is not meant for hand editing. It is recommended the CLI or an externally provided GUI product be used to configure GTT data, rather than editing the gtt\_default file.

Steps 4 and 5 can be repeated for subsequent updates of GTT data.

## Loading a GTT Table from a Remote File Server or Flash (Existing GTT Data)

For an existing system with GTT data, to execute the load command immediately use the following command in global configuration mode:

| Command                                                           | Purpose                                                                    |
|-------------------------------------------------------------------|----------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt load</b> <i>URL</i> [ <b>execute</b> ] | Specify the URL location of the GTT database and, optionally, load it now. |

## Bulk Loading/Replacing GTT Database

It may be desirable to replace the entire contents of a GTT database with a new database without rebooting the ITP. The **cs7 gtt load** command discussed above does not support this capability. To perform a bulk load of the entire GTT database without the need to reboot an ITP, use the following command in privileged EXEC mode:

| Command                                                                                                                                                                                                                                                                                               | Purpose                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Router# <b>cs7 gtt replace-db</b> <i>URL</i><br>Warning: This action will take the SCCP subsystem offline while replacing the entire GTT database. SCCP messages requiring Global Title Translation may be dropped.<br>Are you sure?<br>[confirm]<br><br>GTT table: <i>URL</i> , loaded successfully. | Replace the entire contents of a GTT database with a new database without rebooting the ITP. |

## Syntax and Format Rules for Creating a GTT Database Download File

This section describes the syntax and format of the text file used to store and load GTT information on the ITP. Since GTT data is not preserved in NVRAM, and the maximum size of GTT data can be up to 500,000 entries, a separate compressed format (comma separated) is provided to represent GTT data configured on the ITP. The text file is generated by the ITP when GTT data is saved to a file. Users who require the ability to generate GTT tables offline must use these guidelines to create a syntactically and semantically correct file that may be loaded to the ITP.

## Command Identifiers in a GTT Database Download File

Table 1 shows the command identifiers supported by the GTT table download format. Each line in the text file is identified with a one-character string. All command identifiers except **v** may be prefixed with a “**d**” to indicate a delete action. Otherwise the action is assumed to be an add action. A modify action occurs only when the item already exists and one or more attributes have changed. The table shows the command identifier and the action it specifies.

**Table 1** *GTT Database Download File Command Identifiers*

| Command Identifier | Action                                                                                                                                                                                                |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>v</b>           | Add or modify the format version of the GTT configuration file. Must be the first command in the GTT configuration file because it identifies which parameters are valid within the various commands. |
| <b>s</b>           | Add or modify GTT Selector.                                                                                                                                                                           |
| <b>ds</b>          | Delete Selector.                                                                                                                                                                                      |
| <b>g</b>           | Add or modify GTT GTA.                                                                                                                                                                                |
| <b>dg</b>          | Delete GTT GTA.                                                                                                                                                                                       |
| <b>a</b>           | Add or modify GTT Application Groups or items in the group.                                                                                                                                           |
| <b>da</b>          | Delete GTT Application Groups or items in the group.                                                                                                                                                  |
| <b>m</b>           | Add or modify GTT MAP.                                                                                                                                                                                |
| <b>dm</b>          | Delete a GTT MAP.                                                                                                                                                                                     |
| <b>c</b>           | Add or modify a Concerned Point Code List.                                                                                                                                                            |
| <b>dc</b>          | Delete a Concerned Point Code List or item in the list.                                                                                                                                               |
| <b>p</b>           | Add or modify a GTT address conversion entry.                                                                                                                                                         |
| <b>dp</b>          | Delete a GTT address conversion entry                                                                                                                                                                 |

### Syntax Rules:

- All lines must be terminated with a '\n' (unix eol).
- All tokens are comma separated.
- Each line is parsed for syntax checks and then checked for semantics.
- If a line is parsed and fails either syntax or semantic checks the download process is aborted at the point of failure.

## Parameter Values in GTT Database Download Files

This section describes the values of the parameters that you use with the command identifiers when you create a GTT database download file.

The first line in any GTT file must indicate the version and variant of the GTT file. Table 2 lists the current GTT table versions by ITP software version.

**Table 2** *GTT File Version*

| ITP Software Rel | GTT Table Version |
|------------------|-------------------|
| MB4              | 1.0               |

**Table 2** *GTT File Version (continued)*

|             |     |
|-------------|-----|
| MB5         | 2.0 |
| MB6         | 2.0 |
| MB7         | 3.0 |
| MB8         | 3.0 |
| MB9         | 3.1 |
| MB9A        | 3.1 |
| MB10        | 4.0 |
| MB11        | 4.0 |
| MB12        | 4.0 |
| MB13        | 4.0 |
| 12.2(20)SW  | 4.1 |
| 12.2(21)SW1 | 4.2 |
| 12.2(23)SW  | 4.2 |
| 12.2(23)SW1 | 4.2 |
| 12.2(25)SW  | 4.2 |

Table 3 lists the values for each parameter of the GTT commands that can be specified in a GTT database download file.

**Table 3** *GTT Command Parameter Values*

| Parameter            | Valid Values                                                         |
|----------------------|----------------------------------------------------------------------|
| <i>version</i>       | GTT Table Version - 1.0, 2.0, 3.0, 3.1, 4.0, 4.1, 4.2. (See Table 2) |
| <i>variant</i>       | Variant - {ANSI, ITU , CHINA}                                        |
| <i>selector name</i> | Name of Selector - alphanumeric string maximum of 12 chars           |
| <i>tt</i>            | Translation Type - integer {0-255}                                   |
| <i>gti</i>           | Global Title Indicator- integer {2,4}                                |
| <i>np</i>            | Numbering Plan - integer {0-15}                                      |
| <i>nai</i>           | Nature of Address Indicator - integer {0-127}                        |
| <i>qos</i>           | Quality of service Class identifier {1-7}                            |
| <i>gta</i>           | Global Title Address Digits - numeric/hex sting 1 to 15 digits       |
| <i>pc</i>            | Destination point code in hex                                        |
| <i>ri</i>            | Routing indicator { <b>gt</b> , <b>pcssn</b> }                       |
| <i>ssn</i>           | Subsystem Number - integer {2-255}                                   |
| <i>ntt</i>           | New Translation Type - integer {0-255}                               |
| <i>app-grp</i>       | Application Group name - alphanumeric string maximum of 12 chars     |
| <i>group-name</i>    | Application Group name - alphanumeric string maximum of 12 chars     |
| <i>mult</i>          | Multiplicity { <b>sol</b> , <b>dom</b> , <b>sha</b> , <b>cos</b> }   |
| <i>mult.1</i>        | Multiplicity { <b>sha</b> , <b>cos</b> }                             |

**Table 3** *GTT Command Parameter Values (continued)*

|                             |                                                                             |
|-----------------------------|-----------------------------------------------------------------------------|
| <i>mult.2</i>               | Multiplicity { <b>sha</b> , <b>cos</b> , <b>cgp</b> }                       |
| <i>cost</i>                 | Cost or priority of destination {1-8}                                       |
| <i>ppc</i>                  | Primary point code in hex                                                   |
| <i>pssn</i>                 | Primary Subsystem Number - integer {2-255}                                  |
| <i>bpc</i>                  | Backup point code in hex                                                    |
| <i>bssn</i>                 | Backup Subsystem Number - integer {2-255}                                   |
| <i>concern pc list name</i> | Concerned Point Code List Name - alphanumeric string maximum of 12 chars.   |
| <i>rrc</i>                  | Boolean Re-Route if Congested - integer {0,1}                               |
| <i>adj</i>                  | Boolean Adjacency indicator {0,1}                                           |
| <i>pre-addrconv</i>         | Name of address conversion table - alphanumeric string maximum of 12 chars. |
| <i>post-addrconv</i>        | Name of address conversion table - alphanumeric string maximum of 12 chars. |
| <i>network-name</i>         | Network name of instance - alphanumeric string maximum of 12 chars.         |

## Examples of Entries in a GTT Database Download File

This section provides the syntax and examples of entries in a GTT database:

### Version and Variant

To specify the version of the GTT configuration file and the variant, use the syntax appropriate to your version:

- Syntax for version 1.0 to 3.0:

*v,version,variant*

Examples:

```
v1.0,ITU
v2.0,ANSI
v3.0,CHINA
```

- Syntax for version 4.0: In version 4.0 the ITP software supports multiple variants via the use of multiple instances. Each instance is assigned a variant.

*v,version,variant,instance*

Example:

```
v4.0,ANSI,0
```

- Syntax for version 4.1 and 4.2

*v,version,variant,instance,network-name*

Example:

```
v4.1,ITU,0,itu-national
```

### GTT Selector

To add, modify, or delete a GTT Selector:

- Syntax:

*[d]sselectorname,tt,gti,[np],[nai],[qos],[pre-addrconv],[post-addrconv]*

**Examples:**

```
stest,0,4,7,4,1
stestsel,0,2, , ,
sa12345672,100,4,15,127,
```

**GTT GTA**

To add, modify, or delete a GTT GTA:

- Syntax for version 1.0:

**[d]gselectorname,gta,[pc],[ri],[ssn],[ntt],[app-grp],[qos]**

**Examples:**

```
gtest,349,1012,gt,100, , ,
gtest,828,1012,gt, ,100, ,
gtest,828258,1012,pcssn,129, , ,
gtest,8282588595,1012,pcssn,100, ,1,
gtest,919, , , ,test,
gtest,920, , , ,test,
gtest,980,859,pcssn,10, , ,
```

- Syntax for version 2.0 to 4.1:

**[d]gselectorname,gta,[pc],[ri],[ssn],[ntt],[app-grp],[qos], [asname]**

**Examples:**

```
gtest,349,1012,gt,100, , ,
gtest,828,1012,gt, ,100, ,
gtest,828258,1012,pcssn,129, , ,
gtest,8282588595,1012,pcssn,100, ,1,
gtest,919, , , ,test,
gtest,920, , , ,test,
gtest,980,859,pcssn,10, , ,
gtest,999, , , , , ,sua_as1
```

- Syntax for version 4.2:

Same as previous except *ssn* may be **0** when *ri* is **gt**.

**GTT Application Groups**

To add, modify, or delete a GTT Application Group:

- Syntax for version 1.0:

**[d]agroup-name,[mult.I],cost,pc,ri,[ssn]**

**Example:**

```
aapp0,cost,1,1012,gt,
```

- Syntax for version 2.0:

**[d]agroup-name,[mult.I],cost,pc,ri,[ssn],[asname]**

**Example:**

```
aapp0,cost,1, , , ,as0
```

- Syntax for version 3.0:

**[d]agroup-name,[mult.I],cost,pc,ri,[ssn],[asname]**

No syntax change, but can enter local-pc in table.

**Example:**

```
aapp1,sha,1,10203,pcssn, ,
```

- Syntax for version 3.1:

```
[d]agroup-name,[mult.1],cost,pc,ri,[ssn],[asname]
```

No syntax change, but allows 8 items with same cost

**Example:**

```
aapp1,sha,1,10203,pcssn, ,
```

- Syntax for version 4.0:

```
[d]agroup-name,[mult.2],cost,pc,ri,[ssn],[asname]
```

CGPA load sharing introduced

**Example:**

```
aapp1,cgp,1,20203,pcssn, ,
```

- Syntax for version 4.1:

The item in the application group can be in a different instance than the application group. The *network-name* parameter is added to indicate the instance to which the item belongs.

```
[d]agroup-name,[mult.2],cost,pc,ri,[ssn],[asname],[network-name]
```

**Example:**

```
aapp1,cgp,1,20203,pcssn,5, ,instance1
```

- Syntax for version 4.2:

Unchanged, except *ssn* may be 0 for intermediate GTT.

**Example:**

```
aapp1,cos,1,10203,pcssn,5, ,instance1
```

**GTT MAP**

To add, modify or delete a GTT MAP:

- Syntax for version 1.0 and 2.0

```
[d]mppc,pcssn,mult,[bpc],[bssn],[concern pc list name],[rrc],[adj]
```

- Syntax for version 3.0 to 4.2 adds support for local-pc in the MAP table.

**Examples:**

```
m809,10,sol,,,0,0
m859,10,sol,,,0,0
m861,10,sol,,,0,0
m1012,10,sol,,,0,0
m859,20,sha,861,20,,0,1
m859,25,dm,861,25,,1,0
```

**Concerned PC Lists**

To add, modify, or delete a Concerned PC List:



- Syntax for version 1.0 to 3.0  
[d]cconcern pc list name,pc  
Examples:  
clist1,809  
clist1,859  
clist3,1012
- Syntax for version 4.0  
[d]cconcern pc list name,pc,instance  
Example:  
clist1,1024,1

Address Conversion Tables

To add, modify, or delete an address conversion table:

- Syntax for version 1.0 to 4.2  
[d]paddress conversion table name,[np],[nai],gta,[gta],[np],[nai]  
Example:

Displaying Current GTT Configuration

Since the GTT data on an ITP is not stored in NVRAM, commands such as **show run** will not display the current configuration. To display the current running configuration regarding GTT use the following command in privileged EXEC mode:

| Command                            | Purpose                                           |
|------------------------------------|---------------------------------------------------|
| Router# <b>show cs7 gtt config</b> | Display the current running configuration of GTT. |

Configuring GTT: 6 Scenarios

The following sections describe how to configure GTT data on the ITP for different scenarios applicable to real customer networks. The scenarios include:

- Configuring Intermediate GTT To Route MSUs to a Single Point Code, page 110
- Configuring Intermediate GTT To Load Balance MSUs Across Two Or More Point Codes, page 113
- Configuring Final GTT To Route MSUs to a Solitary Point Code, page 116
- Configuring Final GTT To Route MSUs to a Primary and Backup Point Code and SSN (Dominant Mode), page 119
- Configuring Final GTT To Load Balance MSUs Across a Group of Point Codes and Subsystems, page 122
- Configuring Final GTT to an SUA AS with a Backup Point Code (Dominant Mode), page 125

Rules For Removing GTT Configurations:

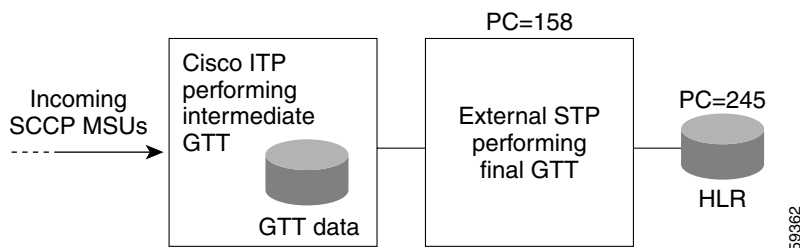
- To delete a selector you must first delete any GTAs that reference it, using the **no gta** command. After deleting the GTAs, you can remove the selector, using the **no selector** command.

- To delete a mated application (GTT MAP), you must first delete any application groups and GTAs that reference it (using the **no cs7 gtt application-group** command and **no gta** command). You can then delete the mated application configuration using the **no cs7 gtt map** command.
- To delete a map entry that references another map entry as a backup, change all entries that reference it to “solitary” then delete the map entry with the **no cs7 gtt map** command.
- To delete an application group that is referenced by a GTA, you must first delete the GTA using the **no gta** command. After deleting the GTA, you can remove the application group with the **no cs7 gtt app-grp** command.

## Configuring Intermediate GTT To Route MSUs to a Single Point Code

This configuration describes the scenario shown in Figure 9.

**Figure 9** *Intermediate GTT With One Destination*



The ITP on the left side of Figure 9 is required to perform intermediate GTT for a set of digits (GTAs). There is only 1 choice for the next destination regardless of its availability. All SCCP traffic that requires GTT and that matches the configured digits is to be GTT routed to the destination PC=158.

### Provisioning the ITP

To provision the ITP, perform the following steps:

- Step 1** Determine the criteria needed to select the appropriate translation table. For ITU the most common Global Title Indicator is 4. This means a TT, NP and NAI identify the translation table. For ANSI, only the TT is required. For this example we will use TT=0, NP=1, NAI=3.



**Note** The choices of TT, NP, and NAI are application specific. Refer to the SS7 network administrator to determine the appropriate combination of TT, NP, and NAI. ITU-T Q.714 Specifications of Signaling System No. 7- Signaling Connection Control Part defines many of the well-known applications.

- Step 2** Determine if a GTT Selector matching the criteria stated above already exists:

| Command                              | Purpose                           |
|--------------------------------------|-----------------------------------|
| Router# <b>show cs7 gtt selector</b> | Display GTT selector information. |

If a matching GTT selector exists, it can be referenced by its text name. If not, a new selector must be created. For this example assume it does not exist and the name **c7gsp** will be used.

- Step 3** Determine the range of digits from the called party address (CDPA) that need to be routed to PC=158. In this example assume that any digits matching the prefix 3330810 need to be GTT routed to PC=158.

All GTA digits entered on the ITP are prefix matched against the actual digits arriving in the MSU requiring GTT. When 3330810 is provisioned on the ITP it really means 3330810xxxxx... where x is any digit. The ITP currently supports prefix matching from 1 to 15 digits (1 - 9 and hex characters A - F).

## Configuring the ITP GTT Database

Once the above criteria are determined, follow these steps to configure the ITP GTT database:

### Step 1 Configure the selector:

| Command                                                                      | Purpose                                                                    |
|------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt selector selector tt tt gti gti np np nai nai</b> | Names and configures the GTT selector and enters CS7 GTT selector submode. |

Using the details of the example, the command would be:

```
cs7 gtt selector c7gsp tt 0 gti 4 np 1 nai 3
```

In this simple case only one translation needs to be added within the selector.

### Step 2 Configure the GTA within the selector:

| Command                                                                          | Purpose                       |
|----------------------------------------------------------------------------------|-------------------------------|
| Router(config-cs7-gtt-selector)# <b>gta gta result-type pc routing-indicator</b> | Names and configures the GTA. |

The result type is used to specify whether the GTA will be routed to a specific point code and optional SSN (pcssn) or to an application group (app-grp). In this case the result type is pcssn which allows the operator to specify a specific point code (pc=158). An SSN is not used in this example:

```
gta 3330810 pcssn 158 gt
```

The above command can be referred to as a GTA rule. The rule states that the CDPA digits matching 3330810 will be routed to a point-code and optional subsystem number (pcssn). The point-code is 158, the subsystem number in this example is not defined and the routing indicator is set to 'gt' indicating intermediate GTT. Omitting a new SSN in the rule causes the original SSN to be preserved during the translation.

### Step 3 Exit the submode and verify the data entered:

| Command                                           | Purpose                               |
|---------------------------------------------------|---------------------------------------|
| Router(config-cs7-gtt-selector)# <b>exit</b>      | Exits CS7 GTT selector submode.       |
| Router(config)# <b>exit</b>                       | Exits global configuration mode.      |
| Router# <b>show cs7 gtt gta selector [digits]</b> | Displays details about the given GTA. |

For the example, the command and the output would be:

Router# **show cs7 gtt gta c7gsp**

| Selector Name | TT | GTI | NP | NAI | DFLTQOS | #GTAs |
|---------------|----|-----|----|-----|---------|-------|
| c7gsp         | 0  | 4   | 1  | 3   |         | 1     |

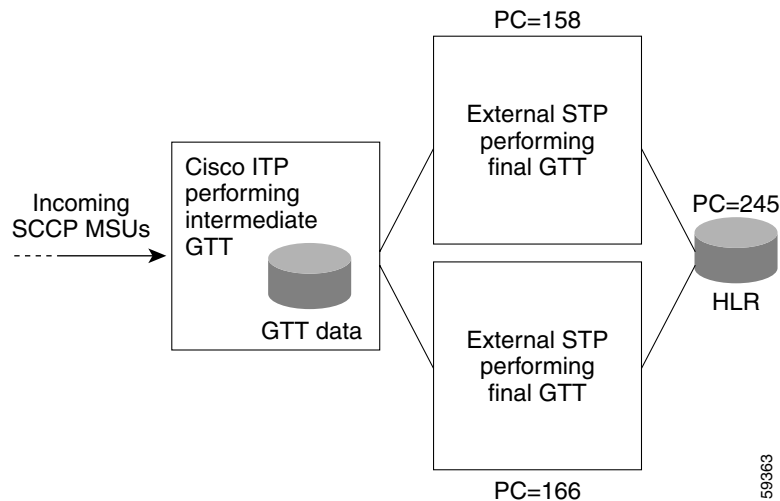
| GTA     | PC  | RI | SSN | TT | App-Grp | QOS | ASname |
|---------|-----|----|-----|----|---------|-----|--------|
| 3330810 | 158 | gt |     |    |         |     |        |

To delete a GTT configuration, follow the rules in the “Rules For Removing GTT Configurations:” section on page 109.

## Configuring Intermediate GTT To Load Balance MSUs Across Two Or More Point Codes

This configuration describes the scenario shown in Figure 10.

**Figure 10** *Intermediate GTT Shared Across 2 Destinations*



This example is similar to the previous example except that instead of only 1 destination point-code a group of point-codes shall be used. For this example the mode (multiplicity) used to pick which point-code to choose from the group is **shared**. This means that all SCCP messages that matched the translation will be equally shared across the available destinations in the group in a round-robin fashion.

The MTP3 destination status is used to determine if the point code is available.

In Figure 10 the ITP on the left side of the illustration is required to act as an intermediate translation point to the mated pair of STPs, which handle all final translations to a HLR. In this case the ITP is required to share all GTT routed traffic for a range of digits between a mated pair of STPs (PC=158 and PC=166).

### Provisioning the ITP

To provision the ITP, perform the following steps:

- Step 1** Determine the criteria needed to select the appropriate translation table. For this example assume GTT selector criteria GTI=4, TT=0, NP=1, NAI=3. Also assume the appropriate selector already exists in the ITP GTT database.
- Step 2** Define a GTT application group representing the mated pair of STPs (PC=158, PC=166) in the intermediate/shared mode.
- Step 3** Determine the range of digits from the called party address (CDPA) that need to be routed to the application group containing PC=158 and PC=166. In this example assume that any digits matching the prefix 328 needs to be GTT routed to the application group.

## Configuring the ITP GTT Database

Once the above criteria are determined the following steps may be followed to configure the ITP GTT database:

**Step 1** Define a GTT application group representing the mated pair of STPs in the intermediate/shared mode:

| Command                                                            | Purpose                                                                                                            |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt application-group</b> <i>group-name</i> | Assigns an application group name and enables the CS7 GTT application-group submode for adding items to the group. |

Using the details of the example, the command would be:

```
Router(config)# cs7 gtt application-group intergroup1
```

**Step 2** Add the point-codes into the application group then exit application group submode:

| Command                                                                                          | Purpose                                                                  |
|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Router(config-cs7-gtt-app-grp)# <b>pc</b> <i>point-code</i> <i>cost</i> <i>routing-indicator</i> | Adds a point code, cost, and routing indicator to the application group. |
| Router(config-cs7-gtt-app-grp)# <b>exit</b>                                                      | Exits CS7 GTT application-group submode.                                 |

Using the details of the example, the commands would be:

```
Router(config-cs7-gtt-app-grp)# pc 158 1 gt
Router(config-cs7-gtt-app-grp)# pc 166 2 gt
Router(config-cs7-gtt-app-grp)# exit
```

The default mode for the group is share, which does not have to be changed for this example. In the shared mode, all items in an application group must be given a unique cost (1-8). In the shared mode the cost can be thought of as an item number. Should the mode be changed to a “cost” mode, the method for choosing the next destination would switch from a round-robin scheme to a least cost available algorithm. (The cost is ignored when the group is share, and share is the default.) An example of using the cost mode is not shown, but can be thought of as follows:

Instead of sharing all traffic between the items in the group, pick the least cost item (1 being the least) and choose it always if available. If the least cost item is not available, choose the next least cost available item and route to it. If no items are available, drop message and initiate error and measurement procedures.

**Step 3** Enter the submode configuration for the existing selector:

| Command                                                 | Purpose                                                      |
|---------------------------------------------------------|--------------------------------------------------------------|
| Router(config)# <b>cs7 gtt selector</b> <i>selector</i> | Enables the CS7 GTT selector submode for the given selector. |

Using the details of the example, the commands would be:

```
Router(config)# cs7 gtt selector c7gsp
```

After performing the above step, the CLI enters selector submode for configuring translations options within the selector. In this simple case only one translation needs to be added within the selector.

**Step 4** Configure the GTA within the selector:

| Command                                                             | Purpose                                              |
|---------------------------------------------------------------------|------------------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>gta gta result-type app-grp</b> | Names and configures the GTA for the given selector. |

Using the details of the example, the command would be:

```
Router(config-cs7-gtt-selector)# gta 328 app-grp intergroup1
```



**Note** The application group intergroup1 may be used by as many GTT rules as needed. Avoid creating application groups with the same items in them.

The above command can be referred to as a GTA rule. The rule states that the CDPA digits matching 328 will be routed to the application group “intergroup1.” Using an application group allows destinations to be modified, added, or deleted without impacting the GTA table.

**Step 5** Exit the submode and verify the data entered:

| Command                                                          | Purpose                                   |
|------------------------------------------------------------------|-------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>exit</b>                     | Exits CS7 GTT selector submode.           |
| Router(config)# <b>exit</b>                                      | Exits global configuration mode.          |
| Router# <b>show cs7 gtt gta selector [sgta sgta] [egta egta]</b> | Displays details about the specified GTA. |

Using the details of the example, the command and output would be:

```
Router# show cs7 gtt gta c7gsp
```

```

Selector Name   TT   GTI   NP   NAI   DFLTQOS   #GTAs
-----
c7gsp           0     4     1     3           2

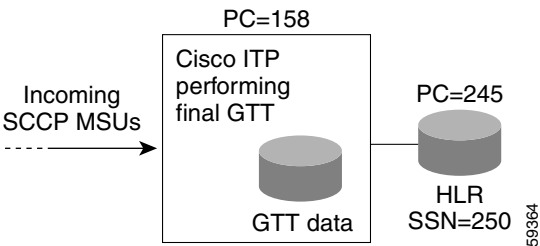
GTA             PC             RI     SSN   TT   App-Grp   QOS   ASname
-----
3330810         158             gt
328                                     intergroup1
```

To delete a GTT configuration, follow the rules in the “Rules For Removing GTT Configurations:” section on page 109.

## Configuring Final GTT To Route MSUs to a Solitary Point Code

This configuration describes the scenario shown in Figure 11.

**Figure 11** ITP performing Final GTT to a Solitary Point Code



This example is similar to the previous example in that a solitary point-code is used. However, this example involves final GTT rather than intermediate GTT from the previous 2 examples. The main difference in intermediate vs. final GTT is the resultant routing indicator of the outgoing/translated message. The ITP also makes use of the Subsystem status when choosing the destination.

In Figure 11 the ITP (PC=158) is required to perform final GTT to a HLR (PC=245/ SSN=250) for a specific range of digits from the CDPA. In this case the ITP is required to route all GTT traffic for the range of digits to an end node such as the HLR in this example.

### Provisioning the ITP

To provision the ITP, perform the following steps:

- Step 1** Determine the criteria needed to select the appropriate translation table. For this example assume GTT selector criteria GTI=4, TT=0, NP=1, NAI=3. Also assume the appropriate selector already exists in the ITP GTT database.
- Step 2** Determine the range of digits from the called party address (CDPA) that need to be routed to the HLR. In this example assume that any digits matching the prefix 3335114 needs to be GTT routed to the HLR.
- Step 3** Determine if the ITP should replace the SSN in the called party with SSN=250 or the ITP should rely on the proper SSN already being set in the CDPA. In this example the ITP will implicitly replace SSN=250 in the called party regardless of any existing SSN.

### Configuring the ITP GTT Database

Once the above criteria are determined the following steps may be followed to configure the ITP GTT database.

- Step 1** Enter the submode configuration for the existing selector:

| Command                                          | Purpose                                                                                                                    |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt selector selector</b> | Specifies the selector name and enables CS7 GTT selector submode for configuring translations options within the selector. |



Using the details of the example, the command would be:

```
Router(config)# cs7 gtt selector c7gsp
```

After performing the above step, the CLI enters selector submode for configuring translations options within the selector. In this simple case only one translation needs to be added within the selector.

**Step 2** Configure the GTA within the selector:

| Command                                                                                  | Purpose                                              |
|------------------------------------------------------------------------------------------|------------------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>gta gta result-type pc routing-indicator ssn ssn</b> | Names and configures the GTA for the given selector. |

Using the details of the example, the command would be:

```
Router(config-cs7-gtt-selector)# gta 3335114 pcssn 245 pcssn ssn 250
```

The above command can be referred to as a GTA rule. The rule states that the CDPA digits matching 3335114 will be routed to a point-code and subsystem. The point-code is 245 and the SSN=250. The resultant routing indicator shall be set to **pcssn**, indicating final GTT (route on point code and subsystem). Since the SSN was specified as 250, it will override any SSN that previously existed in the called party. Conversely if the SSN was not specified in this rule, the ITP would try to route to whatever subsystem existed in the CDPA.

**Step 3** Exit the submode and use the **show cs7 gtt** commands to verify the data entered:

| Command                                      | Purpose                                     |
|----------------------------------------------|---------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>exit</b> | Exits CS7 GTT selector submode.             |
| Router(config)# <b>exit</b>                  | Exits global configuration mode.            |
| Router# <b>show cs7 gtt gta gta</b>          | Displays details about the specified GTA.   |
| Router# <b>show cs7 gtt map</b>              | Displays details about the GTT MAP entries. |

Using the details of the example, the show command and output would be:

```
Router# show cs7 gtt gta c7gsp
```

```

Selector Name   TT   GTI   NP   NAI   DFLTQOS   #GTAs
-----
c7gsp           0     4     1     3           3

GTA             PC             RI     SSN   TT   App-Grp   QOS   ASname
-----
3330810         158             gt           ---   ---   ---   ---
3335114         245             pcssn  250           ---   ---
328                                     intergroup1

```

```
Router# show cs7 gtt map
```

```

PPC      PSSN  MULT  BPC           BSSN  ConPCLst   RRC  ADJ  Ref
245      250   sol   -----   ---           off  no    1

```

Table 4 describes the fields in the **show cs7 gtt map** display.

**Table 4**      *show cs7 gtt map Field Descriptions*

| Field    | Description                                                                                                                                                                                                                                                               |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PCC      | Primary Point Code                                                                                                                                                                                                                                                        |
| PSSN     | Primary Subsystem Number                                                                                                                                                                                                                                                  |
| Mult     | Multiplicity (load share mode)                                                                                                                                                                                                                                            |
| BPC      | Backup Point Code for Primary Point Code                                                                                                                                                                                                                                  |
| BSSN     | Backup Subsystem Number for Primary Subsystem Number                                                                                                                                                                                                                      |
| ConPCLst | Concerned point-code list name. Concerned point-code lists are created using the <b>cs7 gtt concern-pclist</b> command. All destinations in the list are notified when a subsystem status change occurs. Concerned point-code lists are optional for all GTT MAP entries. |
| RRC      | Reroute to backup if primary is congested Used to tell SCCP routing if the backup should be used when the primary is congested. Default is OFF.                                                                                                                           |
| ADJ      | Adjacency flag. Used to signify if a PC/SSN should be considered adjacent to local node in regards to SCCP management. Default is NO.                                                                                                                                     |
| Ref      | Reference Count. Indicates how many times a MAP entry is referenced by GTA or application group entries. A referenced MAP can not be removed.                                                                                                                             |

**Note**

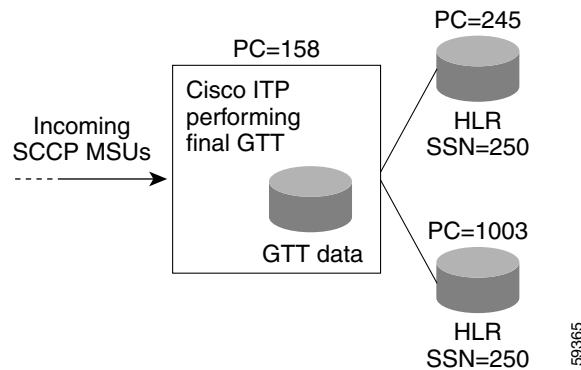
Whenever final GTT is provisioned with an explicit subsystem from a GTA entry such as the one for GTA=3335114, a GTT MAP (Mated Application) entry is required. The ITP will automatically create a solitary MAP as needed when the GTA entry is created. The GTT MAP entry is used internally by the ITP to manage the status of a subsystem. The operator could have pre-provisioned this MAP entry prior to configuring the GTT using the **cs7 gtt map** command. For an example where the MAP is provisioned prior to the GTA see the “Configuring Final GTT To Route MSUs to a Primary and Backup Point Code and SSN (Dominant Mode)” section on page 119. The MAP can also be used to define a mate point-code for the primary point-code. This is an alternative to using application-groups, which take up more memory.

To delete a GTT configuration, follow the rules in the “Rules For Removing GTT Configurations:” section on page 109.

## Configuring Final GTT To Route MSUs to a Primary and Backup Point Code and SSN (Dominant Mode)

This configuration describes the scenario shown in Figure 12

**Figure 12** Final GTT routed to a primary and backup PC/SSN



This example is similar to the previous example in that final GTT is being performed. However, this example involves final GTT using a customized GTT MAP entry where a backup PC and SSN are also utilized.

In Figure 12 the ITP (PC=158) is required to perform final GTT to a HLR (PC=245/ SSN=250) for a specific range of digits from the CDPA. Also suppose the HLR (PC=245) has a backup (PC=1003) in case of a failure. In this case the ITP is required to route all GTT traffic for a range of digits to the primary HLR if it is available. If the primary HLR becomes unavailable, the ITP is required to use the backup instead. This method of choosing the primary and backup subsystems is typically referred to as operating in the dominant mode.

### Provisioning the ITP

To provision the ITP, perform the following steps:

- Step 1** Determine the criteria needed to select the appropriate translation table. For this example assume GTT selector criteria GTI=4, TT=0, NP=1, NAI=3. Also assume the appropriate selector already exists in the ITP GTT database.
- Step 2** Determine the range of digits from the called party address (CDPA) that need to be routed to the HLR. In this example assume that any digits matching the prefix 339 needs to be GTT routed to the primary HLR (PC=245) if available or the backup HLR (PC=1003) if the primary is not available.
- Step 3** Determine if the ITP should replace the SSN in the called party with SSN=250 or the ITP should rely on the proper SSN already being set in the CDPA. In this example the ITP will implicitly replace SSN=250 in the called party regardless of any existing SSN.
- Step 4** Determine if a GTT MAP entry having the appropriate mode and backup criteria exists. For this example assume the GTT MAP entry does not exist and create it.

## Configuring the ITP GTT Database

Once the above criteria are determined, follow these steps to configure the ITP GTT database:

### Step 1 Enter the GTT MAP entry:

| Command                                                                      | Purpose                           |
|------------------------------------------------------------------------------|-----------------------------------|
| Router(config)# <b>cs7 gtt map</b> <i>ppc pssn [flags] mode [bpc] [bssn]</i> | Specifies the GTT MAP definition. |

Using the details of the example, the command would be:

```
Router(config)# cs7 gtt map 245 250 rrc dom 1003 250
```

The above command can be referred to as a GTT MAP definition. The definition dictates that PC=245 and SSN=250 is a primary application backed up in the dominant mode by PC=1003 and SSN=250. The rrc flag specifies that if the primary PC/SSN becomes congested we will re-route to the standby PC/SSN.

### Step 2 Enter the submode configuration for the existing selector:

| Command                                                 | Purpose                                                                                    |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt selector</b> <i>selector</i> | Enables CS7 GTT selector submode for configuring translations options within the selector. |

Using the details of the example, the command would be:

```
Router(config)# cs7 gtt selector c7gsp
```

In this simple case only one translation needs to be added within the selector.

### Step 3 Configure the GTA within the selector:

| Command                                                                                                 | Purpose                                   |
|---------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>gta</b> <i>gta result-type point-code routing-indicator ssn ssn</i> | Configure the GTA for the given selector. |

Using the details of the example, the command would be:

```
Router(config-cs7-gtt-selector)# gta 339 pcssn 245 pcssn ssn 250
```

The above command can be referred to as a GTA rule. The rule states that the CDPA digits matching 339 will be routed to a point-code and subsystem. The point-code is 245 and the SSN=250. The resultant routing indicator shall be set to 'pcssn' indicating final GTT (route on point code and subsystem). Since the SSN was specifically specified as 250, it will override any SSN that previously existed in the called party. Conversely if the SSN was not specified in this rule, the ITP would try to route to whatever subsystem existed in the CDPA. Since a GTT MAP entry was pre-defined and the PC=245 / SSN=250 exists in the GTT Mated Application entity set, a backup PC/SSN shall be used in the dominant mode with the rrc flag indicating re-route to backup if primary is congested.

### Step 4 Exit the submode and verify the data entered:

| Command                                      | Purpose                          |
|----------------------------------------------|----------------------------------|
| Router(config-cs7-gtt-selector)# <b>exit</b> | Exits CS7 GTT selector submode.  |
| Router(config)# <b>exit</b>                  | Exits global configuration mode. |

| Command                             | Purpose                                     |
|-------------------------------------|---------------------------------------------|
| Router# <b>show cs7 gtt gta gta</b> | Displays details about the given GTA.       |
| Router# <b>show cs7 gtt map</b>     | Displays details about the GTT MAP entries. |

Using the details of the example, the show command and output would be:

```
Router# show cs7 gtt gta c7gsp
```

```

Selector Name  TT  GTI  NP  NAI  DFLTQOS  #GTAs
-----
c7gsp          0   4   1   3           4

GTA            PC            RI  SSN  TT  App-Grp  QOS  ASname
-----
3330810        158            gt
3335114        245            pcssn 250
328                                intergroup1
339            245            pcssn 250

```

```
Router# show cs7 gtt map
```

```

PPC      PSSN  MULT  BPC      BSSN  ConPCLst  RRC ADJ  Ref
245      250   dom   1003     250           on  no   2

```



#### Note

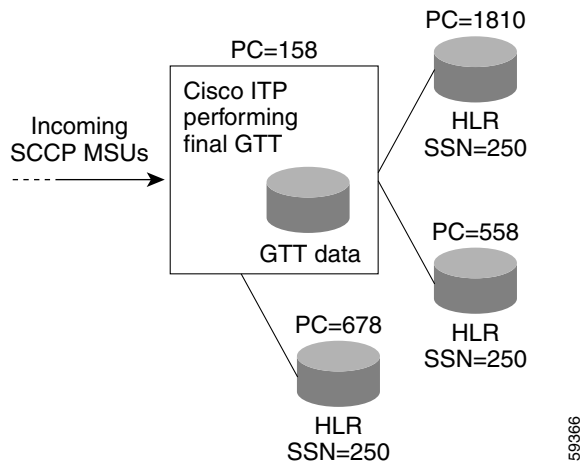
You can not delete any map entry that references another MAP entry. You must first change all entries that reference it to **sol** before you can delete the entry with the **no cs7 gtt map** command. To modify a MAP entry you must replace the entire command, including all keywords and arguments.

To delete a GTT configuration, follow the rules in the “Rules For Removing GTT Configurations:” section on page 109.

## Configuring Final GTT To Load Balance MSUs Across a Group of Point Codes and Subsystems

This configuration describes the scenario shown in Figure 13.

**Figure 13** *Final GTT Load Balanced Across Multiple PC/SSN Nodes*



This example is similar to the example shown in Figure 10 in that an application group name is being used rather than an explicit point-code or PC/SSN. However, this example involves final GTT instead of intermediate GTT.

In Figure 13 the ITP (PC=158) is required to perform final GTT to an application existing on multiple end nodes to reduce the CPU load at any given single node. In this case the ITP is required to share all GTT traffic for a range of digits between multiple end nodes (in this case 3 shall be used - maximum of 8 destinations possible).

### Provisioning the ITP

To provision the ITP, perform the following steps:

- Step 1** Define a GTT application group representing the 3 HLRs.
- Step 2** Determine the criteria needed to select the appropriate translation table. For this example assume GTT selector criteria GTI=4, TT=0, NP=1, NAI=3. Also assume the appropriate selector already exists in the ITP GTT database.
- Step 3** Determine the range of digits from the called party address (CDPA) that need to be routed to the HLR. In this example assume that any digits matching the prefix 900 needs to be GTT routed to the application group containing the 3 HLRs.
- Step 4** Determine if the ITP should replace the SSN in the called party with SSN=250 or the ITP should rely on the proper SSN already being set in the CDPA. In this example the ITP will implicitly replace SSN=250 in the called party regardless of any existing SSN.
- Step 5** Determine if GTT MAP entries for the 3 end nodes exist. For this example assume the 3 MAP entries already exist. Note: When final GTT is being performed with the use of application groups, the MAP entry is required for each PC/SSN, but the fields in the MAP entry such as the load share mode, bpc, bssn, and optional flags are ignored.

## Configuring the ITP GTT

Once the above criteria are determined, follow these steps to configure the ITP GTT database:

- Step 1** Define a GTT application group representing the 3 HLRs in the final/shared mode.

| Command                                                            | Purpose                                                                          |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt application-group</b> <i>group-name</i> | Defines the GTT application group and enables CS7 GTT application-group submode. |

Using the details of the example, the command would be:

```
Router(config)# cs7 gtt application-group finalgroup1
```

- Step 2** Add the point codes into the application group then exit the configuration submode for the application group:

| Command                                                                                                                | Purpose                                        |
|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Router(config-cs7-gtt-app-grp)# <b>pc</b> <i>point-code</i> <b>ssn</b> <i>ssn</i> <i>cost</i> <i>routing-indicator</i> | Adds the point codes to the application group. |
| Router(config-cs7-gtt-app-grp)# <b>exit</b>                                                                            | Exits CS7 GTT application-group submode.       |

Using the details of the example, the commands would be:

```
Router(config-cs7-gtt-app-grp)# pc 1810 ssn 250 1 pcssn
Router(config-cs7-gtt-app-grp)# pc 558 ssn 250 2 pcssn
Router(config-cs7-gtt-app-grp)# pc 678 ssn 250 3 pcssn
Router(config-cs7-gtt-app-grp)# exit
```

- Step 3** Enter the submode configuration for the existing selector:

| Command                                                 | Purpose                           |
|---------------------------------------------------------|-----------------------------------|
| Router(config)# <b>cs7 gtt selector</b> <i>selector</i> | Enables CS7 GTT selector submode. |

Using the details of the example, the commands would be:

```
Router(config)# cs7 gtt selector c7gsp
```

In this simple case only one translation needs to be added within the selector.

- Step 4** Configure the GTA within the selector:

| Command                                                                                     | Purpose                                    |
|---------------------------------------------------------------------------------------------|--------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>gta</b> <i>gta</i> <i>result-type</i> <i>group-name</i> | Configures the GTA for the given selector. |

Using the details of the example, the commands would be:

```
Router(config-cs7-gtt-selector)# gta 900 app-grp finalgroup1
```

The above command can be referred to as a GTA rule. The rule states that the CDPA digits matching 900 will be routed to the application group “finalgroup1.”

- Step 5** Exit the submode and verify the data entered:

| Command                                       | Purpose                                            |
|-----------------------------------------------|----------------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>exit</b>  | Exits CS7 GTT selector submode.                    |
| Router(config)# <b>exit</b>                   | Exits global configuration mode.                   |
| Router# <b>show cs7 gtt application-group</b> | Displays details about the GTT application groups. |
| Router# <b>show cs7 gtt gta gta</b>           | Displays details about the given GTA.              |

Using the details of the example, the show commands and their output would be:

```
Router# show cs7 gtt application-group
Application Group Name: finalgroup1
Multiplicity           : share
Ref Count              : 1
```

```
Application Identifier  RI      Cost
-----
PC=1810 SSN=250        pcssn   1
PC=558  SSN=250        pcssn   2
PC=678  SSN=250        pcssn   3
```

```
Router# show cs7 gtt gta c7gsp
```

```
Selector Name  TT  GTI  NP  NAI  DFLTQOS  #GTAs
-----
c7gsp          0   4   1   3           5

GTA            PC            RI      SSN  TT  App-Grp      QOS  ASname
-----
3330810        158            gt           ---  ---  ---
3335114        245            pcssn  250  ---  ---  ---
328                                ---  ---  ---  intergroup1
339            245            pcssn  250  ---  ---  ---
900                                ---  ---  ---  finalgroup1
```

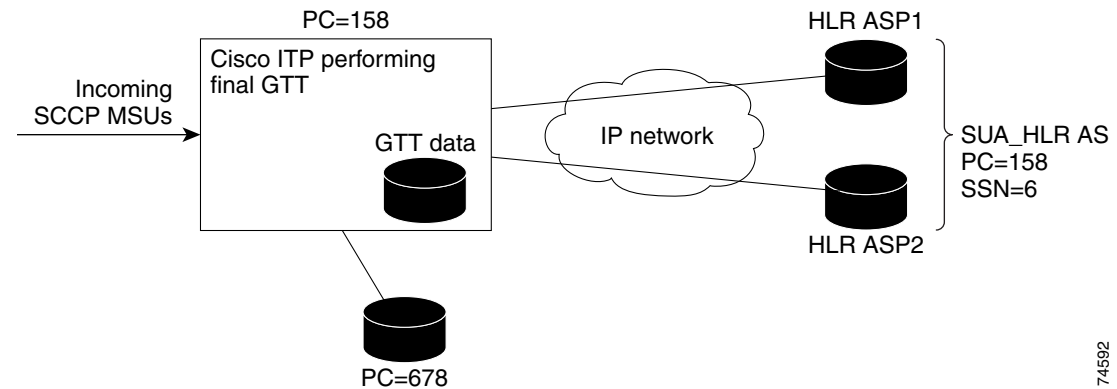
To delete a GTT configuration, follow the rules in the “Rules For Removing GTT Configurations:” section on page 109.



## Configuring Final GTT to an SUA AS with a Backup Point Code (Dominant Mode)

This configuration describes the scenario shown in Figure 14.

**Figure 14** Final GTT to an SUA AS with a Backup PC/SSN in SS7 Network



This example is similar to the previous example in that final GTT is being performed. However, this example involves final GTT directly to an SUA AS name with a backup PC and SSN located via an SS7 linkset.

In Figure 14 the ITP (PC=158) is required to perform final GTT to a primary HLR (PC=158/ SSN=6) for a specific range of digits from the CDPA. The primary HLR is composed of two SUA ASPs within an SUA AS in loadsharing mode. The routing key for the AS is sharing the ITP PC (PC=158) with an SCCP subsystem of 6.

The primary HLR (PC=158) has a backup (PC=678) in case of a failure. In this case, the ITP is required to route all GTT traffic for a range of digits to the primary HLR if it is available. If the primary HLR becomes unavailable, the ITP is required to use the backup HLR. This method of choosing the primary and backup subsystems is typically referred to as operating in the dominant mode, and is handled by using an application group.

### Provisioning the ITP

To provision the ITP, perform the following steps:

- Step 1** Define a GTT application group representing the two HLRs. Note that two ASPs implement the SUA HLR, but the GTT database sees only a single SUA AS.
- Step 2** Determine the criteria needed to select the appropriate translation table. For this example assume GTT selector criteria GTI=4, TT=0, NP=1, NAI=3. Also assume the appropriate selector already exists in the ITP GTT database.
- Step 3** Determine the range of digits from the called party address (CDPA) that need to be routed to the HLR. In this example assume that any digits matching the prefix 900 need to be GTT routed to the application group containing the 2 HLRs.
- Step 4** Determine if the ITP should replace the SSN in the called party with SSN=6, or if the ITP should rely on the proper SSN already being set in the CDPA. In this example, the ITP will explicitly write SSN=6 in the called party regardless of any existing SSN.

- Step 5** Determine if a GTT MAP entry exists for the SCP HLR. For this example, assume the MAP entry already exists. Note: When final GTT is being performed with the use of application groups, the MAP entry is required for each PC/SSN, but the fields in the MAP entry such as the load share mode, bpc, bssn, and optional flags are ignored.

## Configuring the ITP GTT

Once the above criteria are determined, follow these steps to configure the ITP GTT database:

- Step 1** Define a GTT application group representing the 2 HLRs in the final/shared mode.

| Command                                                            | Purpose                                                                          |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt application-group</b> <i>group-name</i> | Defines the GTT application group and enables CS7 GTT application-group submode. |

Using the details of the example, the command would be:

```
Router(config)# cs7 gtt application-group finalgroup1
```

- Step 2** Add the SUA AS name, and the backup HLR point code into the application group, and then exit the configuration submode for the application group:

| Command                                                                                     | Purpose                                               |
|---------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Router(config-cs7-gtt-app-grp)# <b>asname</b> <i>as-name cost ssn ssn routing-indicator</i> | Adds an SUA or M3UA AS name to the application group. |
| Router(config-cs7-gtt-app-grp)# <b>pc</b> <i>point-code ssn ssn cost routing-indicator</i>  | Adds a point code to the application group.           |
| Router(config-cs7-gtt-app-grp)# <b>exit</b>                                                 | Exits CS7 GTT application-group submode.              |

Using the details of the example, the commands would be:

```
Router(config-cs7-gtt-app-grp)# asname SUA_HLR 1 ssn 6 pc ssn
Router(config-cs7-gtt-app-grp)# pc 678 ssn 6 2 pc ssn
Router(config-cs7-gtt-app-grp)# exit
```

- Step 3** Enter the submode configuration for the existing selector:

| Command                                                 | Purpose                           |
|---------------------------------------------------------|-----------------------------------|
| Router(config)# <b>cs7 gtt selector</b> <i>selector</i> | Enables CS7 GTT selector submode. |

Using the details of the example, the commands would be:

```
Router(config)# cs7 gtt selector c7gsp
```

In this simple case only one translation needs to be added within the selector.

- Step 4** Configure the GTA within the selector:

| Command                                                                       | Purpose                                    |
|-------------------------------------------------------------------------------|--------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>gta</b> <i>gta result-type group-name</i> | Configures the GTA for the given selector. |

Using the details of the example, the commands would be:

```
Router(config-cs7-gtt-selector)# gta 900 app-grp finalgroup1
```

The above command can be referred to as a GTA rule. The rule states that the CDPA digits matching 900 will be routed to the application group “finalgroup1.”

**Step 5** Exit the submode and verify the data entered:

| Command                                       | Purpose                                            |
|-----------------------------------------------|----------------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>exit</b>  | Exits CS7 GTT selector submode.                    |
| Router(config)# <b>exit</b>                   | Exits global configuration mode.                   |
| Router# <b>show cs7 gtt application-group</b> | Displays details about the GTT application groups. |
| Router# <b>show cs7 gtt gta gta</b>           | Displays details about the given GTA.              |

Using the details of the example, the show commands and their output would be:

```
Router# show cs7 gtt application-group
```

```
Application Group Name: finalgroup1
Multiplicity           : cost
Ref Count              : 1
```

```

Application Identifier  RI      Cost    PCST    SST    CONGESTED    AS ST    AVAIL
-----
AS=SUA_HLR             pcssn  1                      avail
PC=678      SSN=6       pcssn  2                      avail

```

```
Router# show cs7 gtt gta c7gsp
```

```

Selector Name  TT  GTI  NP  NAI  DFLTQOS  #GTAs
-----
c7gsp          0   4   1   3           5

GTA            PC            RI      SSN  TT  App-Grp      QOS  ASname
-----
3330810        158            gt
3335114        245            pcssn  250
328                                intergroup1
339            245            pcssn  250
900                                finalgroup1

```

To delete a GTT configuration, follow the rules in the “Rules For Removing GTT Configurations.” section on page 109.

## Configuring Global Title Address Conversion



### Note

This section describes the tasks and commands for specifying Global Title Address (GTA) conversion mapping.

For information about specifying changes to Global Title fields when configuring the Instance Translation feature, see the “Configuring Global Title Conversion” section on page 74 of the “Configuring Multiple Instances and Instance Translation” chapter.

Global Title Address conversion tables are used to specify mappings such as E.212 to E.214 address conversion and E.212 to E.164 address conversion in ITU networks. Global Title Address conversion includes the following capabilities and functions:

- The address conversion process is applied to digits in the Called Party address, and is invoked when RI=GT.
- The address conversion process is separately configurable, allowing for variable length address and resultant digit string (up to a maximum of 15 digits).
- For ITU networks, the numbering plan and nature of address indicator values in the GTA may be changed.
- Global Title Address conversion tables can be stored on local or network hard media, just as the GTT entries are.
- Global Title Address conversion table updates are allowed during router operation.
- Global Title Address conversion can occur before and/or after GTT.
- Initially, conversion rules perform a best match on the defined input addresses. Upon a successful match, the input address is replaced with the resultant, or output, address. The addresses are stored in a radix tree with the input address as the key.

To define a address conversion table and enter GTT address conversion submode, use the following command in global configuration mode:

| Command                                                            | Purpose                                                                                                               |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt address-conversion</b> <i>tablename</i> | Specifies a GTT address conversion table name (1-12 characters) and enables CS7 GTT address conversion table submode. |

To define an input address and an output address, use the following commands in CS7 GTT address conversion table submode:

| Command                                                                                                                                                                                                                                                          | Purpose                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Router(config-cs7-gtt-conv-tbl)# <b>update</b> [ <b>in-address</b> <i>in-address</i> ] [ <b>nai</b> <i>nai</i> ] [ <b>np</b> <i>np</i> ] [ <b>out-address</b> <i>out-address</i> ] [ <b>np</b> <i>np</i> ] [ <b>nai</b> <i>nai</i> ] [ <b>es</b> <i>es-val</i> ] | Defines input and (optionally) output address entries. |

To define a new numbering plan for the entire table, use the following command in CS7 GTT address conversion submode:

| Command                                                 | Purpose                                                                                 |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Router(config-cs7-gtt-conv-tbl)# <b>np</b> <i>newnp</i> | Defines the new numbering plan value for the entire table. Only valid for ITU networks. |

To define a new nature of address for the entire table (in ITU networks only), use the following command in CS7 GTT address conversion submode:

| Command                                                    | Purpose                                                                                    |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Router (config-cs7-gtt-conv-tbl)# <b>nai</b> <i>newnai</i> | Defines the new nature of address value for the entire table. Only valid for ITU networks. |

After you have defined a GTA address conversion table, you can apply the table on a GTT selector basis. To specify the global title address conversion table to apply either prior to or after performing local global title translation, use either of the following commands in CS7 GTT selector submode:

| Command                                                                              | Purpose                                                                                                          |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>pre-gtt-address-conversion</b> <i>tablename</i>  | Specifies the global title address conversion table to apply prior to performing local global title translation. |
| Router(config-cs7-gtt-selector)# <b>post-gtt-address-conversion</b> <i>tablename</i> | Specifies the global title address conversion table to apply after performing local global title translation.    |

## Verifying Global Title Translations

After the ITP is configured with GTT data and the links come into service, you can determine if the GTT and routing are working properly. This section describes three methods for verifying GTT:

- GTT Measurements, page 129
- SCCP Accounting, page 130
- Subsystem Status, page 130

### GTT Measurements

You can display CS7 GTT measurements based on system, map, counters, selector, application-group, or line card.

To display a report for each PC/SSN combination, including the number of times it was used by a successful translation, use the following command in privileged EXEC mode:

| Command                                      | Purpose                                        |
|----------------------------------------------|------------------------------------------------|
| Router# <b>show cs7 gtt measurements map</b> | Displays a report for each PC/SSN combination. |

To display measurements kept on a Selector basis, use the following command in privileged EXEC mode:

| Command                                                               | Purpose                              |
|-----------------------------------------------------------------------|--------------------------------------|
| Router# <b>show cs7 gtt measurements selector</b> [ <i>selector</i> ] | Displays a report for each selector. |

To display measurements for the system, use the following command in privileged EXEC mode:

| Command                                         | Purpose                   |
|-------------------------------------------------|---------------------------|
| Router# <b>show cs7 gtt measurements systot</b> | Displays a system report. |

To display measurements for the application group, use the following command in privileged EXEC mode:

| Command                                                                | Purpose                                                      |
|------------------------------------------------------------------------|--------------------------------------------------------------|
| Router# <b>show cs7 gtt measurements application-group</b> <i>name</i> | Displays GTT measurements kept on a application group basis. |

To display measurements for the line card, (available only if MTP3 offload is enabled and only on the Cisco 7500 platform) use the following command in privileged EXEC mode:

| Command                                                                     | Purpose                                              |
|-----------------------------------------------------------------------------|------------------------------------------------------|
| Router# <b>show cs7 gtt measurements line-card</b> [ <i>line-card-num</i> ] | Displays GTT measurements kept on a line card basis. |

To reset all GTT measurements to 0, use the following command in privileged EXEC mode:

| Command                            | Purpose                           |
|------------------------------------|-----------------------------------|
| Router# <b>clear cs7 gtt -meas</b> | Resets all GTT measurements to 0. |

## SCCP Accounting

In addition to the GTT measurements that are kept on a system wide scale, Cisco ITP provides optionally configurable per linkset GTT accounting. In it's current implementation, GTT accounting provides a mapping between the linkset that packets come in on, the selector that they match, the GTA within that selector, and final translated point codes. This accounting is performed for successful GTT.

To display GTT accounting, use the following command in privileged EXEC mode:

| Command                                       | Purpose                                                           |
|-----------------------------------------------|-------------------------------------------------------------------|
| Router# <b>show cs7 accounting gtt-active</b> | Displays the real time status of each entry in the GTT MAP table. |

## Subsystem Status

The ITP SCCP application must process SCCP management messages to track the status of remote subsystems. A GTT MAP entry should be created for all remote subsystems the ITP will be routing to via GTT. The ITP provides a method for displaying the real time status for any remote subsystem entered in its database. To display the status of a remote subsystem use the keyword **stat** in conjunction with the **show cs7 gtt map** privileged EXEC command:

| Command                                       | Purpose                                                           |
|-----------------------------------------------|-------------------------------------------------------------------|
| Router# <b>show cs7 accounting gtt-active</b> | Displays the real time status of each entry in the GTT MAP table. |

The following sample output of the **show cs7 accounting gtt-active** command shows the real-time status of each entry in the GTT MAP table:

```
Router# show cs7 gtt map stat
PC          SSN    PCST   SST    CONGESTED
668         250    UNAVL  avail  -----
1003        250    avail  avail  -----
1008        250    avail  UNAVL  -----
2020        250    avail  avail  level 2
```

## Logging GTT Errors with the ITP Logging Facility

The ITP Logging Facility enables you to log GTT errors to a local or remote destination for post processing. The logging facility enables you to set an interval at which the log will be archived automatically or save the archive manually as you require. You can also display the current log as you require. These capabilities are shown in the following tasks. At the end of this section Tablex lists and describes GTT errors.

To enable the ITP to log GTT errors, use the **cs7 log** command in global configuration mode:

| Command                                                         | Purpose                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITP(config)# <b>cs7 log</b> <i>type size size</i>               | Enables logging, specifies the logging type, and defines the maximum number of entries in the log. The valid range is 0 to 100000. When the 100000 limit is reached, new entries will overwrite existing entries, starting from the first entry. |
| <b>Example:</b><br>ITP(config)# cs7 cs7 log gtt size<br>1000005 |                                                                                                                                                                                                                                                  |

To enable automatic archiving of a log to a remote or local destination, use the **cs7 log checkpoint** command in global configuration mode:

| Command                                                                              | Purpose                                                                           |
|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| ITP(config)# <b>cs7 log</b> <i>type checkpoint secs destination</i>                  | Enables archiving to a specified path and sets the archiving interval in seconds. |
| <b>Example:</b><br>ITP(config)# cs7 log gtt checkpoint<br>3600 tftp://10.1.1.2/logs/ |                                                                                   |

To save a log to a file, use the **cs7 log save** command in privileged EXEC mode:

| Command                                                                              | Purpose                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITP# <b>cs7 save log</b> <i>type destination</i>                                     | Detaches the current log from the active log process and saves it to a destination. New log entries that occur while the save is in progress are written to a new log file and are not lost. The logs are written in readable text format. |
| <b>Example:</b><br>ITP(config)# cs7 save log gtt<br>tftp://10.1.1.3/logs/gttlog1.txt |                                                                                                                                                                                                                                            |

To display a log, use the **show cs7 log** command in Privileged EXEC mode:

| Command                       | Purpose                   |
|-------------------------------|---------------------------|
| ITP# <b>show cs7 log type</b> | Displays the current log. |
| <b>Example:</b>               |                           |
| ITP# show cs7 log gtt         |                           |

## GTT Error Log

Table 5 lists and describes GTT Errors

**Table 5** *GTT Error Log*

| Error Text                                | Description                                                                                                                                                                 |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CdPA SSN does not exist in GTT MAP Table. | The ITP received an MSU requiring GTT routing for which the SSN in the called party was not configured in the ITP's GTT MAP table.                                          |
| Translated DPC unavailable.               | The ITP received an MSU requiring GTT routing for which the translated DPC in the ITP's GTT MAP table was marked as unavailable.                                            |
| Translated DPC congested.                 | The ITP received an MSU requiring GTT routing for which the translated DPC in the ITP's GTT MAP table was marked as congested.                                              |
| Translated SSN unavailable.               | The ITP received an MSU requiring GTT routing for which the translated DPC/SSN in the ITP's GTT MAP table was marked as SSN unavailable.                                    |
| Translated SSN congested.                 | The ITP received an MSU requiring GTT routing for which the translated DPC/SSN in the ITP's GTT MAP table was marked as SSN congested.                                      |
| CalledP GTI not valid.                    | The ITP received an MSU requiring GTT routing for which GTI in the SCCP called party was a value other than 2 or 4. These are the only supported values for GTI on the ITP. |
| CalledP missing SSN.                      | The ITP received an MSU requiring GTT routing for which the SSN in the called party was expected, but not present.                                                          |
| Invalid GT Type.                          | The ITP received a MSU destined to a local SSN of the wrong type.                                                                                                           |
| No translation configured.                | The ITP received an MSU requiring GTT routing for which no translation was configured in the GTT database.                                                                  |
| Invalid or unsupported message type.      | The ITP received an SCCP message with an unsupported or invalid msg type.                                                                                                   |
| Hop Counter expired.                      | The ITP received an MSU requiring GTT routing for which the hop counter was expired.                                                                                        |



**Table 5**      **GTT Error Log (continued)**

| Error Text                                    | Description                                                                                                                    |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Unqualified error.                            | The ITP received an MSU requiring GTT routing which resulted in error that could not be matched to any specific error message. |
| Unexpected MTP3 routing failure.              | SCCP tried to route traffic to MTP3 which resulted in an unexpected routing failure.                                           |
| Could not find corresponding GTT MAP entry.   | The ITP received an MSU requiring GTT routing, but could not find a corresponding GTT MAP entry to verify PC/SSN status.       |
| SCCP unavailable at translated DPC.           | The ITP received an MSU requiring GTT routing, but SCCP was marked as unavailable at remote node.                              |
| No member available in GTT Application Group. | The ITP received an MSU requiring GTT routing, but no member was found available in the resultant GTT application group.       |
| No matching GTT selector found.               | The ITP received an MSU requiring GTT routing, but no matching GTT selector was found in the GTT database.                     |
| Network indicator mismatch.                   | SCCP received an MSU, but the network indicator field did not match the variant configured.                                    |
| Instance conversion failed.                   | SCCP tried to route across instances, but instance conversion failed.                                                          |

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.

- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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# Configuring M3UA and SUA SS7 Over IP Signaling Gateways

The Cisco ITP Signaling Gateway (ITP SG) feature provides open-standards-based SS7 over IP solutions through the implementation of SIGTRAN MTP3-User Adaptation (M3UA) and SCCP User Adaptation (SUA) protocols.

## Feature History for M3UA and SUA SS7 over IP Signaling Gateways

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This feature was introduced. |

## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Information About M3UA and SUA ITP Signaling Gateways, page 136
- How to Configure Signaling Gateways, page 142
- Where to Go Next, page 149



### Note

Most of the commands that are shown in the configuration task sections of this chapter are described in detail in the “ITP Command Set” chapter. Some general IOS configuration commands are not included in the ITP Command Set chapter. For those commands, a footnote indicates the IOS document where more information can be found.

For a sample configuration showing the tasks described in this chapter, see the “ITP Signaling Gateway Configuration Examples” section on page 388 of the “ITP Configuration Examples” chapter.



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## Information About M3UA and SUA ITP Signaling Gateways

The Cisco ITP SG feature enables you to develop or deploy IP-based application servers without having to develop MTP layers and SCCP on the application server platform. The application server platform needs only to implement the MTP3 User Part or SCCP User Part appropriate for the application. The MTP layers and SCCP layer reside on the ITP SG.

The ITP SG is responsible for terminating and/or translating MTP/SCCP events on the SG. The translated event or the user part protocol data is sent to the application over the IP network.

SS7 network management messages are translated to M3UA, or SUA messages before being transferred to the application server. User part messages are encapsulated and transferred transparently to the application server.

The following sections provide an overview of the main components and features of the Cisco ITP SG:

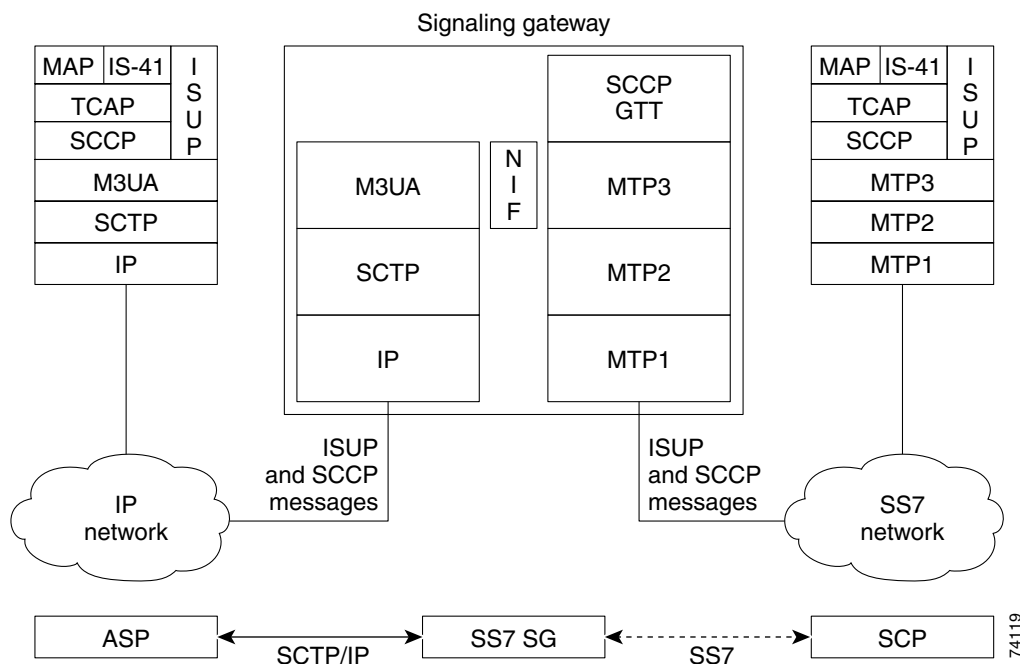
### M3UA

M3UA is a client/server protocol that provides a gateway to the legacy SS7 network for IP-based applications that interface at the MTP3 layer, such as ISDN User Part (ISUP) and Signaling Connection Control Part (SCCP). For M3UA, the user part can be ISUP for call setup applications or SCCP for TCAP/MAP and RANAP applications.

M3UA describes a transport mechanism for delivering SS7 MTP3-User Part messages as well as certain MTP network management events over SCTP transport to IP-based application processors or databases. The M3UA SG terminates the SS7 MTP2 and MTP3 protocol layers and delivers ISUP, SCCP and/or any other MTP3-User protocol messages. Protocol termination and translation and user part protocol encapsulations are done by the M3UA nodal inter-working function (NIF) on the SG. The NIF is the interface between MTP3 and M3UA.

Figure 15 depicts the relationship between the legacy SS7 Service Control Point (SCP), the M3UA SG, the IP-based Application Server Process (ASP), and the protocol stacks.

**Figure 15** M3UA Signaling Gateway Protocol Stacks



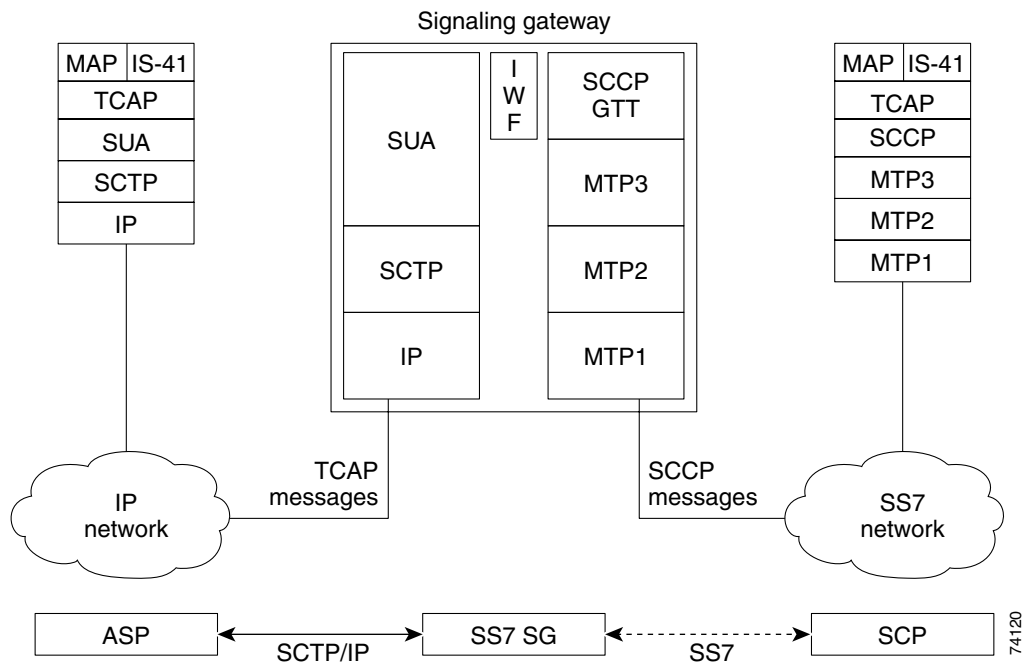
In Figure 15 the legacy SS7 SCP on the far right uses MTP1, MTP2, and MTP3 for transporting SCCP and ISUP messages into the network. The SG terminates the SS7 links, translates the MTP3 messages into M3UA messages, and transports them to the ASP over SCTP/IP. M3UA at the ASP delivers SCCP and ISUP messages.

## SUA

SUA is a client/server protocol that provides a gateway to the legacy SS7 network for IP-based applications that interface at the SCCP layer, such as TCAP, RANAP, etc. For SUA, the SCCP user part can be TCAP/MAP, RANAP, etc. The MTP layers and the SCCP layer reside on the SG.

SUA describes a transport mechanism for delivering SS7 SCCP-User Part messages as well as certain SCCP network management events over SCTP transport to IP-based application processors or databases. The SUA SG terminates the SS7 MTP2, MTP3, and SCCP protocol layers and delivers TCAP, RANAP and/or any other SCCP-User protocol messages. For SUA, the protocol termination and translation and user part protocol encapsulations are done by the SUA inter-working function (IWF) on the SG. The IWF is the interface between SCCP and SUA.

Figure 16 depicts the relationship between the legacy SS7 SCP, the SUA SG, the IP-based ASP, and the protocol stacks.

**Figure 16** SUA Signaling Gateway Protocol Stacks

In Figure 16 the legacy SS7 SCP on the far right uses MTP1, MTP2, and MTP3 for transporting SCCP messages into the network. The SG terminates the SS7 links, translates the SCCP messages into SUA messages, and transports them to the ASP over SCTP/IP. SUA at the ASP delivers TCAP messages.

## SGMP and Mated SGs

Two SGs can function as a mated pair and exchange necessary state information using the Signaling Gateway Mate Protocol (SGMP). SGMP is used to establish an association to the mated signaling gateway with an equivalent SG configuration.

The mated-pair SGs are used to loadshare and/or back up each other in failover scenarios. The mated SG can be used as a backup point code for cases when there is a failure of an association between this SG and the ASP.

When the SG mate association is active, the SG is informed of AS state changes on the mate in real time. When an AS becomes inactive, subsequent messages are rerouted to the mate if the corresponding AS on the mate is active.

When the AS on the original SG returns to active state, new messages are temporarily queued to allow in-transit messages from the mated SG to arrive at the ASP. Queued messages are released to the ASP upon expiration of an AS recovery timer.

The mated-pair SGs also exchange ASP binding information. This allows rerouted traffic that is bound to a specific ASP to continue uninterrupted even when the AS on the original SG returns to active state. The bound traffic continues to be rerouted through the SG mate to the bound ASP. The only exception is when the bound ASP becomes active on the original SG. In this case, the bound traffic begins flowing through the original SG to the same ASP, following a queueing period to allow in-transit messages to arrive at the ASP.

Mated-pair SGs must have equivalent SG configuration, including the same AS and AS Route Table routing-key definitions. However, the local point code of each SG must be unique and must not match the local point code, the capability point code, the secondary point code, any AS point code (dpc), or any AS Route Table point code configured on its mate.

## Application Server (AS)

An Application Server (AS) is a logical entity serving a specific Routing Key. An example of an Application Server is a virtual switch element handling all call processing for a unique range of PSTN trunks, identified by an SS7 DPC/OPC/CIC\_range. Another example is a virtual database element, handling all HLR transactions for a particular SS7 DPC/OPC/SCCP\_SSN combination. The AS implements a set of one or more unique Application Server Processes, of which one or more is normally actively processing traffic.

## Application Server Process (ASP)

An Application Server Process (ASP) is an IP-based instance of an application server, such as Call Agents, HLRs, SMSCs, etc.

An ASP may implement more than one AS.

## AS Route Table

An AS Route Table is a set of possible routes to a virtual point code (AS) in the IP network. Such a set consists of one or more ASes, and (optionally) the SG mate. Each route in an AS Route Table is prioritized, and equal priorities are disallowed.

Every route in an AS Route Table has a status of available, restricted, or unavailable.

Upon receipt at the SG, a message destined for an AS Route Table's virtual point code is mapped to the highest priority route that has a status of available or restricted. If the selected route is the route to the SG mate, the message is sent to the mate. Otherwise, the selected route is via an AS, and the message is sent to the ASP(s) selected using normal ASP selection rules.

## Point Code Assignment and Management

Special care must be taken when planning the assignment of point codes to ASes. The ITP SG feature allows point code assignment to ASes and ASPs as follows:

- An AS may be assigned the primary local point code or the secondary local point code owned by the ITP SG. The AS is sharing the point code with the ITP SG.
- An AS may be assigned a capability code or alias point code of the ITP SG. The AS is sharing the point code with the ITP SG's mated-pair.
- An AS may be assigned a unique point code not previously assigned to any of the SGs in the mated-pair.
- An ASP can be assigned a unique point code by being the only ASP in an AS that has been assigned a unique point code.

- All ASes or groups of ASes serviced by the ITP SG may share a given point code. Any group of ASes that shares the same point code is referred to as a Signaling Point Management Cluster (SPMC). Note that a M3UA AS and a SUA AS may share only one of the router's point codes (primary local, secondary local, or capability).

Assigning more than one AS the same point code can have significant affect on the ability of the ITP SG to report ASP, AS, user part, or subsystem outages or unavailability to the SS7 network.

## Routing Keys

A routing key describes a set of SS7 parameters that uniquely define the range of signaling traffic to be handled by a particular AS or AS Route Table. Thus, the routing key identifies an AS or an AS Route Table.

Possible routing keys assignments for an M3UA AS are:

- DPC and optionally OPC, SI, CIC range
- GTT only

Possible routing keys assignments for an SUA AS are:

- DPC and optionally OPC, SSN
- GTT only

Routing key assignments for all AS Routes are limited to DPC only.

The SG maps incoming SS7 messages to the appropriate AS or AS Route Table using the routing key table. Relevant fields of the incoming SS7 messages are compared to the existing routing keys. An AS is selected based on the best matching routing key. The routing keys are prioritized by matching gtt keys first, followed by the longest matching routing key at the highest layer in the protocol stack. An AS Route Table is selected based on a matching dpc.

## AS Load-sharing Support

The ITP M3UA and SUA SG features support the load-share redundancy model.

By default, the traffic-mode of the AS will be set to load-share if the first valid ASP Active message received from an ASP in the AS has the traffic mode type set to load-share. Any subsequent ASP Active message received from an ASP in the AS that does not have the traffic mode type set to load-share will be rejected.

The desire to enforce AS load-sharing is indicated by setting the traffic-mode type parameter under the AS configuration to load-share round-robin or load-share bindings. If the traffic mode type has been configured as load-share, then any ASP Active message received for an ASP in that AS containing a traffic mode parameter with the traffic mode type not set to load-share will be rejected.

The SG will perform either basic round-robin load sharing among the active ASPs in the AS or round-robin load sharing based on a load-share seed.

When basic round-robin load sharing is done, the first received MSU will be processed by the first active ASP in the list, the next MSU by the next active ASP in the list, and so on. When each ASP in the list has been sent an MSU, the distribution of subsequent MSUs will begin again with the first active ASP in the list.



A load-share seed is a parameter or a group of parameters in an MSU and is traffic-type dependent. For example, the seed could be the DPC/OPC/CIC combination, the SLS, etc. When load-sharing is based on a load-share seed all MSUs for an AS with the same seed value must be processed by the same ASP until that ASP becomes inactive. The association of a load-share seed with a specific ASP is referred to as a binding or having traffic bound to an ASP.

Binding is necessary to maintain the proper sequencing of MSUs or to ensure that all MSUs that are a part of the same transaction, procedure, or connection are processed by the same ASP. When an MSU is received the SG will first check to see if the load-share seed of the MSU has been bound to a specific ASP. If it has been bound to an ASP, the MSU will be directed to that ASP. If no binding was found, the SG will select and bind the load-share seed to an ASP from the list of active ASPs for the AS.

Default bindings are assigned sequentially to the ASP list in the AS, up to a maximum value equal to the sum of the ASP weights in the AS. The number of default bindings owned by a single ASP is equal to its weight. ASPs of weight 0 get no default bindings. When a message is received with an unbound load-share seed, it is assigned to the ASP that owns the default binding equal to  $(\text{received\_load-share\_seed}) \bmod (\text{total\_asp\_weight})$ . This loadshares all bound traffic according to the relative ASP weights within the AS. If the assigned ASP is inactive or congested, the binding is round-robin loadshared to another active ASP. If the owning ASP subsequently becomes active, the binding is reassigned to it, with an 800 msec queueing period to allow in-transit messages to arrive at the old ASP. If the new ASP becomes inactive during the queueing period, queued messages are processed as new bindings. When an ASP becomes inactive all bindings for that ASP are cleared.

Load sharing per traffic type is performed as follows:

- ISUP traffic: round-robin load sharing will be done with the DPC/OPC/CIC of the MSU as the load-share seed.
- SCCP class 0 traffic: basic round-robin load sharing will be done without regard to any parameters in the MSU.
- SCCP class 1 traffic: round-robin load sharing will be done with the SLS of the MSU as the load-share seed.

When an AS requires traffic to be bound to a specific ASP, ASPs in the AS may need to exchange state information to avoid transaction, procedure, or connection disruption in the event of ASP failure and subsequent traffic redistribution.

## AS Fail-over support

The ITP M3UA and SUA SG features support the over-ride or primary/back up redundancy model. By default, the traffic-mode type of an AS is specified dynamically as follows. If the traffic mode parameter under the AS was not configured, the traffic mode of the AS will be set to over-ride if the first valid ASP Active message received for an ASP in the AS indicates a traffic mode type of over-ride. Any subsequent ASP Active message received from an ASP in the AS that does not have the traffic mode type set to over-ride will be rejected.

The desire to enforce the operation of an AS in over-ride mode is indicated by configuring the traffic-mode type parameter under the AS to over-ride. If the traffic mode type has been configured as over-ride, any ASP Active received for an ASP in that AS that contains a traffic mode parameter with traffic mode type not set to over-ride will be rejected.

In the over-ride mode AS model, traffic for the AS is not load-shared. AS traffic is only sent to the active ASP in the AS. Only one ASP is active at a time. If ASP1 and ASP2 are in the same AS, and ASP1 is active when an ASP Active(over-ride) from ASP2 is received, ASP1 will be sent a NOTIFY(alternate-asp-active) message and be placed in the inactive state. ASP2 will be placed in active state and AS traffic will now be redirected to ASP2.

## SCCP Traffic Processing for M3UA

SCCP traffic to an M3UA AS PC can be sent to only one AS. If SCCP traffic must be split (for example, by SSN), then use SUA for the affected PC.

A Signaling Connection Control Part (SCCP) Management (SCMG) message for an M3UA AS PC will be routed according to normal routing key search and AS traffic mode rules. For a broadcast traffic mode AS, the SCMG message will be sent to all active ASPs in the AS. For an override traffic mode AS, the SCMG message will be sent to the active ASP. For a loadshare AS, the SCMG message will be sent to only one of the active ASPs in the AS. Broadcast or override mode is recommended if the ASPs in a loadshare AS do not share management information.

When an SCMG message is sent to one of the router's point codes (primary local, secondary local, or capability point code), the SCMG message is distributed to a M3UA AS if the AS PC is in the router's concerned point code list. In addition, the SCMG message is sent to M3UA ASes that share a point code with the router and all M3UA ASes with GTT routing keys.

## ITP SG Quality Of Service (QoS)



### Note

ITP Quality of Service (QoS) is described fully in the “Configuring ITP QoS” chapter. If you are unfamiliar with QoS, you are advised to refer to that chapter for more detail.

## How to Configure Signaling Gateways



### Note

IP routing is enabled on the ITP by default, and must not be disabled. Disabling IP routing can result in connection errors.

This section describes the following ITP SG configuration tasks:

- Performing Basic ITP Configuration, page 142
- Enabling and Disabling M3UA or SUA on the ITP SG, page 143
- Defining an SG Mated Pair, page 145
- Defining an Application Server Process (ASP), page 146
- Defining Application Servers (AS) and Routing Keys, page 147
- Defining an AS Route Table and Routing Key (M3UA Only), page 148

## Performing Basic ITP Configuration



### Note

Basic ITP configuration is described fully in the “Configuring ITP Basic Functionality” chapter. If you are unfamiliar with ITP basic configuration, you are advised to refer to that chapter for more details.

This section summarizes the basic ITP configuration tasks. To accomplish the basic ITP configuration, use the following commands in global configuration mode:

|               | Command                                                                                    | Purpose                                                        |
|---------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <b>Step 1</b> | Router(config)# <b>cs7 variant</b> {ansi   itu   china}                                    | Specifies which SS7 variant the router is running.             |
| <b>Step 2</b> | Router(config)# <b>cs7 national-options</b> {TFR   multiple-congestion}                    | Specifies ITU national options.                                |
| <b>Step 3</b> | Router(config)# <b>cs7 network-indicator</b> {international   national   reserved   spare} | Specifies this network indicator.                              |
| <b>Step 4</b> | Router(config)# <b>cs7 point-code format</b> 1-24 [1-23 [1-22]] <b>description</b> string  | Specifies the point code representation.                       |
| <b>Step 5</b> | Router(config)# <b>cs7 point-code delimiter</b> [dot   dash]                               | Specifies the delimiter between bits as either dots or dashes. |
| <b>Step 6</b> | Router(config)# <b>cs7 capability-pc</b> point-code                                        | Specifies the capability point code for the ITP.               |

## Enabling and Disabling M3UA or SUA on the ITP SG

Configuring M3UA or SUA on the ITP SG provides the definitions necessary for the ITP SG to accept connections from an ASP.

You may configure either M3UA, SUA, or both, as needed.

### Enabling M3UA and M3UA SCTP Offload

To use M3UA as a connectivity solution, you must configure the M3UA subsystem on the ITP SG.

First you must configure an M3UA local SCTP port on the ITP for inbound connections to use as their destination port. You may configure a local port number in the range 1024 to 65535. This port may not currently be configured for M2PA, SUA, or SGMP. (2905 is the well-known port for M3UA.)

After you configure an M3UA local port, you must configure at least one local IP address known to the ITP for use by M3UA. On the 7500 platform, you can use the **offload** keyword to offload M3UA SCTP processing to the VIP. This feature increases forwarding performance.

To configure an M3UA local port number and configure a local IP address for use by M3UA, use the following commands, beginning in global configuration mode:

| Command                                                                         | Purpose                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 m3ua</b> local-port-number [ <b>offload</b> slot-number] | Specifies a local port for inbound connections and enters CS7 M3UA submenu.                                                                                                                                                          |
| Router(config-cs7-m3ua)# <b>local-ip</b> ip-address                             | Configures a local IP address for use by M3UA. If you are configuring M3UA SCTP offload, the <b>local-ip ip-address</b> must be an IP address that was already configured on the VIP to which you are offloading this M3UA instance. |

## Disabling M3UA

To disable the local M3UA port, use the following command in CS7 M3UA submode:

| Command                                  | Purpose                                                                           |
|------------------------------------------|-----------------------------------------------------------------------------------|
| Router(config-cs7-m3ua)# <b>shutdown</b> | Disables this local port on the ITP SG and kills all associations with this port. |

There are several SCTP parameters that you can modify under the M3UA local instance. The tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Enabling SUA and SUA SCTP Offload

To use SUA as a connectivity solution, you must configure the SUA subsystem on the ITP SG.

First you must configure an SUA local SCTP port on the ITP for inbound connections to use as their destination port. You may configure a local port number in the range 1024 to 65535. This port may not currently be configured for M2PA, M3UA, or SGMP. (14001 is the well-known port for SUA.)

After you configure an SUA local SCTP port, you must configure at least one local IP address known to the ITP for use by SUA via the SCTP communications protocol. On the 7500 platform, you can use the **offload** keyword to offload SUA SCTP processing to the VIP. This feature increases forwarding performance.

To configure an SUA local port number and configure a local IP address for use by SUA, use the following commands, beginning in global configuration mode:

| Command                                                                                       | Purpose                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 sua</b> <i>local-port-number</i> [ <b>offload</b> <i>slot-number</i> ] | Specifies a local port for inbound connections and enters CS7 SUA submode.                                                                                                                                                               |
| Router(config-cs7-sua)# <b>local-ip</b> <i>ip-address</i>                                     | Configures a local IP address for use by SUA. If you are configuring SUA SCTP offload, the <b>local-ip</b> <i>ip-address</i> must be an IP address that was already configured on the VIP to which you are offloading this SUA instance. |

## Disabling SUA

To disable the local SUA port, use the following command in CS7 SUA submode:

| Command                                 | Purpose                                                                           |
|-----------------------------------------|-----------------------------------------------------------------------------------|
| Router(config-cs7-sua)# <b>shutdown</b> | Disables this local port on the ITP SG and kills all associations with this port. |

There are several SCTP parameters that you can modify under the SUA local instance. The tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Defining an SG Mated Pair

Two SGs can function as a mated pair and exchange necessary state information using the Signaling Gateway Mate Protocol (SGMP). SGMP is used to establish an association to the mated signaling gateway with an equivalent SG configuration.

The mated-pair SGs are used to loadshare and/or back up each other in failover scenarios. The mated SG can be used as a backup point code for cases when there is a failure of an association between this SG and the ASP.

When the SG mate association is active, the SG is informed of AS state changes on the mate in real time. When an AS becomes inactive, subsequent messages are rerouted to the mate if the corresponding AS on the mate is active.

When the AS on the original SG returns to active state, new messages are temporarily queued to allow in-transit messages from the mated SG to arrive at the ASP. Queued messages are released to the ASP upon expiration of an AS recovery timer.

Mated-pair SGs must have equivalent SG configuration, including the same AS and AS Route Table routing-key definitions. However, the local point code of each SG must be unique and must not match the local point code, the capability point code, the secondary point code, any AS point code (dpc), or any AS Route Table point code configured on its mate.

Configuring a QoS classification for the SG mated pair is optional.

To enable SGMP and define the link to the SG mate, use the following commands, beginning in global configuration mode:

| Command                                                                             | Purpose                                                                                                                                                           |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 sgmp</b> <i>local-port</i>                                   | Enable SGMP and specify the SGMP local port.                                                                                                                      |
| Router(config-cs7-sgmp)# <b>local-ip</b> <i>ip-address</i>                          | Configures a local IP address for use by SGMP.                                                                                                                    |
| Router(config-cs7-sgmp)# <b>exit</b>                                                | Return to Global configuration mode.                                                                                                                              |
| Router(config)# <b>cs7 mated-sg</b> <i>mate-name remote-port</i> [ <b>passive</b> ] | Define the mated SG name and remote port number and enable CS7 mated-sg submode. The passive keyword specifies no attempt to initiate the connection to the mate. |
| Router(config-cs7-mated-sg) <b>remote-ip</b> <i>remote-ip</i>                       | Specify the remote IP address of the Mate.                                                                                                                        |
| Router(config-cs7-mated-sg) <b>qos-class</b> <i>class</i>                           | Defines the QoS class for the SG mated pair.                                                                                                                      |

There are several SCTP parameters that you can modify under the M3UA local instance. The tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.



### Note

If you deploy ITPs in a mated-pair redundant configuration, you may optionally define a special IP-based cross link between the two ITPs. Although significant mated pair redundancy is achieved without a cross-link definition (node failures and single IP path failures do not require this definition), such a cross link increases overall availability by offering a routing path around the specific case where all IP connectivity between an ITP and ASP fails, but the mated-pair ITP has an available IP path to the ASP.

## Defining an Application Server Process (ASP)

Each ASP connecting to the ITP SG must be represented by an ASP definition. The ASP definition allows the ITP SG to validate the ASP IP address list and port number upon establishment of the SCTP association.

The ASP definition requires an ASP name that is used for configuration and monitoring only. The ASP name may be up to 12 characters long. The first character must be alphabetic. The name must not match any reserved keyword (such as m3ua, sua, all, operational, active, statistics, bindings, or detail).

The ASP definition also requires at least one of the remote IP addresses of the ASP, the remote SCTP port number, and the local port number that indicates the M3UA or SUA subsystem.

The combination of the remote port, remote IP, and local port must be unique for each configured ASP. If a remote port of 0 is configured, the ASP will match on any remote port (provided the remote IP and local port match).

Configuring a QoS classification is optional, as is specification of SCTP association parameter values.

To define an ASP, use the following commands, beginning in global configuration mode:

| Command                                                                                               | Purpose                                                     |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Router(config)# <b>cs7 asp</b> <i>asp-name remote-port local-port</i><br>[ <b>m3ua</b>   <b>sua</b> ] | Configures a CS7 ASP definition and enters CS7 ASP submode. |
| Router(config-cs7-asp)# <b>remote-ip</b> <i>remote-ip</i>                                             | Specifies the remote IP address of the ASP.                 |
| Router(config-cs7-asp)# <b>qos-class</b> <i>class</i>                                                 | Defines the QoS class for the ASP                           |
| Router(config-cs7-asp)# <b>match any qos-class</b> <i>class</i>                                       | Sets the match criteria.                                    |
| Router(config-cs7-asp)# <b>match si si qos-class</b> <i>class</i>                                     | Sets the serviced indicator match criteria.                 |

To block or to terminate the SCTP association with the ASP, use one of the following commands in CS7 ASP submode:

| Command                                 | Purpose                                                                                                                                                                                                                                          |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-asp)# <b>block</b>    | Allows a new SCTP association with this ASP, but doesn't let it become active. In other words, always rejects ASP-ACTIVE messages from the ASP. If block is set while the ASP is active, it is forced inactive (but the association remains up). |
| Router(config-cs7-asp)# <b>shutdown</b> | Terminates the SCTP association with this ASP. New SCTP associations will be rejected if the ASP is in shutdown mode.                                                                                                                            |

You can optionally allow the SUA ASP additional control in determining whether an SCCP UDT or XUDT message will be generated upon receiving a CLDT message. To enable the SUA to request that the SCCP layer generate an XUDT message if the ASP has provided either the IMPORTANCE or HOP\_COUNTER parameters within the CLDT message, use the following command in global configuration mode:

| Command                                                                                                | Purpose                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7</b> [ <b>instance</b> <i>instance-number</i> ]<br><b>sua-allow-xudt-request</b> | Enables the SUA to request that the SCCP layer generate an XUDT message if the ASP has provided either the IMPORTANCE or HOP_COUNTER parameters within the CLDT message. |

There are several SCTP parameters that you can modify under the ASP definition. The tasks and commands to tune timers and SCTP parameters are described in the of the “Verifying, Monitor, and Tuning ITP” chapter.

## Defining Application Servers (AS) and Routing Keys

Each ASP connecting to an ITP SG must be represented in an AS definition. The AS definition is used to properly route messages to the appropriate set of ASPs handling a particular routing key.

The AS definition requires a unique AS name that will identify the AS for configuration or monitoring. The AS name may be up to 12 characters long. The first character must be alphabetic. The AS name may not match a reserved keyword (such as m3ua, sua, all, operational, active, statistics, bindings, or detail).

The AS definition must indicate whether the AS is M3UA or SUA.

Configuring a QoS classification for the AS is optional.

To configure an AS definition, use the following command in global configuration mode:

| Command                                                                   | Purpose                                                   |
|---------------------------------------------------------------------------|-----------------------------------------------------------|
| Router(config)# <b>cs7 as</b> <i>as-name</i> [ <b>m3ua</b>   <b>sua</b> ] | Configures a CS7 AS definition and enters CS7 AS submode. |

Each ASP connecting to an ITP must have a routing key configured for each AS definition. The routing key defines the routing parameters used to send traffic to the ASP. Within the routing key, a routing context must be defined to identify traffic sent to and from a particular ASP. The routing context must be unique for each AS defined, but there is no other significance of the value chosen when pertaining to an ASP configuration.

To configure the AS routing key, use the following command in CS7 AS submode:

| Command                                                                                                                                                                                                                              | Purpose                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Router(config-cs7-as)# <b>routing-key</b> <i>rcontext</i> { <b>gtt</b>   <b>dpc</b> [ <b>opc</b> <i>pc pc-mask</i> ] [ <b>si</b> { <b>isup</b>   <b>sccp</b> }] [[ <b>cic</b> <i>cic-min cic-max</i> ]   [ <b>ssn</b> <i>ssn</i> ]]} | Defines the AS routing key. |

To associate the ITP AS and ASP definitions and, optionally specify weighted round-robin ASP distribution within an AS, use the following command in CS7 AS submode:

| Command                                                                           | Purpose                                 |
|-----------------------------------------------------------------------------------|-----------------------------------------|
| Router(config-cs7-as)# <b>asp</b> <i>asp-name</i> [ <b>weight</b> <i>weight</i> ] | Specifies the ASPs contained in the AS. |

You can optionally specify the traffic mode, QoS class, recovery timeout interval and burst recovery timeout interval. To configure these options, use the following commands, in CS7 AS submode:

| Command                                                                                                                                      | Purpose                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-as)# <b>traffic-mode</b> { <b>broadcast</b>   <b>loadshare</b> [ <b>bindings</b>   <b>roundrobin</b> ]   <b>override</b> } | Specifies the traffic mode of operation of the ASP within this AS. The default is loadshare bindings.               |
| Router(config-cs7-as)# <b>recovery-timeout</b> <i>msec</i>                                                                                   | Specifies the recovery timeout value, in milliseconds. The valid range is 1 to 2000 msec. The default is 2000 msec. |
| Router(config-cs7-as)# <b>burst-recovery-timeout</b> <i>msec</i>                                                                             | Specifies the amount of time allowed for an association to recover from a burst of traffic caused by failover.      |
| Router(config-cs7-as)# <b>qos-class</b> <i>class</i>                                                                                         | Defines the QoS class for the ASP.                                                                                  |

## Defining an AS Route Table and Routing Key (M3UA Only)

On the M3UA configuration only, you may optionally define a set of routes to a virtual point code within the IP network.

Each AS Route Table definition requires a unique name that will identify the AS Route Table for configuration or monitoring. The AS Route Table name may be up to 12 characters long. The first character must be alphabetic. The AS Route Table name may not match a reserved keyword (such as m3ua, sua, all, operational, active, statistics, bindings, or detail).



### Note

The **cs7 asroute** command is valid in the M3UA configuration only.

To name the AS Route Table, use the following command in global configuration mode:

| Command                                                | Purpose                                                                  |
|--------------------------------------------------------|--------------------------------------------------------------------------|
| Router(config)# <b>cs7 asroute</b> <i>asroute-name</i> | Specifies the AS Route Table name and enters CS7 AS Route Table submode. |

Each AS Route Table requires a routing key that uniquely defines the range of signaling traffic to be handled by a particular AS Route Table. The routing key definition is a routing-context number and a DPC.

The routing context number is an unsigned decimal number that uniquely identifies a routing key. This value is used internally and by the SG mate to associate messages with a specific AS Route Table.



The routing key routing context defined in the CS7 ASroute submode must be different from routing contexts used by other ASes and AS route tables. This context is used to communicate state information regarding the route with the mated ITP.

The DPC indicates the point code associated with this AS Route Table and routing key. The DPC must be unique. It cannot share the point code of the SG. Refer to “Point Code Assignment and Management” section on page 139 for more details on point code assignment.

To configure the AS Route Table routing key, use the following command in CS7 AS Route Table submode:

| Command                                                            | Purpose                                           |
|--------------------------------------------------------------------|---------------------------------------------------|
| Router(config-CS7-asroute)# <b>routing-key</b> <i>rcontext dpc</i> | Specifies the routing key for the AS Route Table. |

To add or delete routes via ASes or SG Mates to the AS Route Table, use the following commands in CS7 AS Route Table submode:

| Command                                                                                                                                         | Purpose                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-CS7-asroute)# <b>update route</b> { <b>as</b> <i>as_name</i>   <b>mated-sg</b> <i>mate_name</i> } <b>priority</b> <i>priority</i> | Associates an AS or SG Mate to this AS Route Table. To associate multiple ASes to this AS Route Table, repeat the command as needed. The priority value determines which active AS or SG Mate is used if multiple are available. Priority values range from 1 to 9, with 1 indicating the highest priority. The SG Mate should never be defined as the highest priority. |
| Router(config-CS7-asroute)# <b>remove route</b> { <b>as</b> <i>as_name</i>   <b>mated-sg</b> <i>mate_name</i> }                                 | Deletes AS or the SG Mate associated with this AS Route Table. This command will delete the ASP list associated with an AS name or the SG Mate from the AS Route Table definition.                                                                                                                                                                                       |

## Where to Go Next

You have completed the tasks specific to configuring the ITP SG. Depending on your configuration requirements, refer to the information provided in the following sections of this documentation:

- Defining Interfaces, Linksets, and Links

If you have not already done so, you must define interfaces, linksets, and links. The tasks for configuring ITP connectivity to the SS7 network are described in the chapter “Configuring ITP Basic Functionality,” beginning with the “Specifying the Interface and Encapsulation” section on page 52.

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.

- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The ITP Group feature, which provides inter-device redundancy, is described in the “Configuring ITP Group” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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# Configuring Gateway Screening

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Gateway Screening uses access lists to control access to or from the ITP.

## Feature History for Gateway Screening

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB2 | This feature was introduced. |

## Finding Support Information for Platforms and Cisco IOS Software Images

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## Contents

- Information About Gateway Screening, page 153
- How to Configure Gateway Screening, page 154
- Where to Go Next, page 154

## Information About Gateway Screening

Access lists filter traffic by controlling whether packets are forwarded or blocked at the router's interfaces. The router examines each packet to determine whether to forward or drop the packet, on the basis of the criteria you specified within the access lists.



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Typical gateway screening on an SS7 node allows you to permit or deny messages based on message characteristics. You can control access to or from the Cisco ITP by defining one or more access lists and then applying the access list to a linkset.

## SCCP Screening

SCCP screening is a method of screening MSUs on inbound and outbound linkset.

If the access list is inbound, when the ITP receives a packet it checks the access list criteria statements for a match. If the packet is permitted, the ITP continues to process the packet. If the packet is denied, the ITP discards it.

If the access list is outbound, after receiving and routing a packet to the outbound interface the ITP checks the access list criteria statements for a match. If the packet is permitted, the ITP transmits the packet. If the packet is denied, the ITP discards it.

## How to Configure Gateway Screening

Configuring Gateway Screening consists of defining an access list and applying it to a linkset definition.

### SUMMARY STEPS

1. **access-list**
2. **cs7 linkset**
3. **access-group**

### DETAILED STEPS

|               | Command or Action                                                                                                                                                                                                                                                                                                                                                                                                                         | Purpose                                                    |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <b>Step 1</b> | Router(config)# <b>access-list</b> <i>access-list-number</i> { <b>deny</b>   <b>permit</b> } [ <b>dpc</b> <i>point-code wildcard-mask</i>   <b>opc</b> <i>point-code wildcard-mask</i>   <b>si</b> { <b>0-15</b> }   <b>pattern</b> <i>offset hex-pattern</i>   <b>aftpc</b> <i>point-code wildcard-mask</i>   <b>cdpa</b> <i>point-code wildcard-mask</i>   <b>cgpa</b> <i>point-code wildcard-mask</i>   <b>selector</b>   <b>all</b> ] | Defines an access list.                                    |
| <b>Step 2</b> | Router(config)# <b>cs7 linkset</b> <i>ls-name adj-pc</i>                                                                                                                                                                                                                                                                                                                                                                                  | Specifies a linkset and enters linkset configuration mode. |
| <b>Step 3</b> | Router(config-cs7-ls)# <b>access-group</b> { <b>2700-2999</b>   <i>name</i> } [ <b>in</b>   <b>out</b> ]                                                                                                                                                                                                                                                                                                                                  | Applies the access list to the linkset.                    |

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.

- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
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  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
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# Multi-Layer SMS Routing and Screening

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The ITP Multi-Layer Routing (MLR) feature implements the routing of SMS messages based on information found in the Transaction Capability Application Part (TCAP), Mobile Application Part (MAP), and SMS layers.

## Feature History for Multi-Layer SMS Routing

| Release     | Modification                                           |
|-------------|--------------------------------------------------------|
| 12.2(4)MB10 | This feature was introduced.                           |
| 12.2(25)SW  | The Segmented SMS MO proxy function was added.         |
| 12.2(25)SW1 | Added support for saving MLR address tables to a file. |

## Finding Support Information for Platforms and Cisco IOS Software Images

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## Contents

- Information About Multi-Layer SMS Routing and Screening, page 158
- How to Configure MLR-Based Routing, page 160
- Configuration Examples of Multi-layer SMS Routing, page 170
- How to Configure MLR-Based Screening, page 172
- Verifying and Monitoring Multi Layer SMS Routing, page 175
- Where to Go Next, page 175



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# Information About Multi-Layer SMS Routing and Screening

Short Message Service (SMS) applications such as audience interaction services place a heavy demand on the capacity of the legacy SS7 infrastructure, as well as the SMSC servers. These applications create extremely high bursts of signaling traffic over a very short time span, which can result in denial of service and lost messages.

The ITP MLR feature enables intelligent routing of SMS messages based on the application or service from which they originated or to which they are destined. The MLR feature can make SMS message routing decisions based on information found in the TCAP, MAP, and MAP-user layers. For ITU TCAP and GSM-MAP, MLR supports routing on the following operations:

- MAP-MO-FORWARD-SM
- MAP-MT-FORWARD-SM
- SEND-ROUTING-INFO-FOR-SM
- MAP-ALERT-SERVICE-CENTRE

For ANSI TCAP and IS-41 MAP, MLR incorporates Mobile Directory Number (MDN) based SMS routing and supports routing on the following operations:

- Smdpp
- SmsRequest
- SmsNotify

The Segmented SMS MO proxy feature extends the ITP MLR capabilities by allowing segmented MAP version 2 or higher GSM SMS MO dialogues to be routed based on application-layer parameters such as the destination SME address. Functionally, this allows new SMS applications that require larger message sizes (approximately 70% of the available user payload) to be routed to the appropriate SMSC or application server based on an application-layer parameter such as the B-address. Without the implementation of this feature, all segmented SMS MO messages are routed to one or more destination SMSCs based only on SCCP CgPA and SCCP CdPA addressing.

ITP MLR-based screening enables the blocking of incoming SS7 traffic based on the originating SCCP CgPA and SCCP CdPA destination, including the global title address (gta). MLR screening also enables blocking on the basis of SCCP CdPA global title digits and the MAP operation codes MAP-MO-FORWARD-SM, MAP-MT-FORWARD-SM, and SEND-ROUTING-INFO-FOR-SM. This allows the blocking of short message transactions from a specific originating global title.

## Multi-Layer SMS Routing Triggers and the Multi-layer Routing Table

High performance routing of legacy SS7 traffic is a key component of the Multi-layer SMS routing feature. It is achieved through the configuration of routing triggers that optimize route table lookup and destination processing.

The multi-layer SMS routing table contains the information necessary to efficiently block or route GSM SMS messages. The table contains a set of triggers that identify the SCCP-network layer parameters. Each specified trigger contains a set of rules that identify a set of input SMS messages, and identify the resulting destination SMSC that will process the message. The rules specify the key SMS routing parameters found above the network layer.

If the multi-layer routing table is configured, then SCCP invokes the multi-layer routing utility to match the inbound MSU with one of the triggers specified in the table. If a trigger is matched, then the packet is further parsed at the application layers. If a rule is matched, then the packet will be routed to the selected destination (e.g., SMSC) address, using local GTT if necessary.

## Trigger Search Order

It is possible that a message may match to more than one primary trigger since a primary trigger can be either CdPa or CgPa based. CdPa matches are attempted before CgPa matches. The lookup mechanism for GT-based primary triggers is the GTT table, while the lookup mechanism for PC/SSN based primary triggers is the GTT MAP table. Once a primary trigger is matched, the secondary triggers are searched sequentially in the order defined until a match is found.

Table 6 describes the Multi-layer routing trigger types and their function.

**Table 6**            **Multi-Layer Routing Trigger Types**

| Trigger Type            | Function                                                                                                                                                                                                                                                                           |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SCCP Global Title       | The received packets arrive into SCCP with RI=GT and a specific range of global titles. The primary routing trigger for SMS MO traffic is the CdPA destination SMSC E.164 address. The originating MSC address, which is found in the CgPA, may also be used as a routing trigger. |
| SCCP Point Code and SSN | The received packets arrive into SCCP with RI=PC/SSN. For example, SMS MO traffic for which the MSC/STP has performed final GTT will arrive destined for the ITP PC and SMSC SSN.                                                                                                  |
| Global Configuration    | All traffic received will be checked for Multi-layer SMS routing, provided that a routing table is defined.                                                                                                                                                                        |
| Combination Triggers    | A combination of two mutually exclusive SCCP CdPA and CgPA trigger types may be specified to form a trigger match. This allows packets destined to the same SMSC from different MSCs to be handled by different routing tables.                                                    |

## Destination Selection

A match in the multi-layer routing table will map to one of the following:

- A single point-code.
- An M3UA or SUA application server name. Upon selection, the message is routed to the AS which may be composed of multiple ASPs.
- A multi-layer result table. This table will provide the set of possible results along with the associated algorithm used to select among the results. This table is independent of the global title translation function, but uses PC and SSN state to route to available destinations.
- A global title address. Upon selection, the SCCP global title translation function will be invoked for the specified address. This address may then map to an application group consisting of multiple destinations.

## Weighted Round Robin Distribution

A weighted round-robin (WRR) distribution algorithm properly balances SMS workload to servers of varying capacity. Each server within a result group (application group or multi-layer result table) is assigned a server weight from 0 to 10. The value of 0 indicates that the server is a backup, and should only be used when all of the servers in the group with a non-zero weight have failed.

## How to Configure MLR-Based Routing

To enable the Multi-Layer SMS routing feature, perform the configuration tasks described in the following sections:

- Define the Multi-layer Result Group, page 160
- Creating and Managing Address Tables, page 161
- Define One or More Multi-layer SMS Rulesets, page 167
- Define the Multi-Layer SMS Routing Table, page 169

## Define the Multi-layer Result Group

With this task you identify a group of destination resources to process traffic that will be routed based on multi-layer information. The result group lists the appropriate destination resources and the mechanism used to select a single destination for a given packet. State information is determined for each possible destination. Congested resources are used only if no available, non-congested destinations exist. Only available destination are considered for routing.

To define the Multi-layer result group, perform the following steps, beginning in global configuration mode:

| Command                                                                                                        | Purpose                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7</b> [ <b>instance</b> <i>instance-number</i> ] <b>mlr result</b> <i>name</i>            | This command enables the MLR results configuration mode.                                                                                                                                                      |
| Router(cfg-cs7-mlr-result)# <b>asname</b> <i>as-name</i> [ <b>weight</b> <i>weight</i> ]                       | Specifies a particular destination M3UA or SUA application server. The application server should already be defined, and its state is extracted from the SUA or M3UA routing layer for availability purposes. |
| Router(cfg-cs7-mlr-result)# <b>pc</b> <i>dest-pc</i> [ <b>ssn</b> <i>ssn</i> ] [ <b>weight</b> <i>weight</i> ] | Specifies a destination point code. The destination point code must exist in the MTP3 routing table; its state is extracted from MTP3 for availability purposes.                                              |

# Creating and Managing Address Tables

This section discusses the configuration, storage, and retrieval of lists of addresses that can be used for blocking or routing SMS messages.

MLR address tables can be stored in either NVRAM on the IOS platform or in a file that typically would be stored in flash. NVRAM limitations on some platforms might restrict the number off address entries that can be stored there. In this case, the file storage option is recommended.

This section includes 3 tasks:

- Creating and Loading an Address Table File Using the CLI, page 161
- Creating and Loading a Stored Address Table File, page 164
- Replacing an Address Table File, page 167

## Creating and Loading an Address Table File Using the CLI

In this task you use the CLI to configure address table entries that you plan to save to an external file. You then specify a location from which you will load the file of address table entries upon reboot. Finally you save the address entries to a an external file.

### SUMMARY STEPS

1. **cs7 mlr address-table** *tablename*
2. **addr** *address* [**exact**] [**result** {**asname** *asname* | **block** | **continue** | **group** *group-name* | **pc** *dest-pc* [**ssn** *ssn*] | **gt** *addr-string* [**tt** *tt* **gti** {**2** | **4** **np** *np* **nai** *nai*}}]]]
3. **load** *URL*
4. **exit**
5. **cs7 save address-table mlr** *tablename url*

### Detailed Steps

| Command or Action |                                                                       | Purpose                                                                                                                                                                       |
|-------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1            | <b>cs7 mlr address-table</b> <i>tablename</i>                         | Identifies the name of the address table. This name is used to identify the address table from within MLR ruleset commands. Enables CS7 MLR address table configuration mode. |
|                   | <b>Example:</b><br>ITP(config)# <b>cs7 mlr address-table</b> addrtbl1 |                                                                                                                                                                               |

## Step 2

| Command or Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>addr</b> <i>address</i> [<b>exact</b>] [<b>result</b> {<i>asname asname</i>   <b>block</b>   <b>continue</b>   <b>group</b> <i>group-name</i>   <b>pc</b> <i>dest-pc</i> [<b>ssn</b> <i>ssn</i>]   <b>gt</b> <i>addr-string</i> [<b>tt</b> <i>tt</i> <b>gti</b> {<b>2</b>   <b>4</b> <b>np</b> <i>np</i> <b>nai</b> <i>nai</i>}]}]</p> <p><b>Example:</b></p> <pre>ITP(cfg-cs7-mlr-addr-table)# addr 1111 exact result group grp1</pre> <pre>ITP(cfg-cs7-mlr-addr-table)# addr 1800 result gt 12341234 tt 11 gti 4 np 1 nai 2</pre> | <p>Configures one or more addresses in the address table.</p> <p><b>exact</b> specifies that the configured address must match exactly.</p> <p><b>result</b> indicates that the address will be handled in one of the following ways:</p> <div>  <p><b>Note</b> If a rule contains multiple table-based parameters (such as <i>dest-sme-table</i>, <i>orig-sme-table</i>, or <i>orig-imsi-table</i>), then any result configured on an <i>addr</i> entry of an address-table is ignored.</p> </div> <ul style="list-style-type: none"> <li>• <b>block</b> indicates that the message will be rejected.</li> <li>• <b>continue</b> indicates that message processing will continue.</li> <li>• <b>rule</b> <i>rule-number</i> indicates that routing should proceed with a specified target rule number.</li> <li>• <b>group</b> <i>group-name</i> indicates that the message will be routed according to a named result-group.</li> <li>• <b>pc</b> <i>dest-pc</i> indicates that the message will be routed according to a specified point code.</li> <li>• <b>ssn</b> <i>ssn</i> indicates an ssn associated with the point code.</li> <li>• <b>gt</b> <i>addr-string</i> indicates a global title result and address.</li> <li>• <b>tt</b> <i>tt</i> specifies a translation type in the range 0 to 255.</li> <li>• <b>gti</b> {<b>2</b>   <b>4</b>} specifies a global title indicator. (2 is primarily used in the ANSI domain; 4 in the ITU domain.)</li> <li>• <b>np</b> <i>np</i> specifies a numbering plan value in the range 0 to 15.</li> <li>• <b>nai</b> <i>nai</i> specifies a nature of address indicator in the range 0 to 127.</li> </ul> |

|        | Command or Action                                                                                                                                               | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 3 | <p><b>load</b> <i>URL</i></p> <p><b>Example:</b><br/> ITP(cfg-cs7-mlr-addr-table)# load<br/> disk0:mlraddrtbl</p>                                               | <p>(Optional) Specifies an address table file to load at startup.</p> <ul style="list-style-type: none"> <li>• bootflash: URL to load</li> <li>• cs7: URL to load</li> <li>• disk0: URL to load</li> <li>• disk1: URL to load</li> <li>• flash: URL to load</li> <li>• ftp: URL to load</li> <li>• null: URL to load</li> <li>• nvram: URL to load</li> <li>• rcv: URL to load</li> <li>• slavebootflash: URL to load</li> <li>• slavedcfs: URL to load</li> <li>• slavedisk0: URL to load</li> <li>• slavedisk1: URL to load</li> <li>• slavenvram: URL to load</li> <li>• slavercsf: URL to load</li> <li>• slaveslot0: URL to load</li> <li>• slaveslot1: URL to load</li> <li>• slot0: URL to load</li> <li>• slot1: URL to load</li> <li>• system: URL to load</li> <li>• tftp: URL to load</li> </ul> |
| Step 4 | <p><b>exit</b></p> <p><b>Example:</b><br/> ITP(cfg-cs7-mlr-addr-table)# exit</p>                                                                                | Exit to global configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Step 5 | <p><b>cs7 save address-table mlr</b> <i>tablename url</i></p> <p><b>Example:</b><br/> ITP(config)#cs7 save address-table mlr addrtbl1<br/> disk0:mlraddrtbl</p> | Saves the address table to an external location and file (url).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## Creating and Loading a Stored Address Table File

Address tables are typically created and stored to a file using the CLI. However, you may also create address tables externally from the ITP and then read the file into the ITP. For users interested in this option, the format for ITP address table files is specified below.

In this task you use any text editor to create a file of addresses. When you configure the ITP, you specify the table name and the location from which you will load the file of address table entries upon reboot. If necessary, you can add addresses to the file using the CLI. If you do add address entries, you must save the address table in order to have the updated list of addresses load upon reboot.

Each line in an address file must follow the following format:

*line-identifier,token1,[token-n+1],[token-n+2], ... [token-n+x]]eol*

Where line-identifier identifies the mandatory and optional tokens on a line and to which entity the line applies. All tokens are order dependant and follow the order specified in Table 7.

Table 7 lists the supported line identifiers for address tables and lists the syntax for each line.

**Table 7** *Line Identifiers*

| Line Identifier | Description                                                      | Syntax                                                                 |
|-----------------|------------------------------------------------------------------|------------------------------------------------------------------------|
| <b>ver</b>      | Specifies the version, variant, instance, network name and type. | <i>major,minor,variant,[instance],[network-name],type</i>              |
| <b>mlr</b>      | Specifies an MLR address table entry                             | <i>addr-tbl-name,address,result-id,[result-value],[result-options]</i> |
| <b>!</b>        | Specifies a comment. Not parsed.                                 |                                                                        |

Table 8 describes and lists the values all of the tokens listed in Table 7.

**Table 8** *Token Identifiers*

| Token                 | Description                                                                                                     | Supported Value(s)                      |
|-----------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <i>major</i>          | Indicates the major version associated with the file.                                                           | 1                                       |
| <i>minor</i>          | Indicates the minor version associated with the file.                                                           | 0                                       |
| <i>instance</i>       | If the address-table file is associated with a particular instance, this field is used to convey that instance. | 0 - 7                                   |
| <i>variant</i>        | Specifies the variant associated with a particular file.                                                        | ANSI, ITU, TTC                          |
| <i>network-name</i>   | User-specified network name associated with the instance.                                                       | Alphanumeric string. 1 - 19 characters. |
| <i>addr-tble-name</i> | User-specified name identifying the address table where the entry belongs.                                      | Alphanumeric string. 1 - 12 characters. |
| <i>address</i>        | User-specified address.                                                                                         | Hexadecimal string. 1 - 20 digits.      |



**Table 8**      **Token Identifiers (continued)**

| Token                 | Description                                                                                         | Supported Value(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>result-id</i>      | Identifies the result type configured by the user.                                                  | <b>as</b> Result is an asname.<br><b>bl</b> Result is to block address.<br><b>cn</b> Result is to continue.<br><b>gr</b> Result is a group.<br><b>pc</b> Result is a pc.<br><b>pcssn</b> Result is a pc and ssn.<br><b>gt</b> Result is a gt address and selector                                                                                                                                                                                                                          |
| <i>result-value</i>   | The result value of the MLR entry. The contents are dictated by the result identifier. See Table 9. | Possible result values: <ul style="list-style-type: none"> <li>• Variable length string if result identifier is <b>as</b> or <b>gr</b>.</li> <li>• Null if result identifier is <b>bl</b> or <b>cn</b>.</li> <li>• Hexadecimal point code if result is <b>pc</b>.</li> <li>• Hexadecimal point code and decimal ssn if result is <b>pcssn</b>.</li> <li>• Variable length digit string, decimal <i>tt</i>, <i>gti</i>, <i>np</i>, and <i>nai</i> values if result is <b>gt</b>.</li> </ul> |
| <i>result-options</i> | User-configured option applied to entry.                                                            | Ex    Specifies exact match.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

Table 9 lists the MLR result value tokens listed in Table 8.

**Table 9**      **MLR Result Identifier Syntax**

| Result Identifier | Result Value Syntax                      | Supported Value(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>bl</b>         |                                          | null                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>cn</b>         |                                          | null                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>gr</b>         | <i>group-name</i>                        | Alphanumeric string. 1 - 12 characters.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>gt</b>         | <b>gt:gt-tt:tt-gti:gti-np:np-nai:nai</b> | <i>gt</i> Hexadecimal digit string. 1 to 15 digits.<br><i>tt</i> Decimal value in range 0 255<br>ANSI defaults to 10.<br>ITU defaults to 0.)<br><i>gti</i> 2 or 4.<br>ANSI defaults to 2.<br>ITU defaults to 4.<br><i>np</i> Decimal value in range 0 - 15.<br>For gti=2, use 253 to indicate invalid.<br>ANSI defaults to 253.<br>ITU defaults to 1.<br><i>nai</i> Decimal value in range 0 - 127<br>For gti=2, use 253 to indicate invalid.<br>ANSI defaults to 253.<br>ITU defaults to 4. |
| <b>pc</b>         | <i>pc</i>                                | Hexadecimal point code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>pcssn</b>      | <i>pc-ssn</i>                            | <i>pc</i> Hexadecimal point code.<br><i>ssn</i> Decimal value in range 2 - 255.                                                                                                                                                                                                                                                                                                                                                                                                              |

## SUMMARY STEPS

1. Create a file of addresses following the format and syntax described in the above tables.
2. `cs7 mlr address-table tablename`
3. `load URL`

## Detailed Steps

|        | Command or Action                                                                                                                      | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Create a file of addresses, following the format and syntax described in Tables 1 - 4.                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Step 2 | <code>cs7 mlr address-table <i>tablename</i></code><br><br><b>Example:</b><br><code>ITP(config)# cs7 mlr address-table addrtbl1</code> | Identifies the name of the address table. This name is used to identify the address table from within MLR ruleset commands. Enables CS7 MLR address table configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Step 3 | <code>load <i>URL</i></code><br><br><b>Example:</b><br><code>ITP(cfg-cs7-mlr-addr-table)# load<br/>disk0:mlraddrtbl</code>             | (Optional) Specifies an address table file to load at startup. <ul style="list-style-type: none"> <li>• bootflash: URL to load</li> <li>• cs7: URL to load</li> <li>• disk0: URL to load</li> <li>• disk1: URL to load</li> <li>• flash: URL to load</li> <li>• ftp: URL to load</li> <li>• null: URL to load</li> <li>• nvram: URL to load</li> <li>• rcp: URL to load</li> <li>• slavebootflash: URL to load</li> <li>• slavecdfs: URL to load</li> <li>• slavedisk0: URL to load</li> <li>• slavedisk1: URL to load</li> <li>• slavenvram: URL to load</li> <li>• slavercsf: URL to load</li> <li>• slaveslot0: URL to load</li> <li>• slaveslot1: URL to load</li> <li>• slot0: URL to load</li> <li>• slot1: URL to load</li> <li>• system: URL to load</li> <li>• tftp: URL to load</li> </ul> |

## Replacing an Address Table File

You can replace an existing address table. The replacement does not impact routing until the entire replacement address table is loaded successfully. If an error occurs, the old address table (if present) remains intact. Each time an address table is replaced, the corresponding **load** command is added to the running configuration.

### SUMMARY STEPS

1. **cs7 address-table replace mlr** *tablename url*

### Detailed Steps

|        | Command or Action                                                                                                                                           | Purpose                                                         |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Step 1 | <b>cs7 address-table replace mlr</b> <i>tablename url</i><br><br><b>Example:</b><br>ITP(config)# cs7 address-table replace mlr<br>addrtbl1 disk0:mlraddrtbl | Replaces an existing address table with one specified in a URL. |

## Examples

The following example shows three address tables. Two of the address tables are loaded from stored files at startup. The third address table and the addresses in the table are configured from within the configuration.

```
cs7 mlr address-table imsi-screen
load disk0:imsi-screen
!
cs7 mlr address-table orig-screen
load disk0:orig-screen
!
cs7 mlr address-table shortcodes
addr 11112 result group grp2
addr 1111 result group grp1
addr 2222 result group grp1
addr 5551212 exact result group grp3
```

## Define One or More Multi-layer SMS Rulesets

With this task you specify sets of rules for processing traffic that matches triggers defined in the MLR routing table.

Table 10 lists the parameters that are valid based on the specified **rule** operation.

**Table 10**      **Valid Rule Parameters by Operation**

| Operation/<br>Msg Type | dest-sme | orig-sme | orig-smsc | orig-imsi | dest-smsc | pid | teleservice | port | multi-msg |
|------------------------|----------|----------|-----------|-----------|-----------|-----|-------------|------|-----------|
| smdpp                  | X        | X        |           |           |           |     | X           |      |           |
| smsreq                 | X        |          |           |           |           |     | X           |      |           |

**Table 10** Valid Rule Parameters by Operation (continued)

| Operation/<br>Msg Type | dest-sme | orig-sme | orig-smsc | orig-imsi | dest-smsc | pid | teleservice | port | multi-msg |
|------------------------|----------|----------|-----------|-----------|-----------|-----|-------------|------|-----------|
| smsnot                 | X        |          |           |           |           |     | X           |      |           |
| sms-mo                 | X        | X        |           | X         | X         | X   |             | X    | X         |
| sms-mt                 | X        | X        | X         |           |           | X   |             | X    | X         |
| sri-sm                 | X        |          | X         |           |           |     |             |      |           |
| alertsc                | X        |          |           |           | X         |     |             |      |           |
| all                    |          |          |           |           |           |     |             |      | X         |

To define a multi-layer SMS ruleset, perform the following steps, beginning in global configuration mode:

| Command                                                                                                                                  | Purpose                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7</b> [ <b>instance</b> <i>instance-number</i> ] <b>mlr ruleset</b> <i>name</i> [ <b>gsm-map</b>   <b>ansi-41</b> ] | Specifies a ruleset name and enables the MLR ruleset configuration mode.                                                                                                                                                                                                                                                                       |
| Router(cfg-cs7-mlr-set)# <b>rule</b> <i>order</i> <i>operation-name</i> [ <b>default</b> ]                                               | Specifies the rules within a Multi-layer ruleset table. Specifies the attributes of an application-layer message to be matched, and the resulting behavior for handling the message. At least one rule must be specified for the ruleset to be valid. Enables the MLR ruleset-rule configuration mode.                                         |
| Router(cfg-cs7-mlr-set-rule)# <b>multi-message-dialogue</b>                                                                              | Specifies that the short messages segmented at the MAP layer and SMS MT messages with the More-Messages-To-Send indicator set match the rule. If the <b>multi-message-dialogue</b> command is specified, no other routing parameters may be configured for the rule.                                                                           |
| Router(cfg-cs7-mlr-set-rule)# <b>allow-multi-message-dialogue</b>                                                                        | Specifies that all messages including multi-message dialogues match the rule. Only valid for default rules.                                                                                                                                                                                                                                    |
| Router(cfg-cs7-mlr-set-rule)# <b>dest-sme</b> <i>dest-addr</i> [ <i>sme-addr-type</i> ] [ <b>exact</b> ]                                 | Specifies the address of the destination Short Message Entity (SME) within an SMS operation. This parameter is part of the rule used to match this route.                                                                                                                                                                                      |
| Router(cfg-cs7-mlr-set-rule)# <b>dest-sme-table</b> <i>table-name</i>                                                                    | Specifies the address table name.                                                                                                                                                                                                                                                                                                              |
| Router(cfg-cs7-mlr-set-rule)# <b>dest-smsc</b> <i>dest-addr</i> [ <i>addr-type</i> ] [ <b>exact</b> ]                                    | Specifies the address of the destination service center address within an SMS operation. This parameter is part of the rule used to match this route. Note that if intermediate GTT is used toward the ITP SMS routers, then the CdPA routing trigger may already contain the destination SMSC address, and need not be specified on the rule. |
| Router(cfg-cs7-mlr-set-rule)# <b>orig-sme</b> <i>orig-addr</i> [ <i>orig-sme-addr-type</i> ] <b>exact</b>                                | Specifies the address of the origin SME within an SMS operation. This parameter is part of the rule used to match this route.                                                                                                                                                                                                                  |

| Command                                                                                                                                                                                                                             | Purpose                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(cfg-cs7-mlr-set-rule)# <b>orig-smsc</b> <i>orig-addr</i> [ <i>smc-addr-type</i> ] [ <b>exact</b> ]                                                                                                                           | Specifies the address of the originating service center within an SMS MT operation.                                                                    |
| Router(cfg-cs7-mlr-set-rule)# <b>result</b> { <b>gt</b> <i>addr-string</i> [ <i>gt-addr-type</i> ]   <b>pc</b> <i>dest-pc</i> [ <i>ssn ssn</i> ]   <b>asname</b> <i>as-name</i>   <b>group</b> <i>result-group</i>   <b>block</b> } | Specifies the processing that will be performed on a packet that matches the specified trigger and rule. One result must be specified.                 |
| Router(cfg-cs7-mlr-set-rule)# <b>pid</b> <i>protocol-id</i>                                                                                                                                                                         | Specifies a particular protocol identifier value for an SMS operation. The value of the PID maps to the values specified for the TP-PID SMS parameter. |
| Router(cfg-cs7-mlr-set-rule)# <b>teleservice</b> <i>teleservice</i>                                                                                                                                                                 | Specifies a particular service identifier value for an IS-41 SMS operation.                                                                            |

## Define the Multi-Layer SMS Routing Table

An MLR table comprises a list of primary triggers, which can represent either the SCCP CgPA or SCCP CdPA within a given message.

With this task you specify the SS7 network-layer parameters to identify traffic that requires parsing into the application layers.

To define the Multi-layer SMS routing table, perform the following steps, beginning in global configuration mode:

| Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7</b> [ <b>instance</b> <i>instance-number</i> ] <b>mlr table</b> <i>name</i>                                                                                                                                                                                                                                                                                                                                                                                                   | Specifies the MLR routing table name and enables the MLR table configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Router(config-cs7-mlr)# <b>trigger</b> { <b>mtp3</b> {[ <b>dpc</b> <i>point-code</i> ] [ <b>opc</b> <i>point-code</i> ] [ <b>si</b> <i>indicator</i> ]}   <b>cdpa</b> { <b>gt</b> <sup>1</sup> <i>addr-string</i> [ <i>gt-addr-type</i> ]   <b>pc</b> <i>point-code</i> <i>ssn ssn</i> }   <b>cgpa</b> { <b>gt</b> <i>addr-string</i> [ <i>addr-type</i> ]   <b>pc</b> <i>point-code</i> <i>ssn ssn</i> }   <b>default</b> } [ <b>block</b>   <b>continue</b>   <b>ruleset</b> <i>ruleset-name</i> ] | Specifies the routing key, or trigger, which will be used to route or block messages according to a specified ruleset. Enables the MLR trigger configuration mode in which you can define combination triggers.                                                                                                                                                                                                                                                                                                                                                                          |
| Router(cfg-cs7-mlr-trigger)# <b>cdpa</b> { <b>gt</b> <i>addr-string</i> [ <i>gt-addr-type</i> ]   <b>pc</b> <i>point-code</i> <i>ssn ssn</i> } ( <b>block</b>   <b>continue</b>   <b>ruleset</b> <i>ruleset-name</i> )                                                                                                                                                                                                                                                                               | Within the mlr-trigger submode, the <b>cgpa</b> , <b>cdpa</b> and <b>default ruleset</b> commands are used to define combination triggers. (MTP3 may be specified as a primary trigger only.) The secondary triggers in conjunction with the trigger address constitute the combination trigger used to match a packet. If any secondary address in the trigger submode is specified, then BOTH addresses must match for the packet to be blocked or routed using the specified ruleset. The parameter keywords and values are the same as those defined for the <b>trigger</b> command. |
| Router(cfg-cs7-mlr-trigger)# <b>cgpa</b> { <b>gt</b> <i>addr-string</i> [ <i>addr-type</i> ]   <b>pc</b> <i>point-code</i> <i>ssn ssn</i> } ( <b>block</b>   <b>continue</b>   <b>ruleset</b> <i>ruleset-name</i> )                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Router(cfg-cs7-mlr-trigger)# <b>default</b> ( <b>block</b>   <b>continue</b>   <b>ruleset</b> <i>ruleset-name</i> )                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

1. To enable a cdpa or cgpa trigger, the CS7 GTT selector and GTA entry must be defined. For more information about configuring GTT, refer to the “Configuring Global Title Translation” chapter.

# Configuration Examples of Multi-layer SMS Routing

This section includes the following examples:

- Examples of Configuring Routing based on Operation types, page 170
- Example of Combined Multi-layer Routing and Distributed Short Message Routing, page 171

## Examples of Configuring Routing based on Operation types

The following are examples of configuring routing based on operation types.

### Example: Configure Routing Based on SMS MT Parameters

Specify one or more of the SMS MT routing parameters when defining a rule with the sms-mt operation type. Then specify the result destination for the message via the result parameter. Rules are searched sequentially for a match, and rulesets may contain a mixture of rules defining any operation type.

In the following example, all SMS MT messages destined to the MSC 11111 with a destination SME (or mobile) IMSI of 238012650007149 are routed via the MLR distribution group named CLUSTER. SMS MT messages originating from the mobile MSISDN 9193922900 are routed to pc 1-3-1. All other SMS MT messages are routed to pc 1-2-1.

```
cs7 mlr result CLUSTER
pc 1-1-1 weight 5
pc 2-2-2 weight 1
pc 3-3-3 weight 0

cs7 mlr ruleset SMSMT
rule 10 sms-mt
dest-sme 238012650007149
result group CLUSTER
rule 20 sms-mt
orig-sme 9193922900
result pc 1-3-1
rule 30 sms-mt default
result pc 1-2-1

cs7 mlr table MT-ROUTING
trigger cdpa gt 11111 tt 10 ruleset SMSMT
```

### Example: Configure Routing Based on SRI SM Parameters

Specify one or more of the SRI SM routing parameters when defining a rule with the sri-sm operation type. Then specify the result destination for the message via the result parameter. Rules are searched sequentially for a match, and rulesets may contain a mixture of rules defining any operation type.

In the following example, all SRI-SM messages destined to the HLR 44444 with a destination SME (MSISDN) of 9191112222 are routed via the MLR distribution group 'cluster'. All other SRI-SM messages are routed to pc 1-3-1.

```
cs7 mlr result CLUSTER
pc 1-1-1 weight 5
pc 2-2-2 weight 1
pc 3-3-3 weight 0

cs7 mlr ruleset SRISM
rule 10 sri-sm
dest-sme 9191112222
result group CLUSTER
rule 20 sri-sm default
```

```

result pc 1-3-1

cs7 mlr table SMS-BLOCKING
trigger cdpa gt 44444 tt 10 ruleset SRISM

```

## Example of Combined Multi-layer Routing and Distributed Short Message Routing

The following example shows a configuration in which MLR and Distributed Short Message Routing (DSMR) are used together to loadbalance map segmented and unsegmented SHORT messages. In this example, MLR is configured to route all segmented traffic to DSMR (1.1.1 is the local ITP point code). MLR is configured to route all unsegmented traffic according to the MLR rules.

For more information about DSMR, see the “ITP Distributed Short Message Routing (DSMR)” chapter.

### MLR Configuration

```

cs7 mlr result-group VOTING          //Voting SMSC//
pc 2.2.1
pc 2.2.2

cs7 mlr result-group SMSC            //Legacy SMSC//
pc 3.1.1
pc 3.1.2

cs7 mlr address-table SHORT-CODES
addr 2332
addr 2333

cs7 mlr ruleset MLR-RULES
rule 10 sms-mo
multi-message-dialogue
result pc 1.1.1 ssn 8               //forward segmented messages to local ITP PC 1.1.1 for DSMR//
rule 20 sms-mo
dest-sme-table SHORT-CODES         //forward non-segmented "voting" traffic to voting SMSCs//
result group VOTING
rule 30 sms-mo default
result group SMSC                  //forward non-segmented "not voting" traffic to legacy SMSCs//

cs7 mlr table SMS
trigger default ruleset MLR-RULES

```

### DSMR Configuration

```

cs7 sms result-group VOTING
pc 2.2.1
pc 2.2.2

cs7 sms result-group SMSC
pc 3.1.1
pc 3.1.2

cs7 sms ruleset SMS-RULES
rule 10 sms-mo
dest-sme-table SHORT-CODES         //DSMR can read MLR address-tables//
result group VOTING                //forward segmented voting traffic to voting SMSCs//
rule 20 sms-mo
result group SMSC                  //forward segmented non-voting traffic to legacy SMSCs//

cs7 sms routing-table
gsm sms-mo ssn 8

```

```
ruleset SMS-PROXY
msc-proxy-addr tt 236
map-source-addr 987654321
smc-map-version 2
```

## What to Do Next

Configure MLR-Based Screening

## How to Configure MLR-Based Screening

The following sections describe and provide example of MLR-based screening. When a message is blocked MLR discards the packet.

- Blocking Based on SCCP CdPA and CgPA, page 172
- Blocking Based on CgPA, CdPA, and SMS MAP Operation Code, page 173
- Blocking Based on CgPA, CdPA and SMS MO/MT Routing Parameters, page 174

## Blocking Based on SCCP CdPA and CgPA

To configure blocking based on SCCP CdPA and CgPA perform the following tasks:

**Step 1** Define GTT entries for CdPA and CgPA digits to screen.

MLR primary GT triggers re-use the existing GTT selector table entity containing lists of GTA entries used to perform Global Title Translation. To create a GTT selector, use the following command in global configuration mode:

| Command                                                              | Purpose                                                                     |
|----------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Router(config)# <b>cs7 gtt selector selector tt tt gti gti np np</b> | Names and configures the GTT selector and enables CS7 GTT selector submode. |

To specify a GTA, use the following commands as appropriate to your needs, in CS7 GTT selector submode:

| Command                                                                                                           | Purpose                                                                            |
|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Router(config-cs7-gtt-selector)# <b>gta gta app-grp app-grp</b>                                                   | Defines a GTA that translates to a GTT application group.                          |
| Router(config-cs7-gtt-selector)# <b>gta gta asname as-name {gt   pcssn} [ssn ssn] [ntt newtt] [qos-class qos]</b> | Defines a GTA that translates to an M3UA or SUA Application Server name.           |
| Router(config-cs7-gtt-selector)# <b>gta gta pcssn pc {gt   pcssn} [ssn ssn] [ntt newtt]</b>                       | Defines a GTA entry that translates to a point code and optional subsystem number. |

### Example:

```
cs7 gtt selector e164 tt 10
gta 11111 pcssn 1-1-1 pcssn
```



```
gta 22222 pcssn 2-2-2 pcssn
gta 33333 pcssn 3-3-3 pcssn
```

**Note**

The GTT mapping results will not be used if blocking triggers are configured via MLR for the CgPa and CdPA global title addresses.

**Step 2** Define MLR table and blocking based on SCCP CdPA or CgPA.

An MLR table consists of a list of primary triggers, which can represent either the SCCP CgPA or the SCCP CdPA within a given message. To block a message based on either CgPA or CdPA, specify the block keyword in lieu of a ruleset.

**Example:**

```
cs7 mlr table sms-blocking
trigger cdpa gt 11111 tt 10 block
trigger cgpa gt 22222 tt 10 block
trigger cgpa gt 33333 tt 10 block
```

When coding a mixture of primary CgPA and primary CdPA triggers, the triggers are not searched sequentially. The first primary trigger match found is used based on the following hierarchy:

1. The default trigger is defined (only trigger configured)
2. CdPA GT triggers when SCCP CdPA is RI=GT
3. CdPA PC/SSN triggers when SCCP CdPA is RI=SSN
4. CgPA GT triggers when SCCP CgPA is RI=GT
5. CgPA PC/SSN triggers when SCCP CgPA is RI=SSN

**Step 3** Define MLR table and blocking on combination of SCCP CdPA and CgPA

To block a message based on a combination of SCCP CdPA and CgPA, specify the combination triggers and place the block keyword at the end of the secondary trigger.

**Example:**

```
cs7 mlr table sms-blocking
trigger cdpa gt 11111 tt 10 ruleset MY_RULES
cgpa gt 22222 tt 10 block
cgpa gt 33333 tt 10 block
```

**Note**

Ruleset `MY_RULES` is a placeholder and will not be used. A packet destined for 11111 from 44444 will not match a trigger, and will be routed normally.

## Blocking Based on CgPA, CdPA, and SMS MAP Operation Code

MLR triggers must be specified, but will be configured with an associated MLR ruleset instead of the **block** keyword. When a non-blocking MLR trigger matches, the received packet is parsed through the application layer for the rule operations identified in the ruleset.

MLR supports the following operation types:

**sms-mo**     MAP-MO-FORWARD-SM GSM MAP operation code 0x2E

|               |                                                                                                |
|---------------|------------------------------------------------------------------------------------------------|
| <b>sms-mt</b> | MAP-MT-FORWARD-SM GSM MAP operation code 0x2C. The operation code for MAPv1 and MAPv2 is 0x2E. |
| <b>sri-sm</b> | SEND-ROUTING-INFO-FOR-SM GSM MAP operation code 0x2D                                           |
| <b>all</b>    | All possible GSM MAP operation codes                                                           |

**Example:**

The following example will block all SMS MO messages from 22222 to 11111, and will block all SMS MT message from 11111 to 33333. All other messages will be routed according to standard SCCP and MTP3 procedures.

```
cs7 mlr ruleset BLOCK-SMSMO
  rule 10 sms-mo default
  result block

cs7 mlr ruleset BLOCK-SMSMT
  rule 10 sms-mt default
  result block

cs7 mlr table sms-blocking
  trigger cdpa gt 11111 tt 10
  cgpa gt 22222 tt 10 ruleset BLOCK-SMSMO
  trigger cdpa gt 33333 tt 10
  cGpa gt 11111 tt 10 ruleset BLOCK-SMSMT
```

## Blocking Based on CgPA, CdPA and SMS MO/MT Routing Parameters

To block based on select parameters within the SMS MO or SMS MT message, specify the appropriate routing parameters within sms-mo or sms-mt operation. Rules are searched sequentially for a match.

**Example:**

The following example will block all SMS MO messages from 22222 to 11111 with an origin SME (A-address) prefix of 919, and will block all SMS MT messageS from 11111 to 33333 with a destination SME (or mobile) IMSI of 238012650007149. All other messages not matching a trigger will be routed according to standard SCCP and MTP3 procedures.

```
cs7 mlr ruleset BLOCK-SMSMT
  rule 10 sms-mt
  dest-sme 238012650007149
  result block

cs7 mlr ruleset BLOCK-SMSMO
  rule 10 sms-mo
  orig-sme 919
  result block

cs7 mlr table sms-blocking
  trigger cdpa gt 11111 tt
  cgpa gt 22222 tt 10 ruleset BLOCK-SMSMO
  trigger cdpa gt 33333 tt 10
  cgpa gt 11111 tt 10 ruleset BLOCK-SMSMT
```

# Verifying and Monitoring Multi Layer SMS Routing

With this task you verify configuration, monitor status, and troubleshoot errors in the MLR configuration.

To display information about the MLR configuration, perform the following steps in privileged EXEC mode:

| Command                                                               | Purpose                                                                                                                                              |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router# <b>show cs7 instance-number mlr address-table table-name</b>  | Displays the addresses matched within the table.                                                                                                     |
| Router# <b>show cs7 instance-number mlr result name</b>               | Displays the contents of all MLR result groups, or a specific named result group along with the weight and number of matches for each server result. |
| Router# <b>show cs7 instance-number mlr statistics name</b>           | Displays statistics associated with multi-layer routing.                                                                                             |
| Router# <b>show cs7 instance-number mlr table name detail</b>         | Displays the parameters and results associated with each routing trigger.                                                                            |
| Router# <b>show cs7 instance-number mlr table name result-summary</b> | Displays the result parameters associated with a particular rule along with the number of times the rule has been matched for the given trigger.     |
| Router# <b>show cs7 instance-number mlr table name rule-summary</b>   | Displays the rule parameters associated with a particular rule along with the number of times the rule has been matched for the given trigger.       |

To display debug messages for Multi-layer routing, use the **debug cs7 mlr** command in privileged EXEC mode.

| Command                                   | Purpose                       |
|-------------------------------------------|-------------------------------|
| Router# <b>debug cs7 mlr table all</b>    | Enables all debugs.           |
| Router# <b>debug cs7 mlr table error</b>  | Debugs error events.          |
| Router# <b>debug cs7 mlr table info</b>   | Displays informational events |
| Router# <b>debug cs7 mlr table packet</b> | Displays packet events.       |

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.

- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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# ITP Distributed Short Message Routing (DSMR)

ITP Distributed Short Message Routing (DSMR) is a software feature that routes global system for mobile (GSM) Short Message Service (SMS) messages.

With the assistance of a full-featured Short Message Service Center (SMSC), DSMR can provide a cost effective way to implement a large capacity short message routing system suitable for mass audience interaction and voting solutions. DSMR can also significantly reduce the SMS traffic load on the legacy SMSC complex (and potentially on the core SS7 network) by providing delivery of a Mobile Originated (MO) SMS to a Mobile Terminated (MT) user.

## Feature History for ITP Distributed Short Message Routing

| Release     | Modification                                                                                                                            |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 12.2(25)SW  | This feature was introduced with Phase 1 functionality: voting traffic and Mobile Originated-Application Terminated (MO-AT) capability. |
| 12.2(25)SW1 | Phase 2 functionality added: Mobile Originated-Mobile Terminated (MO-MT), SMS status reports, Mobile Number Portability (MNP) support.  |

## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Prerequisites for DSMR, page 180
- Restrictions for DSMR, page 180
- Information About DSMR, page 180
- How to Configure DSMR, page 182
- Configuration Example for DSMR, page 217



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## Prerequisites for DSMR

The DSMR feature uses a network-based system for archiving call detail records (CDR). An external CDR archival device is required to receive CDR information from the ITP and format that information into CDRs for future retrieval purposes. This archival device should be installed and configured prior to activating DSMR in a live environment. If no CDR archival system is configured, no CDRs are generated by DSMR.

## Restrictions for DSMR

When the ITP Multiple Instances feature is active, DSMR is capable of running in instance 0 only.

DSMR supports GSM MAP SMS traffic only.

DSMR is not supported on the Cisco 2600 router.

## Information About DSMR

DSMR allows for an SMS network architecture in which the responsibility for delivering short messages is distributed among DSMR nodes and traditional full-featured SMSCs. For example, the DSMR feature can deliver some SMS messages immediately while referring other messages to a full-featured SMSC. DSMR can dramatically extend the capacity of a mobile service provider's current SMS infrastructure. Since all application-terminated SMS traffic can typically be delivered on the first attempt, using DSMR can provide the additional infrastructure necessary to handle mass-audience-interaction SMS traffic, such as messages sent in response to TV and radio votes or contests.

DSMR supports both Short Message Peer-to-Peer (SMPP) and Universal Computer Protocol (UCP) for the exchange of messages between a mobile operator's network and various External Short Message Entities (ESME) that receive application-terminated SMS messages. In addition, DSMR is capable of delivering mobile originated messages directly to mobile destinations (MO-MT messages). For traffic that cannot be delivered immediately, DSMR is capable of deferring and load balancing messages to full featured SMSCs.

### Call Detail Records

Messages processed by DSMR may completely bypass a full-featured SMSC. To allow for proper billing of these messages, the ITP is capable of generating Call Detail Records (CDR) for messages that it processes. The ITP uses a network based system for transmitting CDR information to an archival/retrieval system. The CDR archival device receives CDR information from the ITP, applies appropriate formatting and filtering of fields, and stores the records for later retrieval.

### DSMR Message Routing

The DSMR feature uses a powerful set of customizable routing rules to direct SMS traffic, similar to the system used by the ITP Multi-Layer Routing (MLR) feature. The rules provide a means for screening, blocking, and routing messages. Each message is compared against the ordered list of rules in a ruleset, continuing until the message is blocked or successfully routed. Multiple routing rules are permitted, allowing for backup routing after failure or outages are detected. For example, if a message cannot be routed to an ESME because no SMPP session is unavailable, a backup rule could direct that message to a full-featured SMSC for future store-and-forward routing to the destination.



DSMR uses the following configuration constructs to facilitate routing of short messages:

- **route-table**  
The route table allows the specification of the types of incoming messages that will be accepted for processing and indicates which ruleset to use for that traffic.
- **ruleset**  
Rulesets describe a list of rules to traverse in an ordered fashion. Within each rule, checks can be made to compare the configured parameters to the message being processed. For example, IMSI, source address, destination address, etc. can be compared within a rule. If a rule matches the inbound message, the corresponding result configured on the rule will be executed. The rules are traversed until the message is blocked, successfully routed, or until all rules within the ruleset have been exhausted.
- **address-table**  
Address tables are referred to by rules and allow the listing of large numbers of addresses to be compared during a specific rule. Address tables can be saved and loaded from flash memory.
- **result**  
Configured on a rule or within an address table, a result specifies the action to be performed on messages matching the rule. The following actions are supported:
  - **result block**: A negative acknowledgement is sent to the requester.
  - **result next-rule**: Proceed to the next rule within the ruleset.
  - **result rule**: Skip to the specified rule found later in the ruleset.
  - **result pc**: Attempt to route this request to an SMSC, routing to the SMSC's point code address.
  - **result gt**: Attempt to route this request to an SMSC, routing to the SMSC's global title address.
  - **result deliver-mt**: Attempt to deliver this message to a mobile destination. The ITP queries the destination mobile's HLR for location information and forwards the message directly to the MSC currently supporting the destination mobile.
  - **result group**: A result group table lists the set of possible routing destinations along with the associated algorithm used to select among the destinations.
- **result groups**  
Result groups describe a system for load balancing and failover for various acceptable destinations for a message. Result group type ESME is used to send messages to a group of SMPP or UCP destinations. Result group type SMSC is used to route messages to a group of SMSCs.

### Weighted Round Robin Distribution

A weighted round robin (WRR) distribution algorithm properly balances workload to servers of varying capacity. Each entry within a result group (application group or multi-layer result table) can be assigned a server weight from 0 to 10. The value of 0 indicates that the server is a backup and should only be used when all of the servers in the group with a non-zero weight have failed. The WRR algorithm is used to weight traffic to the result group servers when possible. If servers become constrained or unavailable, the algorithm automatically adjusts to send traffic to the remaining servers that are able to accept the traffic.

# How to Configure DSMR

This section describes the tasks to configure and monitor DSMR. Each section includes a sample configuration for that task. The complete DSMR configuration is presented with an illustration in the “Configuration Example for DSMR” section on page 217

- Configuring a Call Detail Record (CDR) Archival System, page 182
- Configuring SMPP or UCP Connectivity, page 184
- Configuring SMS Result Groups, page 189
- Creating and Managing SMS Address Tables, page 195
- Configuring an SMS MSC Table, page 203
- Configuring SMS Rulesets, page 204
- Configuring SMS Route Table, page 210
- Monitoring DSMR, page 214

## Configuring a Call Detail Record (CDR) Archival System

Call Detail Records (CDRs) are generated for each SMS message processed by the DSMR.

DSMR uses the assistance of a network-based CDR archival device to store CDRs, creating a redundant, network-based archiving system.

This section describes how to configure the ITP to connect to one or more CDR archival devices.

Configuration of a CDR archival system is optional. If not configured, no CDRs will be generated by the DSMR.

### SUMMARY STEPS

1. **cs7 cdr destination** *name [remote-port remote-ip-addr local-ip-addr]*
2. **tx-window** *window-value*
3. **exit**
4. **cs7 cdr service** *service-name*
5. **destination** *name share-value*
6. **congestion-threshold** *percentage*
7. **queue-depth** *depth*
8. **share-mode** {**cost** | **weight-rr**}

## DETAILED STEPS

|        | Command or Action                                                                                                                                                                                          | Purpose                                                                                                                                                                                                                                                                                                |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 cdr destination</b> <i>name</i> [ <i>remote-port</i><br><i>remote-ip-addr</i> <i>local-ip-addr</i> ]<br><br><b>Example:</b><br>ITP(config)# cs7 cdr destination CDR1 8000<br>10.10.1.100 10.10.2.15 | Specifies a CDR archive destination and enables CS7 CDR destination configuration mode.<br><br>Address and port must be specified for new destination. Only the <i>name</i> argument is required for subsequent reference to that destination.                                                         |
| Step 2 | <b>tx-window</b> <i>window-value</i><br><br><b>Example:</b><br>ITP(config-cs7-cdr-dest)# tx-window 500                                                                                                     | (Optional) Specifies the tx-window value for a CDR destination. Valid range is 10 to 1000. The default is 20.                                                                                                                                                                                          |
| Step 3 | <b>exit</b><br><br><b>Example:</b><br>ITP(config-cs7-cdr-dest)# exit                                                                                                                                       | Exits to global configuration mode.                                                                                                                                                                                                                                                                    |
| Step 4 | <b>cs7 cdr service</b> <i>service-name</i><br><br><b>Example:</b><br>ITP(config)# cs7 cdr service CDR1                                                                                                     | Specifies a CDR service and enables CS7 CDR service configuration mode.                                                                                                                                                                                                                                |
| Step 5 | <b>destination</b> <i>name</i> <i>share-value</i><br><br><b>Example:</b><br>ITP(config-cs7-cdr-ser)# destination CDR1 1                                                                                    | Specifies or updates a CDR destination and share value within a service. Valid share-value range is 1 to 100. There is no default.                                                                                                                                                                     |
| Step 6 | <b>congestion-threshold</b> <i>percentage</i><br><br><b>Example:</b><br>ITP(config-cs7-cdr-ser)# congestion-threshold 75                                                                                   | (Optional) Specifies the congestion-threshold in percent. The valid range is 0 to 99%. 0 specifies never report congestion. 99 specifies report congestion when 99% is reached. The default is 80%.                                                                                                    |
| Step 7 | <b>queue-depth</b> <i>depth</i><br><br><b>Example:</b><br>ITP(config-cs7-cdr-ser)# queue-depth 10000                                                                                                       | (Optional) Specifies the available queue depth for the CDR service. The depth is dependant on available system memory and represents the number of CDRs that may be queued while awaiting acknowledgement from the CDR destination. The valid range is 1000 to 1000000 CDRs. The default is 5000 CDRs. |
| Step 8 | <b>share-mode</b> { <b>cost</b>   <b>weight-rr</b> }<br><br><b>Example:</b><br>ITP(config-cs7-cdr-ser)# share-mode weight-rr                                                                               | (Optional) Specifies the distribution mode within the service. The valid share modes are <b>cost</b> and <b>weight-rr</b> . The default share mode is <b>cost</b> .                                                                                                                                    |

## Examples

The following example shows a CDR archival system configuration.

```
cs7 cdr destination cdrdest1 8000 172.18.40.31 172.18.40.41
cs7 cdr destination cdrdest2 8000 172.18.44.136 172.18.40.41
!
cs7 cdr service cdrserv1
share-mode cost
destination cdrdest1 1
destination cdrdest2 2
```

## What to Do Next

Configure SMPP or UCP Connectivity

## Configuring SMPP or UCP Connectivity

The Short Message Peer-to-Peer protocol (SMPP) is an open industry standard protocol designed for the transfer of short message data over a TCP/IP network between an SMSC and an SMS application system.

The Universal Computer Protocol (UCP), a predecessor to SMPP, is an industry protocol for the transfer of short message data over TCP/IP between an SMSC and an SMS application system.

Either SMPP or UCP may be used for communication between the ITP and an External Short Message Entity (ESME). SMPP connections are generally preferred because of the feature-rich, industry standard SMPP protocol. However, UCP is still commonly used by older applications that have not yet implemented the SMPP protocol.

In this section you provision the local interfaces and ports that will be involved in SMPP/UCP traffic. Optionally, you can also specify and tune SMPP/UCP session parameters.



### Note

If you have decided to create a profile of SMPP or UCP session parameters, you may create the profile first and then configure connectivity and invoke the profile. If this is your plan, perform the task “Creating an SMPP or UCP Profile” before you perform the task “Configuring SMPP or UCP Connectivity.”

Perform either or both tasks described in the following sections. Tuning session parameters is optional.

- Configuring SMPP or UCP Connectivity, page 184
- Tuning SMPP or UCP Session Parameters, page 185

## Configuring SMPP or UCP Connectivity

This task provisions the local interfaces and ports that will participate in SMPP or UCP traffic.



### Note

If you have already configured a profile of session parameters, you can invoke the profile during step 2 of this task. This task does not include the steps for specifying session parameters.

## SUMMARY STEPS

- Step 1** `cs7 sms {smpp | ucp} local-port local-ip local-ip-addr [dynamic]`
- Step 2** `destination dest-name remote-ip-addr remote-port [profile profile-name]`

## DETAILED STEPS

|               | Command or Action                                                                                                                                                                                        | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | <code>cs7 sms {smpp   ucp} local-port local-ip local-ip-addr [dynamic]</code><br><br><b>Example:</b><br><pre>ITP(config)# cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic</pre>                          | Provisions the local interfaces and ports that will be involved in the SMPP or UCP traffic. When the optional keyword <b>dynamic</b> is specified, no IP address validation is performed on incoming session activation attempts. However, UCP- or SMPP-level validation (session ID and password) is still performed.                                                                                                                                                                                                                                                                                                                                                     |
| <b>Step 2</b> | <code>destination dest-name remote-ip-addr remote-port [profile profile-name]</code><br><br><b>Example:</b><br><pre>ITP(cfg-cs7-sms-smpp)# destination offisland 10.10.20.1 6000 profile mmprofile</pre> | <p>(Optional) Identifies an SMPP or UCP session partner.</p> <p>This command is not required if you specified the <b>dynamic</b> keyword in Step 1. However, specifying <b>dynamic</b> does not disallow specific destinations to be configured. For example, you might configure a specific parameter on one session, but leave the default on all the others. The <b>destination</b> command enables CS7 SMS session parms configuration mode.</p> <p>The <b>profile</b> keyword can be used only if you have already created a session profile. Creating a session profile is discussed in the section “Tuning SMPP or UCP Session Parameters” section on page 185.</p> |

## What to Do Next

If you wish to specify individual parameters for the session you just provisioned, go to the section “Tuning SMPP or UCP Session Parameters for a Session” and begin at Step 3.

Otherwise, you are ready to perform the task “Configuring SMS Result Groups.”

## Tuning SMPP or UCP Session Parameters

You can tune session parameters in either of 2 methods:

- You can create a profile of SMPP or UCP session parameters. You invoke the profile when you specify the destination of a session partner.
- You can specify session parameters individually after specifying the destination of the session partner.

### Creating an SMPP or UCP Profile

This task creates a profile of SMPP or UCP session parameters that can be applied by reference to a session partner. After creating a profile, you invoke the profile when you specify the destination of a session partner.

## SUMMARY STEPS

- Step 1 **cs7 sms {smpp | ucp} profile** *name*
- Step 2 **bind-type** {any | receiver | transceiver | transmitter}
- Step 3 **inactivity-timer** {off | msec}
- Step 4 **keepalive-timer** *msec*
- Step 5 **response-timer** *msec*
- Step 6 **send-window** *operations*
- Step 7 **session-init-timer** *msec*

## DETAILED STEPS

|        | Command or Action                                                                                                                                               | Purpose                                                                                                                                                                                                                                                                                                                                                                                               |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms {smpp   ucp} profile</b> <i>name</i><br><br><b>Example:</b><br>ITP(config)#cs7 sms smpp profile mmprofile                                            | Creates a profile of parameters that you can then invoke in the <b>destination</b> command to enable the parameters for that SMPP/UCP session partner. You can also create an SMPP/UCP profile named “default” to be used for all sessions that do not have a profile specifically configured. The <b>cs7 sms {smpp   ucp} profile</b> command enables cs7 sms profile parameters configuration mode. |
| Step 2 | <b>bind-type</b> {any   receiver   transceiver   transmitter}<br><br>SMPP only.<br><br><b>Example:</b><br>ITP(cfg-cs7-sms-profile-parms)# bind-type transmitter | (Optional) Specifies the SMPP bind type. Received SMPP binds will be checked against this parameter and rejected if they do not match. Valid bind types are <b>any</b> , <b>receiver</b> , <b>transceiver</b> , and <b>transmitter</b> . The default is <b>any</b> .<br><br>The <b>bind-type</b> command can be configured for SMPP only; it does not apply to UCP.                                   |
| Step 3 | <b>inactivity-timer</b> {off   msec}<br><br><b>Example:</b><br>ITP(cfg-cs7-sms-profile-parms)# inactivity-timer 5000                                            | (Optional) Specifies the session inactivity timer value, in milliseconds. Valid range is 1000 to 9000000 ms. The UCP default is <b>off</b> . The SMPP default is 300000 ms.                                                                                                                                                                                                                           |
| Step 4 | <b>keepalive-timer</b> <i>msec</i><br><br>SMPP only.<br><br><b>Example:</b><br>ITP(cfg-cs7-sms-profile-parms)# keepalive-timer 10000                            | (Optional) Specifies the time lapse, in milliseconds, between sending SMPP enquire-link operations on an idle SMPP connection. Valid range is 500 to 120000 ms. The default is 30000 ms.<br><br>The <b>keepalive-timer</b> command can be configured for SMPP only; it does not apply to UCP.                                                                                                         |
| Step 5 | <b>response-timer</b> <i>msec</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-profile-parms)# response-timer 5000                                                 | (Optional) Specifies the time lapse, in milliseconds, allowed between an SMPP/UCP request and the corresponding SMPP/UCP response. Valid range is 1000 to 10000 ms. The default is 5000 ms.                                                                                                                                                                                                           |

|        | Command or Action                                                                                                           | Purpose                                                                                                                                                                                                                 |
|--------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 6 | <b>send-window</b> <i>operations</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-profile-parms)# send-window 50               | (Optional) Specifies the number of simultaneous SMPP/UCP operations that are permitted to be outstanding (sent but not yet responded to) at one time. Valid range is 1 to 100 operations. The default is 10 operations. |
| Step 7 | <b>session-init-timer</b> <i>msec</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-profile-parms)#<br>session-init-timer 10000 | (Optional) Specifies the time lapse, in milliseconds, allowed between a network connection being established and the establishment of the SMPP/UCP connection. Valid range is 500 to 120000 ms. The default is 500 ms.  |

## What to Do Next

You can apply the profile of session parameters to an SMPP/UCP session partner. To do this, perform the task “Configuring SMPP or UCP Connectivity.”

### Tuning SMPP or UCP Session Parameters for a Session

This task specifies the session parameters individually for the SMPP/UCP session partner.



#### Note

If you have just performed steps shown in step 1 and 2, then, depending on your needs, configure any or all of steps 3 through 8 in any order. Steps 3 and 5 apply to an SMPP profile only.

### SUMMARY STEPS

- |               |                                                                         |
|---------------|-------------------------------------------------------------------------|
| <b>Step 1</b> | <b>cs7 sms {smpp   ucp} local-port local-ip local-ip-addr [dynamic]</b> |
| <b>Step 2</b> | <b>destination dest-name remote-ip-addr remote-port</b>                 |
| <b>Step 3</b> | <b>bind-type {any   receiver   transceiver   transmitter}</b>           |
| <b>Step 4</b> | <b>inactivity-timer {off   msec}</b>                                    |
| <b>Step 5</b> | <b>keepalive-timer msec</b>                                             |
| <b>Step 6</b> | <b>response-timer msec</b>                                              |
| <b>Step 7</b> | <b>send-window operations</b>                                           |
| <b>Step 8</b> | <b>session-init-timer msec</b>                                          |

## DETAILED STEPS

|        | Command or Action                                                                                                                                              | Purpose                                                                                                                                                                                                                                                                                                                                                             |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms {smpp   ucp} local-port local-ip local-ip-addr [dynamic]</b><br><br><b>Example:</b><br>ITP(config)# cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic | Provisions the local interfaces and ports that will be involved in the SMPP/UCP traffic. The optional keyword <b>dynamic</b> indicates that SMPP/UCP session partners connecting on this port need not be specifically listed as a <b>destination</b> under this port. This allows sessions to start with no IP address validation on the remote IP address/port.   |
| Step 2 | <b>destination dest-name remote-ip-addr remote-port</b><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-smpp)# destination offisland 10.10.20.1 6000                 | (Optional) Identifies an SMPP session partner.<br><br>This command is not used if you specified the <b>dynamic</b> keyword in Step 1. Otherwise, specify the session partner. The destination command enables CS7 SMS session parms configuration mode.                                                                                                             |
| Step 3 | <b>bind-type {any   receiver   transceiver   transmitter}</b><br><br>SMPP only<br><br><b>Example:</b><br>ITP(cfg-cs7-sms-session-parms)# bind-type transmitter | (Optional) Specifies the SMPP bind type. Received SMPP binds will be checked against this parameter and rejected if they do not match. Valid bind types are <b>any</b> , <b>receiver</b> , <b>transceiver</b> , and <b>transmitter</b> . The default is <b>any</b> .<br><br>The <b>bind-type</b> command can be configured for SMPP only; it does not apply to UCP. |
| Step 4 | <b>inactivity-timer {off   msec}</b><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-profile-parms)# inactivity-timer 5000                                           | (Optional) Specifies the session inactivity timer value, in milliseconds. Valid range is 1000 to 9000000 ms. The UCP default is <b>off</b> . The SMPP default is 300000 ms.                                                                                                                                                                                         |
| Step 5 | <b>keepalive-timer msec</b><br><br>SMPP only<br><br><b>Example:</b><br>ITP(cfg-cs7-sms-session-parms)# keepalive-timer 1000                                    | (Optional) Specifies the time lapse, in milliseconds, between sending SMPP enquire-link operations on an idle SMPP connection. Valid range is 500 to 120000 ms. The default is 30000 ms.<br><br>The <b>keepalive-timer</b> command can be configured for SMPP only; it does not apply to UCP.                                                                       |
| Step 6 | <b>response-timer msec</b><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-session-parms)# response-timer 5000                                                       | (Optional) Specifies the time lapse, in milliseconds, allowed between an SMPP request and the corresponding SMPP/UCP response. Valid range is 1000 to 10000 ms. The default is 5000 ms.                                                                                                                                                                             |
| Step 7 | <b>send-window operations</b><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-session-parms)# send-window 50                                                         | (Optional) Specifies the number of simultaneous SMPP/UCP operations that are permitted to be outstanding (sent but not yet responded to) at one time. Valid range is 1 to 100 operations. The default is 10 operations.                                                                                                                                             |
| Step 8 | <b>session-init-timer msec</b><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-session-parms)# session-init-timer 1000                                               | (Optional) Specifies the time lapse, in milliseconds, allowed between a network connection being established and the establishment of the SMPP/UCP connection. Valid range is 500 to 120000 ms. The default is 500 ms.                                                                                                                                              |



## Examples

The following example shows a configuration of two SMPP profiles and the provisioning of local interfaces and ports for SMPP traffic and UCP traffic. The keyword **dynamic** specifies that no IP address validation is performed on incoming session activation attempts.

```
cs7 sms smpp profile esme1
send-window 4
!
cs7 sms smpp profile default
keepalive-timer 60000
send-window 10
!
cs7 sms smpp 6000 local-ip 172.18.40.41 dynamic
!
cs7 sms ucp 7000 local-ip 172.18.40.41 dynamic
```

## What to Do Next

Configure SMS Result Groups.

## Configuring SMS Result Groups

Result tables identify a group of resources capable of receiving a short message and identifying how it is to be delivered to a destination. There are two types of result groups, ESME and SMSC. ESME result groups are used to route short messages directly to External Short Message Entities over SMPP or UCP. SMSC result groups are used to route short messages to a complex of SMSCs via a list of point code destinations.

This section describes the following tasks for configuring result groups:

- Configuring an ESME Result Group for Defined SMPP or UCP Sessions  
Perform this task if you used the **destination** command to identify a specific SMPP or UCP session partner when you configured SMPP or UCP connectivity.
- Configuring an ESME Result Group for Dynamic SMPP or UCP Sessions  
Perform this task if you included the **dynamic** keyword to enable dynamic session partners when you configured SMPP or UCP connectivity.
- Configuring an SMSC Result Group  
Perform this task if you are configuring an SMSC result group.

## Prerequisites

Configuring an ESME result group for defined SMPP or UCP sessions requires that you have already assigned an SMPP or UCP session. See the “Configuring SMPP or UCP Connectivity” section on page 184.

## Configuring an ESME Result Group for Defined SMPP or UCP Sessions

Perform this task if you used the **destination** command to identify a specific SMPP or UCP session partner when you configured SMPP or UCP connectivity.

## SUMMARY STEPS

- 
- Step 1 **cs7 sms result-group** *name esme*
- Step 2 **smpp** *session-name [weight weight]*
- Step 3 **ucp** *session-name [weight weight]*
- Step 4 **esme cdr consolidation** *consolidation-string*
- Step 5 **esme id** *id*
- Step 6 **queue-limit** *operations*
- Step 7 **queue-timer** *msec*

## DETAILED STEPS

|        | Command or Action                                                                                                      | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------|------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms result-group</b> <i>name esme</i><br><br><b>Example:</b><br>ITP(config)#cs7 sms result-group offisland esme | Specifies the result group table name and result group type. Result group types are <b>esme</b> or <b>smsc</b> . In this task we are specifying a result group of type ESME. This command enables CS7 SMS result configuration mode, in which you can configure specific ESME parameters and enable the SMS routing subsystem to properly characterize the routing of the message.                                                                                                                                                                                             |
| Step 2 | <b>smpp</b> <i>session-name [weight weight]</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# smpp sess1 weight 3 | Specifies that messages will be routed on an SMPP session and specifies SMPP sessions as members of the result group. <ul style="list-style-type: none"> <li><i>session-name</i> Identifies the session name to be included in the result group. This is the name you assigned with the <b>destination</b> command when you configured SMPP or UCP connectivity.</li> <li><b>weight</b> Assigns a weight value for this session within the weighted round robin facility of the result group.</li> <li><i>weight</i> Identifies a weight value in the range 0 to10.</li> </ul> |
| Step 3 | <b>ucp</b> <i>session-name [weight weight]</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# ucp sess2 weight 2   | Specifies that messages will be routed on a UCP session and specifies UCP sessions as members of the result group. <ul style="list-style-type: none"> <li><i>session-name</i> Identifies the session name to be included in the result group. This is the name you assigned with the <b>destination</b> command when you configured SMPP or UCP connectivity.</li> <li><b>weight</b> Assigns a weight value for this session within the weighted round robin facility of the result group.</li> <li><i>weight</i> Identifies a weight value in the range 0 to10.</li> </ul>    |

|        | Command or Action                                                                                                                     | Purpose                                                                                                                                                                                                                                                                                                                                                                                    |
|--------|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 4 | <b>esme cdr consolidation</b> <i>consolidation-string</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# esme cdr consolidation 1 | If <b>esme</b> is configured on the result group, the <b>esme cdr consolidation</b> command allows configuration of the consolidation field of the CDR. <ul style="list-style-type: none"> <li><i>consolidation-string</i> Identifies a 1 to 5 character string to place in the call detail record (CDR) consolidation string when a message is routed to this group.</li> </ul>           |
| Step 5 | <b>esme id</b> <i>id</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# esme id 100                                               | If <b>esme</b> is configured on the result group, the <b>esme id</b> command specifies an ESME (large account) ID. <ul style="list-style-type: none"> <li><i>id-num</i> EMSE (large account) identifier. Valid range is 100 to 99999. (This identifier is not used for routing, but the value configured here is placed in the alternate-destination-address field of the CDR.)</li> </ul> |
| Step 6 | <b>queue-limit</b> <i>operations</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# queue-limit 1000                              | If <b>esme</b> is configured on the result group, the <b>queue-limit</b> command specifies the maximum number of queued operations in the outbound group send queue. Valid range is 0 to 100000 operations.<br><br>The default is no queue-limit, which means no queue-limit is enforced.                                                                                                  |
| Step 7 | <b>queue-timer</b> <i>msec</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# queue-timer 60000                                   | If <b>esme</b> is configured on the result group, the <b>queue-timer</b> command specifies the maximum time a request can remain on the outbound group send queue before the request is timed out and allowed to continue to the next routing rule. Valid range is 0 to 600000 ms.<br><br>The default is 5000 ms.                                                                          |

## What to Do Next

Configure SMS Address Tables (Optional)

Configure SMS Rulesets

## Configuring an ESME Result Group for Dynamic SMPP or UCP Sessions

Perform this task if you included the **dynamic** keyword to enable dynamic session partners when you configured SMPP or UCP connectivity. (The dynamic option indicates that SMPP/UCP session partners connecting on the port need not be specifically listed as a destination under this port. This allows SMPP or UCP sessions to start with no IP connection validation on the remote IP address/port.) Use one of the **match** commands (steps 2, 3, or 4) to specify how to associate dynamic sessions to a result group.

### SUMMARY STEPS

- Step 1 **cs7 sms result-group** *name esme*
- Step 2 **match ip** *ip-address {port | any} [profile profile-name] [weight weight]*
- Step 3 **match smpp id** *system-id [type system-type] [password password]*
- Step 4 **match ucp id** *ucp-addr [password password]*

**Step 5**    **esme cdr consolidation** *consolidation-string*

**Step 6**    **esme id** *id-num*

**Step 7**    **queue-limit** *size*

**Step 8**    **queue-timer** *time*

## DETAILED STEPS

|        | Command or Action                                                                                                                                                                   | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms result-group</b> <i>name esme</i><br><br><b>Example:</b><br>ITP(config)#cs7 sms result-group grp1 esme                                                                   | Specifies the result group table name and result group type. Result group types are <b>esme</b> or <b>smsc</b> . In this task we are specifying a result group of type ESME. This command enables CS7 SMS result configuration mode, in which you can configure specific ESME parameters and enable the SMS routing subsystem to properly characterize the routing of the message.                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Step 2 | <b>match ip</b> <i>ip-address {port   any} [profile profile-name] [weight weight]</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# match ip 10.10.10.200 any                  | If <b>esme</b> is configured on the result group, the <b>match ip</b> command matches an inbound session to a result group. This operand allows dynamic sessions that match this parameter to be associated with this result group by partner IP address and optional port number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Step 3 | <b>match smpp id</b> <i>system-id [type system-type] [password password]</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# match smpp id system1 password mypassword type esme | If <b>esme</b> is configured on the result group, the <b>match smpp id</b> command is used to match an inbound session to the proper result group. Configuring this operand verifies SMPP session parameters for all SMPP sessions on the result group, and allows dynamic SMPP sessions that match these parameters to be associated with this result group. <ul style="list-style-type: none"> <li>• <i>system-id</i> Identifies the SMPP system identifier for SMPP connections that should be associated with this result group</li> <li>• <i>system-type</i> Identifies the SMPP system type for SMPP connections that should be associated with this result group.</li> <li>• <i>password</i> Identifies the SMPP password for SMPP connections that should be associated with this result group</li> </ul> |
| Step 4 | <b>match ucp id</b> <i>ucp-addr [password password]</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# match ucp id 123456789 password mypassword                               | If <b>esme</b> is configured on the result group, the <b>match ucp id</b> command is used to match an inbound session to the proper result group. Configuring this operand verifies UCP session parameters for all sessions on the result group, and allows dynamic UCP sessions that match these parameters to be associated with this result group. <ul style="list-style-type: none"> <li>• <i>ucp-addr</i> Identifies the UCP address.</li> <li>• <i>password</i> Identifies the UCP password.</li> </ul>                                                                                                                                                                                                                                                                                                     |
| Step 5 | <b>esme cdr consolidation</b> <i>consolidation-string</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# esme cdr consolidation 1                                               | If <b>esme</b> is configured on the result group, the <b>esme cdr consolidation</b> command allows configuration of the consolidation field of the CDR. <ul style="list-style-type: none"> <li>• <i>consolidation-string</i> Identifies a 1 to 5 character string to place in the call detail record (CDR) consolidation string when a message is routed to this group.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                |

|        | Command or Action                                                                                   | Purpose                                                                                                                                                                                                                                                                                                                                                                                      |
|--------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 6 | <b>esme id</b> <i>id-num</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# esme id 100         | If <b>esme</b> is configured on the result group, the <b>esme id</b> command specifies an ESME (large account) ID. <ul style="list-style-type: none"> <li><i>id-num</i> EMSE (large account) identifier. Valid range is 100 to 99999. (This value is not used for routing, but the value configured here will be placed in the alternative-destination-address field of the CDR.)</li> </ul> |
| Step 7 | <b>queue-limit</b> <i>size</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# queue-limit 1000  | If <b>esme</b> is configured on the result group, the <b>queue-limit</b> command specifies the maximum number of queued operations in the outbound group send queue. Valid range is 0 to 100000 operations.<br><br>The default is no queue-limit, which means no queue-limit is enforced.                                                                                                    |
| Step 8 | <b>queue-timer</b> <i>time</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# queue-timer 60000 | If <b>esme</b> is configured on the result group, the <b>queue-timer</b> command specifies the maximum time a request can remain on the outbound group send queue before the request is timed out and allowed to continue to the next routing rule. Valid range is 0 to 600000 ms.<br><br>The default is 5000 ms.                                                                            |

## Examples

The following example shows the configuration of two result groups for dynamic SMPP and UCP sessions.

```
cs7 sms result-group grp2 esme
match smpp id esme2 type esme password pass2
match ip 172.10.22.1 4000
match ip 172.10.22.1 4001
!
cs7 sms result-group grp3 esme
match ucp id 01234567 password ucppass
match ip 172.15.1.1 3001
match ip 172.15.1.2 3001
```

## Configuring an SMSC Result Group

Perform this task if you are configuring an SMSC result group.

### SUMMARY STEPS

- Step 1 **cs7 sms result-group** *name* **smsc**
- Step 2 **pc** *pc* [**ssn** *ssn*] [**weight** *weight*]

## DETAILED STEPS

|        | Command or Action                                                                                                                                        | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms result-group</b> <i>name</i> <b>smmc</b><br><br><b>Example:</b><br>ITP(config)#cs7 sms result-group grp2 smmc                                 | Specifies the result group table name and result group type. Result group types are <b>esme</b> or <b>smmc</b> . In this task we are specifying a result group of type SMSC. This command enables CS7 SMS result configuration mode, in which you can list the destinations that are members of this group.                                                                                                                                                                                                                                                                                                                                                               |
| Step 2 | <b>pc</b> <i>pc</i> [ <b>ssn</b> <i>ssn</i> ] [ <b>weight</b> <i>weight</i> ]<br><br><b>Example:</b><br>ITP(cfg-cs7-sms-result)# pc 1.1.1 ssn 2 weight 5 | <p>If <b>smmc</b> is configured on the result group, the <b>pc</b> commands specifies that messages will be routed using point code.</p> <ul style="list-style-type: none"> <li>• <i>pc</i> Identifies the point code to be included as a routing destination in the result group.</li> <li>• <b>ssn</b> Indicates the ssn should be modified when routing the message.</li> <li>• <i>ssn</i> Identifies the subsystem number in the range 2 to 255.</li> <li>• <b>weight</b> Assigns a weight value for this session within the weighted round robin facility of the result group.</li> <li>• <i>weight</i> Identifies the weight value in the range 0 to 10.</li> </ul> |

## Examples

The following example shows the configuration of an SMSC result group.

```
cs7 sms result-group smscgrp smmc
pc 3.1.2 weight 1
pc 3.1.3 weight 1
```

## What to Do Next

Configure SMS Address Tables (Optional)

Configure SMS Rulesets

## Creating and Managing SMS Address Tables

This section discussed the configuration, storage, and retrieval of lists of addresses that can be used for blocking or routing SMS messages.

SMS address tables can be stored in either NVRAM on the IOS platform or in a file that typically would be stored in flash. NVRAM limitations on some platforms might restrict the number off address entries that can be stored there. In this case, the file storage option is recommended.

This section includes 3 tasks:

- Creating and Loading an Address Table Using the CLI, page 196

- [Creating and Loading a Stored Address Table File](#), page 199
- [Replacing an Address Table](#), page 202

## Creating and Loading an Address Table Using the CLI

In this task you use the CLI to configure address table entries that you plan to save to an external file. You then specify a location from which you will load the file of address table entries upon reboot. Finally you save the address entries to a an external file.

### SUMMARY STEPS

1. **cs7 sms address-table** *tablename*
2. **addr** *address* [**exact**] [**result** { **block** | **next-rule** | **group** *group-name* | **pc** *dest-pc* [**ssn** *ssn*] | **gt** *addr-string* [**tt** *tt* **gti** { **2** | **4** **np** *np* **nai** *nai* } } ] ] ]
3. **load** *URL*
4. **exit**
5. **cs7 save address-table** { **mlr** | **sms** } *tablename url*

### Detailed Steps

|        | Command or Action                                                                                                   | Purpose                                                                                                                                                                       |
|--------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms address-table</b> <i>tablename</i><br><br><b>Example:</b><br>ITP(config)# cs7 sms address-table addrtbl1 | Identifies the name of the address table. This name is used to identify the address table from within SMS ruleset commands. Enables CS7 SMS address table configuration mode. |



## Step 2

| Command or Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>addr</b> <i>address</i> [<b>exact</b>] [<b>result</b> {<b>block</b>   <b>next-rule</b>   <b>group</b> <i>group-name</i>   <b>pc</b> <i>dest-pc</i> [<b>ssn</b> <i>ssn</i>]   <b>gt</b> <i>addr-string</i> [<b>tt</b> <i>tt</i> <b>gti</b> {<b>2</b>   <b>4</b> <b>np</b> <i>np</i> <b>nai</b> <i>nai</i>}]}]</p> <p><b>Example:</b></p> <pre>ITP(cfg-cs7-sms-addr-table)# addr 1111 exact result group grp1</pre> <pre>ITP(cfg-cs7-sms-addr-table)# addr 1800 result gt 12341234 tt 11 gti 4 np 1 nai 2</pre> | <p>Configures one or more addresses in the address table.</p> <p><b>exact</b> specifies that the configured address must match exactly.</p> <p><b>result</b> indicates that the address will be handled in one of the following ways:</p> <div>  <p><b>Note</b> An SMS result may be ignored only when multiple table-based rule parameters are specified, such as <i>dest-sme-table</i>, <i>orig-sme-table</i>, or <i>orig-imsi-table</i>.</p> </div> <ul style="list-style-type: none"> <li>• <b>block</b> indicates that the message will be rejected.</li> <li>• <b>next-rule</b> indicates that the message will continue with the next rule in the ruleset.</li> <li>• <b>rule</b> <i>rule-number</i> indicates that routing should proceed with a specified target rule number.</li> <li>• <b>group</b> <i>group-name</i> indicates that the message will be routed according to a named result-group.</li> <li>• <b>pc</b> <i>dest-pc</i> indicates that the message will be routed according to a specified point code.</li> <li>• <b>ssn</b> <i>ssn</i> indicates an ssn associated with the point code.</li> <li>• <b>gt</b> <i>addr-string</i> indicates a global title result and address.</li> <li>• <b>tt</b> <i>tt</i> specifies a translation type in the range 0 to 255.</li> <li>• <b>gti</b> {<b>2</b>   <b>4</b>} specifies a global title indicator. (2 is primarily used in the ANSI domain; 4 in the ITU domain.)</li> <li>• <b>np</b> <i>np</i> specifies a numbering plan value in the range 0 to 15.</li> <li>• <b>nai</b> <i>nai</i> specifies a nature of address indicator in the range 0 to 127.</li> </ul> |

|        | Command or Action                                                                                                                                                                   | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 3 | <p><b>load</b> <i>URL</i></p> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-addr-table)# load<br/> disk0:smsaddrtbl</p>                                                                   | <p>(Optional) Specifies an address table file to load at startup.</p> <ul style="list-style-type: none"> <li>• bootflash: URL to load</li> <li>• cs7: URL to load</li> <li>• disk0: URL to load</li> <li>• disk1: URL to load</li> <li>• flash: URL to load</li> <li>• ftp: URL to load</li> <li>• null: URL to load</li> <li>• nvram: URL to load</li> <li>• rcp: URL to load</li> <li>• slavebootflash: URL to load</li> <li>• slavecdfs: URL to load</li> <li>• slavedisk0: URL to load</li> <li>• slavedisk1: URL to load</li> <li>• slavenvram: URL to load</li> <li>• slavercsf: URL to load</li> <li>• slaveslot0: URL to load</li> <li>• slaveslot1: URL to load</li> <li>• slot0: URL to load</li> <li>• slot1: URL to load</li> <li>• system: URL to load</li> <li>• tftp: URL to load</li> </ul> |
| Step 4 | <p><b>exit</b></p> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-addr-table)# exit</p>                                                                                                    | <p>Exit to global configuration mode.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Step 5 | <p><b>cs7 save address-table</b> {<b>mlr</b>   <b>sms</b>} <i>tablename</i><br/> <i>url</i></p> <p><b>Example:</b><br/> ITP(config)#cs7 save sms addrtbl1<br/> disk0:smsaddrtbl</p> | <p>Saves the address table to an external location and file (url).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Creating and Loading a Stored Address Table File

Address tables are typically created and stored to a file using the CLI. However, you may also create address tables externally from the ITP and then read the file into the ITP. For users interested in this option, the format for ITP address table files is specified below.

In this task you use any text editor to create a file of addresses. When you configure the ITP, you specify the table name and the location from which you will load the file of address table entries upon reboot. If necessary, you can add addresses to the file using the CLI. If you do add address entries, you must save the address table in order to have the updated list of addresses load upon reboot.

Each line in an address file must follow the following format:

*line-identifier,token1,[[token-n+1],[token-n+2], ... [token-n+x]]eol*

Where line-identifier identifies the mandatory and optional tokens on a line and to which entity the line applies. All tokens are order dependant and follow the order specified in Table 11.

Table 11 lists the supported line identifiers for address tables and lists the syntax for each line.

**Table 11**      **Line Identifiers**

| Line Identifier | Description                                                      | Syntax                                                                  |
|-----------------|------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>ver</b>      | Specifies the version, variant, instance, network name and type. | <i>major,minor,variant,[instance],[network-name],type</i>               |
| <b>sms</b>      | Specifies an SMS address table entry.                            | <i>addr-tbl-name, address,result-id,[result-value],[result-options]</i> |
| <b>mlr</b>      | Specifies an MLR address table entry                             | <i>addr-tbl-name,address,result-id,[result-value],[result-options]</i>  |
| <b>!</b>        | Specifies a comment. Not parsed.                                 |                                                                         |

Table 12 describes and lists the values all of the tokens listed in Table 11.

**Table 12**      **Token Identifiers**

| Token                 | Description                                                                                                     | Supported Value(s)                      |
|-----------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <i>major</i>          | Indicates the major version associated with the file.                                                           | 1                                       |
| <i>minor</i>          | Indicates the minor version associated with the file.                                                           | 0                                       |
| <i>instance</i>       | If the address-table file is associated with a particular instance, this field is used to convey that instance. | 0 - 7                                   |
| <i>variant</i>        | Specifies the variant associated with a particular file.                                                        | ANSI, ITU, TTC                          |
| <i>network-name</i>   | User-specified network name associated with the instance.                                                       | Alphanumeric string. 1 - 19 characters. |
| <i>addr-tble-name</i> | User-specified name identifying the address table where the entry belongs.                                      | Alphanumeric string. 1 - 12 characters. |
| <i>address</i>        | User-specified address.                                                                                         | Hexadecimal string. 1 - 20 digits.      |

**Table 12**      **Token Identifiers (continued)**

| Token                 | Description                                                                                                           | Supported Value(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>result-id</i>      | Identifies the result type configured by the user.                                                                    | <b>as</b> Result is an asname.<br><b>bl</b> Result is to block address.<br><b>cn</b> Result is to continue.<br><b>nr</b> Result is to continue with next SMS rule.<br><b>gr</b> Result is a group.<br><b>pc</b> Result is a pc.<br><b>pcssn</b> Result is a pc and ssn.<br><b>gt</b> Result is a gt address and selector                                                                                                                                                                                               |
| <i>result-value</i>   | The result value of the SMS/MLR entry. The contents are dictated by the result identifier. See Table 13 and Table 14. | Possible result values: <ul style="list-style-type: none"> <li>Variable length string if result identifier is <b>as</b>, <b>gr</b>, <b>smpp</b>, or <b>ucp</b>.</li> <li>Null if result identifier is <b>bl</b>, <b>cn</b>, or <b>nr</b>.</li> <li>Hexadecimal point code if result is <b>pc</b>.</li> <li>Hexadecimal point code and decimal ssn if result is <b>pcssn</b>.</li> <li>Variable length digit string, decimal <i>tt</i>, <i>gti</i>, <i>np</i>, and <i>nai</i> values if result is <b>gt</b>.</li> </ul> |
| <i>result-options</i> | User-configured option applied to entry.                                                                              | Ex    Specifies exact match.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

Table 13 describes the SMS result value tokens listed in Table 12.

**Table 13**      **SMS Result Identifier Syntax**

| Result Identifier | Result Value Syntax                      | Supported Value(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>bl</b>         |                                          | null                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>nr</b>         |                                          | null                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>gr</b>         | <i>group-name</i>                        | Alphanumeric string. 1 - 12 characters.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>gt</b>         | <b>gt:gt-tt:tt-gti:gti-np:np-nai:nai</b> | <i>gt</i> Hexadecimal digit string. 1 to 15 digits.<br><i>tt</i> Decimal value in range 0 - 255<br>ANSI defaults to 10.<br>ITU defaults to 0.)<br><i>gti</i> 2 or 4.<br>ANSI defaults to 2.<br>ITU defaults to 4.<br><i>np</i> Decimal value in range 0 - 15.<br>For gti=2, use 253 to indicate invalid.<br>ANSI defaults to 253.<br>ITU defaults to 1.<br><i>nai</i> Decimal value in range 0 - 127<br>For gti=2, use 253 to indicate invalid.<br>ANSI defaults to 253.<br>ITU defaults to 4. |
| <b>pc</b>         | <i>pc</i>                                | Hexadecimal point code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>pcssn</b>      | <i>pc-ssn</i>                            | <i>pc</i> Hexadecimal point code.<br><i>ssn</i> Decimal value in range 2 - 255.                                                                                                                                                                                                                                                                                                                                                                                                                |

Table 14 lists the MLR result value tokens listed in Table 12.

**Table 14 MLR Result Identifier Syntax**

| Result Identifier | Result Value Syntax                      | Supported Value(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>bl</b>         |                                          | null                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>cn</b>         |                                          | null                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>gr</b>         | <i>group-name</i>                        | Alphanumeric string. 1 - 12 characters.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>gt</b>         | <b>gt:gt-tt:tt-gti:gti-np:np-nai:nai</b> | <i>gt</i> Hexadecimal digit string. 1 to 15 digits.<br><i>tt</i> Decimal value in range 0 255<br>ANSI defaults to 10.<br>ITU defaults to 0.)<br><i>gti</i> 2 or 4.<br>ANSI defaults to 2.<br>ITU defaults to 4.<br><i>np</i> Decimal value in range 0 - 15.<br>For gti=2, use 253 to indicate invalid.<br>ANSI defaults to 253.<br>ITU defaults to 1.<br><i>nai</i> Decimal value in range 0 - 127<br>For gti=2, use 253 to indicate invalid.<br>ANSI defaults to 253.<br>ITU defaults to 4. |
| <b>pc</b>         | <i>pc</i>                                | Hexadecimal point code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>pcssn</b>      | <i>pc-ssn</i>                            | <i>pc</i> Hexadecimal point code.<br><i>ssn</i> Decimal value in range 2 - 255.                                                                                                                                                                                                                                                                                                                                                                                                              |

## SUMMARY STEPS

1. Create a file of addresses following the format and syntax described in Tables 1 - 4.
2. **cs7 sms address-table** *tablename*
3. **load** *URL*

## Detailed Steps

|               | Command or Action                                                                                                   | Purpose                                                                                                                                                                       |
|---------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | Create a file of addresses, following the format and syntax described in Tables 1 - 4.                              |                                                                                                                                                                               |
| <b>Step 2</b> | <b>cs7 sms address-table</b> <i>tablename</i><br><br><b>Example:</b><br>ITP(config)# cs7 sms address-table addrtbl1 | Identifies the name of the address table. This name is used to identify the address table from within SMS ruleset commands. Enables CS7 SMS address table configuration mode. |

| Command or Action |                                                                                      | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 3            | <code>load URL</code>                                                                | (Optional) Specifies an address table file to load at startup.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                   | <p><b>Example:</b></p> <pre>ITP(cfg-cs7-sms-addr-table)# load disk0:smsaddrtbl</pre> | <ul style="list-style-type: none"><li>• bootflash: URL to load</li><li>• cs7: URL to load</li><li>• disk0: URL to load</li><li>• disk1: URL to load</li><li>• flash: URL to load</li><li>• ftp: URL to load</li><li>• null: URL to load</li><li>• nvram: URL to load</li><li>• rcp: URL to load</li><li>• slavebootflash: URL to load</li><li>• slavecdfs: URL to load</li><li>• slavedisk0: URL to load</li><li>• slavedisk1: URL to load</li><li>• slavenvram: URL to load</li><li>• slavercsf: URL to load</li><li>• slaveslot0: URL to load</li><li>• slaveslot1: URL to load</li><li>• slot0: URL to load</li><li>• slot1: URL to load</li><li>• system: URL to load</li><li>• tftp: URL to load</li></ul> |

Replacing an Address Table

You can replace an existing address table. The replacement does not impact routing until the entire replacement address table is loaded successfully. If an error occurs, the old address table (if present) remains intact. Each time an address table is replaced, the corresponding **load** command is added to the running configuration.

## SUMMARY STEPS

1. **cs7 address-table replace {mlr | sms} tablename url**

## Detailed Steps

|        | Command or Action                                                                                                                                     | Purpose                                                         |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Step 1 | <b>cs7 address-table replace {mlr   sms} tablename url</b><br><br><b>Example:</b><br>ITP(config)# cs7 address-table sms addrtbl1<br>disk0:smsaddrtbl1 | Replaces an existing address table with one specified in a URL. |

## Examples

The following example shows three address tables. Two of the address tables are loaded from stored files at startup. The third address table and the addresses in the table are configured from within the configuration.

```
cs7 sms address-table imsi-screen
load disk0:imsi-screen
!
cs7 sms address-table orig-screen
load disk0:orig-screen
!
cs7 sms address-table shortcodes
addr 11112 result group grp2
addr 1111 result group grp1
addr 2222 result group grp1
addr 5551212 exact result group grp3
```

## What to Do Next

- Configure an SMS MSC Table (Optional)
- Configure Rulesets.

## Configuring an SMS MSC Table

This section discusses the optional task of configuring an SMS MSC table.

The SMS MSC table stores information pertaining to MSCs with which the ITP communicates. The table stores information that indicates the time zone information for each MSC relative to the ITP. By default, if an MSC table is not configured, all messages to mobile destinations are delivered with delivery times that indicate the local time of the ITP, regardless of whether the destination is in the same or different time zone as the ITP. If you configure an MSC table, short messages will be delivered with delivery times indicated in the MSC's local time, which is typically also the local time of the receiver of the message.

## SUMMARY STEPS

1. **cs7 sms msc-table**
2. **digits address time-offset {add | subtract} time-difference**

## Detailed Steps

|        | Command or Action                                                                                                                                                        | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms msc-table</b>                                                                                                                                                 | Enables CS7 SMS MSC table configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|        | <b>Example:</b><br>ITP(config)# cs7 sms msc-table                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Step 2 | <b>digits address time-offset {add   subtract} time-difference</b>                                                                                                       | Specifies an MSC address.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|        | <b>Example:</b><br>ITP(cfg-cs7-sms-msc-table)# digits 19199332252<br>time-offset subtract 01:00<br>ITP(cfg-cs7-sms-msc-table)# digits 1505<br>time-offset subtract 01:00 | <ul style="list-style-type: none"> <li>• <b>address</b> Full or partial prefix MSC E.164 address.<br/>All MSCs with E.64 addresses that have the coded prefix assume the traits configured for this MSC table entry.</li> <li>• <b>time-offset</b> Indicates that the MSC is in a different time-zone from the ITP.</li> <li>• <b>add</b> Indicates a time interval to be added to the ITP local time to match the MSC local-time.</li> <li>• <b>subtract</b> Indicates a time interval to be subtracted from the ITP local time to match the MSC local-time.</li> <li>• <b>time-difference</b> Specifies the time interval to be added to or subtracted from ITP local time to match MSC local-time. The time interval must be in the format <i>hh:mm</i> where <i>hh</i> is the number of hours and <i>mm</i> is the number of minutes.</li> </ul> |

## Configuring SMS Rulesets

A ruleset is a set of ordered rules, each with an input condition and a corresponding result that occurs if all of that rule's conditions match.

You can configure multiple rules within a ruleset. Each rule has one or more input conditions, all of which must be true for the rule to be considered a match. For each rule match, the corresponding result will be executed.

Rules within the ruleset will be checked sequentially until either the message is blocked, routed successfully, or until the last rule is attempted. Backup routing can be achieved by sequencing backup routing results after primary results. If routing to the primary result fails, the backup will be attempted.

This section describes how to configure SMS Rulesets and specify rules within the rulesets.



## Prerequisites

If the ruleset specifies a result that routes the message using a result group, you must have already specified the result group. See the “Configuring SMS Result Groups” section on page 189.

## Restrictions

The **dest-sme-table**, **orig-imsi-table**, and **orig-sme-table** rule parameters accept either an SMS address-table name OR an MLR address-table name. This ability is primarily for customers that want the SMS-MO Proxy functionality. Therefore, SMS and MLR address table names must be unique across all instances. You may enter an MLR address-table name for an SMS rule parameter. However, MLR cannot reference SMS address-tables.

If an incoming message matches an SMS rule that references an MLR address-table, then any MLR address-table result is mapped to an SMS result:

- BLOCK, PC, and PCSSN results map easily from MLR to SMS.
- For result groups, the MLR result group name is mapped to an SMS result group name. If the SMS result group is not configured, then the result specified on the rule is used.
- AS and CONTINUE results are not valid in SMS. For these cases, the result specified on the rule is used.
- If no result is specified, the result on the rule is used.

## SUMMARY STEPS

Steps 1 and 2 are required in the order shown.

Steps 3 - 12 are optional input conditions for a rule.

Each input condition must be followed by Step 13, a result command.

1. **cs7 sms ruleset** *name* [**protocol** *[gsm-map]*]
2. **rule** *index* **sms-mo**
3. **cdr-service-queue** [**available** | **congested** | **unavailable**]
4. **dest-port** *dest-port-number*
5. **dest-sme** { \* | *dest-address* } [**exact**] [**min-digits** *min*] [**max-digits** *max*] [**noa** *noa-value* **np** *np-value*]
6. **dest-sme-table** *tablename* [**noa** *noa-value* **np** *np-value*]
7. **dest-smsc** { \* | *dest-address* } [**exact**] [**min-digits** *min*] [**max-digits** *max*] [**noa** *noa-value* **np** *np-value*]
8. **orig-imsi** { \* | *imsi-address* | **unknown** } [**exact**] [**min-digits** *min*] [**max-digits** *max*]
9. **orig-imsi-table** *tablename* [**noa** *noa-value* **np** *np-value*]
10. **orig-sme** { \* | *address* } [**exact**] [**min-digits** *min*] [**max-digits** *max*] [**noa** *noa-value* **np** *np-value*]
11. **orig-sme-table** *tablename* [**noa** *noa-value* **np** *np-value*]
12. **pid** *protocol-id*
13. **result** { **block** | **group** *result-group* | **gt** *addr* [**tt** *tt* **gti** *gti* [**np** *np* **nai** *nai*]] | **next-rule** | **pc** *dest-pc* [*ssn* *ssn*] | **rule** *index* | **deliver-mt** }

## DETAILED STEPS

|        | Command or Action                                                                                                                                                                                                                                                                      | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms ruleset</b> <i>name</i> [ <b>protocol</b> [ <b>gsm-map</b> ]]<br><br><b>Example:</b><br>Router(config)#cs7 sms ruleset SMS-RULES<br>protocol gsm-map                                                                                                                        | Names a <b>cs7 sms ruleset</b> . <ul style="list-style-type: none"> <li><b>protocol</b> Configure an application layer protocol for this ruleset.</li> <li><b>gsm-map</b> Use GSM-MAP as application layer protocol within the ruleset.</li> </ul> Configuring the <b>cs7 sms ruleset</b> command enables CS7 SMS set configuration mode in which you can identify rules and the order in which they are searched                                                                                                                                                                                                                                                                                                                                                          |
| Step 2 | <b>rule</b> <i>index</i> <b>sms-mo</b><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-set)# rule 10 sms-mo                                                                                                                                                                                  | Within the ruleset, specifies a rule and the order in which it is searched. <ul style="list-style-type: none"> <li><b>sms-mo</b> Indicates a GSM-MAP short message service mobile originated request</li> </ul> Configuring the <b>rule</b> command enables CS7 SMS rule configuration mode in which you configure the input conditions of the rule.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Step 3 | <b>cdr-service-queue</b> [ <b>available</b>   <b>congested</b>   <b>unavailable</b> ]<br><br><b>Example:</b><br>ITP(cfg-cs7-sms-set-rule)# cdr-service-queue congested                                                                                                                 | Tests availability of CDR service queue. <ul style="list-style-type: none"> <li><b>available</b> Matches if CDR service queue is available.</li> <li><b>congested</b> Matches if CDR service queue is congested.</li> <li><b>unavailable</b> Matches if CDR service queue is unavailable.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Step 4 | <b>dest-port</b> <i>dest-port-number</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-set-rule)# dest-port 100                                                                                                                                                                            | Specifies the application destination port number. <ul style="list-style-type: none"> <li><i>dest-port-number</i> Specifies the destination port number. Valid range is 0 to 65535.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Step 5 | <b>dest-sme</b> { <b>*</b>   <i>dest-address</i> } [ <b>exact</b> ] [ <b>min-digits</b> <i>min</i> ] [ <b>max-digits</b> <i>max</i> ] [ <b>noa</b> <i>noa-value</i> <b>np</b> <i>np-value</i> ]<br><br><b>Example:</b><br>ITP(cfg-cs7-sms-set-rule)# dest-sme 1111 exact<br>noa 2 np 3 | Specifies the destination short message entity. <ul style="list-style-type: none"> <li><b>*</b> Specifies match all addresses.</li> <li><i>dest-addr</i> Specifies the destination address. Valid range is 1 to 20 hexadecimal digits.</li> <li><b>exact</b> Specifies address must match dest-sme exactly.</li> <li><b>min-digits</b> <i>min</i> The minimum number of digits in the address string. The default is 1.</li> <li><b>max-digits</b> <i>max</i> The maximum number of digits in the address string. The default is the length of the address string.</li> <li><b>noa</b> <i>noa</i> Specifies nature of address value. Valid range is 0 to 7.</li> <li><b>np</b> <i>np</i> Specifies numbering plan identification value. Valid range is 0 to 15.</li> </ul> |

|        | Command or Action                                                                                                                                                                                                                                                    | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 6 | <p><b>dest-sme-table</b> <i>tablename</i> [<b>noa</b> <i>noa-value</i> <b>np</b> <i>np-value</i>]</p> <p><b>Example:</b><br/>ITP(cfg-cs7-sms-set-rule)# dest-sme-table addrtbl1</p>                                                                                  | <p>Specifies an SMS address table or an MLR address table of destination SME addresses.</p> <ul style="list-style-type: none"> <li>• <i>tablename</i> Specifies an address table name.</li> <li>• <b>noa noa</b> Specifies the nature of address value. Valid range is 0 to 7.</li> <li>• <b>np np</b> Specifies the numbering plan identification value. Valid range is 0 to 15.</li> </ul>                                                                                                                                                                                                                                                                                                                                                         |
| Step 7 | <p><b>dest-smsc</b> { *   <i>dest-address</i> } [<b>exact</b>] [<b>min-digits</b> <i>min</i>] [<b>max-digits</b> <i>max</i>] [<b>noa</b> <i>noa-value</i> <b>np</b> <i>np-value</i>]</p> <p><b>Example:</b><br/>ITP(cfg-cs7-sms-set-rule)# dest-smsc 18005551212</p> | <p>Specifies the destination SMSC.</p> <ul style="list-style-type: none"> <li>• * Specifies match all addresses.</li> <li>• <i>dest-addr</i> Specifies the destination address. Valid range is 1 to 20 hexadecimal digits.</li> <li>• <b>exact</b> Specifies address must match dest-sme exactly.</li> <li>• <b>min-digits min</b> The minimum number of digits in the address string. The default is 1.</li> <li>• <b>max-digits max</b> The maximum number of digits in the address string. The default is the length of the address string.</li> <li>• <b>noa noa</b> Specifies the nature of address value. Valid range is 0 to 7.</li> <li>• <b>np np</b> Specifies the numbering plan identification value. Valid range is 0 to 15.</li> </ul> |
| Step 8 | <p><b>orig-imsi</b> { *   <i>imsi-address</i>   <b>unknown</b> } [<b>exact</b>] [<b>min-digits</b> <i>min</i>] [<b>max-digits</b> <i>max</i>]</p> <p><b>Example:</b><br/>ITP(cfg-cs7-sms-set-rule)# orig-imsi unknown</p>                                            | <p>Specifies the origin IMSI address.</p> <ul style="list-style-type: none"> <li>• <i>imsi-addr</i> Specifies the IMSI address, with up to 16 hexadecimal digits.</li> <li>• <b>exact</b> Specifies configured address must match orig-imsi exactly.</li> <li>• <b>min-digits min</b> The minimum number of digits in the address string. The default is 1.</li> <li>• <b>max-digits max</b> The maximum number of digits in the address string. The default is the length of the address string.</li> <li>• <b>unknown</b> Indicates unknown origin IMSI.</li> </ul>                                                                                                                                                                                |
| Step 9 | <p><b>orig-imsi-table</b> <i>tablename</i> [<b>noa</b> <i>noa-value</i> <b>np</b> <i>np-value</i>]</p> <p><b>Example:</b><br/>ITP(cfg-cs7-sms-set-rule)# orig-imsi-table addrtbl2</p>                                                                                | <p>Specifies SMS address table or an MLR address table of origin IMSI addresses (address-table).</p> <ul style="list-style-type: none"> <li>• <i>tablename</i> Specifies an address table name.</li> <li>• <b>noa noa</b> Specifies a nature of address value. Valid range is 0 to 7.</li> <li>• <b>np np</b> Specifies a numbering plan identification value. Valid range is 0 to 15.</li> </ul>                                                                                                                                                                                                                                                                                                                                                    |

|         | Command or Action                                                                                                                                                                                                                               | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 10 | <p><b>orig-sme</b> <i>{*   address [exact]}</i> [<b>min-digits</b> <i>min</i>] [<b>max-digits</b> <i>max</i>] [<b>noa</b> <i>noa-value</i> <b>np</b> <i>np-value</i>]</p> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-set-rule)# orig-sme 12345</p> | <p>Specifies the origin short message entity</p> <ul style="list-style-type: none"> <li>• <b>*</b> Specifies match all addresses.</li> <li>• <b>address</b> Specifies an SMSC address or MSISDN address. Valid range is 1 to 16 hexadecimal digits.</li> <li>• <b>exact</b> Specifies address must match orig-sme exactly.</li> <li>• <b>min-digits</b> <i>min</i> The minimum number of digits in the address string. The default is 1.</li> <li>• <b>max-digits</b> <i>max</i> The maximum number of digits in the address string. The default is the length of the address string.</li> <li>• <b>noa</b> <i>noa</i> Specifies a nature of address value. Valid range is 0 to 7.</li> <li>• <b>np</b> <i>np</i> Specifies a numbering plan identification value. Valid range is 0 to 15.</li> </ul> |
| Step 11 | <p><b>orig-sme-table</b> <i>tablename</i> [<b>noa</b> <i>noa-value</i> <b>np</b> <i>np-value</i>]</p> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-set-rule)# orig-sme-table addrtbl3</p>                                                            | <p>Specifies an SMS address table or an MLR address table of origin SME addresses (address-table).</p> <ul style="list-style-type: none"> <li>• <b>tablename</b> Specifies an address table name.</li> <li>• <b>noa</b> <i>noa</i> Specifies a nature of address value. Valid range is 0 to 7.</li> <li>• <b>np</b> <i>np</i> Specifies a numbering plan identification value. valid range is 0 to 15.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                     |

|         | Command or Action                                                                                                                                                                                                                                                                                                                                                                       | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 12 | <p><b>pid</b> <i>protocol-id</i></p> <p><b>Example:</b><br/>ITP(cfg-cs7-sms-set-rule)# pid 0</p>                                                                                                                                                                                                                                                                                        | <p>Specifies the protocol identifier (TP-PID).</p> <ul style="list-style-type: none"> <li><i>protocol-id</i> Protocol identifier integer. Valid range is 0 to 255.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Step 13 | <p><b>result</b> {<b>block</b>   <b>group</b> <i>result-group</i>   <b>gt</b> <i>addr</i> [<b>tt</b> <i>tt</i> <b>gti</b> <i>gti</i> [<b>np</b> <i>np</i> <b>nai</b> <i>nai</i>]}   <b>next-rule</b>   <b>pc</b> <i>dest-pc</i> [<b>ssn</b> <i>ssn</i>]   <b>rule</b> <i>index</i>   <b>deliver-mt</b>}</p> <p><b>Example:</b><br/>ITP(cfg-cs7-sms-set-rule)# result pc 5.3.5 ssn 7</p> | <p>Specifies the result the occurs if all of a rules conditions match.</p> <ul style="list-style-type: none"> <li><b>block</b> Indicates that the message will be dropped.</li> <li><b>group</b> <i>result-group</i> Indicates that message will be routed using a result group and specifies the result group name.</li> <li><b>gt</b> <i>addr</i> Indicates that message will be routed using GT and specifies the SCCP address, a string of 1 to 15 hexadecimal digits.</li> <li><b>tt</b> <i>tt</i> Optional with <b>gt</b>. Specifies the translation type. Valid range is 0 to 255.</li> <li><b>gti</b> <i>gti</i> Specifies a global title indicator. Valid numbers are 2(primarily used in the ANSI domain) or 4 (used in the ITU domain).</li> <li><b>np</b> <i>np</i> Specifies a numbering plan. Valid range is 0 through 15.</li> <li><b>nai</b> <i>nai</i> Specify a nature of address indicator. Required for a <i>gti</i> value of 4. Optional for a <i>gti</i> value of 2. Valid range is 0 through 127.</li> <li><b>next-rule</b> Indicates that message processing will continue with next rule.</li> <li><b>pc</b> <i>dest-pc</i> Indicates that message will be routed using a point code and specifies the destination point code.</li> <li><b>ssn</b> <i>ssn</i> Optional with <b>pc</b>. Specifies a subsystem number. Valid range is 2 to 255.</li> <li><b>rule</b> <i>index</i> Indicates that message processing will continue at a specified rule, and indicates the rule index. Valid range is 1 to 1000.</li> <li><b>deliver-mt</b> Indicates that a delivery should be attempted to the destination SME as a mobile device. Only valid for sms-mo rule operations.</li> </ul> |

## Examples

The following example shows a ruleset named sms-rules. Each rule specifies an input condition and a result, and indicates the order of search.

```
cs7 sms ruleset sms-rules
rule 10 sms-mo
  orig-imsi unknown
  result group smscgrp
rule 20 sms-mo
  orig-imsi-table imsi-screen
```

```

    result block
rule 30 sms-mo
    orig-sme-table orig-screen noa 0 np 0
    result block
rule 40 sms-mo
    dest-sme-table shortcodes noa 0 np 0
    result next-rule
rule 50 sms-mo
    result deliver-mt
rule 60 sms-mo
    result group smscgrp

```

## What to Do Next

Configure the SMS Route Table

## Configuring SMS Route Table

The SMS route table specifies the types of traffic that will be processed by the DSMR feature and indicates which ruleset should be used for which type of traffic. Optional parameters may be configured to regulate the amount of traffic the feature can process and to specify the source and proxy addresses used by ITP-FDA when sending requests.

This section describes the steps for configuring an SMS route table.

### SUMMARY STEPS

1. **cs7 sms route-table**
2. **cdr-service** *service-name*
3. **transaction-timer** *seconds*
4. **traffic-rate-timer** *seconds*
5. **gsm-map sms-mo ssn** *ssn*
6. **gprs-delivery prefer-sgsn**
7. **mnp tt1 tt** [**tt2 tt**]
8. **modify-prefix**
9. **invoke-timer** *seconds*
10. **map-source-addr** {**digits** | **use** {**international** | **national**} **digits**} *addr-digits* [**tt tt gti gti** [**np np nai nai**]]
11. **msc-proxy-addr** [**use** {**international** | **national**}] **tt tt gti gti** [**np np nai nai**]
12. **ruleset** *ruleset*
13. **smc-map-version** *version*
14. **max-messages** *number*
15. **proxy error use**

## DETAILED STEPS

|        | Command or Action                                                                                                | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 sms route-table</b><br><br><b>Example:</b><br>ITP(config)# cs7 sms route-table                            | Configures an SMS route table and enables CS7 SMS route table configuration mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Step 2 | <b>cdr-service service-name</b><br><br><b>Example:</b><br>ITP(cfg-sms-route-table)# cdr-service CDR1             | Allows configuration of the CDR service that should be used for all traffic. <ul style="list-style-type: none"> <li><b>service-name</b> Identifies the cdr service name used by the SMS routing subsystem. This name must match the name configured in the <b>cs7 cdr service</b> command.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                  |
| Step 3 | <b>transaction-timer seconds</b><br><br><b>Example:</b><br>ITP(cfg-sms-route-table)# transaction-timer 30        | (Optional) Specifies maximum lifetime of a message transaction. <ul style="list-style-type: none"> <li><b>seconds</b> Timer, in the range 5 to 3600 seconds. The default state of the transaction timer is disabled (no limit to the maximum lifetime).</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                     |
| Step 4 | <b>traffic-rate-timer seconds</b><br><br><b>Example:</b><br>ITP(cfg-sms-route-table)# traffic-rate-timer 30      | (Optional) Specifies timer for traffic rate calculation interval. <ul style="list-style-type: none"> <li><b>seconds</b> Data collection interval, in seconds. Valid range is 60-3600 seconds. The default is 600 seconds.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Step 5 | <b>gsm-map sms-mo ssn ssn</b><br><br><b>Example:</b><br>ITP(cfg-sms-route-table)# gsm-map sms-mo ssn 8           | Configures GSM MAP routing and enables CS7 SMS GSM SMSMO configuration mode. Allows configuration of a ruleset to use for routing inbound gsm-map SMS messages. (If no ruleset is configured the configuration will be incomplete and ignored.) <ul style="list-style-type: none"> <li><b>sms-mo</b> Identifies the gsm-map operations which should be routed under this configuration. <b>sms-mo</b> is the only valid entry.</li> <li><b>ssn</b> Identifies the subsystem number to register for this configuration. Only gsm-map SMS traffic that is destined to this SSN will be processed.</li> <li><b>ssn</b> Subsystem number, in the range 2 to 255</li> </ul> |
| Step 6 | <b>gprs-delivery prefer-sgsn</b><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-gsm-smsmo)# gprs-delivery prefer-sgsn | (Optional) Enables some customization of MT deliveries involving GPRS destinations.<br><br>When the <b>prefer-sgsn</b> option is specified, DSMR will first attempt SMS MT delivery to the SGSN address when the HLR provides both MSC and SGSN addresses in an SRI-SM confirmation.<br><br>If not configured, DSMR will first attempt to deliver the message to the MSC when both MSC and SGSN addresses are returned by the HLR.                                                                                                                                                                                                                                     |

|        | Command or Action                                                                                                                                                                                                                                                                                                                                                               | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 7 | <p><b>mnmp</b> <i>tt1 tt</i> [<i>tt2 tt</i>]</p> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-gsm-smsmo)# mnmp tt1 5</p>                                                                                                                                                                                                                                                             | <p>(Optional) Allows configuration of DSMR options specific to mobile number portability.</p> <p>The <b>tt1</b> parameter specifies that all SRI-SM messages will be sent to the HLR using the specified translation type within the SCCP called party address. If <b>tt1</b> is not specified, then the variant-specific default TT is used: TT=10 for ANSI, TT=0 for all other variants.</p> <p>If the SRI-SM response contains the error “Unknown Subscriber” and <b>tt2</b> is configured, then a second SRI-SM request is sent using the TT specified under <b>tt2</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Step 8 | <p><b>modify-prefix dest-sme</b> {<i>*</i>   <i>address</i>} [<i>noa noa np np</i>] [<i>min-digits min-digits</i>] [<i>max-digits max-digits</i>] [<i>remove num-digits-to-remove</i>] [<i>add add-prefix-digits</i>] [<i>rslt-noa noa rslt-np np</i>]</p> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-gsm-smsmo)# modify-prefix dest-sme 0 remove 1 add 31rslt-noa 1 rslt-np 1</p> | <p>(Optional) Allows modification of the SMS destination that was received from an MSC. Enables conversion of local dialing prefixes into international equivalents.</p> <ul style="list-style-type: none"> <li>• <b>dest-sme</b> identifies the type of address to modify. Currently, only the destination short message entity address can be modified. <b>dest-sme</b> is the only valid entry.</li> <li>• <b>*</b> indicates all addresses will be modified.</li> <li>• <b>address</b> indicates only addresses which begin with the digits specified in <i>a</i> will be modified.</li> <li>• <b>noa noa np np</b> indicates only addresses received with nature of address which matches <i>noa</i> and a numbering plan that matches <i>np</i> will be modified.</li> <li>• <b>min-digits min-digits</b> specifies that only addresses received which are at least <i>min-digits</i> in length will be modified.</li> <li>• <b>max-digits max-digits</b> specifies that only addresses received which are at smaller or equal in length to <i>max-digits</i> will be modified.</li> <li>• <b>remove num-digits-to-remove s</b> specifies the number of digits that should be stripped from the prefix of the received address when formulating the new modified address.</li> <li>• <b>add add-prefix-digits</b> specifies the prefix digits that should be added to the received address when formulating the modified address.</li> <li>• <b>rslt-noa noa rslt-np np</b> specifies the desired resulting nature of address and numbering plan used in the modified address.</li> </ul> |
| Step 9 | <p><b>invoke-timer</b> <i>seconds</i></p> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-gsm-smsmo)# invoke-timer 30</p>                                                                                                                                                                                                                                                               | <p>(Optional) Set timer to supervise initiated dialogues.</p> <ul style="list-style-type: none"> <li>• <b>seconds</b> Timer, in the range 1 to 30 seconds. The default is 10 seconds.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



|         | Command or Action                                                                                                                                                                                               | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 10 | <pre>map-source-addr {digits   use {international   national} digits} addr-digits [tt tt gti gti [np np nai nai]]</pre> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-gsm-smsmo)# map-source-addr digits 5555 tt3</p> | <p>Specifies local source address of application. The map source address is used in reply to sms-mo dialogues and in proxied dialogs if an msc proxy address is not specified.</p> <ul style="list-style-type: none"> <li>• <b>digits</b> <i>addr-digits</i> Specifies address digits, in the range of 1 to 15 digits.</li> <li>• <b>use</b> Indicates setting for national use bit in the address indicator.</li> <li>• <b>international</b> Address has international scope (default for ITU/CHINA/TTC).</li> <li>• <b>national</b> Address has national scope (default for ANSI).</li> <li>• <b>tt tt</b> Optional. Specifies the translation type, in the range 0 to 255.</li> <li>• <b>gti gti</b> Specifies a global title indicator. Valid numbers are 2(primarily used in the ANSI domain) or 4 (used in the ITU domain).</li> <li>• <b>np np</b> In ITU domain, specifies a numbering plan. Valid range is 0 through 15.</li> <li>• <b>nai nai</b> In ITU domain, specifies a nature of address indicator. Required for a <i>gti</i> value of 4. Optional for a <i>gti</i> value of 2. Valid range is 0 through 127.</li> </ul> |
| Step 11 | <pre>msc-proxy-addr [use {international   national}] tt tt gti gti [np np nai nai]</pre> <p><b>Example:</b><br/> ITP(cfg-cs7-sms-gsm-smsmo)# msc-proxy-addr use international tt 4</p>                          | <p>(Optional) Specifies MAP MSC Proxy address. The msc proxy address is used to form the SCCP CgPA for a proxied MO dialogue.</p> <ul style="list-style-type: none"> <li>• <b>tt tt</b> Optional. Specifies the translation type, in the range 0 to 255. If not configured, the tt from the original request is used.</li> <li>• <b>gti gti</b> Specifies a global title indicator. Valid numbers are 2(primarily used in the ANSI domain) or 4 (used in the ITU domain).</li> <li>• <b>np np</b> In ITU domain, specifies a numbering plan. Valid range is 0 through 15.</li> <li>• <b>nai nai</b> In ITU domain, specifies a nature of address indicator. Required for a <i>gti</i> value of 4. Optional for a <i>gti</i> value of 2. Valid range is 0 through 127.</li> <li>• <b>use</b> Indicates setting for national use bit in the address indicator.</li> <li>• <b>international</b> Address has international scope (default for ITU/CHINA).</li> <li>• <b>national</b> Address has national scope (default for ANSI).</li> </ul>                                                                                               |

|         | Command or Action                                                                                                   | Purpose                                                                                                                                                                                                                                                                            |
|---------|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 12 | <b>ruleset</b> <i>ruleset</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-smsmo-msc-proxy)# ruleset SMS-RULES         | Applies an SMS ruleset to the specified inbound traffic.<br><br>A ruleset must be configured for the <b>gsm-map sms-mo</b> configuration (See Step 4) to take effect. If no ruleset is configured, the <b>gsm-map sms-mo</b> configuration will be incomplete and will be ignored. |
| Step 13 | <b>smc-map-version</b> <i>version</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-smsmo-msc-proxy)# smc-map-version 1 | (Optional) Specifies locally supported MAP version.<br><ul style="list-style-type: none"><li><i>version</i> GSM MAP version number, in the range 1 to 3. The default is 3.</li></ul>                                                                                               |
| Step 14 | <b>max-messages</b> <i>number</i><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-smsmo-msc-proxy)# max-messages 1000000  | (Optional) Specifies the maximum number of open SMS MO indications before a service center congestion response is generated. Valid range is 1 to 2147483647. By default, no max-messages limit is enforced.                                                                        |
| Step 15 | <b>proxy-error-use</b><br><br><b>Example:</b><br>ITP(cfg-cs7-sms-smsmo-msc-proxy)# proxy-error-use                  | (Optional) Returns error information received from SMSC during last MO Proxy procedure.                                                                                                                                                                                            |

## Examples

```
cs7 sms route-table
cdr-service cdrserv1
gsm-map sms-mo ssn 8
ruleset sms-rules
map-source-addr digits 18881212122
msc-proxy-addr tt 10 gti 2
```

## Monitoring DSMR

This section lists the commands used to monitor DSMR. The commands are listed in alphabetical order, but you may use them in any order, as needed.

### SUMMARY STEPS

1. **show cs7 cdr destination** [*name*]
2. **show cs7 cdr service** [*fda*]
3. **show cs7 smpp** [*detail session-id* | list]
4. **show cs7 sms address-table** [**addr** *address* | **name** *name* | **prefix** *prefix*]
5. **show cs7 sms result** [*name*]
6. **show cs7** [*instance instance-number*] **sms route-table** [**gsm-map** [**sms-mo** [*ssn ssn*]]]
7. **show cs7 sms ruleset** [*name name*] [**detail** | **result-summary** | **rule-summary**]
8. **show cs7 sms smpp** [*name*]
9. **show cs7 sms sms-mo msc-proxy-addr**

10. **show cs7 sms statistics** [**detail** | **rate**]

11. **show cs7 sms ucp** [*name*]

## DETAILED STEPS

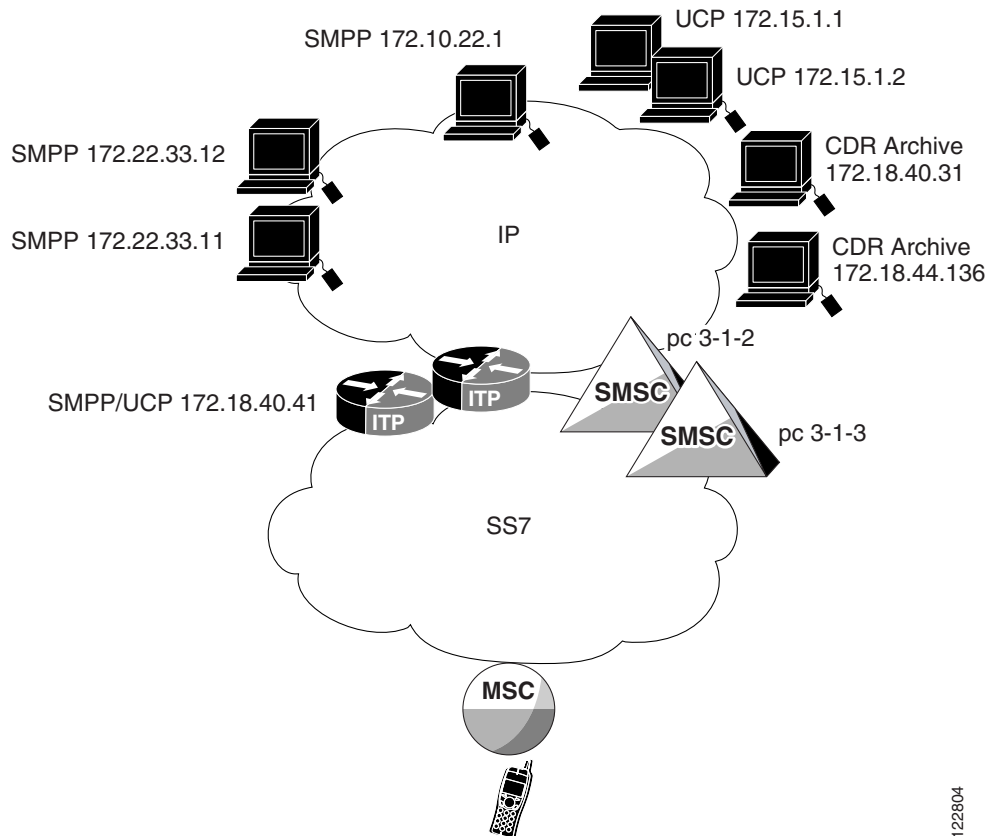
|        | Command or Action                                                                                                                                                                                      | Purpose                                                                                                                                                                                                                                                                                                                                                                          |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>show cs7 cdr destination</b> [ <i>name</i> ]<br><br><b>Example:</b><br>ITP# show cs7 cdr destination cdrdest1                                                                                       | Displays CDR destination information. <ul style="list-style-type: none"> <li><b>name</b> (Optional) CDR destination name.</li> </ul>                                                                                                                                                                                                                                             |
| Step 2 | <b>show cs7 cdr service</b> [ <i>fda</i> ]<br><br><b>Example:</b><br>ITP# show cs7 cdr service fda                                                                                                     | Displays CDR service information. <ul style="list-style-type: none"> <li><b>fda</b> (Optional) First Delivery Attempt subsystem.</li> </ul>                                                                                                                                                                                                                                      |
| Step 3 | <b>show cs7 smpp</b> [ <b>detail</b> <i>session-id</i>   <b>list</b> ]<br><br><b>Example:</b><br>ITP# show cs7 smpp detail 1234                                                                        | Displays information about the SMPP sessions. <ul style="list-style-type: none"> <li><b>detail</b> (Optional) Displays session details.</li> <li><i>session-id</i> Session identifier, in the range 1- 4294967294</li> <li><b>list</b> (Optional) Displays session list.</li> </ul>                                                                                              |
| Step 4 | <b>show cs7 sms address-table</b> [ <b>addr</b> <i>address</i>   <b>name</b> <i>name</i>   <b>prefix</b> <i>prefix</i> ]<br><br><b>Example:</b><br>ITP# show cs7 sms address-table name shortcodes     | Displays SMS address table information. <ul style="list-style-type: none"> <li><b>addr</b> <i>address</i> Display information about specified address.</li> <li><b>name</b> <i>address</i> Display information about named address-table.</li> <li><b>prefix</b> <i>prefix</i> Display information about addresses prefixed with specified digit string</li> </ul>               |
| Step 5 | <b>show cs7 sms result</b> [ <i>name</i> ]<br><br><b>Example:</b><br>ITP# show cs7 sms result grp1                                                                                                     | Displays SMS result group information. <ul style="list-style-type: none"> <li><i>name</i> (Optional) Result group name.</li> </ul>                                                                                                                                                                                                                                               |
| Step 6 | <b>show cs7</b> [ <b>instance</b> <i>instance-number</i> ] <b>sms route-table</b> [ <b>gsm-map</b> [ <b>sms-mo</b> [ <b>ssn</b> <i>ssn</i> ]]]<br><br><b>Example:</b><br>ITP# show cs7 sms result grp1 | Displays SMS route table information. <ul style="list-style-type: none"> <li><b>gsm-map</b> (Optional) Displays GSM MAP routing information.</li> <li><b>sms-mo</b> (Optional) Displays information about the GSM MAP operations that are routed.</li> <li><b>ssn</b> <i>ssn</i> (Optional) Displays information about GSM MAP traffic destined to the specified SSN.</li> </ul> |
| Step 7 | <b>show cs7 sms ruleset</b> [ <b>name</b> <i>name</i> ] [ <b>detail</b>   <b>result-summary</b>   <b>rule-summary</b> ]<br><br><b>Example:</b><br>ITP# show cs7 sms ruleset name sms-rules             | Displays SMS ruleset information. <ul style="list-style-type: none"> <li><b>name</b> <i>name</i> (Optional) Ruleset name.</li> <li><b>detail</b> (Optional) Displays ruleset details.</li> <li><b>result-summary</b> (Optional) Displays result summary.</li> <li><b>rule-summary</b> (Optional) Displays ruleset summary.</li> </ul>                                            |

|         | Command or Action                                                                                                            | Purpose                                                                                                                                                                       |
|---------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 8  | <b>show cs7 sms smpp</b> [ <i>name</i> ]<br><br><b>Example:</b><br>ITP# show cs7 sms smpp                                    | Displays SMS SMPP session information. <ul style="list-style-type: none"> <li>• <i>name</i> (Optional) SMPP session name.</li> </ul>                                          |
| Step 9  | <b>show cs7 sms sms-mo msc-proxy-addr</b><br><br><b>Example:</b><br>ITP# show cs7 sms sms-mo msc-proxy-addr                  | Displays SMS GSMMAP SMS-MO information. <ul style="list-style-type: none"> <li>• <b>msc-proxy-addr</b> Display msc-proxy-addr information.</li> </ul>                         |
| Step 10 | <b>show cs7 sms statistics</b> [ <b>detail</b>   <b>rate</b> ]<br><br><b>Example:</b><br>ITP# show cs7 sms statistics detail | Displays SMS global statistics. <ul style="list-style-type: none"> <li>• <b>detail</b> Include transport statistics.</li> <li>• <b>rate</b> Display traffic rates.</li> </ul> |
| Step 11 | <b>show cs7 sms ucp</b> [ <i>name</i> ]<br><br><b>Example:</b><br>ITP# show cs7 sms ucp                                      | Displays SMS UCP session information. <ul style="list-style-type: none"> <li>• <i>name</i> (Optional) UCP session name.</li> </ul>                                            |

# Configuration Example for DSMR

This sections provides a sample DSMR configuration. Figure 17 illustrates the details of the configuration example.

**Figure 17** *DSMR Operating as an SMSC*



```

cs7 cdr destination cdrdest1 8000 172.18.40.31 172.18.40.41
cs7 cdr destination cdrdest2 8000 172.18.44.136 172.18.40.41
!
cs7 cdr service cdrserv1
share-mode cost
destination cdrdest1 1
destination cdrdest2 2
!
cs7 sms smpp profile esme1
send-window 4
!
cs7 sms smpp profile default
keepalive-timer 60000
send-window 10
!
cs7 sms smpp 6000 local-ip 172.18.40.41 dynamic
!
cs7 sms ucp 7000 local-ip 172.18.40.41 dynamic
!
cs7 sms result-group grp1 esme

```

122804

```

match smpp id esme1 type esme password mypass
match ip 171.22.33.12 any profile esme1
match ip 172.22.33.11 any profile esme1
!
cs7 sms result-group grp2 esme
match smpp id esme2 type esme password pass2
match ip 172.10.22.1 4000
match ip 172.10.22.1 4001
!
cs7 sms result-group grp3 esme
match ucp id 01234567 password ucppass
match ip 172.15.1.1 3001
match ip 172.15.1.2 3001
!
cs7 sms result-group smscgrp smsc
pc 3.1.2 weight 1
pc 3.1.3 weight 1
!
cs7 sms address-table imsi-screen
load disk0:imsi-screen
!
cs7 sms address-table orig-screen
load disk0:orig-screen
!
cs7 sms address-table shortcodes
addr 11112 result group grp2
addr 1111 result group grp1
addr 2222 result group grp1
addr 5551212 exact result group grp3
!
cs7 sms ruleset sms-rules
rule 10 sms-mo
  orig-imsi unknown
  result group smscgrp
rule 20 sms-mo
  orig-imsi-table imsi-screen
  result block
rule 30 sms-mo
  orig-sme-table orig-screen noa 0 np 0
  result block
rule 40 sms-mo
  dest-sme-table shortcodes noa 0 np 0
  result next-rule
rule 50 sms-mo
  result deliver-mt
rule 60 sms-mo
  result group smscgrp
!
cs7 sms route-table
cdr-service cdrserv1
gsm-map sms-mo ssn 8
ruleset sms-rules
map-source-addr digits 18881212122
msc-proxy-addr tt 10 gti 2

```



# Configuring IP Security (IPSec)

---

IP Security (IPSec) is supported on the Cisco 2600 Router. IPSec is available on image c2600-ityk9-mz, which also supports Secure Shell (SSH).

## Feature History for IPSec

| Release    | Modification                                                |
|------------|-------------------------------------------------------------|
| 12.2(23)SW | This capability was added to ITP for the Cisco 2600 Router. |

## Finding Support Information for Platforms and Cisco IOS Software Images

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## Contents

- Restrictions for IPSec, page 219
- Information About IPSec, page 220
- How to Configure IPSec, page 220
- Configuration Examples for IPSec, page 223
- Where to Go Next, page 224

## Restrictions for IPSec

IPSec is supported on ITP on the Cisco 2600 Router only.



---

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# Information About IPSec

IPSec is a framework of open standards developed by the Internet Engineering Task Force (IETF). IPSec provides security for transmission of sensitive information over unprotected networks such as the Internet. IPSec acts at the network layer, protecting and authenticating IP packets between participating IPSec devices (peers), such as Cisco routers.

ITP IPSec support on the 2600 does not introduce any new commands. For more information regarding IPSec, refer to the “Configuring IPSec Network Security” chapter and the “IPSec Network Security Commands” chapter of the *Cisco IOS Security Command Reference*.

## How to Configure IPSec

The following sections describe how to configure IPSec between the ITP and another IP address, and then run an SCTP link over IPSec.

- Create an IPSEC Tunnel, page 220
- Configure a CS7 Peer Link over the Tunnel, page 223

## Create an IPSEC Tunnel

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **crypto isakmp policy**
4. **encryption**
5. **hash**
6. **authentication**
7. **exit**
8. **crypto isakmp key**
9. **crypto ipsec transform-set**
10. **crypto map**
11. **set peer**
12. **set transform-set**
13. **match address**
14. **exit**
15. **interface**
16. **ip address**
17. **crypto map**
18. **exit**
19. **access-list**



## DETAILED STEPS

|         | Command or Action                                                                                                                   | Purpose                                                                                                          |
|---------|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Step 1  | <b>enable</b><br><br><b>Example:</b><br>Router> enable                                                                              | Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul> |
| Step 2  | <b>configure terminal</b><br><br><b>Example:</b><br>Router# configure terminal                                                      | Enters global configuration mode.                                                                                |
| Step 3  | <b>crypto isakmp policy</b><br><br><b>Example:</b><br>Router(config)# crypto isakmp policy 1                                        | Defines an Internet Key Exchange (IKE) policy and enables ISAKMP policy configuration mode.                      |
| Step 4  | <b>encryption</b><br><br><b>Example:</b><br>Router(config-isakmp)# encryption 3des                                                  | Specifies the encryption algorithm within an IKE policy.                                                         |
| Step 5  | <b>hash</b><br><br><b>Example:</b><br>Router(config-isakmp)# hash md5                                                               | Specifies the hash algorithm within an IKE policy.                                                               |
| Step 6  | <b>authentication</b><br><br><b>Example:</b><br>Router(config-isakmp)# authentication pre-share                                     | Specifies the authentication method within an IKE policy.                                                        |
| Step 7  | <b>exit</b><br><br><b>Example:</b><br>Router(config-isakmp)# exit                                                                   | Exits ISAKMP policy configuration mode and enables global configuration mode.                                    |
| Step 8  | <b>crypto isakmp key</b><br><br><b>Example:</b><br>Router(config)# crypto isakmp key cisco 123 address 10.2.1.2                     | Configures a preshared authentication key.                                                                       |
| Step 9  | <b>crypto ipsec transform-set</b><br><br><b>Example:</b><br>Router(config)# crypto ipsec transform-set to_vpn esp-3des esp-md5-hmac | Defines a transform set—an acceptable combination of security protocols and algorithms.                          |
| Step 10 | <b>crypto map</b><br><br><b>Example:</b><br>Router(config)# crypto map to_vpn 10 ipsec-isakmp                                       | Configures IKE extended authentication (Xauth) on the router.                                                    |

|         | Command or Action                                                                                                                                                                                               | Purpose                                                               |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Step 11 | <b>set peer</b><br><br><b>Example:</b><br>Router(config-crypto-map)# set peer 10.2.1.2                                                                                                                          | Specifies an IP Security peer in a crypto map entry.                  |
| Step 12 | <b>set transform-set</b><br><br><b>Example:</b><br>Router(config-crypto-map)# set transform-set to_vpn                                                                                                          | Specifies which transform sets can be used with the crypto map entry. |
| Step 13 | <b>match address</b><br><br><b>Example:</b><br>Router(config-crypto-map)# match address 101                                                                                                                     | Specifies an extended access list for a crypto map entry.             |
| Step 14 | <b>exit</b><br><br><b>Example:</b><br>Router(config-crypto-map)# exit                                                                                                                                           | Exits to Global configuration mode.                                   |
| Step 15 | <b>interface</b><br><br><b>Example:</b><br>Router(config)# interface FastEthernet0/0                                                                                                                            | Configures the interface and enable Interface configuration mode.     |
| Step 16 | <b>ip address</b><br><br><b>Example:</b><br>Router(config-if)# ip address 10.1.3.1 255.255.255.0                                                                                                                | Specifies an IP address.                                              |
| Step 17 | <b>crypto map</b><br><br><b>Example:</b><br>Router(config-if)# crypto map to_vpn                                                                                                                                | Assigns a crypto map set to the interface.                            |
| Step 18 | <b>exit</b>                                                                                                                                                                                                     | Exits to Global configuration mode.                                   |
| Step 19 | <b>access-list</b><br><br><b>Example:</b><br>Router(config)# access-list 101 permit ip 10.1.3.0 0.0.0.255 10.2.1.0 0.0.0.255<br>Router(config)# access-list 101 permit ip 10.2.1.0 0.0.0.255 10.1.3.0 0.0.0.255 | Configures an access list.                                            |

## What to Do Next

Configure a CS7 peer link over the tunnel you created.

## Configure a CS7 Peer Link over the Tunnel

### SUMMARY STEPS

1. **cs7 local-peer**
2. **local-ip**
3. **exit**
4. **cs7 linkset**
5. **link**

### DETAILED STEPS

|        | Command or Action                                                                              | Purpose                                                                          |
|--------|------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Step 1 | <b>cs7 local-peer</b><br><br><b>Example:</b><br>Router(config)# cs7 local-peer 5000            | Specifies the local peer and enables CS7 local peer mode.                        |
| Step 2 | <b>local-ip</b><br><br><b>Example:</b><br>Router(config-cs7-lp)# local-ip 10.1.3.1             | Configures the IP address for this local peer instance.                          |
| Step 3 | <b>exit</b>                                                                                    | Exits to global configuration mode.                                              |
| Step 4 | <b>cs7 linkset</b><br><br><b>Example:</b><br>Router(config)# cs7 linkset dasher 3.3.3          | Specifies a linkset to an adjacent node and enables linkset configuration mode.  |
| Step 5 | <b>link</b><br><br><b>Example:</b><br>Router(config-cs7-ls)# link 0 sctp 10.2.1.2<br>5000 5000 | Configures an SS7 link within a linkset and enables CS7 link configuration mode. |

## Configuration Examples for IPSec

The following example configures IPSEC between the ITP and another IP address, then runs an SCTP link over IPSEC.

First use the Cisco IPSEC commands to create an IPSEC tunnel from the router's IP address 10.1.3.1 to IP address 10.2.1.2:

```
crypto isakmp policy 1
  encr 3des
  hash md5
  authentication pre-share
crypto isakmp key cisco123 address 10.2.1.2

crypto ipsec transform-set to_vpn esp-3des esp-md5-hmac

crypto map to_vpn 10 ipsec-isakmp
```

```

set peer 10.2.1.2
set transform-set to_vpn
match address 101

interface FastEthernet0/0
ip address 10.1.3.1 255.255.255.0
duplex auto
speed auto
crypto map to_vpn

access-list 101 permit ip 10.1.3.0 0.0.0.255 10.2.1.0 0.0.0.255
access-list 101 permit ip 10.2.1.0 0.0.0.255 10.1.3.0 0.0.0.255

```

Next, configure a CS7 peer link over the tunnel:

```

cs7 local-peer 5000
local-ip 10.1.3.1

cs7 linkset dasher 3.3.3
link 0 sctp 10.2.1.2 5000 5000

```

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.

- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

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# Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service

---

The MAP Proxy feature delivers Mobile Application Part (MAP) functionality.

## Feature History for MAP Proxy

| Release    | Modification                                  |
|------------|-----------------------------------------------|
| 12.2(4)MB7 | This feature was introduced.                  |
| 12.2(25)SW | MAP Proxy implements an MMSC Gateway Service. |

## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Information About MAP Proxy, page 227
- How to Configure MAP Proxy, page 229
- Where to Go Next, page 237

## Information About MAP Proxy

The Mobile Application Part (MAP) layer of the SS7 protocol suite provides mobility procedures to SS7 network applications. The MAP layer includes protocol details that support mobility functions such as registration, authentication, and call completion while providing service transparency to roaming subscribers.



---

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The Cisco ITP MAP Proxy feature delivers MAP functionality by exporting a MAP User API (MAPUA). The MAPUA provides an interface between IP-based servers and SS7-based cellular wireless network nodes such as HLRs, VLRs, etc.

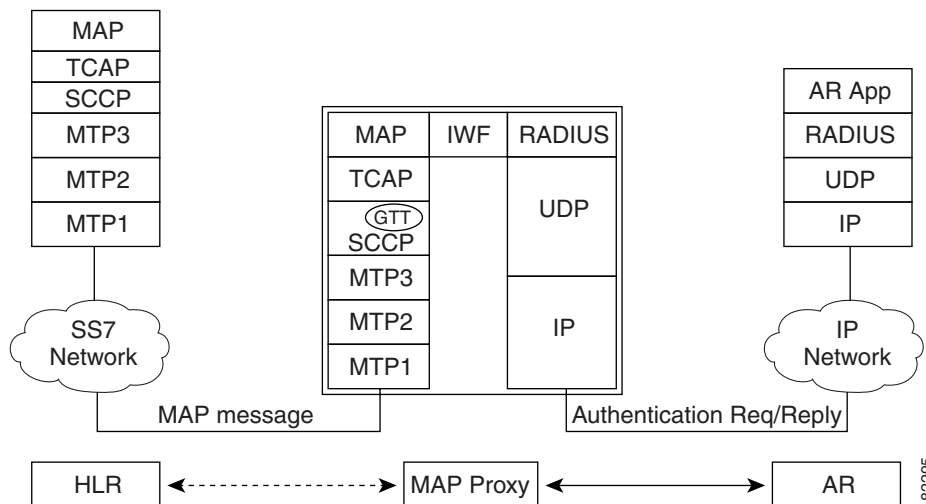
The MAP proxy feature enables the development of IP-based application servers (AS) without the need to develop SS7 layers on the AS platform. The AS platform needs only to implement the remote MAPUA appropriate for the application (the required MAP procedure.) The ITP terminates or translates all SS7 events and sends the translated event or the MAP reply data to the remote AS over the MAPUA.

## GSM MAP Authentication

In IOS Software Release 12.2(4)MB7 the initial release of MAPUA supports a non-standard interface using the RADIUS protocol for performing the GSM MAP authentication service on behalf of a Cisco Access Registrar (AR). As an option, authorization check can be turned on during the authentication procedure. To authorize a subscriber the ITP currently invokes the MAP\_RESTORE\_DATA service. The subscriber profile obtained from the HLR is examined for the presence of a predetermined bearer service or teleservice. If authorization fails then no authentication triplets are returned to the AR. Figure 18 depicts the protocol layers in this implementation.

Figure 18 represents a scenario in which an AS requests HLR information through the MAP Proxy. The AR uses the MAPUA to request authentication triplets for a particular IMSI. The interworking function (IWF) on the MAP Proxy receives the request and initiates the appropriate MAP procedure. If the request cannot be satisfied using cached information, then a request is sent to the HLR using MAP/TCAP. (An SS7 transport is depicted in this scenario, but the transport could also be through SS7 over IP protocols such as M2PA, M3UA, or SUA.)

**Figure 18** Protocol Layers for GSM MAP Authentication Service





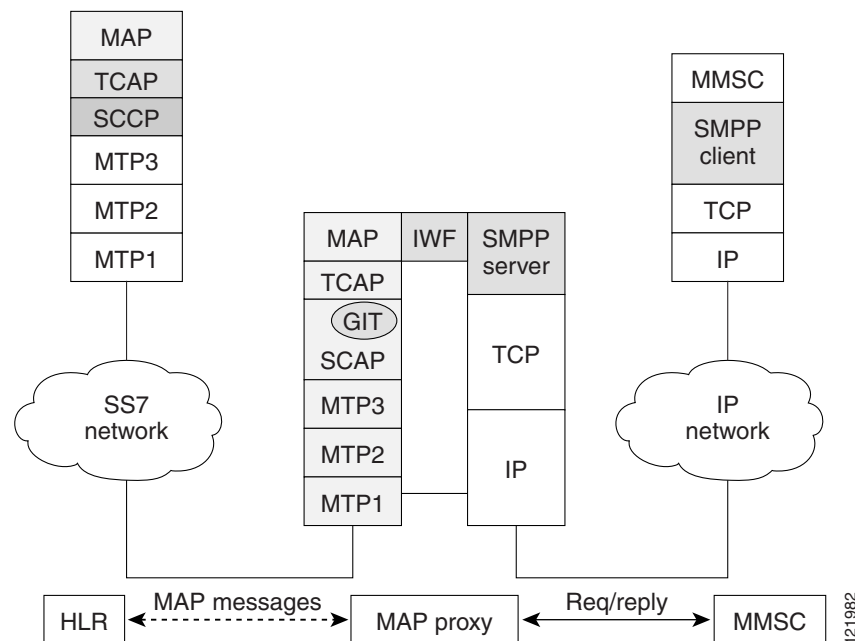
## Multimedia Message Service Center Gateway

In IOS Software Release 12.2(25)SW, the MAP Proxy implementing a remote MAPUA provides a Short Message Peer to Peer (SMPP) interface for IP-based multimedia message service centers (MMSC) to exchange information with SS7-based cellular wireless network nodes. This implementation exports a MAPUA that also supports the GSM MAP-based SendIMSI, SendRoutingInfoForSM (SRISM), and SendRoutingInformation (SRI) procedures to support an MMSC Gateway service.

Figure 19 depicts the protocol layers used to support the MMSC Gateway service. The MMSC requests mobile station information from an HLR through the MAP Proxy. The MMSC uses the SMPP to send a request. The interworking function (IWF) on the MAP Proxy receives the request and initiates the appropriate MAP procedure. A SendIMSI, SendRoutingInfoForSM, or SendRoutingInfo request is sent to the HLR using MAP/TCAP. (An SS7 transport is depicted in this figure, but the transport to the HLR may also be through SS7 over IP protocols such as M2PA, M3UA or SUA.)

The MMSC Gateway feature allows FDA SMSC, M3UA, SUA, M2PA, MTP2, and HSL concurrent operation in any combination. Traffic may flow from one component to any of the other components. Components are unaware of the origin of the traffic. All MSUs appear to be from the SS7 network.

**Figure 19** Protocol Layers for the MMSC Gateway



## How to Configure MAP Proxy

This section describes the following tasks:

- Performing Basic ITP Configuration, page 230
- Implementing a GSM MAP Authentication Service, page 230
- Provisioning MAP Proxy Parameters for GSM MAP Authentication Service, page 232

- Implementing an MMSC Gateway Service, page 234
- Provisioning MAP Proxy Parameters for An MMSC Gateway Service, page 235
- Enabling and Disabling MAPUA, page 236

## Performing Basic ITP Configuration



### Note

The following configuration task includes basic ITP configuration, which is described fully in the “Configuring ITP Basic Functionality” chapter. If you are unfamiliar with ITP basic configuration, you are advised to refer to that chapter for more details.

To perform the minimum basic ITP configuration, use the following commands in global configuration mode:

|               | Command                                                                                               | Purpose                                         |
|---------------|-------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| <b>Step 1</b> | <b>cs7 variant</b> {ansi   itu   china   ttc}<br><br><b>Example:</b><br>ITP(config)# cs7 variant ansi | Specifies which SS7 variant the ITP is running. |
| <b>Step 2</b> | <b>cs7 point-code</b> point-code<br>ITP(config)# cs7 point-code 5.3.5                                 | Specifies the point code representation.        |

## Implementing a GSM MAP Authentication Service

### SUMMARY STEPS

1. **cs7 mapua** name protocol local-port
2. **local-ip** local-ip
3. **client** remote-ip [port remote-port] [encryption-off] secret {0 | 7 | LINE} shared-secret
4. **map-source-addr** [use {national | international}] digits digit-string [tt tt] [gti {2 | 4 np np nai nai}]
5. **map-dest-addr** [use {national | international}] [tt tt] [gti {2 | 4 np np nai nai}]

## Detailed Steps

|        | Command                                                                                                                                                                                                                                                         | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>cs7 mapua</b> <i>name protocol local-port</i><br><br><b>Example:</b><br>ITP(config)# cs7 mapua rad2000 radius 2000                                                                                                                                           | <p>Specifies the name, local port number, and protocol, and enables the CS7 MAPUA configuration submode.</p> <p>The name must be a character string with a maximum of 12 characters and must be unique among all MAPUA instances.</p> <p>The protocol must be <b>radius</b>.</p> <p>The local port is the local port number that the MAP Proxy will listen to on the specified protocol. You can configure a local port number in the range 1024 through 65535.</p>                                                                                                                                                                                                     |
| Step 2 | <b>local-ip</b> <i>local-ip</i><br><br><b>Example:</b><br>Router(config-cs7-mapua)# local-ip 4.4.4.4                                                                                                                                                            | <p>Specifies the local IP addresses that will receive MAPUA packets. You can repeat this command for a total of 4 local IP addresses.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Step 3 | <b>client</b> <i>remote-ip</i> [ <b>port</b> <i>remote-port</i> ]<br>[ <b>encryption-off</b> ] <b>secret</b> { <b>0</b>   <b>7</b>   <b>LINE</b> }<br><i>shared-secret</i><br><br><b>Example:</b><br>Router(config-cs7-mapua)# client 2.2.2.2 secret client2222 | <p>Specifies the clients that are allowed by the MAP Proxy. The source IP address within the MAPUA client request is used to match the client IP address you specify here.</p> <p>You may specify the remote port of the MAPUA client. If you do not specify the remote port, the client may connect using any valid port number.</p> <p>You must specify a shared secret string (as specified by the RADIUS protocol) to authenticate the MAPUA client. You must also specify whether the shared secret is unencrypted or encrypted (7).</p> <p>You may use the optional keyword <b>encryption-off</b> to specify that MAP Proxy RADIUS packets are not encrypted.</p> |

|        | Command                                                                                                                                                                                                                                                                                                                   | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 4 | <b>map-source-addr</b> [ <b>use</b> { <b>national</b>   <b>international</b> }] <b>digits</b> <i>digit-string</i> [ <b>tt</b> <i>tt</i> ] [ <b>gti</b> { <b>2</b>   <b>4</b> <b>np</b> <i>np</i> <b>nai</b> <i>nai</i> }]<br><br><b>Example:</b><br>Router(config-cs7-mapua)#<br>map-source-addr digits 1234567890 type 9 | Provision a global title address, such as an E.164 address, to be used as the calling party address for all MAP-generated messages. If no address is specified, then the calling party address will contain the MAP Proxy's point code and VLR subsystem number.<br><br>You must specify a digit string of 1 - 15 hexadecimal digits to represent the MAP Proxy.<br><br>You may specify the translation type of the address specified in the digits parameter. The type determines the translation-type used in the global title representing the MAP Proxy. Typical values would be 9 (for IMSI), 14 (for MSISDN), or 10 (for network element without number portability). The valid types are in the range 0 through 255.<br><br>You may also provisions the attributes of the destination global title address that represents the subscriber's IMSI. If not specified, the variant-specific address attributes for an IMSI are used. |
| Step 5 | <b>map-dest-addr</b> [ <b>use</b> { <b>national</b>   <b>international</b> }] [ <b>tt</b> <i>tt</i> ] [ <b>gti</b> { <b>2</b>   <b>4</b> <b>np</b> <i>np</i> <b>nai</b> <i>nai</i> }]<br><br><b>Example:</b><br>Router(config-cs7-mapua)# map-dest-addr<br>tt 10                                                          | Specifies the destination address parameters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## Provisioning MAP Proxy Parameters for GSM MAP Authentication Service

To enter the submode to provision parameters specific to the GSM MAP Process\_Obtain\_Authentication\_Sets\_VLR service, use the following commands, beginning in CS7 MAPUA submode:

|        | Command                                                                                                                                                             | Purpose                                                                                                             |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>gsm-authent-vlr</b><br><br><b>Example:</b><br>Router(config-cs7-mapua)# gsm-authent-vlr                                                                          | Enables the authent-vlr submode, in which you can provision parameters.                                             |
| Step 2 | <b>authorize</b> { <b>bs</b> <i>bs-number</i>   <b>ts</b> <i>ts-number</i> }<br><br><b>Example:</b><br>Router(config-cs7-mapua-gsm-authent-vlr)# authorize bs<br>26 | Specifies that authorization of the IMSI must be performed by accessing the subscriber's profile stored in the HLR. |

|               | Command                                                                                                                | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 3</b> | <b>cache-size</b> <i>cache-size</i><br><br><b>Example:</b><br>Router(config-cs7-mapua-gsm-authent-vlr)# cache-size 100 | Specifies the total number of IMSIs for which authentication triplets will be cached. A maximum of 5 triplets are stored per IMSI, and the default cache size is 65535. If the value 0 is specified, caching is disabled. If the cache-size is not configured, the default value is 65535.                                                                                                                                                                                                |
| <b>Step 4</b> | <b>max-return</b> <i>return-size</i><br><br><b>Example:</b><br>Router(config-cs7-mapua-gsm-authent-vlr)# max-return 2  | Specifies the maximum number of authentication triplets that may be returned to a MAPUA client for a single request. This command allows you to override the number of requested triplets specified by the client (e.g, AR) in order to optimize caching in the system. If not specified, the return size default is 5, but fewer triplets may be returned based on the number requested by the client and the number returned by the HLR (or stored in the cache from a previous query). |
| <b>Step 5</b> | <b>ttl</b> <i>time-to-live</i><br><br><b>Example:</b><br>Router(config-cs7-mapua-gsm-authent-vlr)# ttl 10080           | Specifies the amount of time, in seconds, that a cached authentication triplet will be stored. If not specified, the default is set to 604800 seconds (7 days).                                                                                                                                                                                                                                                                                                                           |
| <b>Step 6</b> | <b>reuse-count</b> <i>count</i><br><br><b>Example:</b><br>Router(config-cs7-mapua-gsm-authent-vlr)# reuse-count 3      | Specifies the number of times a triplet can be reused.                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Step 7</b> | <b>invoke-timer</b> <i>seconds</i><br><br><b>Example:</b><br>Router(config-cs7-mapua-gsm-authent-vlr)# invoke-timer 20 | Specifies the maximum amount of time, in seconds, that the MAP Proxy will wait for a response to a sent TCAP Invoke component. The default value is 10 seconds                                                                                                                                                                                                                                                                                                                            |

## Example

The following example specifies a MAP Proxy configuration for a GSM MAP Authentication Service.

```
cs7 variant ansi
cs7 point-code 5.3.5

interface ethernet 0/0
 ip address 4.4.4.4 255.255.255.128

cs7 mapua rad2000 radius 2000
 local-ip 4.4.4.4
 client 1.1.1.1 secret client1111
 client 2.2.2.2 secret client2222
 client 3.3.3.3 secret client3333
 map-source-addr digits 1234567890 type 9
 gsm-authent-vlr
  cache size 100
  max-return 2
```

## Implementing an MMSC Gateway Service

### SUMMARY STEPS

1. **cs7 mapua** *name protocol local-port*
2. **local-ip** *local-ip*
3. **client** {*dynamic* | *remote-ip*}
4. **map-source-addr** [use {*national* | *international*}] **digits** *digit-string* [**tt** *tt*]
5. **map-dest-addr** [use {*national* | *international*}] [**tt** *tt*] [**gti** {*2* | *4 np np nai nai*}]
6. **get-imsi** [*include-msc*]  
- or -  
**get-msrn** [*map-version version*]

### Detailed Steps

|        | Command                                                                                                                             | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | Router(config)# <b>cs7 mapua</b> <i>name protocol local-port</i><br><br><b>Example:</b><br>ITP(config)# cs7 mapua GetIMSI smpp 9000 | Specifies the name, local port number, and protocol for the MAP Proxy feature, and enables the CS7 MAPUA configuration submode.<br><br>The name must be a character string with a maximum of 12 characters and must be unique among all MAPUA instances.<br><br>The protocol must be <b>smpp</b> .<br><br>The local port is the local port number that the MAP Proxy will listen to on the specified protocol. A well-known port of 9000 is used for GetIMSI requests and a well-known port of 9001 is used for GetMSRN requests. |
| Step 2 | <b>local-ip</b> <i>local-ip</i><br><br><b>Example:</b><br>Router(config-cs7-mapua)# local-ip 4.4.4.4                                | Specifies the local IP addresses that will receive SMPP packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Step 3 | <b>client</b> { <i>dynamic</i>   <i>remote-ip</i> }<br><br><b>Example:</b><br>Router(config-cs7-mapua)# client 1.1.1.1              | Specifies the clients that are allowed by the MAP Proxy.<br><br>You can specify the client's remote IP address or you can allow any client to connect.<br><br>The source IP address within the MAPUA client request is used to match the client IP address you specify here.<br><br>The <b>dynamic</b> keyword allows any client to connect.                                                                                                                                                                                      |

|        | Command                                                                                                                                                                                                                                                          | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 4 | <b>map-source-addr</b> [ <b>use</b> { <b>national</b>   <b>international</b> }] <b>digits</b> <i>digit-string</i> [ <b>tt</b> <i>tt</i> ]<br><br><b>Example:</b><br>Router(config-cs7-mapua)#<br>map-source-addr digits 1234567890 tt 9                          | Provisions a global title address, such as an E.164 address, to be used as the calling party address for all MAP-generated messages.<br><br>You must specify a digit string of 1 - 15 hexadecimal digits to represent the MAP Proxy.<br><br>For variant ANSI only, you may specify the translation type of the address specified in the digits parameter. The type determines the translation-type used in the global title representing the MAP Proxy. Typical values would be 9 (for IMSI), 14 (for MSISDN), or 10 (for network element without number portability). The valid types are in the range 0 through 255. |
| Step 5 | <b>map-dest-addr</b> [ <b>use</b> { <b>national</b>   <b>international</b> }] [ <b>tt</b> <i>tt</i> ] [ <b>gti</b> { <b>2</b>   <b>4</b> <b>np</b> <i>np</i> <b>nai</b> <i>nai</i> }]<br><br><b>Example:</b><br>Router(config-cs7-mapua)#<br>map-dest-addr tt 10 | Specifies the destination address parameters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Step 6 | <b>get-imsi</b> [ <b>include-msc</b> ]<br>-or-<br><b>get-msrn</b> [ <b>map-version</b> <i>version</i> ]<br><br><b>Example:</b><br>Router(config-cs7-mapua)# get-imsi<br>include-msc<br>-or-<br>Router(config-cs7-mapua)# get-msrn<br>map-version 3               | <b>get-imsi</b> specifies the GetIMSI procedure and optionally includes the MSC number returned by the HLR in the GetIMSI response.<br><br><b>get-msrn</b> specifies the GetMSRN procedure and optionally specifies the default GSM MAP version for SendRoutingInfo MAP messages. Valid versions are in the range 1 to 3. The default is 2.<br><br>For a given SMPP MAPUA, either the get-imsi or get-msrn procedure must be specified. If no procedure is specified, the SMPP requests will not be accepted from the MMSC.                                                                                            |

## Provisioning MAP Proxy Parameters for An MMSC Gateway Service

This optional task allows you provision parameters specific to the SMPP connections. If not specified, the default behavior for each parameter is applied.

|        | Command                                                                                                                    | Purpose                                                                                                                                                                                                                  |
|--------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>smpp send-window</b> <i>operations</i><br><br><b>Example:</b><br>Router(config-cs7-mapua)# smpp send-window 40          | (Optional) Specifies the maximum number of outstanding SMPP operations between an MMSC and the ITP. Valid range is 1 to 100. The default is 10 operations.                                                               |
| Step 2 | <b>smpp session-init-timer</b> <i>ms</i><br><br><b>Example:</b><br>Router(config-cs7-mapua)# smpp session-init-timer 20000 | (Optional) Specifies the time lapse in milliseconds allowed between the establishment of a network connection and the establishment of the SMPP connection. Valid range is 500 to 120,000 ms. The default is 120,000 ms. |

|               | Command                                                                                                                | Purpose                                                                                                                                                                                                           |
|---------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 3</b> | <b>smpp keepalive-timer</b> <i>ms</i><br><br><b>Example:</b><br>Router(config-cs7-mapua)# smpp keepalive-timer 5000    | (Optional) Specifies the time lapse in milliseconds allowed between SMPP operations over an SMPP connection. Valid range is 0 to 600,000 ms. the default is 600,000 ms. The value 0 indicates no keepalive timer. |
| <b>Step 4</b> | <b>smpp inactivity-timer</b> <i>ms</i><br><br><b>Example:</b><br>Router(config-cs7-mapua)# smpp inactivity-timer 10000 | (Optional) Specifies the maximum time lapse in milliseconds allowed between transactions. Valid range is 1,000 to 9,000,000 ms. The default is 1,8000,000.                                                        |
| <b>Step 5</b> | <b>smpp response-timer</b> <i>ms</i><br><br><b>Example:</b><br>Router(config-cs7-mapua)# smpp response-timer 9000      | (Optional) Specifies the time lapse in milliseconds allowed between an SMPP request and the corresponding SMPP response. Valid range is 500 to 30,000 ms. The default is 5,000 ms.                                |

## Example

The following example specifies a MAP Proxy configuration for an MMSC Gateway service.

```
cs7 variant ansi
cs7 point-code 5.3.5

interface ethernet 0/0
 ip address 4.4.4.4 255.255.255.128

cs7 mapua GetIMSI smpp 9000
 local-ip 4.4.4.4
 client 1.1.1.1
 client 2.2.2.2
 client dynamic
 map-source-addr digits 1234567890 type 9
 get-imsi include-msc
 smpp response-timer 6000
 smpp session-init-timer 3000
!
cs7 mapua GetMSRN smpp 9001
 local-ip 4.4.4.4
 client 1.1.1.1
 client 2.2.2.2
 map-source-addr digits 1234567890 type 9
 invoke-timer 15
 get-msrn map-version 2
 smpp response-timer 2000
```

## Enabling and Disabling MAPUA

To disable the MAPUA after it has been configured, or to re-enable it after it has been disabled, use one of the following commands in CS7-MAPUA submode:



|               | Command                                                                                    | Purpose                                                                                                                 |
|---------------|--------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b> | <b>shutdown</b><br><br><b>Example:</b><br>Router(config-cs7-mapua) # <b>shutdown</b>       | Disables the MAPUA on this MAP Proxy ITP router and terminates MAPUA from listening on the specified port and protocol. |
| <b>Step 2</b> | <b>no shutdown</b><br><br><b>Example:</b><br>Router(config-cs7-mapua) # <b>no shutdown</b> | Re-enables the MAPUA.                                                                                                   |

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.

- Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
- Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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## Configuring MTP3 Offload

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The MTP3 Offload feature allows MTP3 message forwarding and Global Title Translation (GTT) to be performed on the VIPs.

### Feature History for MTP3 Offload

| Release     | Modification                                                                                                                                                                                          |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.2(4)MB13 | This feature was introduced.                                                                                                                                                                          |
| 12.2(20)SW  | Prior to IOS Release 12.2(20)SW, the MTP3 Offload feature and the Instance Translation feature could not be configured simultaneously. That restriction has been removed with IOS Release 12.2(20)SW. |

### Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Restrictions for MTP3 Offload, page 239
- Information About MTP3 Offload, page 240
- How to Configure MTP3 Offload, page 240
- Verifying MTP3 Offload, page 240
- Where to Go Next, page 240

## Restrictions for MTP3 Offload

The MTP3 Offload feature is supported on the Cisco 7500 Router only.



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# Information About MTP3 Offload

MTP3 Offload is an ITP feature on the Cisco 7500 that allows MTP3 message forwarding and Global Title Translation (GTT) to be performed on the VIPs.

Each VIP has a copy of the GTT tables, MTP3 route tables and link and linkset status for the entire ITP. The RSP executes the MTP3 and SCCP management procedures and updates each VIP with status changes that affect MTP3 forwarding and GTT. The MTP3 forwarding occurs VIP to VIP, without using the RSP.

MTP3 Offload eliminates the single process-switch queue because each line card can independently fast switch the majority of SS7 data packets. MTP3 Offload provides combined linkset support, SLS rotation support, GTT and QOS link selection support.

## How to Configure MTP3 Offload

**Note**

Prior to IOS Release 12.2(20)SW, the MTP3 Offload feature and the Instance Translation feature could not be configured simultaneously. That restriction has been removed with IOS Release 12.2(20)SW.

To configure MTP3 offload, use the following command in global configuration mode:

| Command                                 | Purpose                           |
|-----------------------------------------|-----------------------------------|
| Router(config)# <b>cs7 offload mtp3</b> | Enables MTP3 offload on all VIPs. |

The **cs7 offload mtp3** command will take effect when the ITP is reloaded.

## Verifying MTP3 Offload

To verify the MTP3 Offload feature, use the following command in EXEC mode:

| Command                              | Purpose                                                                                   |
|--------------------------------------|-------------------------------------------------------------------------------------------|
| Router# <b>show cs7 offload mtp3</b> | Displays the current status, counters, and events maintained by the MTP3 offload feature. |

## Where to Go Next

Depending on your configuration requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.

- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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## Configuring ITP Non-Stop Operation (NSO)

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The ITP Non-Stop Operation (NSO) feature is an enhancement to the ITP High Availability support on the Cisco 7500 platform. It allows the ITP running on a Cisco 7500 router to continue operation in the event of a Route/Switch Processor (RSP) failure.

### Feature History for ITP NSO

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(23)SW | This feature was introduced. |

### Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Restrictions for ITP NSO, page 243
- Information About ITP NSO, page 244
- How to Configure ITP NSO, page 244
- Configuration Example for ITP NSO, page 250

## Restrictions for ITP NSO

The ITP NSO feature is supported on the Cisco 7500 router.



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# Information About ITP NSO

An RSP switchover (in RPR+ redundancy mode) is a disruptive event in the SS7 and SIGTRAN networks. MTP2, M2PA and HSL links are brought down and a full MTP3 restart occurs. Any messages that were queued at the time of the switchover are lost. M3UA and SUA (collectively referred to as xUA) SCTP associations are closed.

The ITP NSO feature minimizes the disruption caused by an RSP switchover by keeping the ITP links and xUA associations active and avoiding an MTP3 restart. This is accomplished by taking advantage of the offloaded forwarding on the VIPs and synchronizing ITP state information from the Active RSP to the Standby RSP.

## How to Configure ITP NSO

Enabling the ITP NSO features consists of performing the following configuration tasks:

- Configuring MTP3 Offload, page 244
- Configuring M2PA Offload, page 245
- Configuring xUA SCTP Offload, page 246
- Configuring Stateful Switchover Redundancy Mode, page 247
- Configuring ITP NSO, page 249

## Configuring MTP3 Offload

Configuring MTP3 offload allows MTP3 forwarding and Global Title Translation (GTT) to continue operation if the active RSP fails.

### MTP3 Offload

MTP3 Offload is an ITP feature on the 7500 that enables MTP3 message forwarding to be performed on the VIPs. Each VIP has its own copy of the MTP3 route table along with link and linkset status for the entire ITP. The RSP runs the MTP3 management procedures and updates each VIP with status changes that affect MTP3 forwarding. The MTP3 forwarding occurs VIP-to-VIP without the involvement of the RSP due to the fact that the SS7 level 2 processing (MTP2, HSL and M2PA) is performed on the VIP.

#### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **cs7 offload mtp3**



## DETAILED STEPS

|        | Command or Action                                                                  | Purpose                                                                                                        |
|--------|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>Router> enable                             | Enables privileged EXEC mode. <ul style="list-style-type: none"><li>Enter your password if prompted.</li></ul> |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>Router# configure terminal     | Enters global configuration mode.                                                                              |
| Step 3 | <b>cs7 offload mtp3</b><br><br><b>Example:</b><br>Router(config)# cs7 offload mtp3 | Enables MTP3 offload and GTT offload.                                                                          |

## What to Do Next

Configure M2PA offload.

## Configuring M2PA Offload

All M2PA SCTP instances must be offloaded. This allows M2PA links to remain active if the active RSP fails.

## M2PA Offload

M2PA Offload is an ITP feature on the 7500 that enables M2PA message handling to be performed on the VIPs.

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **cs7 local-peer *port-number* offload *slot-number***

## DETAILED STEPS

|        | Command or Action                                                                                                             | Purpose                                                                                                             |
|--------|-------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>Router> enable                                                                        | Enables privileged EXEC mode.<br><ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul> |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>Router# configure terminal                                                | Enters global configuration mode.                                                                                   |
| Step 3 | <b>cs7 local-peer port-number offload slot-number</b><br><br><b>Example:</b><br>Router(config)# cs7 local-peer 1024 offload 6 | Creates an M2PA SCTP instance and offloads the M2PA SCTP processing to the specified VIP.                           |

## What to Do Next

Configure xUA SCTP Offload.

## Configuring xUA SCTP Offload

All xUA instances must be offloaded. This allows xUA ASP connections to remain active if the active RSP fails.

## xUA SCTP Offload

M3UA and SUA use SCTP to communicate with Application Server Processes (ASPs). This feature offloads the SCTP processing for xUA ASPs to the VIPs.

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **cs7 m3ua port-number offload slot-number**
4. **cs7 sua port-number offload slot-number**

## DETAILED STEPS

|        | Command or Action                                                                                                 | Purpose                                                                                                          |
|--------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>Router> enable                                                            | Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul> |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>Router# configure terminal                                    | Enters global configuration mode.                                                                                |
| Step 3 | <b>cs7 m3ua port-number offload slot-number</b><br><br><b>Example:</b><br>Router(config)# cs7 m3ua 1024 offload 6 | Creates an M3UA instance and enables the offload of M3UA SCTP processing to a specified VIP.                     |
| Step 4 | <b>cs7 sua port-number offload slot-number</b><br><br><b>Example:</b><br>Router(config)# cs7 m3ua 2048 offload 7  | Creates an SUA instance and enables the offload of SUA SCTP processing to a specified VIP.                       |

## What to Do Next

Configure Stateful Switchover Redundancy Mode.

## Configuring Stateful Switchover Redundancy Mode

Configuring Stateful Switchover (SSO) redundancy mode allows the ITP NSO feature to track the redundancy state of the Cisco 7500.

## Understanding Redundancy Modes

SSO is one link in a chain of Cisco IOS redundancy features designed to provide progressively higher system and network availability. The specific configuration running on the networking device identifies Cisco IOS redundancy modes.

Understanding the various modes is helpful in configuring and verifying SSO.

### Stateful Switchover Mode

SSO is the IOS High Availability feature that allows one RSP on a 7500 to immediately take over for the other RSP in the event of an RSP failure. SSO redundancy mode provides all the functionality of RPR+ mode in that IOS software is fully initialized on the both RSPs. In addition, SSO supports synchronization of line card, protocol, and application state information between RSPs for supported features and protocols (a “hot standby”).

### High System Availability Mode

High system availability (HSA) mode allows you to install two RPs in a single router to improve system availability. This mode is available only on Cisco 7500 series routers. Supporting two RPs in a router provides the most basic level of increased system availability through a “cold restart” feature. A cold restart means that when one RP fails, the other RP reboots the router. Thus, the router is never in a failed state for very long, thereby increasing system availability.

### Route Processor Redundancy

Router Processor Redundancy (RPR) is an alternative mode to HSA and allows Cisco IOS software to be booted on the standby processor prior to switchover (a “cold boot”). In RPR, the standby RP loads a Cisco IOS image at boot time and initializes itself in standby mode; however, although the startup configuration is synchronized to the standby RP, system changes are not. In the event of a fatal error on the active RP, the system switches to the standby processor, which reinitializes itself as the active processor, reads and parses the startup configuration, reloads all of the line cards, and restarts the system.

### Route Processor Redundancy Plus

In RPR+ mode, the standby RP is fully initialized. The active RP dynamically synchronizes startup and the running configuration changes to standby RP, meaning that the standby RP need not be reloaded and reinitialized (a “hot boot”). Additionally, on the Cisco 10000 and 12000 series Internet routers, the line cards are not reset in RPR+ mode. This functionality provides a much faster switchover between the processors. Information synchronized to the standby RP includes running configuration information, startup information on the Cisco 10000 and 12000 series Internet routers, and changes to the chassis state such as online insertion and removal (OIR) of hardware. Line card, protocol, and application state information is not synchronized to the standby RP.

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **hw-module slot *slot-number* image *device:image-name***
4. **redundancy**
5. **mode sso**

## DETAILED STEPS

|        | Command or Action                                                                                                                                                                                          | Purpose                                                                                                                                   |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>Router> enable                                                                                                                                                     | Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>                          |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>Router# configure terminal                                                                                                                             | Enables global configuration mode.                                                                                                        |
| Step 3 | <b>hw-module slot slot-number image device:image-name</b><br><br><b>Example:</b><br>Router(config)# hw-module slot 6 image slot0:<image-name><br>Router(config)# hw-module slot 7 image slot0:<image-name> | For both RSPs, indicates the location of the image to be loaded when that RSP is reloaded.<br>(The command must be issued for both RSPs.) |
| Step 4 | <b>redundancy</b><br><br><b>Example:</b><br>Router(config)# redundancy                                                                                                                                     | Enables redundancy configuration mode.                                                                                                    |
| Step 5 | <b>mode sso</b><br><br><b>Example:</b><br>Router(config-red)# mode sso                                                                                                                                     | Sets the redundancy mode to SSO.                                                                                                          |

## What to Do Next

Configure ITP NSO.

## Configuring ITP NSO

Configuring ITP NSO instructs the ITP protocols on the active RSP to synchronize the operational state to the standby RSP.

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **cs7 nso**

## DETAILED STEPS

|        | Command or Action                                                              | Purpose                                                                                                             |
|--------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Step 1 | <b>enable</b><br><br><b>Example:</b><br>Router> enable                         | Enables privileged EXEC mode.<br><ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul> |
| Step 2 | <b>configure terminal</b><br><br><b>Example:</b><br>Router# configure terminal | Enters global configuration mode.                                                                                   |
| Step 3 | <b>cs7 nso</b><br><br><b>Example:</b><br>Router(config)# cs7 nso               | Enables ITP NSO.                                                                                                    |

## Configuration Example for ITP NSO

```

cs7 variant ANSI
cs7 network-name ITP1
cs7 point-code 3.4.5
cs7 offload mtp3
cs7 nso
!
redundancy
mode sso
hw-module slot 6 image disk0:rsp-itypv-mz.122-23.SW
hw-module slot 7 image disk0:rsp-itypv-mz.122-23.SW
!
controller T1 4/1/0
framing esf
clock source internal
linecode b8zs
channel-group 0 timeslots 1 speed 56
!
interface FastEthernet3/0/0
ip address 10.0.0.1 255.0.0.0
!
interface Serial4/1/0:0
no ip address
encapsulation mtp2
!
cs7 local-peer 2001 offload 3
local-ip 10.0.0.1
!
cs7 linkset to_bogey 1.2.3
link 0 Serial4/1/0:0
!
cs7 linkset to_bacall 4.5.6
link 0 sctp 10.0.0.2 2002 2001
!
end

```

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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## Configuring ITP QoS

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The ITP QoS feature provides the framework that allows end-to-end Quality of Service (QoS) for SS7 packet flow through SS7 over IP (SS7oIP) networks.

### Feature History for ITP QoS

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB2 | This feature was introduced. |

### Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Information About ITP QoS, page 253
- How to Configure ITP QoS, page 255
- Verifying ITP QoS, page 263
- Where to Go Next, page 264

A full ITP QoS Configuration Example is included in the “ITP Configuration Examples” chapter.

## Information About ITP QoS

Quality of Service (QoS) refers to the performance of packet flow through networks. The goal in a QoS-enabled environment is to enable predictable service delivery to certain traffic classes or types regardless of other traffic flowing through the network at any given time. ITP QoS provides the framework that allows end-to-end QoS for SS7 packet flow through SS7oIP networks. End-to-end QoS



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is the ability of the network to deliver service required by specific network traffic from one end of the network to another. In particular, QoS features ensure improved and more predictable network service by providing the following services:

- Dedicated bandwidth
- Improving loss characteristics
- Avoiding and managing network congestion
- Shaping network traffic
- Setting traffic priorities across the network

QoS enables networks to control and predictably service a variety of network applications and traffic types. SS7 networks generally achieve QoS capabilities by over-provisioning bandwidth. Conventional SS7 networks lack the ability to identify different traffic types and provide network prioritization based on these traffic types. For instance, SS7 networks cannot separate ISUP and SCCP traffic and route this traffic over specific output links.

## ITP QoS Components

ITP QoS is based on 2 components: packet classification and packet scheduling and queuing.

Packet classification provides the capability to partition network traffic into multiple priority levels or classes of service. For instance, you can configure ITP QoS to classify incoming ISUP traffic as a member of class 1 and classify incoming SCCP traffic as a member of another class. Traffic classified by ITP QoS is directed over a specified link or a set of links. Using ITP QoS packet classification, the underlying IP network can ensure that the appropriate service level is provided to each traffic type.

Packet scheduling and queuing is concerned with implementing and policing the packet priorities through the IP network. After packets are classified as members of a QoS class and marked accordingly, the scheduling and queuing component is required to provide the appropriate network priority for the different classes of traffic. Scheduling and queuing also provides congestion management, congestion avoidance, policing, and shaping. The scheduling and queuing component of ITP QoS is provided by Cisco IOS QoS. ITP QoS depends on Cisco IOS QoS services for policing packet priority based on the IP header Type of Service (ToS) byte settings. Cisco IOS provides a rich set of QoS policies such as Weighted Fair Queuing, Class-Based Weighted Fair Queuing, Random Detection, and Traffic Shaping.

## ITP QoS Functionality

ITP QoS supports the setting of the ToS byte in the IP header. The ToS byte can be set to either a 3 bit IP precedence or 6 bit Differential Services Code Point (DSCP). Identifying the QoS requirements using the ToS byte provides the core network with an efficient classification method. Each hop can then provide each packet with the required QoS. IOS QoS techniques can be applied to provide policing for packet queuing and priority.

The ITP QoS service model allows the network administrator to configure up to 8 QoS classes, numbered 0 through 7. The hierarchy within the classes is based on the network priority characteristics assigned to each QoS class. The network administrator is responsible for provisioning the network priority characteristics to each QoS class, thus establishing the QoS class hierarchy. The network priority characteristics are provisioned by assigning either an IP precedence or DSCP to a QoS class. Packets that are classified as belonging to a provisioned QoS class will have the TOS byte in the IP header set to the assigned IP precedence or DSCP.

ITP QoS designates QoS class 0 as the default class. QoS class 0 member peer links can forward two types of packets:

- Packets are not classified as members of any other provisioned QoS class
- Packets are classified as members of a provisioned QoS class, but the QoS class does not have any member peer links available.

When peer links for an unavailable QoS class becomes available, packets classified as members of that QoS class will resume forwarding using the QoS class member peer links.

Peer links within a linkset which are not assigned a QoS class are members of the default class. **ITP QoS requires at least one default class peer link member.** The default class is provisioned automatically when the first QoS class is assigned to a peer link within a linkset. The IP precedence or DSCP for QoS class 0 defaults to zero. The IP precedence or DSCP default for QoS class 0 can be modified through the command line interface configuration for QoS classes.

By configuring ITP QoS, the network administrator can assign different network priority characteristics to certain types of traffic. ITP QoS can direct selected traffic types over a specific set of QoS provisioned peer links. The network administrator identifies the peer links that are members of a QoS class. Packets that are classified as members of a given QoS class are transmitted over the QoS class peer link members. **A peer link can be a member of only one QoS class.** It is strongly recommended that a QoS class have multiple peer link members to provide alternate links in case of link failures. ITP QoS supports changeover and changeback between peer link members of the same QoS class. When a peer link member of a QoS class fails, ITP QoS attempts changeover to a peer link member of the same QoS class. If there are no peer link members of the same QoS class available, ITP QoS forwards the packets of the unavailable QoS class using the QoS class 0 peer link members. If there are no QoS class 0 peer link members available the packets are dropped. When peer links for the unavailable QoS class become available, ITP QoS performs a changeback to switch the QoS class packets from the QoS class 0 peer links back to the QoS class peer link members that became available. The changeover and changeback function is prohibited between peer link members of different QoS classes.

MTP3 management messages will use any available peer link within a linkset regardless of the QoS classes assigned to the peer links.

Upon link failure of all peer link members provisioned for a QoS class, Transfer Restricted (TFR) messages are sent to adjacent signaling points. For ITU, the ITP QoS feature enhances the ITU specification by supporting response method TFRs. When conditions are met that require the sending of ITU response method TFRs, two TFRs at 30 second intervals will be sent. The TFR transmission interval is not configurable.

Link Selection is the process of identifying the outbound link that satisfies the classification criteria and QoS class. ITP MTP3 routing incorporates packet classification and QoS capabilities in the link selection decision. When the ITP QoS feature is configured, the outbound link for classified traffic is selected based on the QoS class and slc value.

For more information about deploying Cisco IOS QoS policies, refer to the *Cisco IOS Quality of Service Solutions Configuration Guide* and the *Cisco IOS Quality of Service Solutions Command Reference*, included in the Cisco IOS Release 12.2 documentation at the following URL:  
<http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/index.htm>

## How to Configure ITP QoS

ITP allows packets to be classified (or colored) based on DPC, GTT selector, global title address, service indicator, inbound linkset and access list. MTP3 routing then incorporates the packet classification and link QoS capabilities into the link selection decision. Once an M2PA link is selected, the provisioned QoS class is assigned to an IP precedence value (TOS field) or a Differential Services Code Point (DSCP).

ITP also provides a mechanism such that traffic flows to M3UA or SUA may be assigned to different QoS classes. ITP enables the classification of packets received from M3UA or SUA to further enhance QoS routing over M2PA links.

## Specifying Packet Classification

Fundamental to the ITP QoS feature is packet classification or “coloring.” Classification is the process of identifying the QoS class of a packet. Packet classification provides the capability to partition network traffic into multiple classes of service. ITP QoS provides the following methods for specifying packet classification:

- **Specifying Input Linkset Classification, page 256**
- **Specifying Access List Classification, page 257**
- **Specifying Service Indicator Classification, page 258**
- **Specifying SCCP Packet Classification, page 260**
- **Specifying Destination Point Code Classification, page 261**
- **Specifying a QoS classification for an ASP, page 262**
- **Specifying QoS Routing Over M2PA Links, page 263**

The input linkset, access list, and service indicator packet classification methods are mutually exclusive.

The sccp and destination point code packet classification methods can be used separately or in tandem. The sccp and destination point code packet classification methods can be used in conjunction with the input linkset, access list, and service indicator classification methods.

When combinations of the classification methods are used, the following precedence order should be observed (highest to lowest):

1. Destination point code classification
2. SCCP packet classification (GTA)
3. SCCP packet classification (Selector Table)
4. Input linkset, access list and service indicator classification

### Specifying Input Linkset Classification

ITP QoS provides the capability to classify packets based on an input linkset. The network operator can classify all packets that arrive on links within a linkset to a provisioned ITP QoS class. By this method of packet classification, all incoming packets to the linkset are classified as members of the QoS class assigned by the network operator. This method of classification provides the capability to group network traffic into a single ITP QoS class regardless of the packet destination. An example where input linkset classification would be most useful is for linksets coming from an SMSC. In this case, the network administrator can be sure all MSUs are related to the short message service and give them the appropriate priority.

A detailed configuration example of ITP input linkset packet classification is provided in the “Input Linkset Classification” section on page 379 of the ITP Configuration Examples chapter.

To permit input linkset packet classification, use the following commands, beginning in global configuration mode:

|                | Command                                                        | Purpose                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b>  | Router(config)# <b>cs7 qos class</b> <i>class</i>              | Defines a QoS class and enters QoS class configuration mode.                                                                                                                                                                                                                                                                                                                                      |
| <b>Step 2</b>  | Router(config-cs7-qos)# <b>qos-ip-precedence</b> <i>class</i>  | Defines an IP precedence for the class.                                                                                                                                                                                                                                                                                                                                                           |
| <b>Step 3</b>  | Router(config-cs7-qos)# <b>exit</b>                            | Exits CS7 QoS configuration submenu, and enters global configuration mode.                                                                                                                                                                                                                                                                                                                        |
| <b>Step 4</b>  | Router(config)# <b>cs7 linkset</b> <i>ls-name adj-pc</i>       | Specifies an input linkset and enters linkset configuration submenu.                                                                                                                                                                                                                                                                                                                              |
| <b>Step 5</b>  | Router(config-cs7-ls)# <b>match any qos-class</b> <i>class</i> | Sets the match criteria.                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Step 6</b>  | Router(config-cs7-ls)# <b>exit</b>                             | Exits CS7 linkset mode and enters global configuration mode.                                                                                                                                                                                                                                                                                                                                      |
| <b>Step 7</b>  | Router(config)# <b>cs7 linkset</b> <i>ls-name adj-pc</i>       | Specifies an output linkset and enters linkset configuration submenu.                                                                                                                                                                                                                                                                                                                             |
| <b>Step 8</b>  | Router(config-cs7-ls)# <b>link</b> <i>slc</i>                  | Specifies a link in the linkset and enters link configuration mode.                                                                                                                                                                                                                                                                                                                               |
| <b>Step 9</b>  | Router(config-cs7-ls-link)# <b>qos-class</b> <i>class</i>      | Assigns QoS class to link.                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Step 10</b> | Router(config-cs7-ls-link)# <b>exit</b>                        | Exits CS7 link configuration mode and enters linkset configuration mode.                                                                                                                                                                                                                                                                                                                          |
| <b>Step 11</b> | Router(config-cs7-ls)# <b>link</b> <i>slc</i>                  | Specifies a link in the linkset and enters link configuration mode. ITP QoS requires that at least one link is configured with no QoS class assigned. A link with no class is a member of the default class (class 0). QoS class 0 member links forward packets that are not classified as members of any other QoS class and packets that are classified as members of an unavailable QoS class. |

## Specifying Access List Classification

Access lists provide the capability to classify packets based on message characteristics. ITP access lists allow the specification of one or more match criteria to be applied to packets. Access-list numbers 2700-2999 can be used to define ITP access lists. Access-lists allow the logical AND or logical OR between specified match elements. For example, an access list can be defined to match destination point code (dpc) and originating point code (opc). Packets that meet the defined match criteria for an ITP access list are classified as members of the ITP QoS class assigned to the access list. Each QoS class that has been assigned an access list is considered for a match. The search begins with QoS class 0 and ends with QoS class 7. The first access list match terminates the search and assigns the corresponding QoS class to the outgoing packet. Complex access list definitions can be created but require more CPU resources to determine packet matches and can increase packet latency.

Access lists assigned to ITP QoS classes do not provide screening. Packets that match an ITP access list with the deny option eliminate that access list for consideration and progress to the next access list. When there are no more access lists to consider, the packet is routed over the default class peer link members.

A detailed configuration example of ITP QoS Access List packet classification is provided in the “Service Indicator Packet Classification and Access List Classification” section on page 372 of the ITP Configuration Examples chapter.

To permit access list packet classification, use the following commands, beginning in global configuration mode:

|                | Command                                                                                                                                                                                                                                                                                                                                                                                     | Purpose                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b>  | Router(config)# <b>access-list</b> <i>access-list-number</i> { <b>deny</b>   <b>permit</b> } [ <b>dpc</b> <i>point-code wildcard-mask</i>   <b>opc</b> <i>point-code wildcard-mask</i>   <b>si</b> <i>si-value</i>   <b>pattern</b> <i>offset hex-pattern</i>   <b>aftpc</b> <i>point-code wildcard-mask</i>   <b>cdpa</b> <i>point-code wildcard-mask</i>   <i>selector</i>   <b>all</b> ] | Defines an access list.                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Step 2</b>  | Router(config)# <b>cs7 qos class</b> <i>class</i>                                                                                                                                                                                                                                                                                                                                           | Defines a QoS class and enters QoS class configuration mode.                                                                                                                                                                                                                                                                                                                                      |
| <b>Step 3</b>  | Router(config-cs7-qos)# <b>qos-ip-precedence</b> <i>class</i>                                                                                                                                                                                                                                                                                                                               | Defines the IP precedence for the class.                                                                                                                                                                                                                                                                                                                                                          |
| <b>Step 4</b>  | Router(config-cs7-qos)# <b>qos-access-group</b> <i>access-list-number</i>                                                                                                                                                                                                                                                                                                                   | Assigns the access list to the QoS class.                                                                                                                                                                                                                                                                                                                                                         |
| <b>Step 5</b>  | Router(config)# <b>cs7 linkset</b> <i>ls-name adj-pc</i>                                                                                                                                                                                                                                                                                                                                    | Specifies an input linkset and enters linkset configuration mode.                                                                                                                                                                                                                                                                                                                                 |
| <b>Step 6</b>  | Router(config-cs7-ls)# <b>match access-group</b>                                                                                                                                                                                                                                                                                                                                            | Sets the match criteria.                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Step 7</b>  | Router(config)# <b>exit</b>                                                                                                                                                                                                                                                                                                                                                                 | Exits linkset configuration mode and enters global configuration mode.                                                                                                                                                                                                                                                                                                                            |
| <b>Step 8</b>  | Router(config)# <b>cs7 linkset</b> <i>ls-name adj-pc</i>                                                                                                                                                                                                                                                                                                                                    | Specifies an output linkset and enters linkset configuration mode.                                                                                                                                                                                                                                                                                                                                |
| <b>Step 9</b>  | Router(config-cs7-ls)# <b>link</b> <i>slc</i>                                                                                                                                                                                                                                                                                                                                               | Specifies a link in the linkset and enters link configuration mode.                                                                                                                                                                                                                                                                                                                               |
| <b>Step 10</b> | Router(config-cs7-ls-link)# <b>qos-class</b> <i>class</i>                                                                                                                                                                                                                                                                                                                                   | Assigns the QoS class to the link.                                                                                                                                                                                                                                                                                                                                                                |
| <b>Step 11</b> | Router(config-cs7-ls-link)# <b>exit</b>                                                                                                                                                                                                                                                                                                                                                     | Exits CS7 link configuration mode and enters linkset configuration mode.                                                                                                                                                                                                                                                                                                                          |
| <b>Step 12</b> | Router(config-cs7-ls)# <b>link</b> <i>slc</i>                                                                                                                                                                                                                                                                                                                                               | Specifies a link in the linkset and enters link configuration mode. ITP QoS requires that at least one link is configured with no QoS class assigned. A link with no class is a member of the default class (class 0). QoS class 0 member links forward packets that are not classified as members of any other QoS class and packets that are classified as members of an unavailable QoS class. |

## Specifying Service Indicator Classification

ITP QoS provides the capability to classify packets based on the Service Indicator (SI) field. This method of classification can be used as an alternative to access-lists without the overhead associated with access-lists. This method allows a simple match criteria based on SI value. To create more complex match criteria, ITP access lists should be used. Multiple SI value match criteria can be specified per input linkset. Packets that match one of the SI match criteria are classified as a members of the corresponding

QoS class. A table lookup provides fast mapping of SI values to QoS classes. An example of where QoS based on service indicator is most useful is in distinguishing ISUP from SCCP traffic. ISUP has SI value of 5 and SCCP has SI value of 3.

A detailed configuration example of ITP QoS service indicator packet classification is provided in the “Service Indicator Packet Classification and Access List Classification” section on page 372 of the ITP Configuration Examples chapter.

To permit service indicator classification, use the following commands, beginning in global configuration mode:

|                | Command                                                          | Purpose                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 1</b>  | Router(config)# <b>cs7 qos class</b> <i>class</i>                | Defines a QoS class and enters QoS class configuration mode.                                                                                                                                                                                                                                                                                                                                      |
| <b>Step 2</b>  | Router(config-cs7-qos)# <b>qos-ip-precedence</b> <i>class</i>    | Defines an IP precedence for the class.                                                                                                                                                                                                                                                                                                                                                           |
| <b>Step 3</b>  | Router(config-cs7-qos)# <b>exit</b>                              | Exits CS7 QoS configuration submode, and enters global configuration mode.                                                                                                                                                                                                                                                                                                                        |
| <b>Step 4</b>  | Router(config)# <b>cs7 qos class</b> <i>class</i>                | Defines a QoS class and enters QoS class configuration mode.                                                                                                                                                                                                                                                                                                                                      |
| <b>Step 5</b>  | Router(config-cs7-qos)# <b>qos-ip-precedence</b> <i>class</i>    | Defines an IP precedence for the class.                                                                                                                                                                                                                                                                                                                                                           |
| <b>Step 6</b>  | Router(config)# <b>cs7 linkset</b> <i>ls-name adj-pc</i>         | Specifies an input linkset and enters linkset configuration submode.                                                                                                                                                                                                                                                                                                                              |
| <b>Step 7</b>  | Router(config-cs7-ls)# <b>match si si qos-class</b> <i>class</i> | Sets the match criteria.                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Step 8</b>  | Router(config-cs7-ls)# <b>exit</b>                               | Exits CS7 linkset mode and enters global configuration mode.                                                                                                                                                                                                                                                                                                                                      |
| <b>Step 9</b>  | Router(config)# <b>cs7 linkset</b> <i>ls-name adj-pc</i>         | Specifies an output linkset and enters linkset configuration submode.                                                                                                                                                                                                                                                                                                                             |
| <b>Step 10</b> | Router(config-cs7-ls)# <b>link</b> <i>slc</i>                    | Specifies a link in the linkset and enters link configuration mode.                                                                                                                                                                                                                                                                                                                               |
| <b>Step 11</b> | Router(config-cs7-ls-link)# <b>qos-class</b> <i>class</i>        | Assigns QoS class to link.                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Step 12</b> | Router(config-cs7-ls)# <b>link</b> <i>slc</i>                    | Specifies a link in the linkset and enters link configuration mode.                                                                                                                                                                                                                                                                                                                               |
| <b>Step 13</b> | Router(config-cs7-ls-link)# <b>qos-class</b> <i>class</i>        | Assigns QoS class to link.                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Step 14</b> | Router(config-cs7-ls-link)# <b>exit</b>                          | Exits CS7 link configuration mode and enters linkset configuration mode.                                                                                                                                                                                                                                                                                                                          |
| <b>Step 15</b> | Router(config-cs7-ls)# <b>link</b> <i>slc</i>                    | Specifies a link in the linkset and enters link configuration mode. ITP QoS requires that at least one link is configured with no QoS class assigned. A link with no class is a member of the default class (class 0). QoS class 0 member links forward packets that are not classified as members of any other QoS class and packets that are classified as members of an unavailable QoS class. |

## Specifying SCCP Packet Classification

Packets that require a Global Title Translation (GTT) can be classified on a per Global Title Address (GTA) basis or on a GTT selector table. A network administrator can assign one of the 8 ITP QoS classes to each GTA/GTA mask or selector table. During GTT processing, the QoS class associated with the GTA/GTA mask or selector table will be stored in the packet header for further processing by the ITP QoS feature.

There is a precedence order when a QoS class is assigned to both a selector table and to a GTA within that selector table. If a QoS class is assigned to a selector table and a GTA entry, the QoS class assigned to the GTA entry has precedence over the QoS class assigned to the selector table.

If the QoS class assigned to a selector table or GTA entry is not configured, the SCCP packet is routed over the default class peer link members.

A detailed configuration example of ITP QoS SCCP packet classification is provided in the “SCCP Packet Classification” section on page 376 of the ITP Configuration Examples chapter.

To permit SCCP packet classification for a GTT selector, use the following commands, beginning in global configuration mode:

|                | Command                                                                                                                      | Purpose                                                                    |
|----------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <b>Step 1</b>  | <code>Router(config)# <b>cs7 qos class</b> class</code>                                                                      | Defines a QoS class and enters QoS configuration submode.                  |
| <b>Step 2</b>  | <code>Router(config-cs7-qos)# <b>qos-ip-precedence</b> class</code>                                                          | Defines an IP precedence for the class.                                    |
| <b>Step 3</b>  | <code>Router(config-cs7-qos)# <b>exit</b></code>                                                                             | Exits CS7 QoS configuration submode, and enters global configuration mode. |
| <b>Step 4</b>  | <code>Router(config)# <b>cs7 qos class</b> class</code>                                                                      | Defines a QoS class and enters QoS configuration submode.                  |
| <b>Step 5</b>  | <code>Router(config-cs7-qos)# <b>qos-ip-precedence</b> class</code>                                                          | Defines an IP precedence for the class.                                    |
| <b>Step 6</b>  | <code>Router(config-cs7-qos)# <b>exit</b></code>                                                                             | Exits QoS configuration submode and enters global configuration mode.      |
| <b>Step 7</b>  | <code>Router(config)# <b>cs7 gtt selector</b> selector <b>tt</b> tt</code>                                                   | Defines the selector table and enters CS7 GTT selector mode.               |
| <b>Step 8</b>  | <code>Router(config-cs7-gtt-selector)# <b>qos-class</b> class</code>                                                         | Assigns a QoS class to the selector table.                                 |
| <b>Step 9</b>  | <code>Router(config-cs7-gtt-selector)# <b>gta</b> gta <b>qos-class</b> class <b>pcssn</b> pc <b>gt</b> <b>ntt</b> ntt</code> | Assigns a QoS class to the GTA entry                                       |
| <b>Step 10</b> | <code>Router(config-cs7-gtt-selector)# <b>exit</b></code>                                                                    | Exits CS7 GTT selector mode and enters global configuration mode.          |
| <b>Step 11</b> | <code>Router(config)# <b>cs7 linkset</b> ls-name <b>adj-pc</b></code>                                                        | Specifies an output linkset and enters linkset configuration submode.      |
| <b>Step 12</b> | <code>Router(config-cs7-ls)# <b>link</b> slc</code>                                                                          | Specifies a link in the linkset and enters link configuration mode.        |
| <b>Step 13</b> | <code>Router(config-cs7-ls-link)# <b>qos-class</b> class</code>                                                              | Assigns QoS class to link.                                                 |
| <b>Step 14</b> | <code>Router(config-cs7-ls-link)# <b>exit</b></code>                                                                         | Exits link configuration mode and enters linkset configuration mode.       |
| <b>Step 15</b> | <code>Router(config-cs7-ls)# <b>link</b> slc</code>                                                                          | Specifies a link in the linkset and enters link configuration mode.        |
| <b>Step 16</b> | <code>Router(config-cs7-ls-link)# <b>qos-class</b> class</code>                                                              | Assigns the QoS class to the link.                                         |



|                | Command                                       | Purpose                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 17</b> | Router(config-cs7-ls-link)# <b>exit</b>       | Exits CS7 link configuration mode and enters linkset configuration mode.                                                                                                                                                                                                                                                                                                                          |
| <b>Step 18</b> | Router(config-cs7-ls)# <b>link</b> <i>slc</i> | Specifies a link in the linkset and enters link configuration mode. ITP QoS requires that at least one link is configured with no QoS class assigned. A link with no class is a member of the default class (class 0). QoS class 0 member links forward packets that are not classified as members of any other QoS class and packets that are classified as members of an unavailable QoS class. |

### Specifying Destination Point Code Classification

ITP QoS provides the capability to classify packets based on the destination point code (DPC). All packets destined for a given DPC will be classified as members of the QoS class that was configured with an ITP routing entry. The QoS class configured with an ITP routing entry is stored with the ITP routes in the routing table. Storing the QoS class with the routing entry provides efficient packet classification based on DPC. An example of where QoS based on point code may be used is on links coming from an MSC. Packets to SMSC and HLR will both be SCCP MSUs with service indicator 3. The DPC may be checked to determine if the MSU is for an SMSC or an HLR (after GTT if desired) and then classified accordingly.

If the QoS class assigned to a DPC is not configured, packets are routed over the default class peer link members.

A detailed configuration example of ITP QoS SCCP packet classification is provided in the “Destination Point Code Classification” section on page 381 of the ITP Configuration Examples chapter.

To permit destination point code packet classification, use the following commands, beginning in global configuration mode:

|               | Command                                                                                                                                               | Purpose                                                                           |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>Step 1</b> | Router(config)# <b>cs7 qos class</b> <i>class</i>                                                                                                     | Defines a QoS class and enters QoS class configuration mode.                      |
| <b>Step 2</b> | Router(config-cs7-qos)# <b>qos-ip-precedence</b> <i>class</i>                                                                                         | Defines an IP precedence for the class.                                           |
| <b>Step 3</b> | Router(config-cs7-qos)# <b>exit</b>                                                                                                                   | Exits CS7 QoS configuration submenu, and enters global configuration mode.        |
| <b>Step 4</b> | Router(config)# <b>cs7 route-table system</b>                                                                                                         | Specifies the route table and enters CS7 route table configuration submenu.       |
| <b>Step 5</b> | Router(config-cs7-rt)# <b>update route point-code mask linkset</b> <i>ls-name</i> <b>priority</b> <i>priority-value</i> <b>qos-class</b> <i>class</i> | Adds QoS class to the destination point code.                                     |
| <b>Step 6</b> | Router(config-cs7-rt)# <b>exit</b>                                                                                                                    | Exits CS7 route table configuration submenu and enters global configuration mode. |
| <b>Step 7</b> | Router(config)# <b>cs7 linkset</b> <i>ls-name</i> <i>adj-pc</i>                                                                                       | Specifies an output linkset and enters linkset configuration submenu.             |

|                | Command                                                   | Purpose                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Step 8</b>  | Router(config-cs7-ls)# <b>link</b> <i>slc</i>             | Specifies a link in the linkset and enters link configuration mode.                                                                                                                                                                                                                                                                                                                               |
| <b>Step 9</b>  | Router(config-cs7-ls-link)# <b>qos-class</b> <i>class</i> | Assigns QoS class to link.                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Step 10</b> | Router(config-cs7-ls-link)# <b>exit</b>                   | Exits CS7 link configuration mode and enters linkset configuration mode.                                                                                                                                                                                                                                                                                                                          |
| <b>Step 11</b> | Router(config-cs7-ls)# <b>link</b> <i>slc</i>             | Specifies a link in the linkset and enters link configuration mode. ITP QoS requires that at least one link is configured with no QoS class assigned. A link with no class is a member of the default class (class 0). QoS class 0 member links forward packets that are not classified as members of any other QoS class and packets that are classified as members of an unavailable QoS class. |

### Specifying a QoS classification for an ASP

QoS packet classification occurs based on both the AS/routing-key and ASP, with ASP taking precedence.

When packets are to be delivered to the AS, the ASP selection process will remain unchanged (i.e., it will not use the QoS classification as a routing key parameter).

If QoS is provisioned for the AS, the classification will be used to set the appropriate TOS using precedence or DSCP values within the IP network. However, if an ASP is selected that is currently active in more than one AS, then the highest priority QoS classification among the active ASs will be used. Setting the QoS class to the highest class ensures that the traffic is processed at the most appropriate priority compared to other IP traffic streams.

If it is desirable for QoS classification to vary based on the type of SS7 traffic, then a unique association is required between the ITP SG and ASP host for each classification type. Thus, from the ITP SG perspective, the ASP “host” will have a unique SCTP association (ASP) per AS that it implements. Each AS is then provisioned with its appropriate QoS class on the ITP SG. For example, an ASP host supporting both ISUP and SCCP traffic would set up two associations to the ITP SG. This would appear to be two different ASPs to the SG, each supporting a unique AS with a different QoS classification value.

QoS can also be provisioned for the ASP. The QoS specified under the ASP takes precedence over the QoS specified for the AS. Consider the following example:

ASP1 has QoS class 5 and this ASP belongs to AS AS1 which has QoS class 3. Since QoS for the ASP overrides the QoS for the AS, the ASP1 will have QoS class 5.

The following rules affect QoS routing over M3UA or SUA links:

- When packets are being routed to an M3UA or SUA AS and eventually delivered to an ASP, the packet might already have been classified by existing packet classification options. The AS or ASP QoS classification overrides the previously set value.
- When a QoS classification is configured for an ASP or an AS, it takes effect only on the subsequent ASP connection.
- When qos-class is not specified for an ASP (and any of the ASes that the ASP serves), the Type of Service (TOS) for the SCTP association of the ASP is obtained from **cs7 qos class 0**, if it's defined. Otherwise, it is set to zero (0).

To configure a QoS classification for an ASP, use the following commands, beginning in global configuration mode:

| Command                                                                                               | Purpose                                                     |
|-------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Router(config)# <b>cs7 asp</b> <i>asp-name remote-port local-port</i><br>[ <b>m3ua</b>   <b>sua</b> ] | Configures a CS7 ASP definition and enters CS7 ASP submode. |
| Router(config-cs7-asp)# <b>remote-ip</b> <i>remote-ip</i>                                             | Specifies the remote IP address of the ASP.                 |
| Router(config-cs7-asp)# <b>qos-class</b> <i>class</i>                                                 | Defines the QoS class for the ASP                           |
| Router(config-cs7-asp)# <b>match any qos-class</b> <i>class</i>                                       | Sets the match criteria.                                    |
| Router(config-cs7-asp)# <b>match si</b> <i>si qos-class class</i>                                     | Sets the serviced indicator match criteria.                 |

### Specifying QoS Routing Over M2PA Links

Packets received from M3UA or SUA must be classified with a default QoS class as a minimum requirement, to ensure that packets are not dropped by MTP3. Additionally, you may specify a QoS classification for packets received from a specific ASP.

Packets flowing from M3UA or SUA to M2PA will be subject to Topsail R2 coloring for DPC, GTT selector and GTT address, but not inbound linkset or access list. There is no single equivalent in M3UA or SUA for the inbound linkset. The ASP from which the data was received is the closest approximation to an inbound linkset. The source AS is unknown, and may not be used for this purpose.

## Verifying ITP QoS

After the ITP is configured for QoS and the links come in service, you can verify that the ITP QoS was configured properly and that the ITP QoS functionality is available.

The **show cs7 qos** commands can be used to display a summary of the QoS configuration and QoS statistics for an input linkset.

To display a summary of the QoS configuration and verify that the QoS class and packet classifications are assigned correctly, use the following command in privileged EXEC mode:

| Command                           | Purpose                                      |
|-----------------------------------|----------------------------------------------|
| Router# <b>show cs7 qos class</b> | Displays a summary of the QoS configuration. |

The following is sample output from the **show cs7 qos class** command:

```
Router# show cs7 qos class
QoS  Prec  DSCP  Acc-Grp  MatchType  Input Linkset
---  -
1      3      10      2700     any         to_newyork
2      5      10      2700     si 3        to_chicago
3      5      10      2700     si 5        to_chicago
4      4      26      2700     access-group to_atlanta
5      3      26      2700     none
6      3      26      2701     access-group to_atlanta
```

The output indicates the following packet classifications for the configured QoS classes:

QoS class 1 is configured for input linkset packet classification.

QoS class 2 and QoS class 3 are configured for service indicator packet classification.

QoS class 4 and QoS Class 6 is configured for access list packet classification.

QoS class 5 is not configured for packet classification.

To verify that traffic is being routed over the correct QoS peer link member(s), use the following command in privileged EXEC mode:

| Command                                | Purpose                           |
|----------------------------------------|-----------------------------------|
| Router# <b>show cs7 qos statistics</b> | Displays QoS link use statistics. |

The following is sample output from the **show cs7 qos statistics** command:

```
Router# show cs7 qos statistics
lsn=to_itpa      apc=3.3.3      state=avail      available/links=2/3
  SLC  QoS    MSU In    MSU Out  Drops  ByteCnt In  ByteCnt Out
  00   0      494      492     0     8965      8864
  01   2      501      493     0     9006      8947
```

The sample output shows the number of MSUs sent and received for each QoS class (which is assigned to a peer link member or members) for a specific input linkset.

When classified packets are received from an input linkset and there are no available peer link members that support the QoS class assigned to the classified packets, the packet is dropped. The ITP displays an error message and logs an access violation in the ITP access violations database. A sample of the error message displayed is shown below:

```
no QoS class 2 link available for packets, see show cs7 accounting access-violations
```

The ITP accounting access-violations database indicates the dropped packets origin and destination point codes. To display CS7 accounting details, use the following command in privileged EXEC mode:

| Command                                              | Purpose                                      |
|------------------------------------------------------|----------------------------------------------|
| Router# <b>show cs7 accounting access-violations</b> | Displays the CS7 access-violations database. |

The following is a sample output from the **show cs7 accounting access-violations** command:

```
Router# show cs7 qos statistics
Checkpoint Interval = 5 min

Linkset = 'to_newyork'
Destination      Originating      Service      Input      Output
Point Code      Point Code      Indicator      Packets      Bytes      Packets      Bytes
-----
  3.3.3          4.4.4           8             96          3824        0           0
```

The sample output shows that access violations occurred for packets destined for 3.3.3 from origin point code 4.4.4. Packets are received on the input, but zero packets are being routed to the destination point code.

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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# Configuring SCCP Load Sharing

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## Feature History for SCCP Load Sharing

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB2 | This feature was introduced. |

## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Information About SCCP Load Sharing, page 267
- How to Configure SCCP Load Sharing, page 268
- Where to Go Next, page 270

## Information About SCCP Load Sharing

The SCCP Load Balancing includes support for SCCP class 0 and class 1 traffic.

SCCP load sharing utilizing mated applications or application groups includes the following functionality:

- Load-sharing / multiplicity is configurable on a Mated-Application (MAP) or application group basis.
- Class 0 traffic can be load-shared among a maximum of 2 destinations based on a round-robin algorithm using a GTT MAP (multiplicity = share).



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- Class 0 traffic can be load-shared among a maximum of 2 destinations based on a dominant algorithm using a GTT MAP (multiplicity = dominant).
- Class 0 traffic can be load-shared among a maximum of 8 destinations based on a round-robin algorithm using a GTT Application Group. (multiplicity = share).
- Class 0 traffic can be load-shared among a maximum of 8 destinations based on a least cost available algorithm using a GTT Application Group. (multiplicity = cost).
- Class 1 traffic can be load-shared among a maximum of 2 destinations based on 1 SLS bit using a GTT MAP (multiplicity = share).
- Class 1 traffic can be load-shared among a maximum of 2 destinations on a dominant algorithm using a GTT MAP (multiplicity = dominant).
- Class 1 traffic can be load-shared among a maximum of 8 destinations based on the SLS bits using a GTT Application Group. (multiplicity = share).
- Class 1 traffic can be load-shared among a maximum of 8 destinations based on a least cost available algorithm using a GTT Application Group in conjunction with the SLS bits. (multiplicity = cost).

## How to Configure SCCP Load Sharing

This section describes the possible configuration options for SCCP load sharing as well as address guidelines for when to use the different methods provided. Load-sharing/multiplicity is configurable on a Mated-Application or Application group basis.

The following SS7 network elements are typical in most SS7 architectures utilizing GTT.

1. Solitary intermediate destination – The final destination of the global title is not known and only one intermediate destination is available for the next hop.
2. Solitary final destination - The final destination of the global title is known and only one choice is available.
3. Redundant intermediate destination - The final destination of the global title is not known and two or more intermediate destinations are available for the next hop.
4. Redundant final destination - The final destination of the global title is known and two or more choices are available.
5. More than one backup final or intermediate: The result may be final or intermediate depending on the availability of external nodes or the ability to load-share across up to 8 different destinations.

Scenario 1 and 2 above do not involve any load sharing and are mentioned only for completeness. In each of these cases all resultant GTT traffic is directed to the solitary destination. In case 1, only the MTP3 status determines if the destination is available. In case 2, the MTP3 point-code status as well as the SCCP subsystem status is analyzed. In either case, if the solitary destination is not available, there is no alternate, and the message is discarded.

Scenario 3: In order to configure this situation an application group must be used. There are 2 different possibilities concerning how load sharing may be configured for this group:

- a. Share mode: When this mode is configured Class 0 traffic will be shared between the two destinations if available based on a round-robin algorithm. Class 1 traffic will be shared based on the SLS. This situation may be configured to share between up to 8 destinations for class 0 and class 1 traffic.
- b. Cost Mode: When cost mode is configured the least cost item or items (if more than one at that cost) will be used. When more than 1 item at the least cost is available round-robin is used for class 0 traffic and the SLS shall be used for class 1 traffic.



Cost Mode Example 1: Suppose an application group is defined with two items, each with its own unique cost. In this situation all traffic would use the least cost item (A) if it were available otherwise it would use item B. This is equivalent to the dominant mode described later for GTT MAPs.

**Table 15**      *Reference for Cost Mode Example 1*

| Item | Cost |
|------|------|
| A    | 1    |
| B    | 2    |

Cost Mode Example 2: Suppose an application group is defined with two items, each with the same cost. In this situation all traffic would share equally between A and B using round robin or SLS depending on the protocol class. This is equivalent to the share mode described earlier.

**Table 16**      *Reference for Cost Mode Example 2*

| Item | Cost |
|------|------|
| A    | 1    |
| B    | 1    |

Cost Mode Example 3: In this example, items A and B shall always be used in a share like fashion (either by round-robin or SLS). If both A and B, become unavailable, then items C and D are used in the same fashion. If all items A though D become unavailable, then item E must handle all the traffic.

**Table 17**      *Reference for Cost Mode Example 3*

| Item | Cost |
|------|------|
| A    | 1    |
| B    | 1    |
| C    | 2    |
| D    | 2    |
| E    | 3    |

Scenario 4: There is no difference between scenario 4 and 3 other than the resultant routing-indicator is final for this scenario instead of intermediate. The same cost and share modes may be applied if using an application group. One option not available for scenario 3, that is available for this, is the ability to use GTT MAP (Mated Application) instead of an application group. GTT Mated Applications only allow a maximum of two replicated PC/SSN combinations as the choice for the resultant GTT. These can operate in the share or dominate modes. The advantage of using a GTT MAP instead of an application group is memory savings. An application group uses approximately 156 bytes more memory than utilizing a GTT MAP.

Scenario 5: There is no difference between this scenario and scenario 3 except the items in the group may have mixed values for the resultant routing indicator. The same cost and share modes may be applied. Suppose GTT is performed from the ITP to locate HLRs (item A and B). The data on A and B is replicated and traffic is shared between them, thus the equal cost 1. If a failure occurred at A or B it may be desired to direct the traffic to another pair of ITPs which will have to perform GTT again to find

a different final destination since the primary final destination could not be reached. This is one reason network operators may wish to have a mixture of final and intermediate destinations in one application group utilizing cost mode sharing.

**Table 18**      **Reference for Scenario 5**

| Item             | Cost |
|------------------|------|
| A - Final        | 1    |
| B - Final        | 1    |
| C - Intermediate | 2    |
| D - Intermediate | 2    |

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP

- Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
- Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
- Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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# Configuring Summary Routing and ANSI Cluster Routing

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The Summary Routing feature allows routing of MSUs to groups of DPCs by specifying one or more routes to a summary destination in the route table rather than individual route table entries for each destination.

## Feature History for Summary Routing and ANSI Cluster Routing

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB2 | This feature was introduced. |

## Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

## Contents

- Information About Summary Routing and ANSI Cluster Routing, page 273
- How to Configure Summary Routes, page 276
- How to Configure ANSI Cluster Routing, page 278
- Where to Go Next, page 279

## Information About Summary Routing and ANSI Cluster Routing

The Summary Routing feature allows routing of MSUs to groups of DPCs by specifying one or more routes to a summary destination in the route table rather than individual route table entries for each destination.



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Typically a route table has primary (or normal) routes and alternate routes of lower priority to fully qualified (or full PC) destinations. A fully qualified destination has all significant bits in the point code explicitly specified. Summary Routing is the capability of using partly qualified destinations in the route table, where one or more trailing bits in the point code are left unspecified, to refer collectively to all the fully qualified destinations that have any combination of bits within the unspecified portion.

This overview begins with a fictional scenario that explains how fully-qualified point codes are assigned and how partly-qualified point codes are derived. The remainder of the overview covers in greater detail the function of summary routing and the routing table.

## How Point Codes Are Used in Summary Routing

To examine how point codes are used in Summary Routing, consider the following example for a company in France we will call Voila. This example uses the ITU standard for point codes, which uses 3 bits to indicate the zone, 8 bits to indicate the region, and 3 bits to indicate the signaling point (sp).

### Assigning Point Codes

When Voila acquired its block of point codes, the zone segment was preassigned to be 5, or 101 binary. The network administrator at Voila wanted to take advantage of Summary Routing and so devised the following numbering strategy for assigning the region and sp segments of the point codes:

- In the Ile-De-France region the region segment of the point code would begin with 00 binary.
- In the Normandy region the region segment would begin with 01 binary.
- In the Brittany region, the region segment would begin with 10 binary. The sp segments would be numbered sequentially.

Focusing on Ile-De-France, we can see that numbering the region segment 00xxxxxx binary provides the range of numbers 0 through 63 decimal. Within this numbering system, the network administrator further decided to provision point codes in the city of Paris to have a region segment of 42 or 00101010 binary. SPs would be numbered sequentially.

The following table shows a partial list of point codes in the Voila network:

**Table 0-19 Sample Point Code Numbering Plan**

| Location | Device  | Point Code |
|----------|---------|------------|
| Paris    | ITP-P1  | 5.42.1     |
| Paris    | ITP-P2  | 5.42.2     |
| Paris    | MSC-P1  | 5.42.3     |
| Paris    | MSC-P2  | 5.42.4     |
| Paris    | SMSC-P1 | 5.42.5     |
| Meudon   | HLR-P1  | 5.50.1     |
| Normandy | ITP-N1  | 5.91.1     |
| Normandy | ITP-N2  | 5.91.2     |
| Normandy | MSC-N1  | 5.91.3     |
| Normandy | SMSC-N2 | 5.91.4     |
| Brittany | ITP-B1  | 5.149.1    |
| Brittany | ITP-B2  | 5.149.2    |

## Specifying Summary Destinations

In our example, the Voila network administrator assigned point codes in a way that can take advantage of the Summary Routing feature. Consider the point codes assigned to the three regions in France. All point codes belonging to each of these groups have in common the first 5 bits of the point code. For example, ITP-P1 in Paris and HLR-P1 in Meudon are both assigned point codes that belong to the same region, as defined by the network administrator.

The point code for MSC-P1 in Paris is 5.42.3, shown in binary format below:

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

The point code for HLR-P1 in the Paris suburb of Meudon is 5.50.1, shown in binary format below:

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

The first 5 characters of the point codes are the same for both destinations and for all of the fully qualified destinations in the region. This commonality can be expressed as a partly-qualified destination with the point code and mask 5.0.0 7.192.0 (or the equivalent expression 5.0.0/5). This partly qualified destination means “consider the first 5 bits in the point code (the mask 7.192.0 and /5 both mean the first 5 bits) and include all point codes with the zone segment equal to 5 and the region segment in the range 0 (all 8 bits off = 0) through (first 2 region bits off and the remaining 6 bits on = 63).”

Examine the point codes for Normandy and Brittany, and notice that all of these point codes can be identified by the partly-qualified destinations 5.64.0/5 (Normandy) and 5.128.0/5 (Brittany). The first two bits in the region segment for Normandy are 01, so the range of numbers in the Normandy region segment will be 64 through 127. The first two bits in the region segment for Brittany are 11, so the range of numbers in the Brittany region segment will be 128 through 255.

## Summary Routes and the Routing Table

Summary routes are used primarily to reduce the number of route table entries. Summary Routing allows an easy translation of the hierarchy in the network topology into the logical organization of the route table. For example, a remote set of nodes with DPCs 1.\*.\* (where \* is a number in the appropriate range for ITU or ANSI) can be reached by creating a set of routes to 1.0.0/3 (ITU), or 1.0.0/8 (ANSI), only. There is no need to create individual routes to all the dozens of destinations 1.\*.\* that may be present in the network, particularly if all those destinations can be reached by the same set of linksets in the same order of priority. If there happens to be a member within 1.\*.\*, say 1.6.7, routes to which do not share some or all the linksets with the routes to the summary destination, then it is possible to configure routes to 1.6.7 using these different linkset(s) along with the summary routes that covers all the other point codes within 1.\*.\*. Such a configuration would be displayed as follows:

```
Router# show cs7 route detailed
```

```
Routing table = system
```

```
C=Cong Q=QoS P=Prio
```

| Destination | C     | Q | P | Linkset Name | Linkset | Non-adj | Route |
|-------------|-------|---|---|--------------|---------|---------|-------|
| 1.6.7/14    | acces |   | 2 | sirius       | avail   | allowed | avail |
|             |       |   | 3 | castor       | avail   | allowed | avail |
|             |       |   | 4 | pollux       | avail   | allowed | avail |
| 1.0.0/3     | acces |   | 2 | polaris      | avail   |         | avail |
|             |       |   | 3 | pollux       | avail   |         | avail |

Summary routes can coexist with fully qualified routes. In the presence of a configured full PC member, summary routes behave as alternate routes that have priority lower than that of fully qualified alternate routes.

When a route has to be selected for an outbound MSU, the route table is searched for a full point code entry matching the DPC in order of route priority. If any route to the full PC is configured and available, it is chosen for routing, otherwise the route table is searched for the next best partial match with a shorter mask length. If a summary route is configured and it is available, then this route is chosen for routing, otherwise the search continues. The search ends after mask length zero yields no route.

If a message is received for routing to an unconfigured destination Y that is a member of a summary destination and that summary destination is inaccessible, then the Response Method will be used to send a TFP concerning Y. Likewise, if the summary destination is restricted a TFR will be sent. If a route-set test message (RSP/RST or RSR) is received concerning a destination Y that is a member of a summary route, then a response will be sent concerning Y depending on the status of that summary route.

Routes to 0.0.0/0 are system wide default routes that behave as alternate routes to all the fully or partly qualified routes configured in the system. The linkset that goes between a mated pair of ITPs is such a default route from the perspective of each of those ITPs. There is no special external route management messages for the support of summary routes (the ANSI cluster routing case is an exception, see below).

There are no route management messages exchanged between network elements to maintain summary route status except the usual TFP, TFR, TFA, RSP/RST and RSR. When a TFP is received on a certain route (i.e. a certain linkset leading to an adjacent point code) concerning a point-code, say 1.6.1 in the above example, and that point-code is not configured, and there is a summary route configured and available on that linkset, route table entries are created dynamically for the concerned point-code by copying the summary routes. The concerned route is marked prohibited. Future traffic is blocked for 1.6.1 but allowed for all other members of the summary route 1.6.0/11. Routeset test is started. When a TFA is received on the same route, and all the other dynamic routes to the concerned point-code have non-adjacent status available, then all the dynamic routes are removed. Dynamic routes are also created when a TFR is received, and traffic for that route is affected as for any other restricted route. Routeset restricted test is started.

In the previous example if routes to the concerned point code were configured, none being the route to which the TFP/TFR pertains, and these routes are all unavailable, then a single dynamic route is created with priority value one more than the highest configured. If a route with priority 9 were to already exist then the dynamic route cannot be added. It is therefore necessary to keep the priority value of the lowest priority configured route at, say, 6 or below when a configured full point-code route is using summary routes.

Dynamic routes are also created when TFC concerning a destination is received and summary routes to that destination exist in the route table. When the routeset congestion test procedure eventually brings the destination congestion status to zero, these dynamic routes are removed.

Dynamic routes cannot be removed using the **no update route** command. There is a periodic audit of the route table that runs once a day at 3:00 a.m. to remove dynamic entries older than 12 hours. This mechanism allows dynamic routes to remain in the system between 12 and 36 hours (24 hours average). For this audit to work properly, the system time-of-day clock and time zone must be set. When the route table is saved to file, dynamic routes are not included.

## How to Configure Summary Routes

You can create a summary route by entering the **update route** command and specifying a mask length value that is less than that for a full point code. The mask length is in the range 0 through 13 for ITU, and 0 through 15, and 17 through 23 for ANSI. For ANSI, mask length 16 is for cluster routes.



To create a summary route, enter the following command, starting in global configuration mode:

| Command                                                                                                            | Purpose                                                                          |
|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Router(config)# <b>cs7 route-table system</b>                                                                      | Specifies the name of the route table and enters route table configuration mode. |
| Router(config-cs7-rt)# <b>update route point-code</b> {[mask   /length] <b>linkset ls-name prio priority-value</b> | Adds a summary route to the table.                                               |

For example, the following two configurations show equivalent ways to specify a summary route when the variant is **ITU**:

```
Router(config)# cs7 route-table system
Router(config-cs7-rt)# update route 1.6.0/11 linkset polaris prio 2
Router(config-cs7-rt)# update route 1.6.0/11 linkset pollux prio 3
Router(config-cs7-rt)# end
```

OR

```
Router(config)# cs7 route-table system
Router(config-cs7-rt)# update route 1.6.0 7.255.0 linkset polaris prio 2
Router(config-cs7-rt)# update route 1.6.0 7.255.0 linkset pollux prio 3
Router(config-cs7-rt)# end
```

The following two configurations show equivalent ways to specify a summary route when the variant is **ANSI**:

```
Router(config)# cs7 route-table system
Router(config-cs7-rt)# update route 1.6.0/17 linkset polaris prio 2
Router(config-cs7-rt)# update route 1.6.0/17 linkset pollux prio 3
Router(config-cs7-rt)# end
```

OR,

```
Router(config)# cs7 route-table system
Router(config-cs7-rt)# update route 1.6.0 255.255.128 linkset polaris prio 2
Router(config-cs7-rt)# update route 1.6.0 255.255.128 linkset pollux prio 3
Router(config-cs7-rt)# end
```

ITU users should set the point code format to suit their national numbering structure and hierarchy using the **cs7 point-code format** command. This will allow them to create summary destinations with mask lengths that conveniently terminate on the point-code delimiters.

A sample route table display for an ITU case with summary routes is shown below for the default format (3 bit - 8 bit - 3 bit):

```
Router# show cs7 route detailed
Routing table = system
C=Cong Q=QoS P=Prio
Destination      C  Q  P Linkset Name      Linkset Non-adj Route
-----
1.4.0/11         RESTR      2  polaris          UNAVAIL          UNAVAIL
                  3  pollux          avail            avail
1.5.1/14         INACC      1  polaris          UNAVAIL allowed UNAVAIL
1.5.3/14         acces     1  pollux          avail  allowed avail
1.6.1/14         RESTR      2  polaris          UNAVAIL allowed UNAVAIL dyn
                  3  pollux          avail  PROHIB UNAVAIL dyn
1.6.3/14         RESTR      2  polaris          UNAVAIL allowed UNAVAIL dyn
                  3  pollux          avail  PROHIB UNAVAIL dyn
1.6.0/11         RESTR      2  polaris          UNAVAIL          UNAVAIL
                  3  pollux          avail            avail
```

The non-adjacent status field is blank for summary routes. Since there are no route management messages exchanged for such routes, there is no non-adjacent status. The availability of a summary route is determined solely by the linkset status. Dynamic route table entries are flagged by **dyn** at the end of the line. Although all routes to 1.6.1 and 1.6.3 are unavailable, the destination status is restricted (instead of inaccessible) because these destinations are members of the summary route 1.6.0/11, one route to which is available. Routes to 1.6.0/11 are considered to be alternate routes to 1.6.1 and 1.6.3.

Use the **show cs7 route** command with the keyword **summary-routes** to display all summary routes of which the given point code is a member:

```
Router# show cs7 route 1.6.1 summary-routes detailed
Routing table = system
C=Cong Q=QoS P=Prio
Destination          C  Q  P Linkset Name          Linkset Non-adj Route
-----
1.6.1/14             RESTR      2 polaris              UNAVAIL allowed UNAVAIL dyn
                   3 pollux              avail  PROHIB UNAVAIL dyn
1.6.0/11             RESTR      2 polaris              UNAVAIL allowed UNAVAIL
                   3 pollux              avail  allowed avail
```

To turn off usage of the summary routes for routing MSUs, when configured full point-code routes exist and are unavailable, use the following command in global configuration mode:

| Command                                              | Purpose                                |
|------------------------------------------------------|----------------------------------------|
| Router(config)# <b>cs7 summary-routing-exception</b> | Turns off usage of the summary routes. |

The summary routes will be used as a default. To restore the default use the **no cs7 summary-routing-exception** global configuration command.

To configure the maximum number of dynamic routes that can be created by the system, use the following command in global configuration mode:

| Command                                                     | Purpose                                                                                                                                    |
|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 max-dynamic-routes</b> <i>number</i> | Specifies the maximum number of dynamic routes that can be created by the system. The valid range is 100 through 1000. The default is 500. |

To restore the default use the **no cs7 max-dynamic-routes** global configuration command.

## How to Configure ANSI Cluster Routing

ANSI Cluster Routing is a special case of Summary Routing, and has associated with it a dedicated set of route management messages and procedures as specified in T1.111 and GR-82. If the variant is ANSI, a cluster route would be created by specifying a mask length of 16 or a mask of 255.255.0 using the default point-code format 8 bit - 8 bit - 8 bit. Cluster Routing and Management Diversity (CRMD) as specified in GR-82 is supported. When a route is configured to a member of a remote cluster using a direct E-link, the route is automatically assigned a priority of 1, contrary to an example in GR-82.

Cluster routes are created by specifying a mask length of 16, or mask 255.255.0:

| Command                                                                                                                                 | Purpose                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Router(config)# <b>cs7 route-table system</b>                                                                                           | Specifies the name of the route table and enters route table configuration mode. |
| Router(config-cs7-rt)# <b>update route point-code</b> {[255.255.0   /16 <b>linkset</b> <i>ls-name</i> <b>prio</b> <i>priority-value</i> | Specifies a cluster route.                                                       |

The following is an example of a cluster route configured using the /16 form to specify the mask:

```
Router(config)# cs7 route-table system
Router(config-cs7-rt)# update route 1.6.0/16 linkset polaris prio 2
Router(config-cs7-rt)# update route 1.6.0/16 linkset pollux prio 3
Router(config-cs7-rt)# end
```

Cluster routes have a non-adjacent status as dictated by the last received TCP, TCR or TCA message on that route. In the output of the **show cs7 route detailed** command, this status is displayed just as for full pc routes. Exclusion list (x-list) members are flagged by **dyn** at the end of the line for the concerned route. A route table display for an ANSI case with two clusters (1.4.0 and 1.6.0) and two x-list members (1.6.1 and 1.6.3) is shown below:

```
Router# show cs7 route detailed
Routing table = system
C=Cong Q=QoS P=Prio
Destination      C  Q  P Linkset Name      Linkset Non-adj Route
-----
1.4.0/16          RESTR      2  polaris          UNAVAIL allowed UNAVAIL
                  3  pollux          avail  allowed avail
1.5.1/24          INACC      1  polaris          UNAVAIL allowed UNAVAIL
1.5.3/24          acces      1  pollux          avail  allowed avail
1.6.1/24          RESTR      2  polaris          UNAVAIL allowed UNAVAIL dyn
                  3  pollux          avail  PROHIB UNAVAIL dyn
1.6.3/24          RESTR      2  polaris          UNAVAIL allowed UNAVAIL dyn
                  3  pollux          avail  PROHIB UNAVAIL dyn
1.6.0/16          RESTR      2  polaris          UNAVAIL allowed UNAVAIL
                  3  pollux          avail  allowed avail
```

If a cluster route is configured then another summary route with mask length in the range 17 - 23 should not be created. In the example above, the presence of a summary route 1.6.128/17 would cause faulty operation.

## Where to Go Next

Depending on your feature requirements, refer to the information provided in the following sections of this documentation:

- M3UA and SUA ITP Signaling Gateways are described in the “Configuring M3UA and SUA SS7 Over IP Signaling Gateways” chapter.
- Global Title Translation (GTT) is described in the “Configuring Global Title Translation” chapter.
- The Instance Translation feature, which enables the conversion of packets between instances of variants, is described in the “Configuring Multiple Instances and Instance Translation” chapter.
- The Multiple Instances feature, which makes it possible to connect the ITP to different networks with specific variant and network indicators, is described in the “Configuring Multiple Instances and Instance Translation” chapter.

- The MAP Proxy feature, which delivers Mobile Application Part (MAP) functionality, is described in the “Configuring MAP Proxy: GSM Authentication Service MMSC Gateway Service” chapter.
- The MTP3 Offload feature, which allows MTP3 message forwarding and Global Title Translation to be performed on the Virtual Interface Processors (VIPs), is described in the “Configuring MTP3 Offload” chapter.
- SCCP Load Sharing is described in the “Configuring SCCP Load Sharing” chapter.
- ITP QoS is described in the “Configuring ITP QoS” chapter.
- The ITP Summary Routing and ANSI Cluster Routing features, which allow routing of MSUs to groups of destination point codes (DPCs), are described in the “Configuring Summary Routing and ANSI Cluster Routing” chapter.
- Gateway Screening, which uses access lists to control access to or from the ITP, is described in the “Configuring Gateway Screening” chapter.
- The ITP Multi Layer Routing (MLR) feature, which enables intelligent routing of Short Message Service (SMS) mobile originated (MO) messages based on the application or service origination/destination, is described in the “Multi-Layer SMS Routing and Screening” chapter.
- The Non-Stop Operation (NSO) feature, which provides ITP High Availability (HA) support on the Cisco 7500 platform, is described in the “Configuring ITP Non-Stop Operation (NSO)” chapter.
- Configuring IP Security (IPSec) for ITP on the Cisco 2600 Router is described in the “Configuring IP Security (IPSec)” chapter.
- Verifying, Monitoring, and Tuning ITP
  - Tasks and commands to verify that the Cisco ITP was installed and configured properly are described in the “Verifying ITP” section on page 284 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Event logging, SNMP, and the tasks to Monitor the status of the ITP are described in the “Monitoring ITP” section on page 295 of the “Verifying, Monitor, and Tuning ITP” chapter.
  - Tasks and commands to tune timers and SCTP parameters are described in the “Tuning ITP” section on page 321 of the “Verifying, Monitor, and Tuning ITP” chapter.

## Technical Assistance

| Description                                                                                                                                                                                                                                                              | Link                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content. | <a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a> |

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## Verifying, Monitoring, and Tuning the ITP

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This chapter describes how to verify proper configuration of the RPR+ feature and the ITP, monitor status and traffic, and tune the ITP. This chapter includes the following optional tasks:

- Verifying RPR+, page 284
- Verifying ITP, page 284
- Monitoring RPR+ on the Cisco 7500 Series Router, page 294
- Monitoring ITP, page 295
- Tuning ITP, page 321

## Verifying RPR+

Use the **show redundancy** command to verify that RPR+ is enabled. The output should be similar to the following:

```
Router# show redundancy
Operating mode is rpr-plus
redundancy mode rpr-plus
hw-module slot 2 image disk0:rsp-pv-mz
hw-module slot 3 image disk0:rsp-pv-mz
```

```
The system total uptime since last reboot is 5 days, 19 hours 36 minutes.
The system has experienced 27 switchovers.
The system has been active (become master) for 5 days, 15 hours 14 minutes.
Reason for last switchover:User forced.
```

## Verifying ITP

After you have configured Cisco ITP, you can perform several tasks that will verify that the Cisco ITP was installed and configured properly, and that Cisco ITP functionality is available. Perform the tasks in this section to verify the Cisco ITP.

**Verify that Cisco ITP is configured on the router with the correct variant and local point code.**

To confirm that the correct variant and point code are configured, use the following command in EXEC mode:

| Command                   | Purpose                     |
|---------------------------|-----------------------------|
| Router# <b>write term</b> | Displays the configuration. |

The output of the above command should include lines such as the following that show the correct variant and point code:

```
cs7 variant ITU
cs7 point-code 1.1.1
```

**Verify that required linksets to adjacent nodes are available.**

To verify that required linksets to adjacent nodes are available, use the following command in EXEC mode:

| Command                               | Purpose                           |
|---------------------------------------|-----------------------------------|
| Router# <b>show cs7 linkset brief</b> | Displays ITP linkset information. |

The possible states of a linkset are:

- **UNAVAIL** Indicates the linkset does not have any “available” links and cannot transport traffic.
- **shutdown** Indicates the linkset has been shutdown in the configuration.
- **avail** Indicates the linkset has at least one available link and can carry traffic.



The output of the above command should include lines such as the following. The state of each linkset should be “avail.”

```
Router# show cs7 linkset brief
lsn=msc1      apc=5.5.5      state=avail
lsn=mica      apc=4.4.4      state=avail
lsn=malo      apc=2.2.2      state=avail
lsn=momo      apc=3.3.3      state=avail
```

If the state of a linkset is not available it might be shutdown or UNAVAIL:

```
lsn=momo      apc=3.3.3      state=shutdown
lsn=momo      apc=3.3.3      state=UNAVAIL
```

If the linkset state is shutdown, it should be administratively restarted. If a linkset is unavailable, verify the links within the linkset (See step 4).

#### Verify that all required destinations are accessible.

To verify that all required destinations are accessible, use the following command in EXEC mode:

| Command                       | Purpose                         |
|-------------------------------|---------------------------------|
| Router# <b>show cs7 route</b> | Displays the ITP routing table. |

The above command should include output such as the following. Each destination should be “access” and the route status should be “avail.”

```
Router# show cs7 route
Routing table = system
Destination      Prio Linkset Name      Route Status
-----
2.2.2/14         acces  1  malo              avail
                  9  mica              avail
3.3.3/14         acces  1  momo              avail
                  9  mica              avail
4.4.4/14         acces  1  mica              avail
                  9  momo              avail
5.5.1/14         acces  1  msc1              avail
                  9  momo              avail
5.5.5/14         acces  1  msc1              avail
                  9  momo              avail
6.6.1/14         acces  1  mica              avail
                  9  malo              avail
6.6.6/14         acces  1  malo              avail
                  9  mica              avail
```

Routes to a destination are listed in priority order. The first route to be selected is the route with the lowest cost (listed in the Prio field). If the route with the lowest cost is available the destination is available. If the route with the lowest cost is UNAVAIL or RESTRIC and there is another available route with a higher cost, then the destination will be RESTR.

```
3.3.3/14         RESTR  1  momo              UNAVAIL
                  9  mica              avail
```

If there are no available routes, the destination will be INACC.

```
5.5.1/14         INACC  1  msc1              UNAVAIL
                  9  momo              UNAVAIL
```

If a destination is inaccessible or restricted, investigate why by verifying the affected cs7 route.

If a required destination is not shown, the route should be administratively added to the route table.

If steps 1 - 3 yield the expected results, you have verified connectivity to all the adjacent nodes and *potentially* available routes to all destinations. (*Potentially* because Cisco ITP assumes that routes are available until the node is notified that a destination is not available.)

To verify connectivity to a particular node, use the following command in EXEC mode:

| Command                                                                                                                                                                                                                                                                                                                                             | Purpose                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| Router# <b>ping cs7</b> [ <i>instance-number</i> ] [- <b>opc</b> <i>origination-point-code</i> ] [- <b>duration</b> <i>seconds</i> ] [- <b>ni</b> <i>network-indicator</i> ] [- <b>rate</b> <i>MSU-per-second</i> ] [- <b>size</b> <i>bytes</i> ] [- <b>sls</b> <i>value</i>   <b>round-robin</b> ] { <i>destination-point-code</i>   <i>host</i> } | Verify that you can reach ITP nodes. |

The following is typical output of the **cs7 ping** command:

```
Router# ping cs7 2.2.2
3d19h:%CS7PING-6-RTT:Test Q.755 2.2.2:MTP Traffic test rtt 16/16/16
3d19h:%CS7PING-6-STAT:Test Q.755 2.2.2:MTP Traffic test 100% successful (1/1)
3d19h:%CS7PING-6-TERM:Test Q.755 2.2.2:MTP Traffic test terminated.
```

#### Verify the links within a linkset.

To verify that all the links in a linkset are available, use the following command in EXEC mode:

| Command                         | Purpose                               |
|---------------------------------|---------------------------------------|
| Router# <b>show cs7 linkset</b> | Displays the ITP linkset information. |

The possible states of a linkset are:

- **UNAVAIL** Indicates the linkset does not have any “available” links and cannot transport traffic.
- **shutdown** Indicates the linkset has been shutdown in the configuration.
- **avail** Indicates the linkset has at least one available link and can carry traffic.

The possible states of a link are:

- **UNAVAIL** Indicates the link is not available to carry traffic. This can occur if the link is remotely or locally inhibited by a user. It can also be unavailable if MTP2/M2PA has not been able to successfully activate the link connection or the link test messages sent by MTP3 are not being acknowledged.
- **shutdown** Indicates the link has been shutdown in the configuration. A link is **shutdown** when it is shutdown at the MTP3 layer.
- **avail** Indicates the link is active and able to transport traffic.
- **FAILED** A link is **FAILED** when the link is not shutdown but is unavailable at layer2 for some reason. It is **FAILED** when the link is unavailable because the link has been inhibited or it is blocked.
- **sys-shutdown** Indicates the link has been shutdown by the system. A link may be in this state when:
  - MTP3 offload is configured and the system is performing error recovery on the VIP
  - MTP3 offload has been permanently disabled on a VIP by the system due to excessive errors. When MTP3 offload has been permanently disabled on a VIP (by the system) all links on that VIP will be in the sys-shutdown state.

The Service field should indicate that links are “avail.”

```
Router# show cs7 linkset
lsn=mscl          apc=5.5.5          state=avail
  SLC  Interface      Service  PeerState  Inhib
  00   199.1.1.5 4096 4096    avail    InService  -----

lsn=mica          apc=4.4.4          state=avail
  SLC  Interface      Service  PeerState  Inhib
  00   199.1.1.4 4096 4096    avail    InService  -----
  01   199.1.1.4 4097 4097    avail    InService  -----
  02   199.1.1.4 4098 4098    avail    InService  -----
  03   199.1.1.4 4099 4099    avail    InService  -----

lsn=malo          apc=2.2.2          state=avail
  SLC  Interface      Service  PeerState  Inhib
  00   199.1.1.2 4096 4096    avail    InService  -----

lsn=momo          apc=3.3.3          state=avail
  SLC  Interface      Service  PeerState  Inhib
  *00   Serial0/0          avail    -----  -----
  *01   Serial0/1          avail    -----  -----
  *02   Serial0/2          avail    -----  -----
  *03   Serial0/3          avail    -----  -----
```

If a link is not available it might be shutdown, FAILED or UNAVAIL....

```
*01   Serial0/1          shutdown -----  -----
*02   Serial0/2          FAILED   -----  -----
*03   Serial0/3          UNAVAIL  -----  rem
```

If the link is shutdown, it should be administratively restarted.

If a link is failed, then the link has failed at MTP2 (or M2PA in the case of SCTP links). The cause must be investigated by verifying MTP2 (or M2PA) links.

If the link is unavailable, the link is okay at the MTP2 (or M2PA) layer.

The link might be remotely inhibited or locally inhibited, or there may be a remote processor outage.

```
*03   Serial0/3          UNAVAIL  -----  loc
```

The above link was locally inhibited. The link should be administratively uninhibited.

```
*03   Serial0/3          UNAVAIL  -----  rem
```

The above link was remotely inhibited. The link should be administratively uninhibited by the SS7 node at the remote end of the link.

```
*03   Serial0/3          UNAVAIL  -----  -----
```

The above link is unavailable and is not inhibited. It is probably blocked due to remote processor outage. (i.e. The problem is at the SS7 node at the remote end of the link)

### Verify routes.

To verify routes, use the following command in EXEC mode:

| Command                              | Purpose                                    |
|--------------------------------------|--------------------------------------------|
| Router# <b>show cs7 route detail</b> | Displays details of the ITP routing table. |

The **show cs7 route detail** command should include output such as the following:

```
Router# show cs7 route detail
Routing table = system
C=Cong Q=QoS P=Prio
```

| Destination | C     | Q | P | Linkset Name | Linkset | Non-adj | Route   |
|-------------|-------|---|---|--------------|---------|---------|---------|
| 2.2.2/14    | aces  |   |   | 1 malo       | avail   | allowed | avail   |
|             |       |   |   | 9 mica       | avail   | allowed | avail   |
| 3.3.3/14    | aces  |   |   | 1 momo       | avail   | allowed | avail   |
|             |       |   |   | 9 mica       | avail   | PROHIB  | UNAVAIL |
| 4.4.4/14    | aces  |   |   | 1 mica       | avail   | allowed | avail   |
|             |       |   |   | 9 momo       | avail   | RESTRIC | RESTRIC |
| 5.5.1/14    | INACC |   |   | 1 msc1       | avail   | PROHIB  | UNAVAIL |
|             |       |   |   | 9 momo       | avail   | PROHIB  | UNAVAIL |
| 5.5.5/14    | aces  |   |   | 1 msc1       | avail   | allowed | avail   |
|             |       |   |   | 9 momo       | avail   | allowed | avail   |
| 6.6.1/14    | INACC |   |   | 1 mica       | avail   | PROHIB  | UNAVAIL |
|             |       |   |   | 9 malo       | avail   | PROHIB  | UNAVAIL |
| 6.6.6/14    | aces  |   |   | 1 malo       | avail   | allowed | avail   |
|             |       |   |   | 9 mica       | avail   | allowed | avail   |

Routes are listed in priority order. The route with the lowest cost (listed under the Prio heading) will be the first route selected to a particular destination. A route should be “avail,” the non-adj status should be “allowed” and the linkset should be “avail.”

If a route is not available, it may be restricted or unavailable. If a route is not available and the linkset is available, then the route is restricted or unavailable because it received a TFR or TFP from the adjacent SS7 node. In this case you need to verify the route in the adjacent SS7 node.

If a route is not available and the linkset is not available, verify the links within the linkset.

### Verify MTP2 links

To Verify that the link state control is “In service,” use the following command in EXEC mode:

| Command                            | Purpose                             |
|------------------------------------|-------------------------------------|
| Router# <b>show cs7 mtp2 state</b> | Displays MTP2 state machine status. |

The following is typical output of the **show cs7 mtp2 state** command:

```
Router# show cs7 mtp2 state ser 0/0
CS7 MTP2 states for interface Serial0/0
Protocol version for interface Serial0/0 is ITU-T Q.703 (1996) (White Book)

Link State Control (LSC)                = In Service
                                         ^^^^^^^^^
Initial Alignment Control (IAC)          = Idle
Transmission Control (TXC)              = In Service
Reception Control (RC)                  = In Service
Signal Unit Error Rate Monitor (SUERM)   = Monitoring
Alignment Unit Error Rate Monitor (AERM) = Idle
Congestion (CONG)                       = Idle

Layer3 link status                      = Started
Layer3 congestion status                 = Abate
```

Other possibilities for LSC might be as follows:

```
Link State Control (LSC)                = Out of Service
or
Link State Control (LSC)                = Initial Alignment
```

If the LSC state is “Out of Service” or transitions in and out of “Initial alignment,” check the physical interface for correct cabling, clocking, etc.

To verify that the physical link is up, use the following command in EXEC mode:

| Command                       | Purpose                             |
|-------------------------------|-------------------------------------|
| Router# <b>show interface</b> | Displays MTP2 state machine status. |

The following is typical output of the **show interface** command:

```
router# show int ser 0/0
Serial0/0 is up, line protocol is up
Hardware is PowerQUICC Serial
  MTU 290 bytes, BW 1544 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation SS7 MTP2, loopback not set
  Keepalive set (10 sec)
  Last input never, output 00:00:16, output hang never
  Last clearing of "show interface" counters 3d17h
  Queueing strategy:fifo
  Output queue 0/40, 0 drops; input queue 0/75, 20654 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    20673 packets input, 62068 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    10339 packets output, 113605 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 output buffer failures, 0 output buffers swapped out
    4 carrier transitions
  DCD=up DSR=up DTR=up RTS=up CTS=up
```

The output might indicate that the interface is administratively down:

```
Serial0/0 is administratively down, line protocol is down
```

If the interface is “administratively down,” the interface must be started administratively.

The output might indicate that the interface is down:

```
Serial0/0 is down, line protocol is down
```

If the interface is “down” check the physical cabling.

To verify that the line protocol is up and the encapsulation is MTP2, use the following command in EXEC mode:

| Command                       | Purpose                             |
|-------------------------------|-------------------------------------|
| Router# <b>show interface</b> | Displays MTP2 state machine status. |

If the encapsulation is not MTP2, it must be changed administratively.

The following is typical output of the show interface command:

```
Router# show int ser 0/0
Serial0/0 is up, line protocol is up
      ^
Hardware is PowerQUICC Serial
MTU 290 bytes, BW 1544 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation SS7 MTP2, loopback not set
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
Keepalive set (10 sec)
Last input never, output 00:00:16, output hang never
Last clearing of "show interface" counters 3d17h
Queueing strategy:fifo
Output queue 0/40, 0 drops; input queue 0/75, 20654 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
  20673 packets input, 62068 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  10339 packets output, 113605 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 output buffer failures, 0 output buffers swapped out
    4 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up
```

The output might indicate that the line protocol is down:

```
Serial0/0 is up, line protocol is down
```

If the line protocol is down verify that the physical cabling and clocking rates are correct.

### Verify M2PA Links

To verify M2PA links, use the following command in EXEC mode:

| Command                                        | Purpose                           |
|------------------------------------------------|-----------------------------------|
| Router# <b>show cs7 linkset</b> <i>ls-name</i> | Displays ITP linkset information. |

The following is typical output of the **show cs7 linkset** command:

```
Router# show cs7 linkset mica
lsn=Router apc=4.4.4      state=UNAVAIL
  SLC  Interface                Service  PeerState  Inhib
  00   199.1.1.4 4096 4096      avail    InService  -----
      ^^^^^^^^^
  01   199.1.1.4 4097 4097      avail    InService  -----
  02   199.1.1.4 4098 4098      avail    InService  -----
  03   199.1.1.4 4099 4099      avail    InService  -----
```

If the PeerState field shows “InitialAlignment,” check that the remote peer IP address and port number are correct and that the link at the remote end is not administratively shutdown. The remote peer IP address and port number should correspond with a local peer and port number on a remote router.

```
01   199.1.1.4 4097 4098      FAILED   InitialAlignment  -----
```

In the above example,

- 199.1.1.4 is the remote IP address
- 4097 is the remote port
- 4098 is the local port

Also check that the local peer IP address and port number correspond to the remote peer IP address and port number in the remote router.

To obtain the local peer IP address, use the following command in EXEC mode:

| Command                                                 | Purpose                       |
|---------------------------------------------------------|-------------------------------|
| Router# <b>show cs7 m2pa local-peer</b> <i>port-num</i> | Displays ITP M2PA statistics. |

The following is typical output of the **show cs7 m2pa local-peer** command:

```
Router# show cs7 m2pa local-peer 4097
CS7 M2PA Local Peer Info for local port = 4097
Local Port           = 4097
Local IP             = 199.1.1.1
                     ^^^^^^^^^
SCTP Instance Handle = 1
Num Peers On Instance = 1
Instance Local Recv Window = 64000
Instance maxInitRetrans = 8
Instance maxInitTimeout = 1000 ms
Instance Unordered Priority = EQUAL
```

If the remote and local peers are not correct, they need to be corrected administratively.

If they are correct and the remote link is not shutdown, then verify IP connectivity.

If the peerstate is OutofService, then the link should be administratively activated.

```
lsn=mica          apc=4.4.4          state=UNAVAIL
  SLC  Interface          Service  PeerState      Inhib
*02   199.1.1.1 4098 4098      shutdown OutOfService      -----
```

### Verify GTT

Refer to the “Verifying Global Title Translations” section on page 129 in the “Configuring Global Title Translation” chapter.

### Verify IP connectivity

To verify IP connectivity ping the remote IP address, using the following command in EXEC mode:

| Command                               | Purpose              |
|---------------------------------------|----------------------|
| Router# <b>ping</b> <i>ip-address</i> | Pings an IP address. |

The following is typical output of the **ping** command:

```
Router# ping 199.1.1.4

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 199.1.1.4, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

The ping should succeed with 100% success rate and the min/avg/max round trip delays should not be excessive.

If the success rate is zero, as in the sample output that follows, there is no IP connectivity between the cs7 peers.

```
Router# ping 199.1.1.4
```

```
!Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 199.1.1.4, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
Router#
```

For each peer, verify that the local IP peer address is associated with an active interface. Verify this using the `show ip interface brief` command. (In this case the local IP address is 199.1.1.1.)

```
Router# show ip interface brief
```

| Interface       | IP-Address    | OK? | Method | Status | Protocol |
|-----------------|---------------|-----|--------|--------|----------|
| FastEthernet0/0 | 172.18.44.176 | YES | NVRAM  | up     | up       |
| Serial0/0       | unassigned    | YES | NVRAM  | up     | down     |
| FastEthernet0/1 | 199.1.1.1     | YES | NVRAM  | up     | up       |
|                 |               |     |        | ^^ ^^  |          |
| Serial0/1       | unassigned    | YES | NVRAM  | down   | down     |
| Serial0/2       | unassigned    | YES | NVRAM  | up     | up       |
| Serial0/3       | unassigned    | YES | NVRAM  | up     | up       |

```
Router#
```

If the interface status and protocol are not “up,” take the appropriate measures to activate the interface.

If the required interface status and protocol are up, verify that there is an IP route to the remote IP address. (In this case the remote IP address is 199.1.1.4)

```
Router# show ip route
```

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP  
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area  
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2  
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP  
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area  
\* - candidate default, U - per-user static route, o - ODR  
P - periodic downloaded static route

```
Gateway of last resort is not set
```

```

      172.18.0.0/25 is subnetted, 1 subnets
C       172.18.44.128 is directly connected, FastEthernet0/0
C       199.1.1.0/24 is directly connected, FastEthernet0/1
      161.44.0.0/32 is subnetted, 1 subnets
S       161.44.2.30 [1/0] via 172.18.44.129
```

The above display shows that there is an IP route to the network 199.1.1.0 via the directly connected fastethernet0/0 interface.

### Verify the State of M3UA and SUA Application Servers and Application Server Processes

The `show cs7 as` command includes keywords to filter and format the output.

- The filter options are **active**, **all** ASes (the default), **m3ua**, **name asname**, **operational**, and **sua**.
- The GTT subfilters are **include-gtt**, **exclude-gtt**, or **only-gtt**
- The format options are **brief** (the default format), **details**, **event-history**, and **statistics**.

The following is output from the `show cs7 as` command entered with no format or filter keywords. The command uses the default filter (**all**) and the default format (**brief**):

```
Router# show cs7 as
```

Routing



| AS Name | State | Context |
|---------|-------|---------|
| asp1    | down  | 1       |
| asp2    | down  | 2       |

| AS Name | State | Routing Context | Routing Key Dpc | Si | Opc | Cic Ssn | Cic Min | Cic Max |
|---------|-------|-----------------|-----------------|----|-----|---------|---------|---------|
| as1     | down  | 111             | 2.1.1           |    |     |         |         |         |

The following is output from the **show cs7 as** command entered with the **name asname** filter keyword and the **detail** format keyword:

```
Router#show cs7 as name owl5 detail
AS name: as1          State: down          Type: SUA
RoutContext: 111      Traffic mode: loadshare roundrobin
Mate AS state: unknwn  Recovery tmout: 2000 ms  Recovery queue depth: 0
QOS Class: 0          Burst recovery tmout: 4000 ms
Routing Key:
  Dest PC: 2.1.1      Origin PC: n/a          Origin PC mask: n/a
  SI: n/a             CIC min: n/a          CIC max: n/a
  SSN: n/a            GTT: n/a
ASP Name      AS Name      State      Type      Rmt Port Remote IP Addr  SCTP Assoc
asp2          owl5        down       SUA        9022    172.18.57.136
asp1          owl5        down       SUA        9012    172.18.57.136
cuba         owl5        down       SUA        14101   172.18.57.90
```

Traffic-mode states are: override, loadshare bindings, loadshare roundrobin, broadcast, or undefined.

AS and Mate-AS states are: shutdown, down, down-rerouting, inactive, inactive-rerouting, active, or pending.

The following is output from the **show cs7 asp sua** command in the default brief format:

| ASP Name | AS Name | State | Type | Rmt Port | Remote IP Addr | SCTP |
|----------|---------|-------|------|----------|----------------|------|
| asp1     | asp1    | down  | SUA  | 9012     | 172.18.57.136  |      |
| asp1     | as1     | down  | SUA  | 9012     | 172.18.57.136  |      |
| asp2     | asp2    | down  | SUA  | 9022     | 172.18.57.136  |      |
| asp2     | as1     | down  | SUA  | 9022     | 172.18.57.136  |      |
| cuba     | as1     | down  | SUA  | 14101    | 172.18.57.90   |      |

ASP States are: shutdown, blocked, down, inactive, active, or active/congested.

If the ASP is down or shutdown, then the remote port and remote IP address display the configured values instead of the actual values.

# Monitoring RPR+ on the Cisco 7500 Series Router

Use the commands in the table below to monitor the RPR+ feature on the Cisco 7500 series routers:

| Command                        | Purpose                                                                                                                                                                                         |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router# <b>show diag</b>       | Use this command to display hardware information for the router.                                                                                                                                |
| Router# <b>show redundancy</b> | Use this command to display the redundancy mode of the RSP. This command also displays information about the number of switchovers, system uptime, RSP uptime, and reasons for any switchovers. |
| Router# <b>show version</b>    | Use this command to display image information for each RSP.                                                                                                                                     |

# Monitoring ITP

You can perform the tasks in the following sections to monitor and maintain the Cisco ITP:

- Configuring ITP for Event Logging to an External Server, page 295
- Configuring the CS7 Monitor Feature, page 296
- Enabling Simple Network Management Protocol, page 297
- Monitoring the Cisco ITP, page 299

## Configuring ITP for Event Logging to an External Server

Routers send system messages to an internal logging process. The logging process controls the distribution of system messages to the various destinations, such as the console (default), terminal lines, router logging buffer, or external UNIX syslog server.

To set the severity level of the system messages to control the type of messages displayed at each of the destinations, use the following commands in global configuration mode:

| Command                                      | Purpose                                                                                                                          |
|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>logging console level</b> | Limits the logging of messages displayed on the console terminal to a specified level.                                           |
| Router(config)# <b>logging monitor level</b> | Limits the logging messages displayed on terminal lines other than the console line to messages at or above the specified level. |
| Router(config)# <b>logging trap level</b>    | Limits the logging of error messages sent to syslog servers to only those messages at the specified level.                       |

By default, system messages are delivered to the console. To enable messages on a terminal line, Use the following command in EXEC mode:

| Command                         | Purpose                                                                                      |
|---------------------------------|----------------------------------------------------------------------------------------------|
| Router# <b>terminal monitor</b> | Display debug command output and system error messages for the current terminal and session. |

To enable logging to a non-volatile ITP buffer and adjust the size of the buffer, use the following command in EXEC mode:

| Command                              | Purpose                                                                                                  |
|--------------------------------------|----------------------------------------------------------------------------------------------------------|
| Router# <b>logging buffered size</b> | Log messages to an internal buffer. The logging is circular, so newer messages overwrite older messages. |

To enable logging messages to a UNIX syslog server host, use the following command in EXEC mode:

| Command                     | Purpose                                                                                                                                                                                                                                          |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router# <b>logging host</b> | Log messages to a UNIX syslog server host. The host parameter is the name or Internet address of the server. By repeating the command, you can have messages sent to multiple syslog servers. the syslog format is compatible with 4.3 BSD UNIX. |

By default, a syslog message contains the IP address of the interface it uses to leave the router. To specify that all syslog messages contain the same IP address, regardless of which interface they take to reach the syslog server, use the following command in global configuration mode:

| Command                                 | Purpose                                          |
|-----------------------------------------|--------------------------------------------------|
| Router# <b>logging source-interface</b> | Specify the source IP address of syslog packets. |

## Configuring the CS7 Monitor Feature

The CS7 Monitor feature enables the ITP to monitor SS7/HSL ports and send the MSUs via TCP to a server for collection and storage.

|                                                                                   |                                                                                     |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |                                                                                     |
| <b>Note</b>                                                                       | The CS& Monitor feature is supported on the Cisco 7200/RSP and Cisco7500 platforms. |

|                                                                                   |                                                                                                      |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
|  |                                                                                                      |
| <b>Note</b>                                                                       | When the CS7 Monitor feature is enabled, no other CS7 feature or function can be enabled on the ITP. |

To configure the CS7 Monitor feature, use the following commands, beginning in global configuration mode:

|               | Command or Action                                                                                      | Purpose                                                                     |
|---------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| <b>Step 1</b> | <b>card type</b> {t1   e1} slot [/bay]                                                                 | Specifies the T1 or E1 card type.                                           |
|               | <b>Example:</b><br>Router(config)# card type t1 4                                                      |                                                                             |
| <b>Step 2</b> | <b>controller</b> {t1   e1} slot[/bay]/port                                                            | Configures a T1 or E1 controller and enables controller configuration mode. |
|               | <b>Example:</b><br>Router(config)# controller t1 4/7                                                   |                                                                             |
| <b>Step 3</b> | <b>clock source</b> {line {primary   secondary}   internal}                                            | Specifies the line or internal clock source.                                |
|               | <b>Example:</b><br>Router(config-controller)# clock source line primary                                |                                                                             |
| <b>Step 4</b> | <b>channel-group</b> channel-number timeslot range speed {56   64}                                     | Specifies the channel group.                                                |
|               | <b>Example:</b><br>Router(config-controller)# channel-group 0 timeslot 1 speed 56                      |                                                                             |
| <b>Step 5</b> | <b>interface</b> type slot[/bay]/port                                                                  | Configure the interface.                                                    |
|               | <b>Example:</b><br>Router(config)# interface serial4/7:0<br>-OR-<br>Router(config)# interface atm5/0/0 |                                                                             |

|         | Command or Action                                                                                                                                                                                                           | Purpose                                                                                                                                                                                                                         |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step 6  | <b>description</b> <i>string</i><br><br><b>Example:</b><br>Router(config-int)# description Monitors HLS<br>between ITP1 and ITP2                                                                                            | (Optional) Add a description of the monitoring interface. The description is displayed in the output of the <b>show cs7 monitor link</b> command.                                                                               |
| Step 7  | <b>encapsulation cs7monitor</b><br>-OR-<br><b>atm cs7 monitor</b><br><br><b>Example:</b><br>Router(config-int)# encapsulation cs7monitor<br>-OR-<br>Router(config-int)# atm cs7monitor<br>Router(config-int)# pvc 0/5 qsaal | Identifies the interface as a monitoring interface. Enables the interface (serial or ATM) to identify the frame format of the received packets. Interprets received packets as MTP2 (serial) or High Speed Link (ATM) protocol. |
| Step 8  | <b>cs7 monitor tcp-listen-port</b><br><br><b>Example:</b><br>Router(config-int)# cs7 monitor 9000                                                                                                                           | Configure the ITP as a monitor and defines the port number to listen on for incoming TCP connections.                                                                                                                           |
| Step 9  | <b>link {atm   serial} slot[/bay]/port</b><br><br><b>Example:</b><br>Router(config-cs7-monitor)# link serial4/7:0                                                                                                           | Configure link to be monitored by the ITP.                                                                                                                                                                                      |
| Step 10 | <b>show cs7 monitor tcp</b><br><br><b>Example:</b><br>Router# show cs7 monitor tcp                                                                                                                                          | Verifies that the CS7 Monitor is connected and indicates the TCP listen port.                                                                                                                                                   |

## Enabling Simple Network Management Protocol

The Simple Network Management Protocol (SNMP) is an application-layer protocol that provides a message format for communication between SNMP managers and agents. The SNMP system consists of the following three parts:

- An SNMP manager
- An SNMP agent
- A Management Information Base (MIB)

The SNMP manager can be part of a Network Management System (NMS) such as CiscoWorks. The agent and MIB reside on the router. To configure SNMP on the router, you define the relationship between the manager and the agent. For more information about SNMP, refer to “Configuring SNMP Support” in the Cisco IOS Release 12.1 *Configuration Fundamentals Configuration Guide*, Part 3, Cisco IOS System Management, at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun\\_c/fcprt3/fcd301.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun_c/fcprt3/fcd301.htm)

To enable SNMP traps for Cisco ITP to be sent, use the **snmp-server enable traps cs7** global configuration command.

| Command                                                                                                                                                               | Purpose                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Router(config)# <b>snmp-server enable traps cs7</b> [gtt-map-state]<br>[link-congestion] [link-state] [link-utilization]<br>[linkset-state] [route-state] [xua-state] | Enables SNMP traps for Cisco ITP. |

When you enable CS7 traps, the default value for trap queue length (10 events) might cause traps to be lost. To avoid this situation set the trap queue length to 100 using the **snmp-server queue-length** global configuration command:

| Commands                                            | Purpose                                        |
|-----------------------------------------------------|------------------------------------------------|
| Router(config)# <b>snmp-server queue-length 100</b> | Sets the default for trap queue length to 100. |

You can control the rate of notifications for destination state changes and route state changes.

To specify the maximum number of destination state changes allowed per window, use the **cs7 snmp dest-max-window** global configuration command:

| Commands                                        | Purpose                                                                                                                                                                                                                                               |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 snmp dest-max-window</b> | Sets the maximum number of destination state changes allowed per window. Valid range is 10 to 9000 changes. Default is 60. (Large values can impact the performance of the device and all notifications might not be sent to the management station.) |

The **cs7 snmp dest-max-window** command corresponds to the cgrtDestNotifMaxPerWindow object in the Cisco-ITP-GRT-MIB.my MIB. Destination state changes are sent in the ciscoGrtDestStateChange notification.

To specify the maximum number of route management state changes allowed per window, use the **cs7 snmp mgmt-max-window** global configuration command:

| Commands                                        | Purpose                                                                                                                                                                                                                                                    |
|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 snmp mgmt-max-window</b> | Sets the maximum number of route management state changes allowed per window. Valid range is 10 to 9000 changes. Default is 60. (Large values can impact the performance of the device and all notifications might not be sent to the management station.) |

The **cs7 snmp mgmt-max-window** command corresponds to the cgrtMgmtNotifMaxPerWindow object in the Cisco-ITP-GRT-MIB.my MIB. Route management state changes are sent in the ciscoGrtMgmtStateChange notification.

## Monitoring the Cisco ITP

This section includes information about the following tasks:

- Monitoring CPU/Memory, page 299
- Monitoring Linksets and Links, page 300
- Monitoring MTP2 Links/Interfaces, page 302
- Monitoring M2PA Links/Interfaces, page 307
- Monitoring GTT Measurements, page 310
- Monitoring M3UA or SUA, page 311
- Monitoring AS, ASP, Mated-SG, page 312
- Monitoring Routes, page 317
- Monitoring Gateway Screening Violations, page 318
- Monitoring System Messages, page 319
- Monitoring Accounting, page 319

### Monitoring CPU/Memory

#### Why is this task important?

A healthy SS7oIP router needs to be running at less than 50% CPU during non fail-over conditions and must have 50% available memory to handle route table changes due to network conditions. If an SS7oIP router has a CPU and/or memory shortage, network availability is at risk. CPU and memory should be monitored via system error messages or SNMP traps alerts

#### Under what circumstances should this task be performed?

System health monitoring is an ongoing process and should be automated. CiscoWorks network management application can be used to automate this task.

#### What incidents or system messages should prompt the user to monitor the CPU/memory?

When Cisco ITP attempts to allocate memory for an event for which no memory is available, the following IOS message is displayed:

```
%SYS-2-MALLOCFAIL:Memory allocation of [dec] bytes failed from [hex], pool [chars], alignment [dec]
```

**Explanation** The requested memory allocation is not available from the specified memory pool. The current system configuration, network environment, or possibly a software error might have exhausted or fragmented the router memory.

**Action** Copy the error message exactly as it appears on the console or in the system log, call your Cisco technical support representative, and provide the representative with the gathered information.

**Should this task be part of a regular maintenance process that the user should do at regular intervals? If so, how frequently?**

Ongoing.

**What commands does the user issue?**

The **show proc cpu** command will display output such as the following:

```
CPU utilization for five seconds:0%/0%; one minute:0%; five minutes:0%
PID Runtime(ms)   Invoked   uSecs    5Sec    1Min    5Min  TTY Process
 27         0         1         0    0.00%   0.00%   0.00%   0 MTP3 Input
 28    30238    70601    428    0.00%   0.01%   0.00%   0 MTP3 Mgmt
 53         56   353673         0    0.00%   0.00%   0.00%   0 CS7 MTP2 timer
```

The **show proc mem** command will display output such as the following:

```
Total:26494208, Used:4829456, Free:21664752
PID TTY Allocated   Freed   Holding   Getbufs   Retbufs Process
 27  0      192         0    13036         0         0 MTP3 Input
 28  0   267888      276   274456         0         0 MTP3 Mgmt
 53  0    20948      340    27452         0         0 CS7 MTP2 timer
```

The **show mem** command will display output such as the following:

```
Processor      Head      Total(b)   Used(b)    Free(b)    Lowest(b)   Largest(b)
I/O    80DBBB00 26494208  4829308   21664900   21615220   21640172
I/O    2700000 26214400  2227876   23986524   23979088   23979036
```

Refer to the “Command Reference” section of this document for detailed descriptions of the show commands.

## Monitoring Linksets and Links

**Why is this task important?**

Links and linksets can change states from available to unavailable while the system is running. It is important to monitor when a linkset has become unavailable since it can indicate total or partial loss of a route to a destination node. When a link becomes unavailable, it can have a negative impact on the throughput, since there will be fewer links to carry the traffic.

**Under what circumstances should this task be performed?**

Link and linkset availability should be monitored at all times when there is traffic flowing over it.

**What incidents or system messages should prompt the user to monitor Linksets and Links?**

The user should monitor the links and linkset whenever a route or destination becomes unavailable.

**Should this task be part of a regular maintenance process that the user should do at regular intervals? If so, how frequently?**

Whenever a link or linkset becomes unavailable, error messages are displayed on the console and an SNMP trap is sent to the network management node.

**What commands does the user issue?**

To monitor all linksets, issue the **show cs7 linkset brief** command, which displays output such as the following:

```
lsn=to_2651_1      apc=0.3.3      state=UNAVAIL
lsn=to_helium       apc=0.2.2      state=avail
lsn=to_mgts_15      apc=1.1.1      state=UNAVAIL
```

The following explanations are based on the preceding output of the **show cs7 linkset brief** command.



- Linkset **to\_helium** is available and for traffic. A linkset is in available state when it has at least one available link in it. The detailed display below indicates that the linkset has several links that are available.
- Linkset **to\_2651\_1** is unavailable because it does not have any available links. Link 0 has been shutdown via configuration.
- In linkset **to\_helium**, link 5 has been locally inhibited and as such is unavailable to carry traffic.
- Link 6 has been remotely inhibited and is also unavailable to carry traffic. (If a link has been locally inhibited via the **cs7 inhibit** command, the Inhibit column will display **loc** to indicate that the link was locally inhibited. If a link is inhibited from the adjacent node, the show output will display **rem** to indicate that it was remotely inhibited.
- Linkset **to\_mgts\_15** is also not available to carry traffic because it does not have any available links.
- Link 0 has failed.

#### Linkset States

- **UNAVAIL** Indicates the linkset does not have any “available” links and cannot transport traffic.
- **shutdown** Indicates the linkset has been shutdown in the configuration.
- **avail** Indicates the linkset has at least one available link and can carry traffic.

#### Link States

- **UNAVAIL** Indicates the link is not available to carry traffic. This can occur if the link is remotely or locally inhibited by a user. It can also be unavailable if MTP2/M2PA has not been able to successfully activate the link connection or the link test messages sent by MTP3 are not being acknowledged.
- **shutdown** Indicates the link has been shutdown in the configuration. A link is **shutdown** when it is shutdown at the MTP3 layer.
- **avail** Indicates the link is active and able to transport traffic.
- **FAILED** A link is **FAILED** when the link is not shutdown but is unavailable at layer2 for some reason. It is **FAILED** when the link is unavailable because the link has been inhibited or it is blocked.
- **sys-shutdown** Indicates the link has been shutdown by the system. A link may be in this state when:
  - MTP3 offload is configured and the system is performing error recovery on the VIP
  - MTP3 offload has been permanently disabled on a VIP by the system due to excessive errors. When MTP3 offload has been permanently disabled on a VIP (by the system) all links on that VIP will be in the sys-shutdown state.

To monitor all linksets and all links in the linksets, issue the **show cs7 linkset** command. Refer to the “Command Reference” section of this document for descriptions of the show commands.

```
Router# show cs7 linkset
lsn=to_2651_1      apc=0.3.3      state=UNAVAIL
  SLC  Interface      Service  PeerState  Inhib
  *00  10.10.10.5 5000 5000      shutdown OutOfService  -----

lsn=to_helium      apc=0.2.2      state=avail
  SLC  Interface      Service  PeerState  Inhib
  00   Serial4/0/0      avail    -----    -----
  01   Serial4/0/1      avail    -----    -----
  02   Serial4/0/2      avail    -----    -----
  03   Serial4/0/3      avail    -----    -----
  04   Serial4/0/4      avail    -----    -----
  *05   Serial4/0/5      UNAVAIL  -----    loc
  *06   Serial4/0/6      UNAVAIL  -----    rem
  07   Serial4/0/7      avail    -----    -----
  08   Serial4/1/0:0      avail    -----    -----
  09   Serial4/1/1:0      avail    -----    -----
  10   Serial4/1/2:0      avail    -----    -----
  11   Serial4/1/3:0      avail    -----    -----
  12   Serial4/1/4:0      avail    -----    -----
  13   Serial4/1/5:0      avail    -----    -----
  14   Serial4/1/6:0      avail    -----    -----
  15   Serial4/1/7:0      avail    -----    -----

lsn=to_mgts_15     apc=1.1.1      state=UNAVAIL
  SLC  Interface      Service  PeerState  Inhib
  *00   Serial1/1/0      FAILED   -----    -----.
```

## Monitoring MTP2 Links/Interfaces

### Why is this task important?

Monitoring interfaces is useful for determining the status of MTP2/SCTP links, for providing statistical information about the performance of the interface.

### Under what circumstances should this task be performed?

If an MTP2 link goes down.

If performance on an MTP2 link is degraded.

### What incidents or system messages should prompt the user to monitor interfaces?

### Should this task be part of a regular maintenance process that the user should do at regular intervals? If so, how frequently?

Regular monitoring is not necessary for link failure problems because system messages will indicate link failure conditions. Regular monitoring to find performance problems may be necessary.

### What commands does the user issue?

```
show interface serial
show cs7 mtp2 state serial
show cs7 mtp2 congestion serial
show cs7 mtp2 statistics serial
```

The output of the **show interface serial** command can reveal possible Link Down problems. The fields to examine are indicated with arrows in the sample output below:

```
Router# show int ser 5/0/0:0
→ Serial5/0/0:0 is up, line protocol is up
  Hardware is Multichannel T1
  MTU 290 bytes, BW 64 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
→ Encapsulation SS7 MTP2, crc 16, CRC 16, Data non-inverted
  Keepalive set (10 sec)
  Last input 00:00:45, output 00:00:45, output hang never
  Last clearing of "show interface" counters 00:05:39
  Queueing strategy:fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
    139 packets input, 1270 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    119 packets output, 856 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    1 carrier transitions no alarm present
  Timeslot(s) Used:1, subrate:64Kb/s, transmit delay is 0 flags
  Transmit queue length 43
```

The field “line protocol” should display “line protocol is up” rather than down.

The field “Encapsulation” should display “SS7 MTP2” rather than (for example) HDLC.

The output of the **show cs7 mtp2 state serial** command indicates the status of the MTP2 state machine. The fields to examine are indicated with arrows in the sample output below:

```
Router# show cs7 mtp2 state ser 5/0/0:0
CS7 MTP2 states for interface Serial5/0/0:0
Protocol version for interface Serial5/0/0:0 is ITU-T Q.703 (1996) (White Book)

→ Link State Control (LSC) = In Service
  Initial Alignment Control (IAC) = Idle
→ Transmission Control (TXC) = In Service
→ Reception Control (RC) = In Service
  Signal Unit Error Rate Monitor (SUERM) = Monitoring
  Alignment Unit Error Rate Monitor (AERM) = Idle
  Congestion (CONG) = Idle

→ Layer3 link status = Started
  Layer3 congestion status = Abate
```

The field “Link State Control (LSC)” should display “In Service.”

The field “Transmission Control (TXC)” should display “In Service.”

The field “Reception Control (RC)” should display “In Service.”

The field “Layer3 link status” should display “Started.”

The output of the **show interface serial** command can reveal possible performance problems. The fields to examine are indicated with arrows in the sample output below:

```
Router# show int ser 5/0/0:0
→ Serial5/0/0:0 is up, line protocol is up
  Hardware is Multichannel T1
  MTU 290 bytes, BW 64 Kbit, DLY 20000 usec,
→   reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation SS7 MTP2, crc 16, CRC 16, Data non-inverted
  Keepalive set (10 sec)
  Last input 00:00:45, output 00:00:45, output hang never
  Last clearing of "show interface" counters 00:05:39
  Queueing strategy:fifo
→   Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
→   139 packets input, 1270 bytes, 0 no buffer
  Received 0 broadcasts, 0 runs, 0 giants, 0 throttles
→   0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
  119 packets output, 856 bytes, 0 underruns
  0 output errors, 0 collisions, 0 interface resets
  0 output buffer failures, 0 output buffers swapped out
  1 carrier transitions no alarm present
  Timeslot(s) Used:1, subrate:64Kb/s, transmit delay is 0 flags
  Transmit queue length 43
```

The field “line protocol” should display “line protocol is up.”

The field “reliability” displays a fraction in the range 255/255 to x/255 which indicates the percentage of reliability. The fraction should represent 100%.

The field “txload” displays a fraction in the range 1/255 to x/255 which indicates the percentage of transmit load on the link.

- Under 40% txload is optimal.
- 40%-80% txload indicates a heavily loaded link.
- Over 80%txload indicates a heavily congested link.

The field “rxload” displays a fraction in the range 1/255 to x/255 which indicates the percentage of receive load on the link.

- Under 40% rxload is optimal.
- 40%-80% rxload indicates a heavily loaded link.
- Over 80% rxload indicates a heavily congested link.

In the field “Output queue 0/40, 0 drops; input queue 0/75, 0 drops”:

- Output drops indicate local txCongestion or rxCongestion at remote.
- Input drops indicate local rxCongestion or txCongestion at remote.

The field “<number> no buffer” indicates packet drops because of buffer shortage. The number should be 0.

The field “<number> input errors, <number> CRC, <number> frame, <number> overrun, <number> ignored, <number> abort” indicates problems with interface receive. The numbers should be 0.

In the field “<number> output errors, <number> collisions, <number> interface resets” all numbers should be 0.

The field “<number> output buffer failures, <number> output buffers swapped out” indicates problems with interface transmit.

The output of the **show cs7 mtp2 congestion serial** command indicates congestion levels. The fields to examine are indicated with arrows in the sample output below:

```
Router# show cs7 mtp2 congestion ser 5/0/0:0
CS7 MTP2 congestion status for interface Serial5/0/0:0
Protocol version for interface Serial5/0/0:0 is ITU-T Q.703 (1996) (White Book)

→ Layer3 congestion status      = Abate
→ CongestionRxInd               = Abate
→ CongestionTxInd               = Abate (Level0)

CongestionTxOnset Level1       = 250 ( 50% of xmitQ maxDepth)
CongestionTxOnset Level2       = 350 ( 70% of xmitQ maxDepth)
CongestionTxOnset Level3       = 450 ( 90% of xmitQ maxDepth)
CongestionTxOnset Level4       = 500 (100% of xmitQ maxDepth)

→ XmitQ depth (max-used)        = 15
→ XmitQ depth (max-allowed)     = 500
```

The field “Layer3 congestion status” should display “Abate” (MTP3 not congested) rather than “Onset” (MTP3 congested).

The fields “CongestionRxInd” and “CongestionTxInd” indicate current congestion levels.

The field “XmitQ depth (max-used)” indicates the maximum number of packets ever waiting on the queue and indicate how congested router might have been.

The output of the **show cs7 mtp2 statistics serial** command indicate congestion levels. The fields to examine are indicated with arrows in the sample output below:

```
Router# show cs7 mtp2 statistics ser 5/0/0:0
CS7 MTP2 Statistics for interface Serial5/0/0:0
Protocol version for interface Serial5/0/0:0 is ITU-T Q.703 (1996) (White Book)

OMtimeINSV (secs)              = 756
OMtimeNotINSV (secs)           = 49

OMIACAlignAttemptCount         = 10
OMIACAlignFailCount            = 4
OMIACAlignCompleteCount        = 2

OMMSU_L3_XMIT_Count            = 137
OMMSU_XMIT_Count               = 137
OMMSUBytesTransmitted          = 1429
→ OMMSU_RE_XMIT_Count          = 0
→ OMMSUBytesRetransmitted      = 0

OMMSU_RCV_Count                = 157
OMMSUBytesReceived             = 1625

OMFISU_XMIT_Count              = 159
OMFISU_RCV_Count               = 307

OMLSSU_XMIT_Count              = 24
OMLSSU_XMIT_SINCount           = 0
OMLSSU_XMIT_SIECount           = 2
OMLSSU_XMIT_SIOCount           = 10
OMLSSU_XMIT_SIOSCount          = 12
OMLSSU_XMIT_SIPOCount          = 0
OMLSSU_XMIT_SIBCount           = 0

OMLSSU_RCV_Count               = 8
```

```

OMLSSU_RCV_SINCount      = 0
OMLSSU_RCV_SIECount      = 4
OMLSSU_RCV_SIOCount      = 4
OMLSSU_RCV_SIOSCount     = 0
OMLSSU_RCV_SIPOCount     = 0
OMLSSU_RCV_SIBCount      = 0

OMT1_TMO_Count           = 0
OMT2_TMO_Count           = 4
OMT3_TMO_Count           = 0
OMT4_TMO_Count           = 2
OMT5_TMO_Count           = 0
OMT6_TMO_Count           = 0
OMT7_TMO_Count           = 0
OMAERMCCount             = 2
OMAERMFailCount          = 0
OMSUERMCCount            = 2
OMSUERMFailCount         = 0

→ OMCongestionRxCount    = 0
→ OMCongestionTxCount    = 0
→ OMRemote_Congestion_Cnt = 0

OMxmitQ_maxcount         = 15

OMNACK_XMIT_Count        = 0
OMNACK_RCV_Count        = 0

→ OMunreasonableFSN_rcvd = 0      (error)
→ OMunreasonableBSN_rcvd = 0      (error)
→ OMabnormalBSN_rcvd     = 0      (error)
→ OMabnormalFIB_rcvd     = 0      (error)

OMFISU_notAccepted       = 4      (packets dropped)
OMMSU_notAccepted        = 0      (packets dropped)
OMFISU_congestionDrops   = 0      (packets dropped)
→ OMMSU_congestionDrops  = 0      (packets dropped)
OMMSU_too_long           = 0      (packets dropped)
→ OMMSU_unexpectedFSN    = 0      (packets dropped)
→ OMMSU_discarded        = 0      (packets dropped)

```

The fields “OMMSU\_RE\_XMIT\_Count” and “OMMSUBytesRetransmitted” indicate retransmission on the link. Retransmission is an indication of probable congestion.

The fields “OMCongestionRxCount”, “OMCongestionTxCount”, “OMRemote\_Congestion\_C indicate congestion counts on the local or remote device.

The fields “OMunreasonableFSN\_rcvd”, “OMunreasonableBSN\_rcvd”, “OMabnormalBSN\_rcvd” and “OMabnormalFIB\_rcvd” indicate protocol errors.

The field “OMMSU\_congestionDrops” indicates the number of MSU packets dropped due to rxCongestion.

The field “OMMSU\_unexpectedFSN” indicates packets dropped due to unexpected FSN received.

The field “OMMSU\_discarded” indicates total MSU packets dropped, probably due to congestion.

## Monitoring M2PA Links/Interfaces



### Note

M2PA/SCTP links run over any interface that supports IP (serial, ethernet, fast ethernet, token ring, etc. The example used in this section is for fast ethernet.

### Why is this task important?

Monitoring interfaces is useful for determining the status of M2PA/SCTP links and for providing statistical information about the performance of the interface.

### Under what circumstances should this task be performed?

If the M2PA/SCTP links fail or if the M2PA/SCTP link performance is degraded.

### What incidents or system messages should prompt the user to issue the monitor M2PA Links/Interfaces?

### Should this task be part of a regular monitoring process that the user should do at regular intervals? If so, how frequently?

Regular monitoring is not necessary for link failure problems because system messages will indicate link failure conditions. Regular monitoring to identify performance problems may be necessary.

### What commands does the user issue?

```
show interface interface-type
show cs7 m2pa state
```

The following output of the show interface ethernet command reveals possible link down problems:

```
Router# show int faste0/1
FastEthernet0/1 is up, line protocol is up
  Hardware is AmdFE, address is 0003.e348.5f41 (bia 0003.e348.5f41)
  Internet address is 50.50.50.1/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, 100BaseTX/FX
  ARP type:ARPA, ARP Timeout 04:00:00
  Last input 00:00:16, output 00:00:03, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy:fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
    75799 packets input, 11049547 bytes
    Received 5616 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog
    0 input packets with dribble condition detected
  155409 packets output, 15498764 bytes, 0 underruns(0/0/0)
    0 output errors, 0 collisions, 1 interface resets
    0 babbles, 0 late collision, 614 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

The field “line protocol” should display “line protocol is up.”

The field “Internet address” should display a valid IP address.

```
CS7 M2PA states for Peer (50.50.50.2 :9000)
M2PA Peer State           = InService
SCTP Peer State           =SCTP_ESTABLISHED
```

```
T1 aligned/ready          = 5000 ms
T6 remote cong            = 3000 ms
```

```
Local Processor Outage    = FALSE
Remote Processor Outage   = FALSE
InService LSSU Recv'd    = TRUE
Transport Handle          = 0
```

The field “M2PA Peer State” should display “InService.”

The field “SCTP Peer State” should display “SCTP\_ESTABLISHED.”

The following output of the **show interface ethernet** command reveals possible performance problems:

```
Router# show int faste0/1
FastEthernet0/1 is up, line protocol is up
  Hardware is AmdFE, address is 0003.e348.5f41 (bia 0003.e348.5f41)
  Internet address is 50.50.50.1/24
  MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s, 100BaseTX/FX
  ARP type:ARPA, ARP Timeout 04:00:00
  Last input 00:00:10, output 00:00:09, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy:fifo
  Output queue 0/40, 20 drops; input queue 0/75, 25 drops
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
    75895 packets input, 11064304 bytes
    Received 5641 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 watchdog
    0 input packets with dribble condition detected
    155709 packets output, 15529225 bytes, 0 underruns(0/0/0)
    0 output errors, 0 collisions, 1 interface resets
    0 babbles, 0 late collision, 0 deferred
    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

The field “line protocol” should display “line protocol is up.”

The field “Internet address” should display a valid IP address.

The field “reliability” displays a fraction in the range 255/255 to x/255 which indicates the percentage of reliability. The fraction should represent 100%.

The field “txload” displays a fraction in the range 1/255 to x/255 which indicates the percentage of transmit load on the link.

- Under 40% txload is optimal.
- 40%-80% txload indicates a heavily loaded link.
- Over 80%txload indicates a heavily congested link.

The field “rxload” displays a fraction in the range 1/255 to x/255 which indicates the percentage of receive load on the link.



- Under 40% rxload is optimal.
- 40%-80% rxload indicates a heavily loaded link.
- Over 80% rxload indicates a heavily congested link.

In the field “Output queue 0/40, 0 drops; input queue 0/75, 0 drops”:

- Output drops indicate local txCongestion or rxCongestion at remote.
- Input drops indicate local rxCongestion or txCongestion at remote.

The field “<number> no buffer” indicates packet drops because of buffer shortage. The number should be 0.

The field “<number> input errors, <number> CRC, <number> frame, <number> overrun, <number> ignored, <number> abort” indicates problems with interface receive. The numbers should be 0.

In the field “<number> output errors, <number> collisions, <number> interface resets” all numbers should be 0.

The field “number output buffer failures, number output buffers swapped out” indicates problems with interface transmit.

```
Router# show cs7 m2pa stats to_duck
CS7 M2PA Peer Statistics for (50.50.50.2 :9000)
M2PA Peer State           = InService
SCTP Peer State           = SCTP_ESTABLISHED
MSU_XMIT_Count             = 98658
MSU_RCV_Count              = 98913
MSU_XMIT_Fail_Count        = 0
MSU_XMIT_Drop_Count        = 0
LSSU_XMIT_Count            = 2
LSSU_XMIT_Fail_Count       = 0
LSSU_XMIT_SIISCount        = 2
LSSU_XMIT_SIPOCount        = 0
LSSU_XMIT_SIPOECount       = 0
LSSU_XMIT_SIBCount         = 0
LSSU_XMIT_SIBECCount       = 0
LSSU_RCV_Count             = 2
LSSU_RCV_SIISCount         = 2
LSSU_RCV_SIPOCount         = 0
LSSU_RCV_SIPOECount        = 0
LSSU_RCV_SIBCount          = 0
LSSU_RCV_SIBECCount        = 0
LSSU_RCV_InvalidCount      = 0
BytesTransmitted           = 3337163
BytesReceived              = 3340840
Remote_PO_Count            = 0
Remote_Congestion_Count    = 0
CongestionCount            = 0
Level 1 CongestionCount    = 1
Level 2 CongestionCount    = 0
Level 3 CongestionCount    = 0
Level 4 CongestionCount    = 0
T1_TMO_Count              = 0
T6_TMO_Count               = 0
```

The field “Level x CongestionCount” displays the number of times congestion level x has occurred.

```
Router# show ip sctp stat

** SCTP Overall Statistics **
Total Chunks Sent:         50141
Total Chunks Rcvd:         47738
Received Ordered Data Chunks: 10877
```

```

Received UnOrdered Data Chunks:0
Total Data Chunks Sent:      10877
Total Data Chunks Rcvd:      10877
Total Data Bytes Sent:        184924
Total Data Bytes Rcvd:        184924
Total Data Chunks Discarded:  0
Total Data Chunks Retrans:    0

Total SCTP Datagrams Sent:    41099
Total SCTP Datagrams Rcvd:    41099
Total ULP Datagrams Sent:     10877
Total ULP Datagrams Ready:    10877
Total ULP Datagrams Rcvd:     10877

```

The field “Total Data Chunks Retrans” displays the number of retransmissions that have occurred.

The field “Total Chunks Discarded” displays the number of packets that have been discarded due to duplicates.

## Monitoring GTT Measurements

You can display CS7 GTT measurements based on system, map, counters, selector, application-group, or line card.

To display a report for each PC/SSN combination, including the number of times it was used by a successful translation, use the following command in privileged EXEC mode:

| Command                                      | Purpose                                        |
|----------------------------------------------|------------------------------------------------|
| Router# <b>show cs7 gtt measurements map</b> | Displays a report for each PC/SSN combination. |

To display measurements kept on a Selector basis, use the following command in privileged EXEC mode:

| Command                                                               | Purpose                              |
|-----------------------------------------------------------------------|--------------------------------------|
| Router# <b>show cs7 gtt measurements selector</b> [ <i>selector</i> ] | Displays a report for each selector. |

To display measurements for the system, use the following command in privileged EXEC mode:

| Command                                         | Purpose                   |
|-------------------------------------------------|---------------------------|
| Router# <b>show cs7 gtt measurements systot</b> | Displays a system report. |

To display measurements for the application group, use the following command in privileged EXEC mode:

| Command                                                                | Purpose                                                      |
|------------------------------------------------------------------------|--------------------------------------------------------------|
| Router# <b>show cs7 gtt measurements application-group</b> <i>name</i> | Displays GTT measurements kept on a application group basis. |

To display measurements for the line card, (available only if MTP3 offload is enabled and only on the Cisco 7500 platform) use the following command in privileged EXEC mode:

| Command                                                                     | Purpose                                                                                                                                              |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router# <b>show cs7 gtt measurements line-card</b> [ <i>line-card-num</i> ] | Displays GTT measurements kept on a line card basis. If line-card-num is not specified, all line-card measurements for all line cards are displayed. |

To reset all GTT measurements to 0, use the following command in privileged EXEC mode:

| Command                            | Purpose                           |
|------------------------------------|-----------------------------------|
| Router# <b>clear cs7 gtt -meas</b> | Resets all GTT measurements to 0. |

## Monitoring M3UA or SUA

This section includes information about the following monitoring tasks:

- Monitoring M3UA, page 311
- Monitoring SUA, page 311
- Monitoring Point Code Status, page 312
- Monitoring AS, page 312
- Monitoring ASP, page 313
- Monitoring SGMP and Mated SG Pairs, page 316

### Monitoring M3UA

The following is sample output from the **show cs7 m3ua** command.

The “State” field should be “Active” and the number of active SUA and M3UA peers should math the number of ASPs available.

```
Router# show cs7 m3ua
Sigtran M3UA RFC number: 3332

M3UA Local port: 2905 State: active          SCTP instance handle: 5
Local ip address:                          172.18.48.39
Number of active M3UA peers:                0
Max number of inbound streams allowed:      17
Local receive window:                       64000
Max init retransmissions:                   8
Max init timeout:                           1000 ms
Unordered priority:                         equal
SCTP defaults for new associations
  Transmit queue depth: 1000                Cumulative sack timeout: 200 ms
  Assoc retransmissions: 10                 Path retransmissions: 4
  Minimum RTO: 1000 ms                     Maximum RTO: 1000 ms
  Bundle status: on                         Bundle timeout: 5 ms
  Keep alive status: true                   Keep alive timeout: 30000 ms
```

### Monitoring SUA

The following is sample output from the **show cs7 sua** command:

```
Router# show cs7 sua
```

Sigtran SUA draft version: 14

```

SUA Local port: 14001 State: active          Sctp instance handle: 5
Local ip address:                          172.18.48.39
Number of active SUA peers:                0
Max number of inbound streams allowed:     17
Local receive window:                      64000
Max init retransmissions:                  8
Max init timeout:                          1000 ms
Unordered priority:                        equal
SCTP defaults for new associations
  Transmit queue depth: 1000                Cumulative sack timeout: 200 ms
  Assoc retransmissions: 10                 Path retransmissions: 4
  Minimum RTO: 1000 ms                     Maximum RTO: 1000 ms
  Bundle status: on                         Bundle timeout: 5 ms
  Keep alive status: true                   Keep alive timeout: 30000 ms

```

## Monitoring Point Code Status

The **show cs7 point-codes** command displays the type and status of all point codes configured as a destination point code in an M3UA or SUA routing key (default).

The **event-history** keyword displays the point code status history (default). The **ssn** keyword displays the status of all point codes configured as a DPC in an SUA routing key that also contains a valid SSN.

The following is sample output from the **show cs7 point-code** command

Router#**show cs7 point-codes**

| CS7 Point Code | Type  | Status       |
|----------------|-------|--------------|
| 1.1.2          | local | active       |
| 2.1.1          | AS    | SUA inactive |

Router#**show cs7 point-code ssn**

| SUA Point Code | SSN | Status       |
|----------------|-----|--------------|
| 5.6.7          | 3   | SUA inactive |

## Monitoring AS, ASP, Mated-SG

### Monitoring AS

The **show cs7 as** command includes keywords to filter and format the output.

- The filter options are **active**, **all** ASes (the default), **m3ua**, **name asname**, **operational**, and **sua**.
- The GTT subfilters are **include-gtt**, **exclude-gtt**, or **only-gtt**
- The format options are **brief** (the default format), **details**, **event-history**, and **statistics**.

The following is output from the **show cs7 as** command entered with no format or filter keywords. The command uses the default filter (**all**) and the default format (**brief**):

Router# **show cs7 as**

| AS Name | State | Routing Context |
|---------|-------|-----------------|
| asp1    | down  | 1               |
| asp2    | down  | 2               |

| AS Name | State | Routing Context | Routing Key Dpc | Si | Opc | Cic Ssn Min | Cic Max |
|---------|-------|-----------------|-----------------|----|-----|-------------|---------|
| as1     | down  | 111             | 2.1.1           |    |     |             |         |

The following is output from the **show cs7 as** command entered with the **name asname** filter keyword and the **detail** format keyword:

```
Router#show cs7 as name owl5 detail
AS name: as1                      State: down                      Type: SUA
RoutContext: 111                  Traffic mode: loadshare roundrobin
Mate AS state: unknown            Recovery tmout: 2000 ms      Recovery queue depth: 0
QOS Class: 0                      Burst recovery tmout: 4000 ms
Routing Key:
  Dest PC: 2.1.1                  Origin PC: n/a              Origin PC mask: n/a
  SI: n/a                        CIC min: n/a                CIC max: n/a
  SSN: n/a                       GTT: n/a
ASP Name      AS Name      State      Type      Rmt Port Remote IP Addr  SCTP Assoc
asp2          owl5        down       SUA        9022    172.18.57.136
asp1          owl5        down       SUA        9012    172.18.57.136
cuba         owl5        down       SUA        14101   172.18.57.90
```

Traffic-mode states are: override, loadshare bindings, loadshare roundrobin, broadcast, or undefined.

AS and Mate-AS states are: shutdown, down, down-rerouting, inactive, inactive-rerouting, active, or pending.

## Monitoring ASP

The following is output from the **show cs7 asp sua** command in the default brief format:

| ASP Name | AS Name | State | Type | Rmt Port | Remote IP Addr | SCTP |
|----------|---------|-------|------|----------|----------------|------|
| asp1     | asp1    | down  | SUA  | 9012     | 172.18.57.136  |      |
| asp1     | as1     | down  | SUA  | 9012     | 172.18.57.136  |      |
| asp2     | asp2    | down  | SUA  | 9022     | 172.18.57.136  |      |
| asp2     | as1     | down  | SUA  | 9022     | 172.18.57.136  |      |
| cuba     | as1     | down  | SUA  | 14101    | 172.18.57.90   |      |

ASP States are: shutdown, blocked, down, inactive, active, or active/congested.

If the ASP is down or shutdown, then the remote port and remote IP address display the configured values instead of the actual values.

The following is output from the **show cs7 asp** command in the detail format:

```
Router#show cs7 asp detail
ASP name: asp1                      Type: SUA
Availability: enabled                ASP id: n/a
SCTP association state: closed        Association id: n/a
AS name: asp1
  ASP state: down                    Traf mode: n/a              Active Time: Not Active
AS name: as1
  ASP state: down                    Traf mode: n/a              Active Time: Not Active
Configured remote port: 9012          Actual remote port: n/a
Configured remote ip addresses: 172.18.57.136
Actual remote ip addresses:          n/a
Local port: 14001
ASP protocol class capability: class 0, class 1
```

```

ASP interworking with SS7 networks capability: ASP
Local receive window: 64000          Cumulative sack timeout: 200 ms
Assoc retrans: 10                    Path retrans: 4
Max init retrans: 8                  Max init RTO: 1000 ms
Minimum RTO: 1000 ms                Maximum RTO: 1000 ms
Bundle status: on                    Bundle timeout: 5 ms
Keep alive status: true              Keep alive timeout: 30000 ms
Unordered priority: equal            Transmit queue depth: 20000
Unordered priority: equal            Cleanup timeout: 0 ms
Link status T1 timeout: 0 ms          Remote congest T6 timeout: 0 ms
SCTP congestion level: 0              SCON congestion level: 0
Transmit queue depth: 1000
Thresholds for congestion on transmit queue
  Level 1 onset: 500                 Level 1 abate: 300
  Level 2 onset: 700                 Level 2 abate: 500
  Level 3 onset: 900                 Level 3 abate: 700
  Level 4 onset: 1000                Level 4 abate: 900
QOS Class: 0                         IP TOS: 0x0
Match Type: None

```

The following is sample output from the **show cs7 asp** command in the **statistics** format:

```

Router# show cs7 asp statistics
ASP name: asp1                      Type: SUA
  Active Time: Not Active
    Data Packets/MSU Stats
      Inbound Packets Rcvd: 0          Inbound Octets Rcvd: 0
      Inbound Packets Sent: 0          Inbound Octets Sent: 0
      Outbound Packets Rcvd: 0         Outbound Octets Rcvd: 0
      Outbound Packets Sent: 0         Outbound Octets Sent: 0
      Inbound CLDTs Rcvd: 0            Inbound CLDTs Sent: 0
      Outbound CLDTs Rcvd: 0           Outbound CLDTs Sent: 0
      Inbound CLDRs Rcvd: 0            Inbound CLDRs Sent: 0
      Outbound CLDRs Rcvd: 0           Outbound CLDRs Sent: 0

```

The following is sample output from the **show cs7 asp** command with the **statistics** and **detail** keywords:

```

Router# show cs7 asp statistics detail
ASP name: asp1                      Type: SUA
  Active Time: Not Active
    Data Packets/MSU Stats
      Inbound Packets Rcvd: 0          Inbound Octets Rcvd: 0
      Inbound Packets Sent: 0          Inbound Octets Sent: 0
      Outbound Packets Rcvd: 0         Outbound Octets Rcvd: 0
      Outbound Packets Sent: 0         Outbound Octets Sent: 0
      Inbound CLDTs Rcvd: 0            Inbound CLDTs Sent: 0
      Outbound CLDTs Rcvd: 0           Outbound CLDTs Sent: 0
      Inbound CLDRs Rcvd: 0            Inbound CLDRs Sent: 0
      Outbound CLDRs Rcvd: 0           Outbound CLDRs Sent: 0
    ASP State Maintenance (ASPSM) Stats
      ASPUP Rcvd: 0                   ASPUP ACK Sent: 0
      ASPDN Rcvd: 0                   ASPDN ACK Sent: 0
      BEAT Rcvd: 0                    BEAT ACK Sent: 0
    ASP Traffic Maintenance (ASPTM) Stats
      ASPAC Rcvd: 0                   ASPAC ACK Sent: 0
      SPIA Rcvd: 0                    SPIA ACK Sent: 0
      ASPAC NRC Rcvd: 0               SPIA NRC Rcvd: 0
      ASPAC Over-ride: 0
      ASPAC Load-share: 0
      ASPAC Broadcast: 0
      Active Routing Keys: 0
    MTP3 Stats

```

```

MSUs Sent To MTP3:      0          MSUs Dropped (Cong):    0
MSUs Buffered:          0          MSUs Dropped (Err):    0
    Buffer Allocation Stats
Buffer Alloc Failures:  0          Buffer Growth Failures: 0
MSUs Sent To MTP3:      0          MSUs Dropped By MTP3:  0
    XUA Error Messages Sent Stats
ERR Invalid Version:    0          ERR Unsupported Class:  0
ERR Unsupported Type:    0          ERR Traffic Mode:       0
ERR Unexpected Msg:      0          ERR Protocol Error:      0
ERR Invalid Stream ID:  0          ERR Refused, Mgmt Block:0
ERR ASP ID Required:    0          ERR Invalid ASP ID:      0
ERR Invalid Parm Value:  0          ERR Parm Field Error:    0
ERR Unexpected Parm:    0          ERR Dest Status Unknown:0
ERR Inv Network App:    0          ERR Missing Parm:        0
ERR RK Change Refused:  0          ERR Inv Routing Context:0
ERR No Cfg As For Asp:  0          ERR Subsystem Status   :0
    XUA Error Messages Received Stats
ERR Invalid Version:    0          ERR Unsupported Class:  0
ERR Unsupported Type:    0          ERR Traffic Mode:       0
ERR Unexpected Msg:      0          ERR Protocol Error:      0
ERR Invalid Stream ID:  0          ERR Refused, Mgmt Block:0
ERR ASP ID Required:    0          ERR Invalid ASP ID:      0
ERR Invalid Parm Value:  0          ERR Parm Field Error:    0
ERR Unexpected Parm:    0          ERR Dest Status Unknown:0
ERR Inv Network App:    0          ERR Missing Parm:        0
ERR RK Change Refused:  0          ERR Inv Routing Context:0
ERR No Cfg As For Asp:  0          ERR Subsystem Status   :0
    XUA Notify Messages Sent Stats
NOTIFY-AS Inactive:     0          NOTIFY-AS Active:       0
NOTIFY-AS Pending:      0          NOTIFY-Insuf ASP:       0
NOTIFY-Alt ASP Active:  0          NOTIFY-ASP Failure:     0
    Outbound SSNM From SS7 Stats
TFAs Rcvd:              0          TFPs Rcvd:              0
TFRs Rcvd:              0          UPUs Rcvd:              0
Cong 0 TFCs Rcvd:       0          Cong 1 TFCs Rcvd:       0
Cong 2 TFCs Rcvd:       0          Cong 3 TFCs Rcvd:       0
    Outbound SSNM to ASP Stats
DUNAs Sent:             0          DAVAs Sent:             0
DRSTs Sent:             0          DUPUs Sent:             0
Cong 0 SCONs Sent:      0          Cong 1 SCONs Sent:      0
Cong 2 SCONs Sent:      0          Cong 3 SCONs Sent:      0
Cong 4 SCONs Sent:      0          Cong 5 SCONs Sent:      0
Cong 6 SCONs Sent:      0          Cong 7 SCONs Sent:      0
    Inbound SSNM to SS7 Stats
TFAs Sent:              0          TFPs Sent:              0
TFRs Sent:              0          UPUs Sent:              0
Cong 0 TFCs Sent:       0          Cong 1 TFCs Sent:       0
Cong 2 TFCs Sent:       0          Cong 3 TFCs Sent:       0
    Inbound SSNM from ASP Stats
SCON No Level Rcvd:     0          DAUDs Rcvd:             0
DUNAs Rcvd:             0          DAVAs Rcvd:             0
Cong 0 SCONs Rcvd:      0          Cong 1 SCONs Rcvd:      0
Cong 2 SCONs Rcvd:      0          Cong 3 SCONs Rcvd:      0
Cong 4 SCONs Rcvd:      0          Cong 5 SCONs Rcvd:      0
Cong 6 SCONs Rcvd:      0          Cong 7 SCONs Rcvd:      0
    Congestion Stats
Pkts Dropped At Lvl 1:  0          Pkts Dropped At Lvl 2:  0
Pkts Dropped At Lvl 3:  0          Level 2 Congestion Cnt: 0
Level 1 Congestion Cnt: 0          Level 4 Congestion Cnt: 0
Level 3 Congestion Cnt: 0          T1 Timeouts:            0
T1 Timeouts:            0          T6 Timeouts:            0

```

Options for ASP state include: Down/Inactive/Active/Standby

Options for ASP availability include: Shutdown/Enabled

## Monitoring SGMP and Mated SG Pairs

The following is sample output from the **show cs7 sgmp** command:

```
Router#show cs7 sgmp
SGMP Local port: 14002          State: active          SCTP instance handle: 3
Local ip address:                172.18.48.39
Number of active SGMP peers:    0
Max number of inbound streams allowed: 17
Local receive window:           64000
Max init retransmissions:       8
Max init timeout:               1000 ms
Unordered priority:             equal
SCTP defaults for new associations
  Transmit queue depth: 20000          Cumulative sack timeout: 200 ms
  Assoc retransmissions: 10            Path retransmissions: 4
  Minimum RTO: 1000 ms                Maximum RTO: 1000 ms
  Bundle status: on                   Bundle timeout: 5 ms
  Keep alive status: true              Keep alive timeout: 30000 ms
```

The following is sample output from the **show cs7 mated-sg** command in the default brief format:

Options for the SG Mate state include: Inactive/Active/Shutdown

If the Mate is shutdown, then the remote port and remote IP address display the configured values instead of the actual values.

```
Router# show cs7 mated-sg
```

| Mate Name | State  | Passive | Remote Port | Remote IP Addr | SCTP Assoc |
|-----------|--------|---------|-------------|----------------|------------|
| bermuda   | active | no      | 14002       | 172.18.48.15   | 0          |

The following is sample output from the **show cs7 mated-sg** command with the **detail** keyword:

Options for SG Mate state include: Inactive/Active/Shutdown

```
Router# show cs7 mated-sg detail
Mated SG name: bermuda          Type: SGMP
State: active
SCTP association state: established Association id: 5
Configured remote port: 14002    Actual remote port: 14002
Configured remote ip addresses: 172.18.48.15
Actual remote ip addresses: 172.18.48.15 State: active (effective prim)
Passive: yes                     Nonpassive retry timeout: 30000 ms
Local receive window: 64000      Cumulative sack timeout: 200 ms
Assoc retrans: 10                Path retrans: 4
Max init retrans: 8              Max init RTO: 1000 ms
Minimum RTO: 1000 ms             Maximum RTO: 1000 ms
Bundle status: on                 Bundle timeout: 5 ms
Keep alive status: true           Keep alive timeout: 30000 ms
Unordered priority: equal         Cleanup timeout: 0 ms
Link status T1 timeout: 0 ms      Remote congest T6 timeout: 0 ms
SCTP congestion level: 0          SCON congestion level: 0
Transmit queue depth: 20000       Burst recovery timeout: 2002 ms
Thresholds for congestion on transmit queue
  Level 1 onset: 10000            Level 1 abate: 6000
  Level 2 onset: 14000            Level 2 abate: 10000
  Level 3 onset: 18000            Level 3 abate: 14000
  Level 4 onset: 20000            Level 4 abate: 18000
```



The following is sample output from the **show cs7 mated-sg** command with the **statistics** keyword:

```
Router# show cs7 mated-sg statistics
Mated-Sg name: bermuda                               Type: SGMP
Active Time: 00:01:23
  Data Packets/MSU Stats
    Inbound Packets Rcvd: 0                          Inbound Octets Rcvd: 0
    Inbound Packets Sent: 0                          Inbound Octets Sent: 0
    Outbound Packets Sent: 0                         Outbound Octets Sent: 0
  Buffer Allocation Stats
    Buffer Alloc Failures: 0                          Buffer Growth Failures: 0
    Buffer Reused: 0
  Congestion Stats
    Pkts Dropped At Pri 0: 0                         Pkts Dropped At Pri 1: 0
    Pkts Dropped At Pri 2: 0
    Level 1 Congestion Cnt: 0                       Level 2 Congestion Cnt: 0
    Level 3 Congestion Cnt: 0                       Level 4 Congestion Cnt: 0
    T1 Timeouts: 0                                  T6 Timeouts: 0
```

## Monitoring AS Route Table

The following is output from the **show cs7 asroute** command:

```
Router# show cs7 asroute

AsRoute Name      Routing      Routing Key
-----
aaa               111222      8.7.5      M3UA inactive
vp1               7777        7.7.7      shutdown
```

The following is sample output from the **show cs7 asroute** command (in the default brief format):

```
Router# show cs7 asroute name scp2 detail

AS Route Name: scp2                               State: M3UA restricted      Type: M3UA
Routing context: 6666                             Routing key DPC: 6.7.8
AS Name: kure2.as1                                AS Route State: unavail    Priority: 2
Mated SG Name: bermuda                            Mated SG State: avail      Priority: 4
```

## Monitoring Routes

### Why is this task important?

Monitoring routes is important because it reveals the status of all the routes in the network, and thus the ability of the network to transport messages efficiently.

### Under what circumstances should routes be monitored?

The status of routes should be monitored whenever the performance of the network is noticeably degraded. This may reveal congestion on specific routes, for example, which may indicate a need to deploy more links. In conjunction with other system messages it may reveal failures in various network components.

### What incidents or system messages should prompt the user to issue the **show cs7 route** command?

Whenever a destination accessibility status change message such as the following appears on the console:

```
00:05:51:%CS7MTP3-5-DESTSTATUS:Destination 10.5.1 is inaccessible
```

Whenever a destination is reported to be inaccessible or restricted, the **show cs7 route detailed** command will reveal what caused the destination to enter that state.

**Should this task be part of a regular monitoring process that the user should do at regular intervals? If so, how frequently?**

Normally this should be performed to verify the configuration of new routes or deletion/modification of existing routes. A regular monitoring is not needed because system generated messages (such as in the example shown above) will inform the user of any abnormal operating conditions.

**What commands does the user issue?**

The **show cs7 route** command displays information such as the following:

```
router# show cs7 route
Routing table = system
```

| Destination | Prio | Linkset | Name    | Route |
|-------------|------|---------|---------|-------|
| 1.1.1/14    | aces | 1       | bermuda | avail |
| 3.1.1/14    | aces | 5       | bermuda | avail |

```
Routing table = XUA
```

| Destination | Cong  |
|-------------|-------|
| 2.1.1/14    | INACC |

Refer to the ITP Command Set chapter of this document for detailed descriptions of the show commands.

## Monitoring Gateway Screening Violations

**Why is this task important?**

When screening is configured you can view screening activity.

**Under what circumstances should this task be performed?**

When screening is configured.

**What incidents or system messages should prompt the user to monitor gateway screening violations?**

None. Violations do not appear as system messages because of the volume of messages this might generate.

**Should this task be part of a regular monitoring process that the user should do at regular intervals? If so, how frequently?**

At user's discretion.

**What commands does the user issue?**

```
show cs7 access-lists
```

```
show cs7 accounting access-violations [checkpoint]
```

Refer to the “Command Reference” section of this document for detailed descriptions of the show commands.

## Monitoring System Messages

**Why is this task important?**

System messages are part of the ITP alert infrastructure.

**Under what circumstances should this task be performed?**

Monitoring should be automated via an external syslog server.

**What incidents or system messages should prompt the user to monitor system messages?**

Refer to the Cisco IOS Software System Error Messages documentation at the following URL:  
<http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121sup/index.htm>

**Should this task be part of a regular monitoring process that the user should do at regular intervals? If so, how frequently?**

Yes, this process should be ongoing and automated.

**What commands does the user issue?**

```
show log
```

## Monitoring Accounting

**Why is this task important?**

Monitoring accounting provides information about user-specific usage.

**Under what circumstances should this task be performed?**

At user's discretion.

**What incidents or system messages should prompt the user to monitor system messages?**

Traffic degradation, debugging of problems.

**Should this task be part of a regular monitoring process that the user should do at regular intervals? If so, how frequently?**

At user's discretion. This task can be part of ongoing statistics collection to be used for network capacity planning or traffic profiling.

**What commands does the user issue?**

```
accounting
```

```
show cs7 accounting [checkpoint]
```

```
show cs7 linkset statistics
```

Refer to the "Command Reference" section of this document for detailed descriptions of the show commands.

## Summary of Commands to Monitor Cisco ITP

The following is a summary of commands in EXEC mode to monitor various functions of Cisco ITP.

| Command                                                                                                                                                                                                                                             | Purpose                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Router# <b>show cs7 access-lists</b>                                                                                                                                                                                                                | Displays ITP access lists.                                   |
| Router# <b>show cs7 accounting</b> [access-violations] [checkpoint]                                                                                                                                                                                 | Displays accounting details.                                 |
| Router# <b>show cs7 as</b> [[m3ua [include-gtt   exclude-gtt   only-gtt]]   [sua [include-gtt   exclude-gtt   only-gtt]]   [all [include-gtt   exclude-gtt   only-gtt]]   [name asname]] [operational   active   all] [statistics   detail   brief] | Displays CS7 AS statistics.                                  |
| Router# <b>show cs7 asp</b> [m3ua   sua   all   name asp-name   asname asname] [statistics [detail]   bindings   detail   event-history]                                                                                                            | Displays CS7 ASP statistics.                                 |
| Router# <b>show cs7 asroute</b> [name name] [active   operational] [detail   event-history   statistics]                                                                                                                                            | Displays CS7 AS Route Table statistics.                      |
| Router# <b>show cs7 gtt</b>                                                                                                                                                                                                                         | Displays GTT statistics.                                     |
| Router# <b>show cs7 linkset</b> [ls-name   routes   sls   statistics   timers   tmap] [brief   detailed]                                                                                                                                            | Displays ITP linkset statistics.                             |
| Router# <b>show cs7 m2pa</b> {[local-peer port-num]   [peer ls-name [slc]]   [state ls-name [slc]]   [stats ls-name [slc]]}                                                                                                                         | Displays ITP M2PA statistics.                                |
| Router# <b>show cs7 m3ua local-port</b>                                                                                                                                                                                                             | Displays CS7 M3UA statistics.                                |
| Router# <b>show cs7 mated-sg</b>                                                                                                                                                                                                                    | Displays CS7 Mated SG statistics.                            |
| Router# <b>show cs7 mtp2</b> [congestion   state   statistics   timers   variant] interface                                                                                                                                                         | Displays ITP MTP2 statistics.                                |
| Router# <b>show cs7 mtp3 timers</b>                                                                                                                                                                                                                 | Displays output from MTP3 timers.                            |
| Router# <b>show cs7 ping point-code</b>                                                                                                                                                                                                             | Displays output from a Cisco ITP ping test.                  |
| Router# <b>show cs7 point-codes</b> [event-history   ssn]                                                                                                                                                                                           | Displays point codes the ITP SG is responding to.            |
| Router# <b>show cs7 qos</b> {[class class]   [statistics ls-name]}                                                                                                                                                                                  | Displays QoS class information.                              |
| Router# <b>show cs7 route</b> [destination] [brief   detailed]                                                                                                                                                                                      | Displays the routing table.                                  |
| Router# <b>show cs7 sgmp</b>                                                                                                                                                                                                                        | Displays Signaling Gateway Mate Protocol (SGMP) information. |
| Router# <b>show cs7 sua</b>                                                                                                                                                                                                                         | Displays CS7 SUA information.                                |

# Tuning ITP

The following sections provide information about tuning the Cisco ITP:

- Tuning HSL Parameters, page 321
- Tuning MTP3 Timers, page 324
- Tuning MTP2 Parameters, page 324
- Tuning SCTP Parameters, page 328

## Tuning HSL Parameters

ITP allows you to specify bundling, SSCF-NNI, and SSCOP parameters for ATM HSL support. You can choose either or both of two configuration methods. You can configure the parameters in a CS7 profile that you apply globally to all links in a linkset. Or, you can specify or modify the parameters on a specific link.

The following sections describe both methods for specifying HSL parameters:

Create a Profile to Support HSL, page 321

Specify HSL Parameters on a Link, page 323

### Create a Profile to Support HSL

You can create a CS7 profile, specify the HSL parameters, then apply the profile to a linkset.

#### Step 1 Create a CS7 Profile

To create the profile use the following commands, beginning in global configuration mode:

| Command                                 | Purpose                                                           |
|-----------------------------------------|-------------------------------------------------------------------|
| Router(config)# <b>cs7 profile</b> name | Names the CS7 profile and enables CS7 profile configuration mode. |
| Router(config-cs7-profile)# <b>hsl</b>  | Enables the CS7 profile mode for configuring HSL parameters.      |

#### Step 2 Specify HSL Paramters

A CS7 profile can specify values for SSCF-NNI parameters, SSCOP parameters, and bundling.

The SSCF NNI provides mapping of the services provided by SSCOP and of the SAAL to the ULP, in this case MTP3.

To configure the HSL parameters for SSCF-NNI, use the following commands in CS7 profile configuration mode:

| Command                                                             | Purpose                                                                                                                                              |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-profile-hsl)# <b>sscf-nni force-proving</b> timer | Specify the time (in minutes) to monitor the link after proving. The range is 0 to 20 minutes. The default is 10 minutes.                            |
| Router(config-cs7-profile-hsl)# <b>sscf-nni n1</b> num              | Specify the number of PDUs sent during proving. The range is 5 to 180000 PDUs. The default for ITU is 1000 PDUs. The default for ANSI is 60000 PDUs. |

| Command                                                              | Purpose                                                                                                                                                          |
|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-profile-hsl)# <b>sscf-nni no-credit timer</b>      | Specify the time (in seconds) allowed with no credit. The range is 1 to 6 seconds. The default is 2 seconds.                                                     |
| Router(config-cs7-profile-hsl)# <b>sscf-nni nrp num</b>              | Specify the maximum number of retransmissions allowed during proving. The range is 1 to 10 retransmissions. The default is 1 retransmission.                     |
| Router(config-cs7-profile-hsl)# <b>sscf-nni sscop-recovery timer</b> | Specify the time (in minutes) for SSCOP recovery. The range is 30 to 1440 minutes. The default is 60 minutes.                                                    |
| Router(config-cs7-profile-hsl)# <b>sscf-nni t1 timer</b>             | Specify the time (in seconds) to reestablish connection. The range is 1 to 15 seconds. The default is 5 seconds.                                                 |
| Router(config-cs7-profile-hsl)# <b>sscf-nni t2 timer</b>             | Specify the time (in seconds) for alignment to complete. The range is 15 to 180 seconds. The default for ITU is 30 seconds. The default for ANSI is 120 seconds. |
| Router(config-cs7-profile-hsl)# <b>sscf-nni t3 timer</b>             | Specify the time (in milliseconds) to send proving packets. The range is 1 to 5000 milliseconds. The default is 1 millisecond.                                   |

The Service-Specific connection -Oriented Protocol (SSCOP) resides in the service-specific convergence sublayer (SSCS) of the ATM adaptation layer (AAL). SSCOP is used to transfer variable-length service data units (SDUs) between users of SSCOP. SSCOP provides for the recovery of lost or corrupted SDUs.

To configure the HSL parameters for SSCOP, use the following commands in CS7 profile configuration mode:

| Command                                                             | Purpose                                                                                                                                                               |
|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-profile-hsl)# <b>sscop cc-timer timer</b>         | Specify the time (in milliseconds) to send BGN/END/RS/ER PDU at the connection control phase. The range is 100 to 2000 milliseconds. The default is 200 milliseconds. |
| Router(config-cs7-profile-hsl)# <b>sscop idle-timer timer</b>       | Specify the time (in milliseconds) to send poll PDU at the idle phase. The range is 25 to 1000 milliseconds. The default is 100 milliseconds.                         |
| Router(config-cs7-profile-hsl)# <b>sscop keepalive-timer timer</b>  | Specify the time (in milliseconds) to send poll PDU at the transient phase. The range is 25 to 500 milliseconds. The default is 100 milliseconds.                     |
| Router(config-cs7-profile-hsl)# <b>sscop max-cc num</b>             | Specify the maximum number of retries for connection control operations. The range is 1 to 127 retries. The default is 4 retries.                                     |
| Router(config-cs7-profile-hsl)# <b>sscop max-pd num</b>             | Specify the maximum number of Sd frames to send before sending a Poll. The range is 1 to 500 Sd frames. The default is 500 Sd frames.                                 |
| Router(config-cs7-profile-hsl)# <b>sscop noResponse-timer timer</b> | Specify the time (in milliseconds) in which at least one STAT PDU must be received. The range is 200 to 2000 milliseconds. The default is 1500 milliseconds.          |
| Router(config-cs7-profile-hsl)# <b>sscop poll-timer timer</b>       | Specify the times (in milliseconds) to send poll PDU at the active phase. The range is 25 to 500 milliseconds. The default is 100 milliseconds.                       |

| Command                                                                | Purpose                                                                                                                                        |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-profile-hsl)# <b>sscop receive-window</b> <i>num</i> | Specify the maximum number of Sd(p) frames our partner can send. The range is 1 to 1024 Sd(p) frames. The default is 1024 Sd(p) frames.        |
| Router(config-cs7-profile-hsl)# <b>sscop send-window</b> <i>num</i>    | Specify the maximum number of Sd frames to send before waiting for acknowledgement. The range is 1 to 1024 frames. The default is 1024 frames. |

To configure HSL bundling, use the following command in CS7 profile configuration mode:

| Command                                                  | Purpose                                                                                                                          |
|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-profile-hsl)# <b>bundling interval</b> | Specifies (in milliseconds) the HSL packet bundling interval. The range is 5 to 100 milliseconds. The default is 5 milliseconds. |

### Step 3 Apply the CS7 Profile to a Linkset

After you have created the profile, apply it to a linkset by using the following commands, beginning in CS7 profile configuration mode:

| Command                                                           | Purpose                                                                                           |
|-------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Router(config-cs7-profile-hsl)# <b>cs7 linkset</b> <i>ls-name</i> | Specifies the linkset to which you will apply the profile, and enters linkset configuration mode. |
| Router(config-cs7-ls)# <b>profile</b> <i>name</i>                 | Applies the parameter values specified in the profile to all the links in the linkset.            |



#### Note

Whenever you change the CS7 profile, the revised profile automatically applies to the linkset.



#### Note

You can override parameter applied with the profile by configuring the specific parameter on the link.

## Specify HSL Parameters on a Link

You can specify/modify individual HSL parameters on a link, or you can specify/modify all the HSL parameters on the link. To configure parameters on a link, use any of the commands described in Step 2 Specify HSL Parameters, page 321 from CS7 link configuration mode. To enable CS7 link configuration mode, use the following commands, beginning in global configuration mode:

| Command                                           | Purpose                                                                                                 |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 linkset</b> <i>ls-name</i> | Specifies the linkset to which you will apply the profile, and enters linkset configuration mode.       |
| Router(config-cs7-ls)# <b>link</b> <i>slc</i>     | Identifies the link to which you intend to apply HSL parameters, and enter CS7 link configuration mode. |

## Tuning MTP3 Timers

MTP3 timers can be defined at 3 levels, global, linkset, and link.

All global, linkset, and link specific timers can be defined at the global level. These values serve as defaults and are propagated down to the lower levels.

To globally configure MTP3 timers, Use the following command in global configuration mode:

| Command                                                 | Purpose                                                                      |
|---------------------------------------------------------|------------------------------------------------------------------------------|
| Router(config)# <b>cs7 mtp3 timer</b> <i>timer msec</i> | Configure MTP3 timers for the system, the linkset, or the link. <sup>1</sup> |

1. For details about the MTP3 timers that you can configure with this command, see the Command Reference entry for **cs7 mtp3 timer**.

Linkset and link specific timers can be defined at the linkset level. These values serve as defaults for the linkset and all links defined within that linkset. Any values defined at the linkset level will override any global values.

To configure MTP3 timers on a linkset, use the following commands in linkset configuration mode:

| Command                                           | Purpose                                                                                                                                                                                                       |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-ls)# <b>timer</b> <i>timer msec</i> | Configure MTP3 timers for a linkset, and (optionally) for links on the linkset. For details about the MTP3 timers that you can configure with this command, see the Command Reference page for <b>timer</b> . |
| Router(config-ls)# <b>sls-shift</b> {1-3}         | Shift which SLS bits are used for link and linkset selection. Available for ITU variant only.                                                                                                                 |

Link specific timers can be defined at the link level. Timers defined at the link level will apply to the link and will override any values for that timer defined at either the linkset, or global level.

To configure MTP3 timers on a link, use the following commands in linkset configuration mode:

| Command                                                     | Purpose                                                                                                                                                        |
|-------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-ls-link)# <b>link-timer</b> <i>timer msec</i> | Configure MTP3 link timers. For details about the MTP3 timers that you can configure with this command, see the Command Reference page for <b>link-timer</b> . |

## Tuning MTP2 Parameters

The following sections describe the MTP2 parameters that you can tune, and describes 2 methods for specifying MTP2 parameters for a link:

- Understanding the MTP2 Parameters, page 324
- Specifying MTP2 Parameters in a CS7 Profile, page 326
- Specifying MTP2 Parameters Individually, page 327

### Understanding the MTP2 Parameters

You can customize MTP2 protocol parameters for timers, bundling, and transmit queue depth to control and influence the MTP2 behavior.



### MTP2 Timers

You can adjust the following MTP2 timers:

- T1 (alignment ready)
- T2 (not aligned)
- T3 (aligned)
- T4E (emergency proving period)
- T4N (normal proving period)
- T5 (sending SIB)
- T6 (remote congestion)
- T7 (excessive delay of acknowledgment)
- TTC timers, including
  - **ttc ta timer**: TTC Timer for sending SIE. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.
  - **ttc te timer**: TTC Timer for error monitoring. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.
  - **ttc tf timer**: TTC Timer for sending FISU. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.
  - **ttc to timer**: TTC Timer for sending SIO. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.
  - **ttc ts timer**: TTC Timer for sending SIOS. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.

### Bundling

MTP2 packet bundling is supported on the Cisco 7500 only. The bundling parameter is used to set the bundling interval (an amount of time to wait for packets before sending the bundle). It is recommended that bundling be enabled for high packet rates (1000 pps or higher) with small packets (50 bytes and lower). Bundling can be less than optimal for lower data rates with small or large packets because of the transmission delay. Bundling is found to be effective for large packets at high data rates in networks with symmetrical traffic. Applications with low data rates should disable bundling if the increase in round-trip time is undesirable. It is recommended that bundling be enabled for applications sending small packets that may start with low data rates, but are capable of increasing to higher sustained data rates. The default bundling delay is 5 milliseconds.

### Transmit Queue

The tx-queue-depth parameter is used to determine the onset and abate thresholds for congestion on transmit queue. The tx-queue-depth parameter controls the number of packets allowed on the transmit queue. The tx-queue exist to absorb inevitable traffic burst. When selecting the tx-queue-depth, there will be a compromise between hitting transmit congestion thresholds causing dropped packets and transmit delays due to queuing times. Applications that are sensitive to small delays should account for transmit delays due to queuing when selecting a tx-queue-depth. During periods of SCTP link congestion, the tx-queue-depth will control the number of packets that can be queued before packets are discarded, causing application retransmissions. The default tx-queue-depth is 1000 packets for M3UA and SUA. The default tx-queue-depth is 20000 packets for SGMP.

## Specifying MTP2 Parameters in a CS7 Profile

You can create a CS7 profile that specifies MTP2 parameters, then apply the profile to a link.

### Step 1 Create a CS7 Profile.

A CS7 profile can specify values for MTP2 timers, bundling, and transmit queue depth. To create the profile use the following commands, beginning in global configuration mode:

| Command                                                                                                                                                                          | Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 profile</b> <i>name</i>                                                                                                                                   | Names the CS7 profile and enables CS7 profile submode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Router(config-cs7-profile)# <b>mtp2</b>                                                                                                                                          | Enables the CS7 profile submode for configuring MTP2 parameters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Router(config-cs7-profile-mtp2)# <b>bundling</b> <i>msec</i>                                                                                                                     | Enables bundling and specifies the bundling interval (the length of time to wait for packets before sending a bundle). MTP2 packet bundling is supported on the Cisco 7500 only.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Router(config-cs7-profile-mtp2)# <b>timer</b> { <b>t1</b>   <b>t2</b>   <b>t3</b>   <b>t4e</b>   <b>t4n</b>   <b>t5</b>   <b>t6</b>   <b>t7</b>   <b>ttc timer</b> } <i>msec</i> | Specifies the following MTP2 timers: <sup>1</sup> <ul style="list-style-type: none"> <li>t1 -- T1 (alignment ready)</li> <li>t2 -- T2 (not aligned)</li> <li>t3 -- T3 (aligned)</li> <li>t4e --T4E (emergency proving period)</li> <li>t4n -- T4N (normal proving period)</li> <li>t5 -- T5 (sending SIB)</li> <li>t6 -- T6 (remote congestion)</li> <li>t7 -- T7 (excessive delay of acknowledgment)</li> <li>ttc ta timer -- TTC Timer for sending SIE. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</li> <li>ttc te timer -- TTC Timer for error monitoring. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</li> <li>ttc tf timer -- TTC Timer for sending FISU. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</li> <li>ttc to timer -- TTC Timer for sending SIO. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</li> <li>ttc ts timer -- TTC Timer for sending SIOS. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</li> </ul> |
| Router(config-cs7-profile-mtp2)# <b>tx-queue-depth</b> <i>msec</i>                                                                                                               | Specifies the number of packets that MTP2 will queue for transmission.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Router(config-cs7-profile-mtp2)# <b>exit</b>                                                                                                                                     | Exits the CS7 profile submode for MTP2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Router(config-cs7-profile)# <b>exit</b>                                                                                                                                          | Exits the CS7 profile submode (returning you to global configuration mode).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

1. For detailed information about MTP2 timers, refer to the appropriate standards.

**Step 2** Apply the profile to all of the links in a linkset.

After you have created the profile, apply it to a linkset by using the following commands, beginning in global configuration mode:

| Command                                           | Purpose                                                                                                                                                                                                                  |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config)# <b>cs7 linkset</b> <i>ls-name</i> | Specifies the linkset to which you will apply the profile, and enters linkset configuration mode.                                                                                                                        |
| Router(config-cs7-ls)# <b>profile</b> <i>name</i> | Applies the parameter values specified in the profile to all the links in the linkset. (The <b>no</b> version of this command removes the profile from the linkset and resets the MTP2 parameters to the default values. |

**Note**

Whenever you change the CS7 profile, the revised profile automatically applies to the linkset.

**Note**

You can override an MTP2 parameter applied with the profile by configuring the specific parameter on the link.

## Specifying MTP2 Parameters Individually

You can specify or change the values of MTP2 timers, bundling, and transmit queue depth individually at the link level.

To tune the MTP2 timers, use the following command in CS7 link submode:

| Command                                                                                                                                                       | Purpose                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-ls-link)# <b>mtp2-timer</b> { <b>t1</b>   <b>t2</b>   <b>t3</b>   <b>t4e</b>   <b>t4n</b>   <b>t5</b>   <b>t6</b>   <b>t7</b> } <i>msec</i> | Specifies the following MTP2 timers: <sup>1</sup> <ul style="list-style-type: none"> <li>t1 -- T1 (alignment ready)</li> <li>t2 -- T2 (not aligned)</li> <li>t3 -- T3 (aligned)</li> <li>t4e --T4E (emergency proving period)</li> <li>t4n -- T4N (normal proving period)</li> <li>t5 -- T5 (sending SIB)</li> <li>t6 -- T6 (remote congestion)</li> <li>t7 -- T7 (excessive delay of acknowledgment)</li> </ul> |

1. For detailed information about MTP2 timers, refer to the appropriate ANSI and ITU standards.

To enable bundling of packets sent between MTP3 on the RSP and MTP2 on the VIP, and to specify the bundling interval for the link, use the following command in CS7 link submode:

| Command                                          | Purpose                                                                                                                |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-ls-link)# <b>bundling</b> msec | Enables bundling and specifies the bundling interval (the length of time to wait for packets before sending a bundle). |

**Note**

Bundling of MTP2 packets is supported on the Cisco 7500 router only.

You can adjust the number of packets that can be queued for transmission before reaching a state of transmit congestion. This parameter is known as the transmit queue depth.

The values for this parameter vary depending on the type of link. For an MTP2 link, the range is 25 to 5000 packets with a default of 500 packets. For an SCTP link, the range is 100 to 20000 packets, with a default of 1000 packets.

To tune the transmit queue depth for the link, use the following command in CS7 link submode:

| Command                                                   | Purpose                                                        |
|-----------------------------------------------------------|----------------------------------------------------------------|
| Router(config-cs7-ls-link)# <b>tx-queue-depth</b> packets | Specifies the number of packets allowed on the transmit queue. |

## Tuning SCTP Parameters

The following sections describe SCTP parameters and tasks:

- How SCTP Parameters Work, page 328
- Tuning SCTP Parameters for M2PA, page 331
- Tuning SCTP Parameters for M3UA, SGMP, and SUA, page 332
- Tuning SCTP Parameters for an ASP, page 333
- Tuning AS Options, page 333
- Tuning SCTP Parameters for a Mated SG, page 334
- Tuning SCTP Parameters for Satellite Channels, page 335

## How SCTP Parameters Work

SCTP provides several protocol parameters that can be customized by the upper layer protocol. These protocol parameters can be customized to control and influence SCTP performance behavior. Different network designs and implementations pose their own unique performance requirements. It is not possible to provide customized protocol parameters that are suitable for all implementations. The tuning information in this section is provided as a guide for understanding what the SCTP protocol parameters are and how they affect the various SCTP algorithms.

### Connection Establishment

The protocol parameters `assoc-retransmit`, `init-retransmit` and `init-timeout` can be customized to control connection establishment. During SCTP association initialization sometimes packet retransmissions occur. When initialization packet retransmissions occur, the timeout value is doubled for each

retransmission. The first initialization packet timeout occurs after 1 second. The maximum timeout value is bound by the `init-timeout` parameter. The `init-timeout` parameter is used to control the time between initialization packet retries. As a general rule, `init-timeout` should be configured to reflect the round-trip-time for packets to traverse the network. An `init-timeout` value that is too small, can cause excessive retries of initialization packets. Large `init-timeout` values can increase connection establishment times.

The number of retries allowed for connection establishment packets is controlled by the `init-retransmit` protocol parameter. When you configure the number of retries to attempt, take into account the varying network conditions that may prevent initialization packets from traversing the network.

The defaults used by M2PA are recommendations from RFC 2960. The `init-timeout` default is 1 second. The `init-retransmit` default is set for 8. The `init-retransmit` and `init-timeout` defaults are suitable for most high-speed links. The defaults may require adjusting for slower links.

### SCTP Multi-homing

A key feature of SCTP is multi-homing. An SCTP endpoint is considered multi-homed if more than one IP address can be used as a destination to reach that endpoint. Upon failure of the primary destination address SCTP switches to an alternate address.

In the configuration of a multi-homed endpoint, the first remote IP address specified on the peer link is defined as the primary address. If the primary address is determined to be unreachable, SCTP multi-homing switches to one of the alternate addresses specified on the peer link. SCTP will monitor the reachability of the failed destination address. Upon notification that reachability is re-established to the primary address, M2PA directs SCTP to switch back to the primary address.

The protocol parameters `path-retransmit` and `retransmit-timeout` can be customized to control how long SCTP waits before switching to an alternate address. The `path-retransmit` parameter controls the number of times that SCTP attempts to retransmit a packet before declaring the destination address unreachable. The `retransmit-timeout` parameter is used to determine whether a packet must be retransmitted. If an acknowledgement is not received by the time the retransmission timer expires, all packets that have been transmitted, but not acknowledged are retransmitted.

### Path-retransmit

The `path-retransmit` parameter is the number of packet retries before the destination address is deemed unreachable. The number of path-retransmits multiplied by the retransmission timer ultimately controls how fast an alternate address becomes the primary path for multi-homed nodes. This relationship suggests the RTO parameters and `path-retransmit` parameter should be considered together. Configuring the default RTO values and default path retransmit value of 4 allows a multi-homed node to switch to an alternate destination address within 4 seconds.

### Retransmit-timeout

The retransmission timeout (RTO) should be adjusted for round-trip delay between nodes. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes. There will be a compromise between allowing a long delay, and having responsive discovery of lost frames. We can calculate a simplistic estimate of round-trip times (rtt) for various packet sizes (ignoring propagation delay and latencies in transmission equipment) using the following estimated rtt equation:

$$\text{estimated rtt} = ( (\text{packet size} * \text{bits per byte}) / \text{link speed} ) * 2$$

Assume a packet with a 20 byte IP header, 32 byte sctp header and 100 bytes of user data and a 1,544,000 bits/sec link between two nodes. Using the estimated rtt equation shown in the previous paragraph we estimate an rtt of 1.5 ms.

SCTP computes RTO values based on rtt measurements. When packet retransmission occurs, the timeout value is doubled for each retransmission, with an upper limit of max rto. Multi-homed nodes will have to compromise between allowing a long delay and having responsive switching to an alternate IP address. Switching to an alternate path is of primary importance for multi-homed nodes. The maximum rto value for multi-homed nodes should be set equal to or just slightly higher than the minimum RTO value. The number of outstanding bytes allowed decreases with each retransmission timeout. The trade-off of bounding the maximum RTO close to the minimum RTO is the frequency of retransmissions versus increasing transmit delays for packets on the transmit queue. During periods of retransmissions multi-homed nodes sends duplicate packets until the alternate address becomes the primary path. The alternate address becomes the primary when the number of retries exceed the path-retransmit parameter. The default value for minimum and maximum RTO is 1 second. Propagation delays and latencies vary in networks, so care should be taken when selecting an RTO value.

### Bundling

It is recommended that bundling be enabled for high packet rates (1000 pps or higher) with small packets (50 bytes and lower). Bundling can be less than optimal for lower data rates with small or large packets because of the transmission delay. Bundling is found to be effective for large packets at high data rates in networks with symmetrical traffic. The default bundling delay is 5 ms. Applications with low data rates should disable bundling if the increase in round-trip time is undesirable. It is recommended that bundling be enabled for applications sending small packets that may start with low data rates, but are capable of increasing to higher sustained data rates.

### Cumulative Selective Ack

The cumulative selective ack (cs-ack) is commonly known as “delayed ack.” The cs-ack parameter controls how long a receiver can delay before sending an acknowledgment. The ack is delayed hoping to have data going in the same direction as the ack, so the ack can “piggyback” with the data. The default of cs-ack is 200 ms. The cs-ack configured at the receiver should be must be less than the rto minimum value configured at the sender. When the cs-ack of the receiver is greater than the rto of the sender, unnecessary retransmissions may occur because the sender rto expires before the receiver sends the delayed acknowledgment.

### Receive Window

The size of the receive window offered by the receiver generally can affect performance. SCTP adapts its transmission rate to suit the available network capacity by using a congestion-sensitive, sliding-window flow control mechanisms described in RFC 2581. At any given instance only a certain number of bytes can be outstanding through the network. Keeping the path full of packets requires both congestion window (cwnd) and receive window (rwnd) to reach the effective size of the “pipe” represented by the so-called bandwidth-delay product. We can calculate the capacity of the pipe using the following capacity equation:

$$\text{capacity (bits)} = \text{bandwidth (bits/sec)} \times \text{round-trip-time(sec)}$$

The bandwidth-delay product can vary widely depending on the network speed and round-trip-time (rtt) between the two end points. Using the capacity equation shown in the previous paragraph, we can estimate the minimum buffer size given the bandwidth of the communication media and the round-trip time between the nodes. Assuming the nodes are connected by a 1,544,000 bits/sec T1 link with a round-trip time of 60 ms, gives an estimated minimum buffer size of 11,580 bytes. The receive-window parameter default is set for 64000 bytes. The congestion control and windowing algorithms adjust to network conditions by controlling the number of bytes that can be outstanding through the network.

### Transmit Queue

The tx-queue-depth parameter is used to determine the onset and abate thresholds for congestion on transmit queue. The tx-queue-depth parameter controls the number of packets allowed on the transmit queue. The tx-queue exist to absorb inevitable traffic burst. When selecting the tx-queue-depth, there will be a compromise between hitting transmit congestion thresholds causing dropped packets and transmit delays due to queuing times. Applications that are sensitive to small delays should account for transmit delays due to queuing when selecting a tx-queue-depth. During periods of SCTP link congestion, the tx-queue-depth will control the number of packets that can be queued before packets are discarded, causing application retransmissions. The default tx-queue-depth is 1000 packets for M3UA and SUA. The default tx-queue-depth is 20000 packets for SGMP.

## Tuning SCTP Parameters for M2PA

To tune the SCTP parameters at the M2PA level of the Cisco ITP, use the following commands in link configuration mode:

| Command                                                                 | Purpose                                                                                                                |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-link) # <b>assoc-retransmit</b> <i>max-returns</i>    | Configure the maximum number of consecutive retransmissions to a peer before the peer is considered unreachable.       |
| Router(config-cs7-link) # <b>bundling</b> <i>msec</i>                   | Enables bundling and specifies the bundling interval (the length of time to wait for packets before sending a bundle). |
| Router(config-cs7-link) # <b>cumulative-sack</b> <i>msec</i>            | Configures the cumulative selective acknowledgment time-out value for the link.                                        |
| Router(config-cs7-link) # <b>init-retransmit</b> <i>max-retries</i>     | Configures the number of retransmissions for peer initialization messages.                                             |
| Router(config-cs7-link) # <b>init-timeout</b> <i>msec</i>               | Configures the maximum time-out value for retransmission initialization messages.                                      |
| Router(config-cs7-link) # <b>ip-precedence</b> <i>ip-tos</i>            | Sets the IP precedence.                                                                                                |
| Router(config-cs7-link) # <b>ip-dscp</b> <i>ip-tos</i>                  | Sets the IP Differential Services Code Point.                                                                          |
| Router(config-cs7-link) # <b>keepalive</b> <i>msec</i>                  | Enable a peer link keepalive interval.                                                                                 |
| Router(config-cs7-link) # <b>path-retransmit</b> <i>max-retries</i>     | Configures path retransmissions on a remote peer address.                                                              |
| Router(config-cs7-link) # <b>peer-timer</b> <i>msec</i>                 | Configures the alignment-ready timer.                                                                                  |
| Router(config-cs7-link) # <b>retransmit-timeout</b> <i>milliseconds</i> | Configure the retransmission time-out value on a link.                                                                 |
| Router(config-cs7-link) # <b>tx-queue-depth</b> <i>queue-depth</i>      | Adjust the number of packets that M2PA will queue for transmission.                                                    |

To Tune the M2PA levels of the ITP on a local peer, use the following command in CS7 local-peer configuration mode:

| Command                                                   | Purpose                                   |
|-----------------------------------------------------------|-------------------------------------------|
| Router(config-cs7-lp) # <b>receive-window</b> <i>size</i> | Configures the local receive window size. |

## Tuning SCTP Parameters for M3UA, SGMP, and SUA

SCTP parameters that are set in the local instance are used as the defaults when an SCTP association is established. To configure SCTP parameters for M3UA, SGMP, or SUA local instance use the following commands in either CS7 M3UA, CS7 SGMP, or CS7 SUA submode. The parameters function the same for all three modes and are shown here in CS7 M3UA mode:

| Command                                                                           | Purpose                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-m3ua)# <b>assoc-retransmit</b> <i>max-returns</i>               | Specifies the maximum number of association retransmissions to be used when a new SCTP association is started with the local port. Range is 2 to 20. Default is 10.                                            |
| Router(config-cs7-m3ua)# <b>bundling</b> <i>msec</i>                              | Specifies that packet bundling is supported and configures the bundling interval to be used when a new SCTP association is started with the local port. Range is 5 to 1000 milliseconds. Default is 100.       |
| Router(config-cs7-m3ua)# <b>cumulative-sack</b> <i>msec</i>                       | Configures the cumulative selective acknowledgment time-out value to be used when a new SCTP association is started with the local port. Range is 100 to 500 milliseconds. Default is 200.                     |
| Router(config-cs7-m3ua)# <b>init-retransmit</b> <i>max-retries</i>                | Configures the maximum number of retransmissions of the peer initialization packets for the local port. Range is 2 to 20 milliseconds. Default is 8.                                                           |
| Router(config-cs7-m3ua)# <b>init-timeout</b> <i>msec</i>                          | Configures the maximum interval for the initialization packet retransmission timeout for the local port. Range is 1000 to 60000 milliseconds. Default is 1000.                                                 |
| Router(config-cs7-m3ua)# <b>keepalive</b> <i>msec</i>                             | Specifies that keepalive timer is supported and configures the keepalive interval to be used when a new SCTP association is started with the local port. Range is 300 to 30000 milliseconds. Default is 30000. |
| Router(config-cs7-m3ua)# <b>max-inbound-streams</b> <i>max-streams</i>            | Specifies the maximum number of inbound streams allowed for the local port. Range is 2 to 25. Default is 17.                                                                                                   |
| Router(config-cs7-m3ua)# <b>path-retransmit</b> <i>max-retries</i>                | Configures the maximum number of path retransmissions on a remote address used when a new SCTP association is started with the local port. Range is 2 to 10 retries. Default is 4.                             |
| Router(config-cs7-m3ua)# <b>receive-window</b> <i>recv-win</i>                    | Specifies the local receive window size for the local port. Range is 5000 to 65535 bytes. Default is 24000.                                                                                                    |
| Router(config-cs7-m3ua)# <b>retransmit-timeout</b> <i>rto-min</i>                 | Specifies the minimum retransmission timeout value used when a new SCTP association is started with the local port. Range is 300 to 60000 milliseconds. Default is 1000.                                       |
| Router(config-cs7-m3ua)# <b>tx-queue-depth</b> <i>queue-depth</i>                 | Specifies the maximum transmit queue depth for new SCTP associations established with the local port.                                                                                                          |
| Router(config-cs7-m3ua)# <b>unordered-priority</b> { <b>equal</b>   <b>high</b> } | Specifies the priority of the unordered packets. The default is "equal."                                                                                                                                       |



## Tuning SCTP Parameters for an ASP

SCTP parameters that are set in the local instance (in CS7 M3UA or CS7 SUA submode) are used as defaults when an SCTP association is established. You can override a default SCTP parameter by specifying an SCTP parameter in the CS7 ASP submode. To specify SCTP parameters under the ASP definition, use the following commands in CS7 ASP submode:

| Command                                                             | Purpose                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-asp) # <b>assoc-retransmit</b> <i>max-returns</i> | Specifies the maximum number of association retransmissions for the association. Range is 2 to 20. Default is the value specified under the local port instance.                                                                         |
| Router(config-cs7-asp) # <b>bundling</b> <i>msec</i>                | Specifies that packet bundling is supported and configures the bundling interval for the association. Range is 5 to 1000 milliseconds. Default is the value specified under the local port instance.                                     |
| Router(config-cs7-asp) # <b>cumulative-sack</b> <i>msec</i>         | Configures the cumulative selective acknowledgment time-out value for the association. Range is 100 to 500 milliseconds. Default is the value specified under the local port instance.                                                   |
| Router(config-cs7-asp) # <b>keepalive</b> <i>msec</i>               | Specifies that keepalive timer is supported and configures the keepalive interval for the association. Range is 300 to 30000 milliseconds. Default is the value specified under the local port instance.                                 |
| Router(config-cs7-asp) # <b>path-retransmit</b> <i>max-retries</i>  | Configures the maximum number of path retransmissions on a remote address for the association. Range is 2 to 10 retries. Default is the value specified under the local port instance.                                                   |
| Router(config-cs7-asp) # <b>retransmit-timeout</b> <i>rto-min</i>   | Specifies the minimum retransmission timeout value for the association. Range is 300 to 60000 milliseconds. Default is the value specified under the local port instance.                                                                |
| Router(config-cs7-asp) # <b>tx-queue-depth</b> <i>queue-depth</i>   | Determines the onset and abate thresholds for congestion on transmit queue. Specifies the maximum transmit queue depth for the association. Range is 100 to 20000 packets. Default is the value specified under the local port instance. |

## Tuning AS Options

To configure the QoS class, recovery timeout value, or traffic mode for an AS, use the following commands in CS7 AS submode:

| Command                                                           | Purpose                                                                                                                                              |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-as) # <b>burst-recovery-timeout</b> <i>msec</i> | Specifies the amount of time allowed for an association to recover from a burst of traffic caused by failover.                                       |
| Router(config-cs7-as) # <b>qos-class</b> <i>class</i>             | Specifies a QoS class for the packets sent to the ASPs in this AS. The QoS class defined under the ASP overrides the QoS class defined under the AS. |

| Command                                                                                                                                     | Purpose                                                                                                                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-as)# <b>recovery-timeout</b> msec                                                                                         | (Optional) Specifies the recovery timeout value. Range is 0 to 2000 milliseconds. Default is 2000.                                                                                                                |
| Router(config-cs7-as)# <b>traffic-mode</b> { <b>broadcast</b>   <b>override</b>   <b>loadshare</b> [ <b>bindings</b>   <b>roundrobin</b> ]} | (Optional) Specifies the traffic mode of operation of the ASP within an AS. Used to validate the traffic mode specified on the ASP Active messages. ASPs connecting with a different traffic mode will be failed. |

## Tuning SCTP Parameters for a Mated SG

SCTP parameters that are set in the local instance (in CS7 M3UA or CS7 SUA submode) are used as defaults when an SCTP association is established. You can override a default SCTP parameter by specifying an SCTP parameter in the CS7 Mated SG submode. To specify SCTP parameters under the Mated SG definition, use the following commands in CS7 Mated SG submode:

| Command                                                          | Purpose                                                                                                                                                                                                                                  |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-mated-sg)# <b>assoc-retransmit</b> max-returns | Specifies the maximum number of association retransmissions for the association. Range is 2 to 20. Default is the value specified under the local port instance.                                                                         |
| Router(config-cs7-mated-sg)# <b>bundling</b> msec                | Specifies that packet bundling is supported and configures the bundling interval for the association. Range is 5 to 1000 milliseconds. Default is the value specified under the local port instance.                                     |
| Router(config-cs7-mated-sg)# <b>cumulative-sack</b> msec         | Configures the cumulative selective acknowledgment time-out value for the association. Range is 100 to 500 milliseconds. Default is the value specified under the local port instance.                                                   |
| Router(config-cs7-mated-sg)# <b>keepalive</b> msec               | Specifies that keepalive timer is supported and configures the keepalive interval for the association. Range is 300 to 30000 milliseconds. Default is the value specified under the local port instance.                                 |
| Router(config-cs7-mated-sg)# <b>path-retransmit</b> max-retries  | Configures the maximum number of path retransmissions on a remote address for the association. Range is 2 to 10 retries. Default is the value specified under the local port instance.                                                   |
| Router(config-cs7-mated-sg)# <b>qos-class</b> class              | Specifies the QoS class for the packets sent to the SG Mate.                                                                                                                                                                             |
| Router(config-cs7-mated-sg)# <b>retransmit-timeout</b> rto-min   | Specifies the minimum retransmission timeout value for the association. Range is 300 to 60000 milliseconds. Default is the value specified under the local port instance.                                                                |
| Router(config-cs7-mated-sg)# <b>tx-queue-depth</b> queue-depth   | Determines the onset and abate thresholds for congestion on transmit queue. Specifies the maximum transmit queue depth for the association. Range is 100 to 20000 packets. Default is the value specified under the local port instance. |

## Tuning Sctp Parameters for Satellite Channels

This section includes the following information about Sctp and Satellite Channels

- Overview of Sctp and Satellite Channels, page 335
- Tuning Sctp on Satellite Channels, page 336
- Verifying Sctp Parameters on Satellite Channels, page 338

### Overview of Sctp and Satellite Channels

There is an inherent delay in the delivery of a message over a satellite link due to the finite speed of light and the altitude of communication satellites. Satellite channels have several characteristics that are different from most terrestrial channels. These characteristics can degrade the performance and channel utilization of Sctp. Some of the characteristics include long delays, large delay-times-bandwidth products, and transmission errors. The delay-times-bandwidth product defines the amount of data a protocol should have outstanding at any one time to fully utilize the available channel capacity. Some satellite channels exhibit a higher bit-error rate than typical terrestrial networks. Sctp interprets all packet drops as signals of network congestion. Since Sctp cannot determine if a packet loss was due to corruption or congestion, Sctp must assume the packet loss was due to network congestion. Packet loss due to corruption can cause Sctp to reduce the amount of data that can be injected into the network. While performance of a transport protocol is not the only consideration when constructing a network containing satellite channels, Sctp congestion control algorithms have an unfavorable effect on performance and channel utilization.

Sctp employs congestion control algorithms to adjust the amount of unacknowledged data that can be injected into the network and to retransmit segments dropped by the network. The Sctp congestion control algorithms respond to packet loss as an indication of network congestion. Packet loss detected by Sctp congestion control algorithms can put the sender in slow-start with a reduced congestion window, thereby limiting the amount of data that can be transmitted. The slow-start algorithm will force the sender to wait for an acknowledgment before transmitting new data. The slow-start and congestion control algorithms can force poor utilization of the available channel bandwidth when using long delay networks.

Sctp congestion control uses two state variables to accomplish congestion control. The first variable is the congestion window (cwnd). The congestion window is an upper bound on the amount of data the sender can inject into the network before receiving an acknowledgment. The second variable is the slow-start threshold (ssthresh). The slow-start threshold variable determines which algorithm is used to increase cwnd. If cwnd is less than or equal to ssthresh, the slow-start algorithm is used to increase cwnd. If cwnd is greater than ssthresh the congestion avoidance algorithm is used to increase cwnd. There are two methods of packet loss detection (interpreted as congestion notification by the Sctp congestion controls) defined in Sctp:

- Timeout of the retransmission timer. The congestion control algorithms resets the congestion control state variables cwnd and ssthresh. The setting of the congestion control state variables have the effect of putting the sender in slow-start and assure that no more than one packet is outstanding until it receives an acknowledgment.

```
ssthresh = max (cwnd/2, 2*MTU)
cwnd     = 1*MTU
```

- Detection of gaps in received Transmission Sequence Numbers (TSNs) through Gap Ack reports in a Selective Acknowledgment (SACK). Normally a sender will wait four consecutive Gap Ack reports before reacting to the indication of packet loss. The congestion control algorithms reset the congestion control state variables cwnd and ssthresh as a result of detecting the packet loss. The setting of the congestion control variables will put the sender in slow-start with a reduced cwnd effectively limiting the amount of data the sender can transmit.

```
sshtresh = max(cwnd/2, 2*MTU)
cwnd = ssthresh
```

The SCTP congestion control algorithms generally respond unfavorably in networks that have large delays, a large delay-times-bandwidth product, and high bit-error rates. SCTP congestion control on the ITP has been enhanced to address the characteristics of satellite channels that contribute to low channel utilization of SCTP. SCTP on the ITP provides for the provisioning of four SCTP parameters that change how the SCTP congestion control algorithms responds to packet loss on satellite channels. The configuration of these parameters are shown in the “Tuning SCTP on Satellite Channels” section on page 336.

**Note**

It is extremely important to understand that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when these parameters are changed to values other than their defaults. These parameters should not be changed without a thorough understanding of SCTP congestion control algorithms.

## Tuning SCTP on Satellite Channels

Before you can modify the SCTP parameters, you must create a basic ITP configuration, which is described fully in the Configuring ITP Basic Functionality chapter. If you are unfamiliar with ITP basic configuration, you are advised to refer to that chapter for more details before continuing.

The following SCTP parameters can be provisioned to change how SCTP congestion control responds to packet loss on satellite channels:

### **init-timeout**

The init-timeout SCTP parameter controls the retransmission of SCTP association setup messages. The init-timeout is how long a SCTP endpoint will wait for a response to a setup message before retransmitting. The init-timeout parameter should be adjusted to for the expected round trip delays expected on the satellite channel.

### **retransmit-timeout**

The retransmission timeout (RTO) should be adjusted for round-trip delays. Round-trip times for some satellite channels can range from 250 ms to 500 ms. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes.

### **init-cwnd-size**

The parameter init-cwnd-size specifies the initial window size used by the sender. If this parameter is provisioned, the window-size specified must match the receive-window size of the remote end of the SCTP association. Failure to match the init-cwnd-size to the remote receive-window will cause non deterministic congestion control behavior. This parameter should be used to overcome slow-start on satellite channels where large burst of sustainable traffic is present. Note the total sizes of the init-cwnd-size and receive-window sizes for all the SCTP associations should not exceed the amount of free memory available.

### **idle-cwnd-rate**

When the endpoint does not transmit data on a given transport address, the congestion window of that transport address is decreased to  $\max(\text{cwnd}/2, 2*\text{MTU})$  per retransmission timeout. The idle-cwnd-rate allows the administrator to control the rate at which the congestion window is decreased due to being idle. Using the idle-cwd-rate, the congestion window is decreased to  $\max(\text{cwnd}/\text{idle-cwnd-rate}, \text{init-cwnd-size})$  per retransmission timeout.

**fast-cwnd-rate**

Normally a SCTP sender will wait four consecutive Gap Ack reports that indicates a missing packet before reacting to the indication of packet loss. On the fourth consecutive Gap Ack report, the SCTP congestion control algorithm decreases the slow-start threshold to  $\max(\text{cwnd}/2, 2 * \text{MTU})$  and reduces the congestion window equal to the slow-start threshold. The setting of the congestion control variables as described will put the sender in slow-start with a reduced cwnd effectively limiting the amount of data the sender can transmit. The fast-cwnd-rate parameter allows the administrator to control the rate at which the congestion window is decreased. Using the fast-cwnd-rate parameter the slow-start threshold variable is set to  $\max(\text{cwnd}/\text{fast-cwnd-rate}, 2 * \text{MTU})$ . The congestion window variable is set to equal to the slow-start threshold as described previously. The sender is still put in slow-start, but depending on the value of the fast-cwnd-rate parameter the congestion window will be reduced conservatively or aggressively. Using the fast-cwnd-rate, we can effectively control how the congestion control algorithm responds to packet loss on satellite channels.

**retransmit-cwnd-rate**

When a retransmission timer timeout occurs, SCTP congestion control sets slow-start threshold to  $\max(\text{cwnd}/2, 2 * \text{MTU})$  and reduces the congestion window to  $1 * \text{MTU}$ . This has the effect of putting the sender in slow-start and assure that no more than one packet is outstanding until it receives an acknowledgment. The retransmit-cwnd-rate parameter allows the administrator to control the rate at which the slow-start threshold is reduced and provides for the setting of the congestion window. Using the retransmit-cwnd-rate parameter the slow-start threshold variable is set to  $\max(\text{cwnd}/\text{retransmit-cwnd-rate}, 2 * \text{MTU})$ . The congestion window variable can be set using one of two methods. The first option for setting the congestion window variable sets the congestion window to its default of  $1 * \text{MTU}$ . The second option for setting the congestion window variable sets the congestion window equal to the slow-start threshold. Setting the congestion window equal to the slow-start threshold variable follows the same procedure for setting the congestion window variable as done for a fast-retransmit. The second option for setting the congestion window allows the congestion control algorithm to respond evenly to packet loss detected by either retransmission timer timeouts or fast-retransmits.

To specify SCTP parameters for satellite channels, use the following commands in CS7 Linkset submode:

| Command                                              | Purpose                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-ls)# <b>fast-cwnd-rate</b> percent | Specifies the rate at which the size of the SCTP congestion window will be decreased due to fast transmission. The range is 0 to 100 percent. The default is 50 percent.                                                                                                                    |
| Router(config-cs7-ls)# <b>idle-cwnd-rate</b> msec    | Specifies the rate at which the size of the SCTP congestion window will be decreased due to the association being idle. The Range is 0 to 100 percent. The default is 50 percent.                                                                                                           |
| Router(config-cs7-ls)# <b>init-cwnd-size</b> msec    | Specifies the size of the SCTP initial congestion window. The range is 3000 to 20971520 bytes. The default is 2 times the smallest MTU of the SCTP interface, in bytes.                                                                                                                     |
| Router(config-cs7-ls)# <b>init-timeout</b> msec      | Specifies how long a SCTP endpoint will wait for a response to a setup message before retransmitting. The init-timeout parameter should be adjusted for the round trip delays expected on the satellite channel. The range is 1000 to 60000 milliseconds. The default is 1000 milliseconds. |

| Command                                                           | Purpose                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Router(config-cs7-ls)# <b>retransmit-cwnd-rate</b> <i>percent</i> | Specifies the rate at which the size of the SCTP congestion window will be decreased due to retransmission timer expiration. The range is 0 to 100 percent. The default is 50 percent.                                                                                                                                                                               |
| Router(config-cs7-ls)# <b>retransmit-timeout</b> <i>rto-min</i>   | Specifies the retransmission timeout value. The retransmission timeout (RTO) should be adjusted for round-trip delays. Round-trip times for some satellite channels range from 250 to 500 msec. The retransmission timeout should be greater than the round-trip delay between nodes. The range is 300 through 60000 milliseconds. The default is 1000 milliseconds. |

## Verifying SCTP Parameters on Satellite Channels

To verify the SCTP congestion control parameters, use the following command in EXEC mode:

| Command                                                         | Purpose                                                                 |
|-----------------------------------------------------------------|-------------------------------------------------------------------------|
| Router# <b>show cs7 m2pa sctp</b> <i>ls-name</i> [ <i>slc</i> ] | Displays the current status and parameter values of a SCTP association. |

The following is sample output from the **show cs7 m2pa** command using the **sctp** keyword:

```

Router#show cs7 m2pa sctp
** SCTP Association Parameters AssocID:0x00010002

AssocID:      0x00010002      Instance ID: 7      Offload: No
Assoc state: ESTABLISHED      Context:      2177134272      Uptime: 01:34:00.294
Local port: 9000
Local addresses: 172.18.44.162

Remote port: 9000
Primary dest addr: 172.18.44.170
Effective primary dest addr: 172.18.44.170
Destination addresses:

172.18.44.170      State: ACTIVE
Heartbeats:      Enabled      Timeout: 30000 ms
RTO/RTT/SRTT: 1000/0/154 ms      TOS:      0      MTU: 1500
cwnd:      3040      ssthresh: 64000      outstand: 0
Retrans cwnd rate: 50      Retrans cwnd mode: FastRetransmit
FastRetrans cwnd rate:      25      Idle dest cwnd rate: 50
Num retrans: 0      Max retrans: 4      Num times failed: 0
172.18.44.162 retrans: 0

Local vertag: 56773F4D      Remote vertag: 4CCCC900
Num inbound streams: 2      outbound streams: 2
Max assoc retrans: 10      Max init retrans: 8      CumSack timeout: 200 ms      Bundle timeout: 5 ms
enabled
Min RTO: 1000 ms      Max RTO: 1000 ms
LocalRwnd: 64000      Low: 63951      RemoteRwnd: 64000      Low: 63988
Congest levels: 4      current level: 0      high mark: 2      chkSum: crc32

```









## ITP Configuration Examples

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This chapter includes the following configuration examples:

- RPR+ Configuration Example, page 341
- ITP Basic Functionality Configuration Example, page 343
- ITP GTT Configuration Example, page 352
- Multi-Layer Routing Configuration Examples, page 362
- Multiple Instance Configuration Example, page 368
- Instance Translation Configuration Examples, page 369
- ITP QOS Configuration Example, page 372
- ITP Signaling Gateway Configuration Examples, page 388
- ITP MAP Proxy Example, page 396
- CS7 Monitor Configuration Example, page 396

### RPR+ Configuration Example

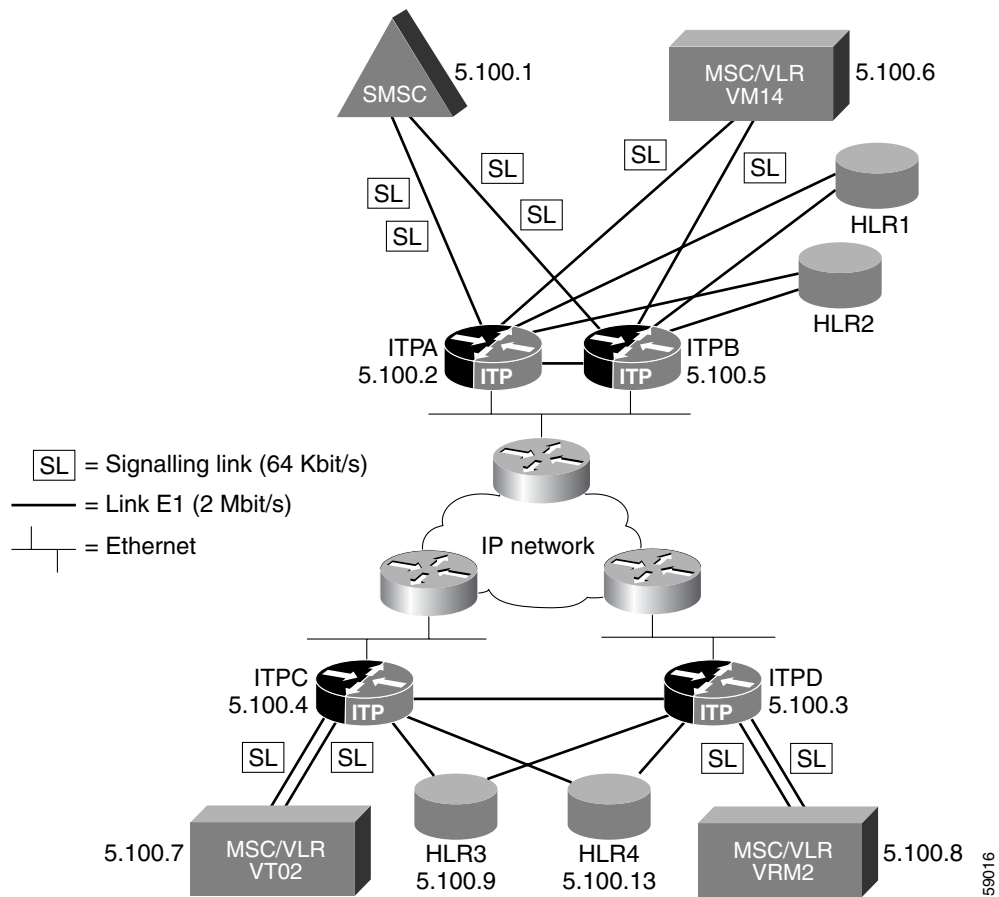
In the following example, the active RSP is in slot 2 and the standby RSP is installed in slot 3 of a Cisco 7507 router.

```
Router# copy tftp slot0:rsp-pv-mz
Router# copy tftp slaveslot0:rsp-pv-mz
Router# configure terminal
Router(config)# hw-module slot 2 image slot0:rsp-pv-mz
Router(config)# hw-module slot 3 image slot0:rsp-pv-mz
Router(config)# redundancy
Router(config-r)# mode rpr-plus
Router(config-r)# end
Router# hw-module sec-cpu reset
Router# show running-config
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service single-slot-reload-enable
!
hostname Router1
!
boot system rcp://path/to/image/rsp-boot-mz
boot system tftp://path/to/image/rsp-boot-mz
boot bootldr bootflash:rsp-boot-mz
```

```

enable password password
!
redundancy
  mode rpr-plus !--indicates Redundancy mode has been configured for RPR+
!
hw-module slot 2 image slot0:rsp-pv-mz
hw-module slot 3 image slot0:rsp-pv-mz
ip subnet-zero
ip rcmd remote-username router1
ip cef distributed
ip host iphost 192.168.0.1
mpls traffic-eng auto-bw timers
!
!
controller T3 6/0/0
  clock source line
!
!
interface Ethernet0/0/0
  ip address 10.0.0.1 255.255.0.0
  no ip directed-broadcast
  ip route-cache distributed
  no keepalive
.
.
.
exec-timeout 0 0
  history size 40
  transport preferred none
  transport input none
line aux 0
line vty 0 4
  login
!end

```

**Figure 20** ITPs as STPs in a SS7oIP Topology

## ITP Basic Functionality Configuration Example

This configuration example includes the basic functions described in the chapter “Configuring ITP Basic Functionality.” Four Cisco ITPs are configured. The network configuration is illustrated in Figure 20.

Assumptions:

All routers have redundant ethernet connectivity and therefore all SCTP associations use two IP addresses (multi-homing).

Point codes and IP addresses for ITP routers:

```
ITPA  5.100.2  172.18.44.242 117.117.117.2
ITPB  5.100.5  172.18.44.243 117.117.117.3
ITPC  5.100.4  172.18.45.1  117.117.119.4
ITPD  5.100.3  172.18.46.1  117.117.118.4
```

Point codes for SS7 SSPs:

```
SMSC  5.100.1
VMI4  5.100.6
```

VT02 5.100.7

VRM2 5.100.8

### ITP Basic Configuration for ITPA

```
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPA
!
enable secret 5 $1$iBmo$AFlH6u2CVGDRM5BMeuGmx/
enable password lab
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.2
!
!
controller E1 1/0/0
  channel-group 0 timeslots 1
!
controller E1 1/0/1
  channel-group 0 timeslots 1
!
controller E1 2/0/0
  channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
  ip address 172.18.44.242 255.255.255.128
  no ip route-cache distributed
  no ip route-cache
  no ip mroute-cache
!
interface FastEthernet0/0/1
  ip address 117.117.117.2 255.255.255.0
  no ip route-cache distributed
  no ip route-cache
  no ip mroute-cache
!
interface Serial1/0/0:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
interface Serial1/0/1:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
interface Serial2/0/0:0
  no ip address
  encapsulation mtp2
```

```

no ip route-cache distributed
no ip route-cache
load-interval 30
!
cs7 local-peer 7000
local-ip 172.18.44.242
local-ip 117.117.117.2
!
!
! Routes using linksets to ITPC and ITPD have a default
! priority of 5. Routes to adjacent node SMS-C and VMI4
! are inserted by the systems with priority 5 and when
! the linkset is configured. They don't have to be defined
! here. Backup-routes to SMS-C and VMI4 are inserted with
! priority 9 using the "C-Link".
!
cs7 route-table system
update route 5.100.7 7.255.7 linkset ITPc
update route 5.100.8 7.255.7 linkset ITPd
update route 5.100.1 7.255.7 linkset ITPb priority 9
update route 5.100.6 7.255.7 linkset ITPb priority 9
!
cs7 linkset ITPc 5.100.4
accounting
link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
route all table system
!
cs7 linkset ITPd 5.100.3
accounting
link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
route all table system
!
cs7 linkset smsc 5.100.1
accounting
link 0 Serial1/0/0:0
link 1 Serial2/0/0:0
route all table system
!
cs7 linkset vmi4 5.100.6
accounting
link 0 Serial1/0/1:0
route all table system
!
cs7 linkset ITPb 5.100.5
accounting
link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
route all table system
!
ip classless
no ip http server
!
!
!
line con 0
transport input none
line aux 0
line vty 0 4
password lab
login
!
end

```

**ITP Basic Configuration for ITPB**

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPB
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.3
!
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
controller E1 1/0/1
    channel-group 0 timeslots 1
!
controller E1 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.44.243 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.117.3 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial1/0/1:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial2/0/0:0
    no ip address
    encapsulation mtp2

```

```

no ip route-cache distributed
no ip route-cache
load-interval 30
!
cs7 local-peer 7000
  local-ip 172.18.44.243
  local-ip 117.117.117.3
!
! Routes using linksets to ITPC and ITPD have a default
! priority of 5. Routes to adjacent node SMS-C and VMI4
! are inserted by the systems with priority 5 and when
! the linkset is configured. They don't have to be defined
! here. Backup-routes to SMS-C and VMI4 are inserted with
! priority 9 using the "C-Link".
!
cs7 route-table system
  update route 5.100.7 7.255.7 linkset ITPc
  update route 5.100.8 7.255.7 linkset ITPd
  update route 5.100.1 7.255.7 linkset ITPa priority 9
  update route 5.100.6 7.255.7 linkset ITPa priority 9
!
cs7 linkset ITPc 5.100.4
  accounting
  link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
  route all table system
!
cs7 linkset ITPd 5.100.3
  accounting
  link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
  route all table system
!
cs7 linkset smsc 5.100.1
  accounting
  link 0 Serial1/0/0:0
  link 1 Serial2/0/0:0
  route all table system
!
cs7 linkset vmi4 5.100.6
  accounting
  link 0 Serial1/0/1:0
  route all table system
!
cs7 linkset ITPa 5.100.2
  accounting
  link 0 sctp 172.18.44.242 117.117.117.2 7000 7000
  route all table system
!
ip classless
no ip http server
!
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end
!
```

**ITP Basic Configuration for ITPC**

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPC
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.4
!
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
controller E1 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.45.1 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.119.4 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial2/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
cs7 local-peer 7000
    local-ip 172.18.45.1
    local-ip 117.117.119.4
!
!
! Routes to SMS-C and VMI4 use a combined linkset.

```



```

! This is defined by inserting two routes with
! identical priority (5 is default).
!
cs7 route-table system
  update route 5.100.1 7.255.7 linkset ITPa
  update route 5.100.1 7.255.7 linkset ITPb
  update route 5.100.6 7.255.7 linkset ITPa
  update route 5.100.6 7.255.7 linkset ITPb
  update route 5.100.8 7.255.7 linkset ITPd
!
cs7 linkset ITPa 5.100.2
  accounting
  link 0 sctp 172.18.44.242 117.117.117.2 7000 7000
  route all table system
!
cs7 linkset ITPb 5.100.5
  accounting
  link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
  route all table system
!
cs7 linkset ITPd 5.100.3
  accounting
  link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
  route all table system
!
cs7 linkset vt02 5.100.7
  accounting
  link 0 Serial1/0/0:0
  link 1 Serial2/0/0:0
  route all table system
!
ip classless
no ip http server
!
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end

```

**ITP Basic Configuration for ITPD**

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPD
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.3
!
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
controller E1 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.46.1 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.118.4 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial2/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
cs7 local-peer 7000
    local-ip 172.18.46.1
    local-ip 117.117.118.4
!
!
! Routes to SMS-C and VMI4 use a combined linkset.

```

```

! This is defined by inserting two routes with
! identical priority (5 is default).
!
cs7 route-table system
  update route 5.100.1 7.255.7 linkset ITPa
  update route 5.100.1 7.255.7 linkset ITPb
  update route 5.100.6 7.255.7 linkset ITPa
  update route 5.100.6 7.255.7 linkset ITPb
  update route 5.100.7 7.255.7 linkset ITPc
!
cs7 linkset ITPa 5.100.2
  accounting
  link 0 sctp 172.18.44.242 117.117.117.2 7000 7000
  route all table system
!
cs7 linkset ITPb 5.100.5
  accounting
  link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
  route all table system
!
cs7 linkset ITPd 5.100.4
  accounting
  link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
  route all table system
!
cs7 linkset vrm2 5.100.8
  accounting
  link 0 Serial1/0/0:0
  link 1 Serial2/0/0:0
  route all table system
!
ip classless
no ip http server
!
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end

```

## ITP GTT Configuration Example

This configuration example includes the Global Title Translation (GTT) feature described in the chapter “Configuring ITP Optional Features.” Four Cisco ITPs are configured. The network configuration is illustrated in Figure 20.

In this example, Intermediate GTT is performed on ITPB. All GTAs matching 339 are sent to the capability point code shared by ITPC and ITPD, where Final GTT is performed.

- ➔ The arrow symbol indicates the configuration statements most relevant to the GTT configuration on each ITP.

Assumptions:

All routers have redundant ethernet connectivity and therefore all SCTP associations use two IP addresses (multi-homing).

Point codes and IP addresses for ITP routers:

```
ITPA  5.100.2  172.18.44.242 117.117.117.2
ITPB  5.100.5  172.18.44.243 117.117.117.3
ITPC  5.100.4  172.18.45.1  117.117.119.4
ITPD  5.100.3  172.18.46.1  117.117.118.4
```

Point codes for SS7 SSPs:

```
SMSC  5.100.1
VMI4  5.100.6
VT02  5.100.7
VRM2  5.100.8
HLR3  5.100.9
HLR4  5.100.13
```

### ITP GTT Configuration for ITPA

```
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPA
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.2
➔ cs7 capability-pc 5.100.12
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
```

```

controller E1 1/0/1
  channel-group 0 timeslots 1
!
controller E1 2/0/0
  channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
  ip address 172.18.44.242 255.255.255.128
  no ip route-cache distributed
  no ip route-cache
  no ip mroute-cache
!
interface FastEthernet0/0/1
  ip address 117.117.117.2 255.255.255.0
  no ip route-cache distributed
  no ip route-cache
  no ip mroute-cache
!
interface Serial1/0/0:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
interface Serial1/0/1:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
interface Serial2/0/0:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
cs7 local-peer 7000
  local-ip 172.18.44.242
  local-ip 117.117.117.2
!
!
! Routes using linksets to ITPC and ITPD have a default
! priority of 5. Routes to adjacent node SMS-C and VMI4
! are inserted by the systems with priority 5 and when
! the linkset is configured. They don't have to be defined
! here. Backup-routes to SMS-C and VMI4 are inserted with
! priority 9 using the "C-Link".
!
cs7 route-table system
  update route 5.100.7 7.255.7 linkset ITPc
  update route 5.100.8 7.255.7 linkset ITPd
  update route 5.100.1 7.255.7 linkset ITPb priority 9
  update route 5.100.6 7.255.7 linkset ITPb priority 9
!
cs7 linkset ITPc 5.100.4
  accounting
  link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
  route all table system
!
cs7 linkset ITPd 5.100.3

```

```
accounting
link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
route all table system
!
cs7 linkset smsc 5.100.1
accounting
link 0 Serial11/0/0:0
link 1 Serial12/0/0:0
route all table system
!
cs7 linkset vmi4 5.100.6
accounting
link 0 Serial11/0/1:0
route all table system
!
cs7 linkset ITPb 5.100.5
accounting
link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
route all table system
!
ip classless
no ip http server
!
!
!
line con 0
transport input none
line aux 0
line vty 0 4
password lab
login
!
end
```

**ITP GTT Configuration for ITPB**

In the following configuration example, ITPB is configured to perform ITP QoS SCCP packet classification. QoS class 1 is assigned to the GTT selector table named **c7gsp**. QoS class 2 is assigned to GTA 339. According to QoS rules of precedence, if a QoS class is assigned to a selector table and to a GTA within that selector table, the QoS class assigned to the GTA entry has precedence over the QoS class assigned to the selector table.

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPB
!
enable secret 5 $l$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.3
→ cs7 capability-pc 5.100.12
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
controller E1 1/0/1
    channel-group 0 timeslots 1
!
controller E1 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.44.243 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.117.3 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial1/0/1:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed

```

```

no ip route-cache
load-interval 30
!
interface Serial2/0/0:0
no ip address
encapsulation mtp2
no ip route-cache distributed
no ip route-cache
load-interval 30
!
cs7 local-peer 7000
local-ip 172.18.44.243
local-ip 117.117.117.3
!
cs7 local-peer 8000
local-ip 172.18.44.243
local-ip 117.117.117.3
!
cs7 local-peer 9000
local-ip 172.18.44.243
local-ip 117.117.117.3
!
cs7 qos class 1
qos-ip-precedence 4
!
cs7 qos class 2
qos-ip-precedence 3

! Routes using linksets to ITPC and ITPD have a default
! priority of 5. Routes to adjacent node SMS-C and VMI4
! are inserted by the systems with priority 5 and when
! the linkset is configured. They don't have to be defined
! here. Backup-routes to SMS-C and VMI4 are inserted with
! priority 9 using the "C-Link".
!
cs7 route-table system
update route 5.100.7 7.255.7 linkset ITPc
update route 5.100.8 7.255.7 linkset ITPd
update route 5.100.1 7.255.7 linkset ITPa priority 9
update route 5.100.6 7.255.7 linkset ITPa priority 9
!
→ cs7 gtt selector c7gsp tt 0 gti 4 np 3 nai 4
qos-class 1
→ gta 339 qos-class 2 pcssn 5.100.14 gt

cs7 linkset ITPc 5.100.4
accounting
link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
qos-class 1
link 1 sctp 172.18.45.1 117.117.119.4 8000 8000
qos-class 2
link 2 sctp 172.18.45.1 117.117.119.4 9000 9000
route all table system
!
cs7 linkset ITPd 5.100.3
accounting
link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
route all table system
!
cs7 linkset smsc 5.100.1
accounting
link 0 Serial1/0/0:0
link 1 Serial2/0/0:0
route all table system

```



```

!
cs7 linkset vmi4 5.100.6
  accounting
  link 0 Serial1/0/1:0
  route all table system
!
cs7 linkset ITPa 5.100.2
  accounting
  link 0 sctp 172.18.44.242 117.117.117.2 7000 7000
  route all table system
!
ip classless
no ip http server
!
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end
!

```

**ITP GTT Configuration for ITPC**

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPC
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.4
→ cs7 capability-pc 5.100.14
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
controller E1 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.45.1 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.119.4 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial2/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
cs7 local-peer 7000
    local-ip 172.18.45.1
    local-ip 117.117.119.4
!
!
! Routes to SMS-C and VMI4 use a combined linkset.

```

```

! This is defined by inserting two routes with
! identical priority (5 is default).
!
cs7 route-table system
  update route 5.100.1 7.255.7 linkset ITPa
  update route 5.100.1 7.255.7 linkset ITPb
  update route 5.100.6 7.255.7 linkset ITPa
  update route 5.100.6 7.255.7 linkset ITPb
  update route 5.100.8 7.255.7 linkset ITPd
!
cs7 linkset ITPa 5.100.2
  accounting
  link 0 sctp 172.18.44.242 117.117.117.2 7000 7000
  route all table system
!
cs7 linkset ITPb 5.100.5
  accounting
  link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
  route all table system
!
cs7 linkset ITPd 5.100.3
  accounting
  link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
  route all table system
!
cs7 linkset vt02 5.100.7
  accounting
  link 0 Serial1/0/0:0
  link 1 Serial2/0/0:0
  route all table system
!
ip classless
no ip http server
!
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end

```

**ITP GTT Configuration for ITPD**

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPD
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.3
→ cs7 capability-pc 5.100.14
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
controller E1 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.46.1 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.118.4 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial2/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
cs7 local-peer 7000
    local-ip 172.18.46.1
    local-ip 117.117.118.4
!
!
! Routes to SMS-C and VMI4 use a combined linkset.

```

```

! This is defined by inserting two routes with
! identical priority (5 is default).
!
cs7 route-table system
  update route 5.100.1 7.255.7 linkset ITPa
  update route 5.100.1 7.255.7 linkset ITPb
  update route 5.100.6 7.255.7 linkset ITPa
  update route 5.100.6 7.255.7 linkset ITPb
  update route 5.100.7 7.255.7 linkset ITPc
!
cs7 linkset ITPa 5.100.2
  accounting
  link 0 sctp 172.18.44.242 117.117.117.2 7000 7000
  route all table system
!
cs7 linkset ITPb 5.100.5
  accounting
  link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
  route all table system
!
→ cs7 gtt map 5.100.9 100 share 5.100.13 100
→ cs7 gtt selector cnam tt 0 gti 4 np 3 nai 4
→ gta 339 pcasn 5.100.9 pcasn ssn 100
!
cs7 linkset ITPd 5.100.4
  accounting
  link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
  route all table system
!
cs7 linkset vrm2 5.100.8
  accounting
  link 0 Serial1/0/0:0
  link 1 Serial2/0/0:0
  route all table system
!
ip classless
no ip http server
!
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end

```

## Multi-Layer Routing Configuration Examples

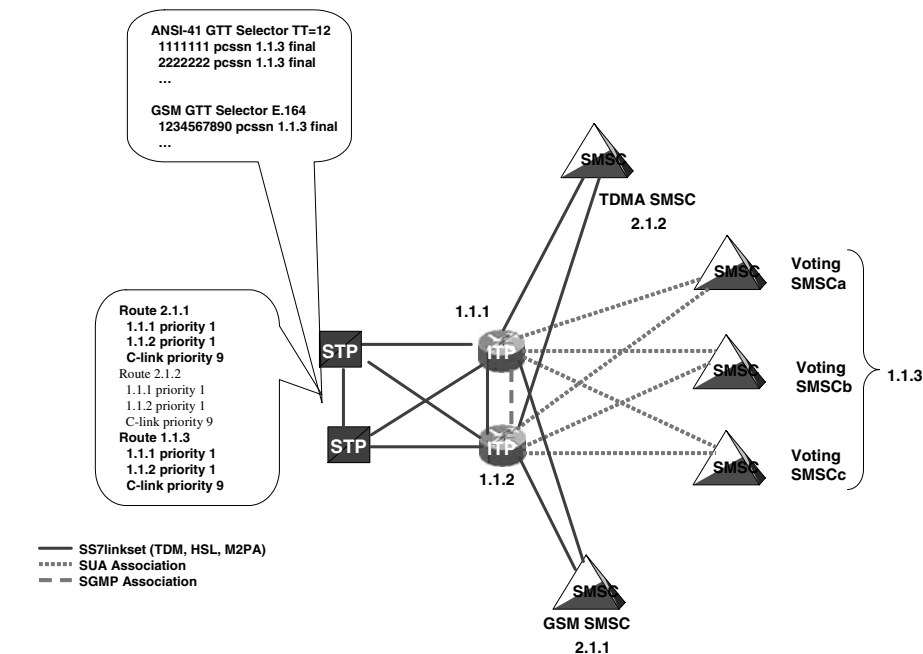
### ITP Receives All SMS-MO Traffic in GT-Routed Network

In this example, a mated pair of ITPs is positioned between the core SS7 network STPs and both the legacy and voting SMSCs. A sample configuration for ITP1 is provided after the figure.

The STPs in the network are configured to perform final GTT toward the ITP SMSC complex. In GSM, the translation will be done based on the E.164 addresses of the legacy SMSCs. In IS-41, the translation will be done using TT=12 to map the MIN to the serving MC. In either case, the GTT translations must be changed to map to the mated-ITP pair's PC for SMSC processing, 1.1.3. No GTT is performed on the ITPs.

GAIT/GHOST SMS MO messages carried over ANSI-41 arrive at ITP1 destined for the SMSC point-code 1.1.3. An SCCP CdPA trigger based on PC/SSN will signal parsing of the TCAP, MAP and SMS routing layers. There will be a trigger for GSM MAP, as well as IS-41/GHOST based on the SSNs 8 and 11, respectively. The GSM-RULES and TDMA-RULES rulesets are then referenced to determine if the destination SME address represents a voting event. Note that each ruleset uses the same dest-sme address tables for efficient best-match lookup.

If a voting event is determined, the message is routed to the selected voting SMSC, otherwise the message is routed to the legacy SMSC. Note that SMS\_Notification messages with the same destination SME pattern are routed to the same SMSC ASes. This configuration assumes that the voting SMSCs are all ASPs within the same AS using a routing-key of PC 1.1.3.



```
:cs7 multi-instance
cs7 instance 1 variant ansi
cs7 instance 1 point-code 1.1.1
```

```
cs7 instance 1 as VOTING_AS sua
routing-key 113 1.1.3
asp SMSCa
asp SMSCb
```

```

asp SMSCc
traffic-mode loadshare roundrobin

cs7 instance 1 as SMSCa sua
routing-key 1 gtt
asp SMSCa

cs7 instance 1 as SMSCb sua
routing-key 2 gtt
asp SMSCb

cs7 instance 1 as SMSCc sua
routing-key 3 gtt
asp SMSCc

cs7 instance 1 mlr result SMS-WEIGHTED
as SMSCa weight 1
as SMSCb weight 1
as SMSCc weight 2
pc 2.1.1 weight 0

cs7 instance 1 mlr result MINGRP1
as SMSCa weight 1
as SMSCb weight 0

cs7 instance 1 mlr result MINGRP2
as SMSCb weight 1
as SMSCc weight 0

cs7 instance 1 mlr result MINGRP3
as SMSCc weight 1
as SMSCa weight 0

cs7 mlr address-table VSMSC-ADDRS
addr 24 exact result group SMSC-GROUP1
addr 26 exact result group SMSC-GROUP1
... <161 other exact-match short-codes>
addr 74648633 exact result group SMSC-GROUP1
addr 2004 result group SMSC-GROUP1
addr 901 result group SMSC-GROUP1
addr 902 result group SMSC-GROUP1
addr 110480 result group SMSC-GROUP1
addr 111480 result group SMSC-GROUP1
... <5 other prefix-match SME addresses>
addr 11150 result group SMSC-GROUP1

cs7 mlr ruleset TDMA-RULES
rule 1 smdpp
dest-sme table VSMSC-ADDRS
rule 2 smsnot
dest-sme table VSMSC-ADDRS
rule 3 smdpp default
result group TDMA-SMSCS
rule 4 smsnot default
result group TDMA-SMSCS

cs7 mlr ruleset GSM-RULES
rule 1 sms-mo
dest-sme table VSMSC-ADDRS
rule 2 alertsc
dest-sme table VSMSC-ADDRS
rule 3 sms-mo default
result group GSM-SMSCS
rule 4 alertsc default

```

```

result group GSM-SMSCS

cs7 mlr table SMS-ROUTING
trigger cdpa pc 1.1.3 ssn 8 ruleset GSM-RULES
trigger cdpa pc 1.1.3 ssn 11 ruleset TDMA-RULES

```

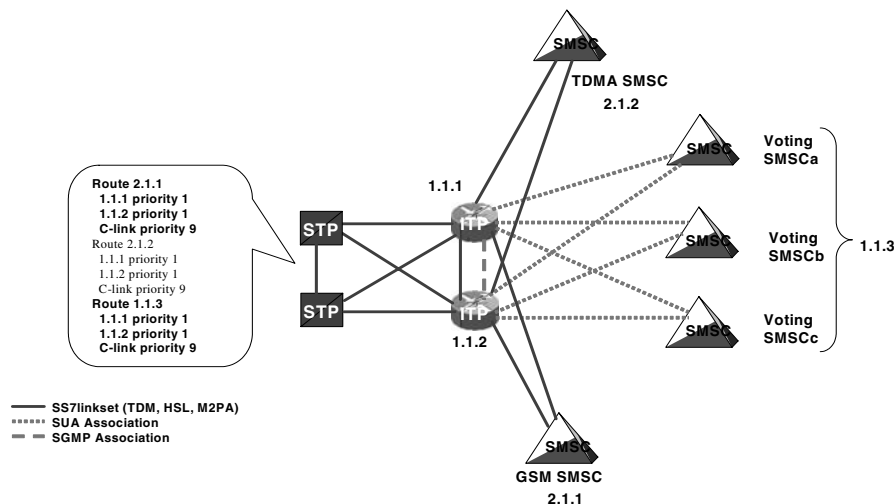
### Legacy SMSC Retains Point Code in PC-Routed Network

In this example, a mated pair of ITPs is positioned between the core SS7 network STPs and both the legacy and voting SMSCs. A sample configuration for ITP1 is provided after the figure.

GAIT/GHOST SMS MO messages carried over ANSI-41 arrive at ITP1 destined for the legacy SMSC point-code 2.1.1. An MTP3 MLR trigger based on the DPC, SI and SCCP sub-trigger of CdPA SSN will signal parsing of the TCAP, MAP and SMS routing layers. The GSM-RULES ruleset is then referenced to determine if the destination SME address represents a voting event.

IS-136 and IS-95 SMS MO messages arrive at ITP1 destined for the legacy SMSC PC 2.1.2. The TDMA-RULES ruleset is then referenced to determine if the destination SME address represents a voting event.

If a voting event is determined, the message is routed to the selected voting SMSC, otherwise the message is routed to the legacy SMSC. Note that SMS\_Notification messages with the same destination SME pattern are routed to the same SMSC ASes. This configuration assumes that the voting SMSCs are all ASPs within the same AS using a routing-key of PC 1.1.3.



```

cs7 multi-instance
cs7 instance 1 variant ansi
cs7 instance 1 point-code 1.1.1

cs7 instance 1 as VOTING_AS sua
routing-key 113 1.1.3
asp SMSCa
asp SMSCb
asp SMSCc
traffic-mode loadshare roundrobin

cs7 instance 1 as SMSCa sua
routing-key 1 gtt
asp SMSCa

```



```

cs7 instance 1 as SMSCb sua
  routing-key 2 gtt
  asp SMSCb

cs7 instance 1 as SMSCc sua
  routing-key 3 gtt
  asp SMSCc

cs7 instance 1 mlr result SMS-WEIGHTED
  as SMSCa weight 1
  as SMSCb weight 1
  as SMSCc weight 2
  pc 2.1.1 weight 0

cs7 instance 1 mlr result MINGRP1
  as SMSCa weight 1
  as SMSCb weight 0

cs7 instance 1 mlr result MINGRP2
  as SMSCb weight 1
  as SMSCc weight 0

cs7 instance 1 mlr result MINGRP3
  as SMSCc weight 1
  as SMSCa weight 0

cs7 instance 1 mlr ruleset GHOST-RULES ansi-41
  rule 1 smdpp
    dest-sme 111
    result group SMS-WEIGHTED
  rule 2 smdpp
    dest-sme 222
    result group SMS-WEIGHTED
  rule 3 smdpp
    dest-sme 333
    result group SMS-WEIGHTED
  rule 10 sms-notify
    dest-sme 111
    result group SMS-WEIGHTED
  rule 20 sms-notify
    dest-sme 222
    result group SMS-WEIGHTED
  rule 30 sms-notify
    dest-sme 333
    result group SMS-WEIGHTED

cs7 instance 1 mlr ruleset TDMA-RULES ansi-41
  rule 1 smdpp
    dest-sme 100 min
    result group MINGRP1
  rule 2 smdpp
    dest-sme 200 min
    result group MINGRP2
  rule 3 smdpp
    dest-sme 300 min
    result group MINGRP3
  rule 10 sms-notify
    dest-sme 100 min
    result group MINGRP1
  rule 20 sms-notify
    dest-sme 200
    result group MINGRP2
  rule 30 sms-notify
    dest-sme 3

```

```

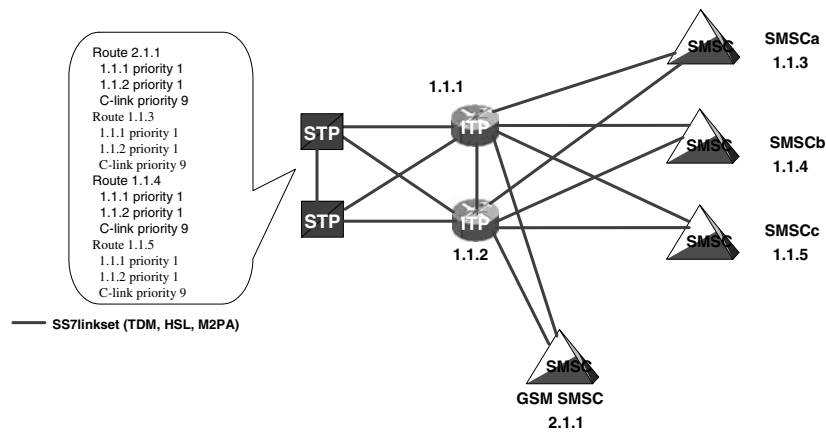
result group MINGRP3

cs7 instance 1 mlr table SMS-TABLE
trigger mtp3 dpc 2.1.1 si 3
  cdpa pc 2.1.1 ssn 8 ruleset GHOST-RULES
trigger mtp3 dpc 2.1.2 si 3
  cdpa pc 2.1.2 ssn 11 ruleset TDMA-RULES

```

### MLR Distribution to MTP3-Based SMSCs

In this example, additional SMSCs are introduced in order to distribute load based on MIN. The legacy SMSC PC is 2.1.1, and is the DPC for all MO SMS messages. MTP3-based MLR triggers are used to distribute the traffic based on the destination SME address, which in this case will be a MIN.



```

cs7 multi-instance
cs7 instance 1 variant ansi
cs7 instance 1 point-code 1.1.1

cs7 instance 1 mlr result MINGRP1
pc 1.1.3 weight 1
pc 1.1.4 weight 0

cs7 instance 1 mlr result MINGRP2
pc 1.1.4 weight 1
pc 1.1.5 weight 0

cs7 instance 1 mlr result MINGRP3
pc 1.1.5 weight 1
pc 1.1.3 weight 0

cs7 instance 1 mlr ruleset TDMA-RULES ansi-41
rule 1 smdpp
  dest-sme 100 min
  result group MINGRP1
rule 2 smdpp
  dest-sme 200 min
  result group MINGRP2
rule 3 smdpp
  dest-sme 300 min

```

```
    result group MINGRP3
rule 10 sms-notify
    dest-sme 100 min
    result group MINGRP1
rule 20 sms-notify
    dest-sme 200
    result group MINGRP2
rule 30 sms-notify
    dest-sme 300
    result group MINGRP3

cs7 instance 1 mlr table SMS-TABLE
trigger mtp3 dpc 2.1.1 si 3
cdpa pc 2.1.1 ssn 11 ruleset TDMA-RULES
```

## Multiple Instance Configuration Example

In the following example, the Multiple Instances feature is used to configure STPs in two SS7 networks.

Network 1 has variant ANSI and network indicator national. All instances in this network will have network name specified as ANSI-NAT.

Network 2 has variant ANSI and network indicator international. All instances in this network will have network name specified as ANSI-INT.

### Configuration for ITP1

```
cs7 multi-instance
cs7 instance 0 variant ANSI
cs7 instance 0 network-name ANSI-NAT
cs7 instance 0 point-code 5.5.1
cs7 instance 1 variant ANSI
cs7 instance 1 network-name ANSI-INT
cs7 instance 1 network-indicator international
cs7 instance 1 point-code 15.5.1
.
.
.
```

### Configuration for ITP2

```
cs7 multi-instance
cs7 instance 0 variant ANSI
cs7 instance 0 network-name ANSI-INT
cs7 instance 0 network-indicator international
cs7 instance 0 point-code 7.3.2
cs7 instance 1 variant ANSI
cs7 instance 1 network-name ANSI-NAT
cs7 instance 1 point-code 11.6.2
.
.
.
```

## Instance Translation Configuration Examples

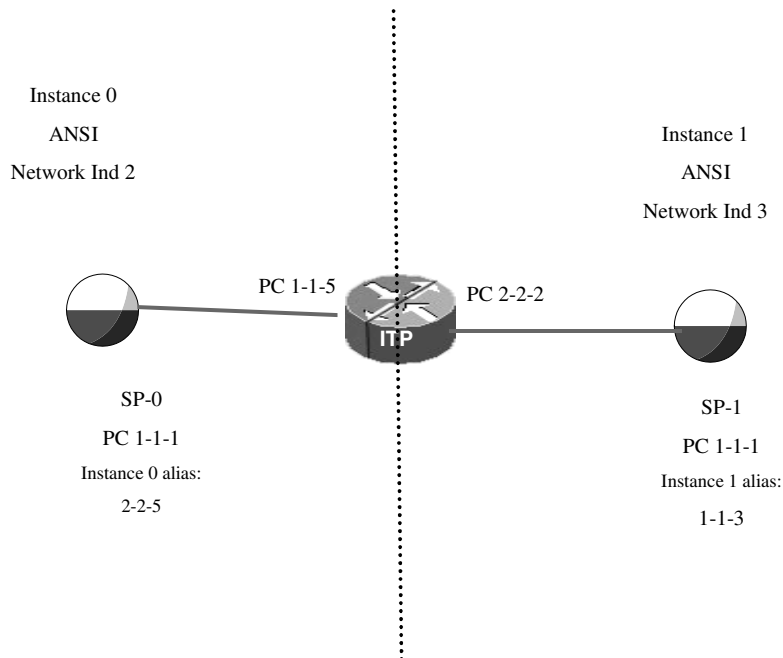
This section includes two examples:

- Instance Translation: Instances with the Same Variant, page 369t
- Instance Translation: Instances with Different Variants, page 371

### Instance Translation: Instances with the Same Variant

The following example configuration is illustrated in Figure 21.

**Figure 21** Instance Translation Configuration Example



In the network above, SP-0 sees the ITP with PC 1-1-5, and also sees a remote SP with PC 1-1-3. SP1 sees the ITP with PC 2-2-2, and also sees a remote SP with PC 2-2-5. The CLI to configure the alias point codes is shown below:

```
ITP#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ITP(config)#cs7 instance 0 pc-conversion 1.1.1 alias-pc 1 2.2.5
ITP(config)#cs7 instance 1 pc-conversion 1.1.1 alias-pc 0 1.1.3
```

When SP-I0 sends an MSU to SP-I1, it sets:

- DPC: 1-1-3
- OPC: 1-1-1
- Network Indicator: 2

When the ITP receives the MSU, it determines that 1-1-3 in Instance 0 is an alias for 1-1-1 in Instance 1, so it converts the MSU to Instance 1. Since Instance 1 uses Network Indicator 3, the MSU's Network Indicator is changed to 3. The converted MSU has:

- DPC 1-1-1
- OPC 2-2-5
- Network Indicator: 3

If the MSU is SCCP and contains a Calling Party PC, this PC is converted using the alias PC table. If the Calling Party PC is 1-1-1, this is converted to 2-2-5

The following show command output sections show the status before and after the configuration of Instance Translation:

```
ITP#show cs7 linkset brief
lsn=SP-0          apc=1.1.1:0    state=avail    avail/links=1/1
lsn=SP-1          apc=1.1.1:1    state=avail    avail/links=1/1
```

```
ITP#show cs7 route
```

```
Routing table = system Instance = 0
```

| Destination | Prio  | Linkset | Name | Route |
|-------------|-------|---------|------|-------|
| 1.1.1/24    | acces | 1       | SP-0 | avail |

```
Routing table = system1 Instance = 1
```

| Destination | Prio  | Linkset | Name | Route |
|-------------|-------|---------|------|-------|
| 1.1.1/24    | acces | 1       | SP-1 | avail |

```
ITP#show cs7 route
```

```
Routing table = system Instance = 0
```

| Destination | Prio  | Linkset | Name         | Route |
|-------------|-------|---------|--------------|-------|
| 1.1.1/24    | acces | 1       | SP-0         | avail |
| 1.1.3/24    | acces | 1       | VirtualLS0-1 | avail |

```
Routing table = system1 Instance = 1
```

| Destination | Prio  | Linkset | Name         | Route |
|-------------|-------|---------|--------------|-------|
| 1.1.1/24    | acces | 1       | SP-1         | avail |
| 2.2.5/24    | acces | 1       | VirtualLS1-0 | avail |

```
ITP#show cs7 linkset brief
lsn=SP-0          apc=1.1.1:0    state=avail    avail/links=1/1
lsn=SP-1          apc=1.1.1:1    state=avail    avail/links=1/1
```

```
ITP#show cs7 pc-conversion
```

```
PC          ALIAS PCs
```

```
1.1.1:0     2.2.5:1
1.1.1:1     1.1.3:0
```

```
ITP#show cs7 0 pc-conversion 1.1.1
```

```

PC          ALIAS PCs
1.1.1:0     2.2.5:1

ITP#show cs7 1 pc-conversion 1.1.1

PC          ALIAS PCs
1.1.1:1     1.1.3:0

```

### Instance Translation: Instances with Different Variants

For these examples, instance 0 is ANSI and instance 1 is ITU.

All ITU MSUs with GTI 4 are always converted to GTI 2

All ANSI MSUs with GTI 2 are converted to GTI 4 with default values for NP, ES, NAI

The SSN, TT, and GTA are not changed

```

cs7 gti-conversion gti-conv0
  update in-gti 2 out-gti 4 out-es 2 out-np 1 out-nai 3

cs7 gti-conversion gti-conv1
  update in-gti 4 out-gti 2

cs7 sccp gtt-conversion input-instance 0 output-instance 1
  set gti-conversion gti-conv0

cs7 sccp gtt-conversion input-instance 1 output-instance 0
  set gti-conversion gti-conv1

```

Default conversion sends any MSUs with unknown point codes in one instance to another instance. Also, any PCs in the MSU that require conversion but do not have an alias point code assigned, will be unchanged in the new instance

In the following example, MSUs to be sent from SSP4 and SSP5 to SSP-2 and SSP-3.

```
cs7 instance 1 pc-conversion default 0
```

The above example will not allow MSUs to be sent in the other direction. To allow MSU to be sent from SSP-2 and SSP-3 to SSP-4 and SSP-5, the user can enter the commands:

```

cs7 instance 0 pc-conversion 2.2.4 alias-pc 1 2.2.4
cs7 instance 0 pc-conversion 2.2.5 alias-pc 1 2.2.5

```

## ITP QoS Configuration Example

This section includes the QoS feature described in the chapter “Configuring ITP Optional Features.” Five configurations provide the following examples of ITP QoS packet classification and Cisco IOS QoS packet scheduling and queuing:

- Service Indicator Packet Classification and Access List Classification, page 372
- SCCP Packet Classification, page 376
- Input Linkset Classification, page 379
- Destination Point Code Classification, page 381
- Cisco IOS QoS Packet Scheduling and Queuing, page 383
- ITP SG QoS Configuration Examples, page 386

The network configuration is illustrated in Figure 20.

→ The arrow symbol indicates the specific configuration statements that implement QoS on each ITP.

Assumptions:

All routers have redundant ethernet connectivity and therefore all SCTP associations use two IP addresses (multi-homing).

Point codes and IP addresses for ITP routers:

```
ITPA  5.100.2  172.18.44.242 117.117.117.2
ITPB  5.100.5  172.18.44.243 117.117.117.3
ITPC  5.100.4  172.18.45.1  117.117.119.4
ITPD  5.100.3  172.18.46.1  117.117.118.4
```

Point codes for SS7 SSPs:

```
SMSC  5.100.1
VMI4   5.100.6
VT02   5.100.7
VRM2   5.100.8
```

### Service Indicator Packet Classification and Access List Classification

In the following configuration example, ITPA is configured to perform ITP QoS Service Indicator packet classification and access list classification.

All packets arriving on linkset **smsc** are classified according to service indicator. Packets with si 3 are classified class 2 and are sent out on link 1 of the linkset ITPd. Packets with si 5 are classified class 1 and are sent out on link 0 of the linkset ITPd.

All ISUP packets arriving on linkset vmi4 are matched with access list 2701, classified as QoS class3 and are sent out on link 1 of linkset ITPc. All other packets arriving from linkset vmi4 are sent out on link 0 of linkset ITPc.

```
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPA
```



```

!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.2
!
controller E1 1/0/0
  channel-group 0 timeslots 1
!
controller E1 1/0/1
  channel-group 0 timeslots 1
!
controller E1 2/0/0
  channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
  ip address 172.18.44.242 255.255.255.128
  no ip route-cache distributed
  no ip route-cache
  no ip mroute-cache
!
interface FastEthernet0/0/1
  ip address 117.117.117.2 255.255.255.0
  no ip route-cache distributed
  no ip route-cache
  no ip mroute-cache
!
interface Serial1/0/0:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
interface Serial1/0/1:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
interface Serial2/0/0:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
cs7 local-peer 7000
  local-ip 172.18.44.242
  local-ip 117.117.117.2

cs7 local-peer 8000
  local-ip 172.18.44.242
  local-ip 117.117.117.2

cs7 local-peer 9000

```

```

local-ip 172.18.44.242
local-ip 117.117.117.2

→ cs7 qos class 1
→ ip precedence 4
!
→ cs7 qos class 2
→ ip precedence 3
!
→ cs7 qos class 3
→ qos-access-group 2701
→ qos-ip-precedence 2
!
! Routes using linksets to ITPC and ITPD have a default
! priority of 5. Routes to adjacent node SMS-C and VMI4
! are inserted by the systems with priority 5 and when
! the linkset is configured. They don't have to be defined
! here. Backup-routes to SMS-C and VMI4 are inserted with
! priority 9 using the "C-Link".
!
cs7 route-table system
update route 5.100.7 7.255.7 linkset ITPc
update route 5.100.8 7.255.7 linkset ITPd
update route 5.100.1 7.255.7 linkset ITPb priority 9
update route 5.100.6 7.255.7 linkset ITPb priority 9
!
cs7 linkset ITPc 5.100.4
accounting
link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
link 1 sctp 172.18.45.1 117.117.119.4 8000 8000
→ qos-class 3
link 2 sctp 172.18.45.1 117.117.119.4 9000 9000
route all table system
!
cs7 linkset ITPd 5.100.3
accounting
link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
→ qos class 1
link 1 sctp 172.18.46.1 117.117.118.4 8000 8000
→ qos class 2
link 2 sctp 172.18.46.1 117.117.118.4 9000 9000
route all table system
!
cs7 linkset smsc 5.100.1
→ match si 3 qos class 2
→ match si 5 qos-class 1
accounting
link 0 Serial1/0/0:0
link 1 Serial2/0/0:0
route all table system
!
cs7 linkset vmi4 5.100.6
→ match access-group
accounting
link 0 Serial1/0/1:0
route all table system
!
cs7 linkset ITPb 5.100.5
accounting
link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
route all table system
!
ip classless
no ip http server

```

```

!
!
→ access-list 2701 permit si 5
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end

```

### SCCP Packet Classification

In the following configuration example, ITPB is configured to perform ITP QoS SCCP packet classification. QoS class 1 is assigned to the GTT selector table named **c7gsp**. QoS class 2 is assigned to GTA 339. According to QoS rules of precedence, if a QoS class is assigned to a selector table and to a GTA within that selector table, the QoS class assigned to the GTA entry has precedence over the QoS class assigned to the selector table.

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPB
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.3
cs7 capability-pc 5.100.12
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
controller E1 1/0/1
    channel-group 0 timeslots 1
!
controller E1 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.44.243 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.117.3 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial1/0/1:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed

```

```

no ip route-cache
load-interval 30
!
interface Serial2/0/0:0
no ip address
encapsulation mtp2
no ip route-cache distributed
no ip route-cache
load-interval 30
!
cs7 local-peer 7000
local-ip 172.18.44.243
local-ip 117.117.117.3
!
cs7 local-peer 8000
local-ip 172.18.44.243
local-ip 117.117.117.3
!
cs7 local-peer 9000
local-ip 172.18.44.243
local-ip 117.117.117.3
!
→ cs7 qos class 1
→ qos-ip-precedence 4
!
→ cs7 qos class 2
→ qos-ip-precedence 3

! Routes using linksets to ITPC and ITPD have a default
! priority of 5. Routes to adjacent node SMS-C and VMI4
! are inserted by the systems with priority 5 and when
! the linkset is configured. They don't have to be defined
! here. Backup-routes to SMS-C and VMI4 are inserted with
! priority 9 using the "C-Link".
!
cs7 route-table system
update route 5.100.7 7.255.7 linkset ITPc
update route 5.100.8 7.255.7 linkset ITPd
update route 5.100.1 7.255.7 linkset ITPa priority 9
update route 5.100.6 7.255.7 linkset ITPa priority 9
!
cs7 gtt selector c7gsp tt 0
→ qos-class 1
→ gta 339 qos-class 2 pcasn 5.100.14 gt ntt 0

cs7 linkset ITPc 5.100.4
accounting
link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
→ qos-class 1
link 1 sctp 172.18.45.1 117.117.119.4 8000 8000
→ qos-class 2
link 2 sctp 172.18.45.1 117.117.119.4 9000 9000
route all table system
!
cs7 linkset ITPd 5.100.3
accounting
link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
route all table system
!
cs7 linkset smsc 5.100.1
accounting
link 0 Serial1/0/0:0
link 1 Serial2/0/0:0
route all table system

```

```
!  
cs7 linkset vmi4 5.100.6  
  accounting  
  link 0 Serial1/0/1:0  
  route all table system  
!  
cs7 linkset ITPa 5.100.2  
  accounting  
  link 0 sctp 172.18.44.242 117.117.117.2 7000 7000  
  route all table system  
!  
ip classless  
no ip http server  
!  
!  
!  
line con 0  
  transport input none  
line aux 0  
line vty 0 4  
  password lab  
  login  
!  
end  
!
```

### Input Linkset Classification

In the following configuration example, ITPC is configured to perform ITP QoS Input Linkset packet classification. All packets arriving on linkset **vt02** are classified as class 1 and are sent out on link 0 of the linkset ITPa.

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPC
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.4
!
!
controller E1 1/0/0
    channel-group 0 timeslots 1
!
controller E1 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.45.1 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.119.4 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial2/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
cs7 local-peer 7000
    local-ip 172.18.45.1

```

```

    local-ip 117.117.119.4
    !
cs7 local-peer 8000
    local-ip 172.18.45.1
    local-ip 117.117.119.4
    !
cs7 local-peer 9000
    local-ip 172.18.45.1
    local-ip 117.117.119.4
    !
→ cs7 qos class 1
→ ip precedence 2

! Routes to SMS-C and VMI4 use a combined linkset.
! This is defined by inserting two routes with
! identical priority (5 is default).
!
cs7 route-table system
    update route 5.100.1 7.255.7 linkset ITPa
    update route 5.100.1 7.255.7 linkset ITPb
    update route 5.100.6 7.255.7 linkset ITPa
    update route 5.100.6 7.255.7 linkset ITPb
    update route 5.100.8 7.255.7 linkset ITPd
    !
cs7 linkset ITPa 5.100.2
    accounting
    link 0 sctp 172.18.44.242 117.117.117.2 7000 7000
→   qos class 1
    link 1 sctp 172.18.44.242 117.117.117.2 8000 8000
    link 2 sctp 172.18.44.242 117.117.117.2 9000 9000
    route all table system
    !
cs7 linkset ITPb 5.100.5
    accounting
    link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
    link 1 sctp 172.18.44.243 117.117.117.3 8000 8000
    link 2 sctp 172.18.44.243 117.117.117.3 9000 9000
    route all table system
    !
cs7 linkset ITPd 5.100.3
    accounting
    link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
    route all table system
    !
cs7 linkset vt02 5.100.7
    accounting
→   match any qos class 1
    link 0 Serial1/0/0:0
    link 1 Serial2/0/0:0
    route all table system
    !
ip classless
no ip http server
!
!
!
line con 0
    transport input none
line aux 0
line vty 0 4
    password lab
    login
!
end

```



### Destination Point Code Classification

In the following configuration example, ITPD is configured to perform ITP QoS Destination Point Code packet classification. All packets with a DPC of 5.100.1 are classified as class 1 and are sent out on link 0 of the linkset ITPa.

```

version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPD
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
!
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.3
!
!
controller El 1/0/0
    channel-group 0 timeslots 1
!
controller El 2/0/0
    channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
    ip address 172.18.46.1 255.255.255.128
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface FastEthernet0/0/1
    ip address 117.117.118.4 255.255.255.0
    no ip route-cache distributed
    no ip route-cache
    no ip mroute-cache
!
interface Serial1/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
interface Serial2/0/0:0
    no ip address
    encapsulation mtp2
    no ip route-cache distributed
    no ip route-cache
    load-interval 30
!
cs7 local-peer 7000
local-ip 172.18.46.1

```

```

    local-ip 117.117.118.4
    !
    cs7 local-peer 8000
    local-ip 172.18.46.1
    local-ip 117.117.118.4
    !
    cs7 local-peer 9000
    local-ip 172.18.46.1
    local-ip 117.117.118.4
    !
→ cs7 qos class 1
→ ip precedence 4
    ! Routes to SMS-C and VMI4 use a combined linkset.
    ! This is defined by inserting two routes with
    ! identical priority (5 is default).
    !
    cs7 route-table system
→ update route 5.100.1 7.255.7 linkset ITPa qos class 1
    update route 5.100.1 7.255.7 linkset ITPb
    update route 5.100.6 7.255.7 linkset ITPa
    update route 5.100.6 7.255.7 linkset ITPb
    update route 5.100.7 7.255.7 linkset ITPc
    !
    cs7 linkset ITPa 5.100.2
    accounting
→ link 0 sctp 172.18.44.242 117.117.117.2 7000 7000
    qos class 1
    link 1 sctp 172.18.44.242 117.117.117.2 8000 8000
    link 2 sctp 172.18.44.242 117.117.117.2 9000 9000
    route all table system
    !
    cs7 linkset ITPb 5.100.5
    accounting
    link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
    route all table system
    !
    cs7 linkset ITPd 5.100.4
    accounting
    link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
    route all table system
    !
    cs7 linkset vrm2 5.100.8
    accounting
    link 0 Serial1/0/0:0
    link 1 Serial2/0/0:0
    route all table system
    !
    ip classless
    no ip http server
    !
    !
    !
    line con 0
    transport input none
    line aux 0
    line vty 0 4
    password lab
    login
    !
end

```

### Cisco IOS QoS Packet Scheduling and Queuing

The following configuration example illustrates ITP QoS used in conjunction with Cisco IOS QoS at the edge of the IP network.

ITPA is configured to perform ITP QoS Service Indicator packet classification. All packets arriving on linkset vmi4 are classified according to service indicator. Packets with si 3 (SCCP) are classified class 2 and are sent out on link 1 of the linkset ITPd. Packets with si 5 (ISUP) are classified class 1 and are sent out on link 0 of the linkset ITPd. The ITP QoS configuration statements are highlighted in bold text. Cisco ITP QoS configuration statements are highlighted in bold italic text.

Cisco IOS Modular QoS Command-Line Interface will be used to create traffic policies and attach these policies to interfaces. A traffic policy contains a traffic class and one or more IOS QoS features. A traffic class is used to classify traffic, while the QoS features in the traffic policy determine how to treat the classified traffic. The traffic policy in this configuration allocates 50% of the available bandwidth to ISUP packets and 25% of the available bandwidth to SCCP packets during periods of congestion.

Packets classified by ITP QoS will have the ToS byte in the IP header set to the appropriate IP precedence value. Before the classified packets are transmitted, the Cisco IOS QoS traffic policy assigned to the output interface is applied to each packet. In this example, any packets with an IP precedence value of 3, will be subject to the characteristics defined for class sccp. Packets with an IP precedence value of 4 will be subject to class isup characteristics

For more information about deploying Cisco IOS QoS policies, refer to the *Cisco IOS Quality of Service Solutions Configuration Guide* and the *Cisco IOS Quality of Service Solutions Command Reference*, included in the Cisco IOS Release 12.2 documentation at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/index.htm>

```
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname ITPA
!
enable secret 5 $1$iBmo$AF1H6u2CVGDRM5BMeuGmx/
enable password lab
!
!
no ip cef
no ip finger
no ip domain-lookup
!
cs7 variant itu
cs7 point-code 5.100.2
!
!
→ class-map match-all sccp
→   match ip precedence 3
→ class-map match-all isup
→   match ip precedence 4
!
!
→ policy-map itpQoS
→   class sccp
→     bandwidth 25
→   class isup
→     bandwidth 50
!
controller E1 1/0/0
channel-group 0 timeslots 1
!
```

```

controller E1 1/0/1
  channel-group 0 timeslots 1
!
controller E1 2/0/0
  channel-group 0 timeslots 1
!
!
interface FastEthernet0/0/0
  ip address 172.18.44.242 255.255.255.128
  no ip route-cache distributed
  no ip route-cache
  no ip mroute-cache
→ service-policy output itpQoS
!
interface FastEthernet0/0/1
  ip address 117.117.117.2 255.255.255.0
  no ip route-cache distributed
  no ip route-cache
  no ip mroute-cache
!
interface Serial1/0/0:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
interface Serial1/0/1:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
interface Serial2/0/0:0
  no ip address
  encapsulation mtp2
  no ip route-cache distributed
  no ip route-cache
  load-interval 30
!
cs7 local-peer 7000
  local-ip 172.18.44.242
  local-ip 117.117.117.2

cs7 local-peer 8000
  local-ip 172.18.44.242
  local-ip 117.117.117.2

cs7 local-peer 9000
  local-ip 172.18.44.242
  local-ip 117.117.117.2

→ cs7 qos class 1
→ qos-ip-precedence 4
!
→ cs7 qos class 2
→ qos-ip-precedence 3
!
!
! Routes using linksets to ITPC and ITPD have a default
! priority of 5. Routes to adjacent node SMS-C and VMI4
! are inserted by the systems with priority 5 and when
! the linkset is configured. They don't have to be defined

```

```

! here. Backup-routes to SMS-C and VMI4 are inserted with
! priority 9 using the "C-Link".
!
cs7 route-table system
  update route 5.100.7 7.255.7 linkset ITPc
  update route 5.100.8 7.255.7 linkset ITPd
  update route 5.100.1 7.255.7 linkset ITPb priority 9
  update route 5.100.6 7.255.7 linkset ITPb priority 9
!
cs7 linkset ITPc 5.100.4
  accounting
  link 0 sctp 172.18.45.1 117.117.119.4 7000 7000
  link 1 sctp 172.18.45.1 117.117.119.4 8000 8000
  link 2 sctp 172.18.45.1 117.117.119.4 9000 9000
  route all table system
!
cs7 linkset ITPd 5.100.3
  accounting
  link 0 sctp 172.18.46.1 117.117.118.4 7000 7000
→  qos class 1
→  link 1 sctp 172.18.46.1 117.117.118.4 8000 8000
→  qos class 2
  link 2 sctp 172.18.46.1 117.117.118.4 9000 9000
  route all table system
!
cs7 linkset smsc 5.100.1
  accounting
  link 0 Serial1/0/0:0
  link 1 Serial2/0/0:0
  route all table system
!
cs7 linkset vmi4 5.100.6
→  match si 3 qos-class 2
→  match si 5 qos-class 1
  accounting
  link 0 Serial1/0/1:0
  route all table system
!
cs7 linkset ITPb 5.100.5
  accounting
  link 0 sctp 172.18.44.243 117.117.117.3 7000 7000
  route all table system
!
ip classless
no ip http server
!
!
line con 0
  transport input none
line aux 0
line vty 0 4
  password lab
  login
!
end

```

## ITP SG QoS Configuration Examples

### Example 1

In Example 1 all the traffic flowing to asp1 will be classified based on the QoS class 3 since asp1 belongs to AS as1.

```
cs7 qos class 3
    qos-ip-precedence 3
!
cs7 m3ua 2905
    local-ip 7.7.7.7
!
cs7 asp asp1 2905 2905 m3ua
    remote-ip 5.5.5.5
!
cs7 as as1 m3ua
    routing 05050505 4.4.4
    asp asp1
    qos-class 3
!
```

### Example 2

In Example 2, since asp2 has been provisioned with qos-class 4, all the traffic flowing to asp2 will be classified with QoS class 4.

```
cs7 qos class 4
    qos-ip-dscp 40
!
cs7 m3ua 2905
    local-ip 7.7.7.7
!
cs7 asp asp2 2905 2905 m3ua
    remote-ip 5.5.5.6
    qos-class 4
!
cs7 as as2 m3ua
    routing 05050506 4.4.4
    asp asp1
!
```

### Example 3

In Example 3 the ISUP and SCCP ASPs are located on the same host (same IP address, but different SCTP ports). They are defined as two different ASPs. Since isup-asp belongs to isup-as and isup-as-bk ASes, the QoS with highest IP Type Of Service (TOS), i.e. qos-class 5, will be used for the traffic flowing to isup-asp. Also the traffic flowing to sccp-asp will be classified based on QoS class 3 since this ASP belongs to AS sccp-as.

```
cs7 qos class 3
    qos-ip-precedence 3
cs7 qos class 5
    qos-ip-precedence 5
!
cs7 m3ua 2905
    local-ip 7.7.7.7
!
cs7 asp isup-asp 5500 2905 m3ua
    remote-ip 6.6.6.6
cs7 asp sccp-asp 6000 2905 m3ua
    remote-ip 6.6.6.6
```

```

!
cs7 as isup-as m3ua
  routing-key 06060606 5.5.5
  asp isup-asp
  qos-class 5
!
cs7 as isup-as-bk m3ua
  routing-key 07070707 6.6.6
  asp isup-asp
  qos-class 3
!
cs7 as sccp-as m3ua
  routing-key 08080808 7.7.7
  asp sccp-asp
  qos-class 3
!

```

#### Example 4

In Example 4 any traffic coming in from asp3 will be classified as having QoS class 3. Also any ISUP (si=5) traffic coming in from asp4 will be classified as having QoS class 5. The packet is classified this way so that, if needed, it would properly get routed over M2PA links, as explained in the “Specifying QoS Routing Over M2PA Links” section on page 263.

```

cs7 qos class 3
  qos-ip-precedence 3
cs7 qos class 5
  qos-ip-dscp 40
!
cs7 m3ua 2905
  local-ip 7.7.7.7
!
cs7 asp asp3 2905 2905 m3ua
  remote-ip 6.6.6.10
  match any qos-class 3
cs7 asp asp4 2905 2905 m3ua
  remote-ip 6.6.6.11
  match si 5 qos-class 5
!

```

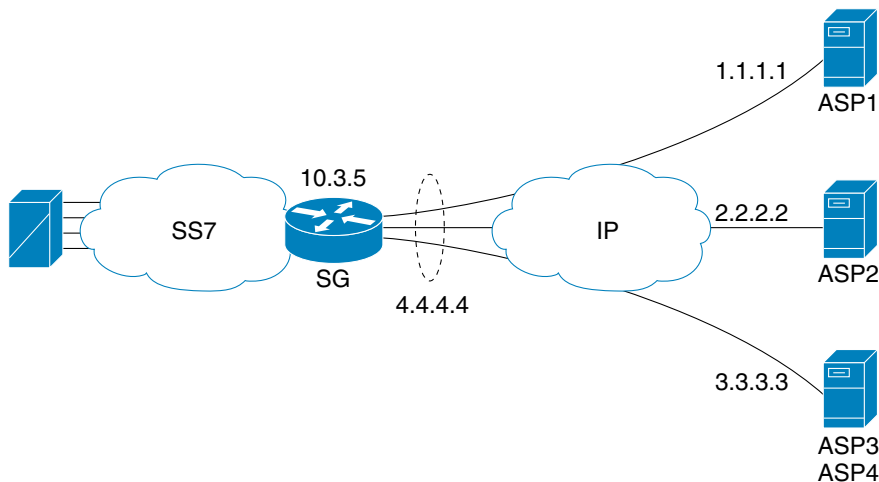
## ITP Signaling Gateway Configuration Examples

This section includes examples for the following aspects of ITP SG configuration:

- M3UA Configuration Example, page 388
- SUA Configuration Example, page 389
- ITP Signaling Gateway: ASPs with Unique Point Codes Configuration Example, page 390
- ITP SG Mated-SG Configuration Example, page 391
- ITP SG GTT Configuration Example, page 392
- ITP SG QoS Configuration Examples, page 394

Figure 22 illustrates the M3UA and SUA configuration examples that follow.

**Figure 22**      *ITP Signaling Gateway*



74459

### M3UA Configuration Example

This configuration is illustrated in Figure 22.

```
cs7 variant ansi
cs7 point-code 10.3.5

interface ethernet 0/0
 ip address 4.4.4.4 255.255.255.128

cs7 m3ua 2905
 local-IP 4.4.4.4

cs7 asp ASP1 2905 2905 m3ua
 remote-ip 1.1.1.1
cs7 asp ASP2 2905 2905 m3ua
 remote-ip 2.2.2.2
cs7 asp ASP3 10001 2905 m3ua
 remote-ip 3.3.3.3
cs7 asp ASP4 10002 2905 m3ua
 remote-ip 3.3.3.3

cs7 as BLUE m3ua
```



```

routing-key 100 10.3.8
asp ASP1
asp ASP2
traffic-mode loadshare

cs7 as GREEN m3ua
routing-key 200 10.3.7
asp ASP2
asp ASP3
asp ASP4
traffic-mode loadshare

```

## SUA Configuration Example

This example is illustrated in Figure 22.

```

cs7 variant ansi
cs7 point-code 10.3.5

interface ethernet 0/0
 ip address 4.4.4.4 255.255.255.128

cs7 sua 15000
 local-IP 4.4.4.4

cs7 asp ASP1 14001 15000 sua
 remote-ip 1.1.1.1
cs7 asp ASP2 14001 15000 sua
 remote-ip 2.2.2.2
cs7 asp ASP3 10001 15000 sua
 remote-ip 3.3.3.3
cs7 asp ASP4 10002 15000 sua
 remote-ip 3.3.3.3

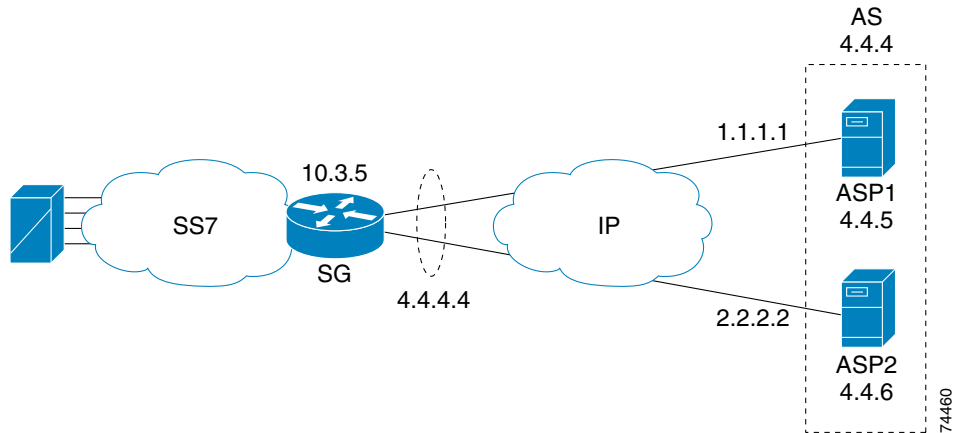
cs7 as BLUE sua
routing-key 100 10.3.8 ssn 8
asp ASP1
asp ASP2
traffic-mode override

cs7 as GREEN sua
routing-key 200 10.3.8 ssn 7
asp ASP2
asp ASP3
asp ASP4

```

## ITP Signaling Gateway: ASPs with Unique Point Codes Configuration Example

**Figure 23** ITP Signaling Gateway: ASPs with Unique Point Codes



The following configuration example is illustrated in Figure 23.

```
cs7 variant ansi
cs7 point-code 10.3.5

interface ethernet 0/0
 ip address 4.4.4.4 255.255.255.128

cs7 m3ua 2905
 local-IP 4.4.4.4

cs7 asp ASP1 2905 2905 m3ua
 remote-ip 1.1.1.1
cs7 asp ASP2 2905 2905 m3ua
 remote-ip 2.2.2.2

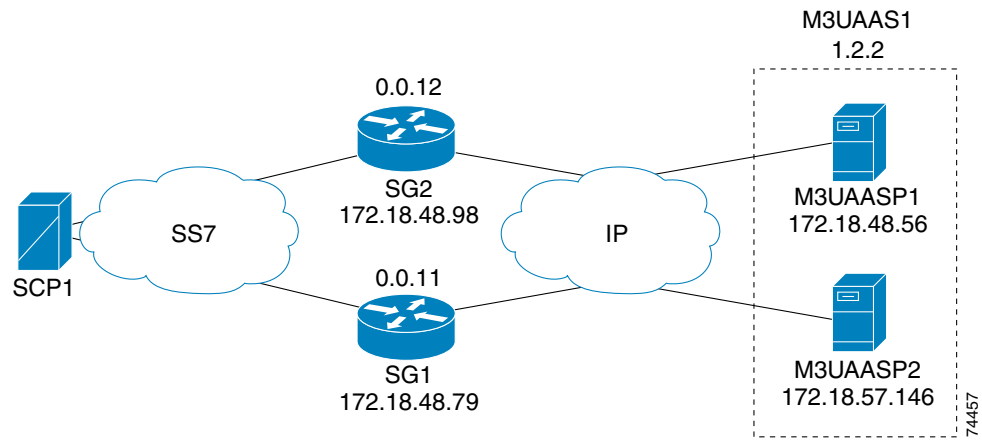
cs7 as ISUPAS m3ua
 routing-key 100 4.4.4
 asp ASP1
 asp ASP2

cs7 as ISUPASP1 m3ua
 routing-key 200 4.4.5
 asp ASP1

cs7 as ISUPASP2 m3ua
 routing-key 300 4.4.6
 asp ASP2
```

## ITP SG Mated-SG Configuration Example

**Figure 24** ITP Signaling Gateway: Mated-SG



The following configuration example is illustrated in Figure 24.

### SG1:

```
cs7 variant ANSI
cs7 point-code 0.0.11
!
interface FastEthernet0/0
 ip address 172.18.48.79 255.255.255.128
!
cs7 m3ua 2905
 local-ip 172.18.48.79
!
cs7 sgmp 9999
 local-ip 172.18.48.79
!
cs7 mated-sg sg2 9999
 remote-ip 172.18.48.98
!
cs7 asp m3uaasp1 2905 2905 m3ua
 remote-ip 172.18.48.56
!
cs7 asp m3uaasp2 2905 2905 m3ua
 remote-ip 172.18.57.146
!
cs7 as M3UAAS1 m3ua
 routing-key 200 1.2.2
 asp m3uaasp1
 asp m3uaasp2
 traffic-mode override
!
```

### SG2:

```
cs7 variant ANSI
cs7 point-code 0.0.12
!
interface FastEthernet0/0
 ip address 172.18.48.98 255.255.255.128
!
```

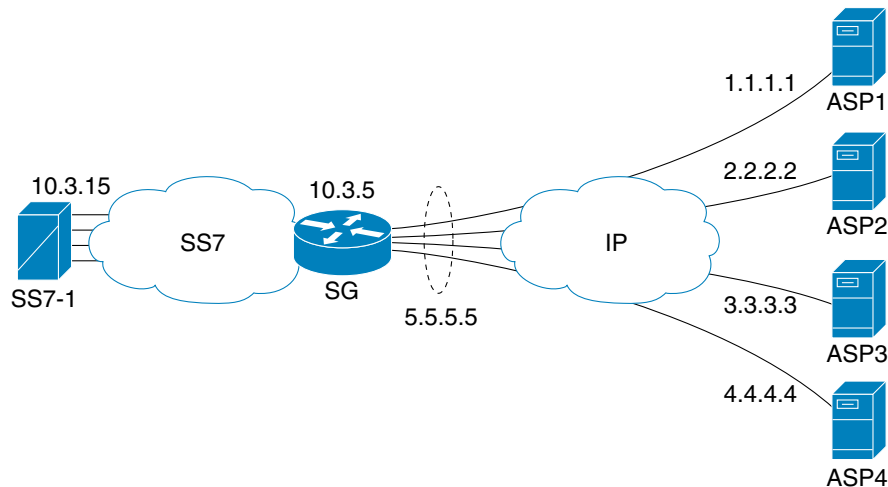
```

cs7 m3ua 2905
  local-ip 172.18.48.98
!
cs7 sgmp 9999
  local-ip 172.18.48.98
!
cs7 mated-sg sg1 9999
  remote-ip 172.18.48.79
!
cs7 asp m3uaasp1 2905 2905 m3ua
  remote-ip 172.18.48.56
!
cs7 asp m3uaasp2 2905 2905 m3ua
  remote-ip 172.18.57.146
!
cs7 as M3UAAS1 m3ua
  routing-key 200 1.2.2
  asp m3uaasp1
  asp m3uaasp2
  traffic-mode override
!

```

## ITP SG GTT Configuration Example

**Figure 25 ITP Signaling Gateway: GTT**



74461

The following configuration example is illustrated in Figure 25.

```

cs7 variant ansi
cs7 point-code 10.3.5

interface ethernet 0/0
  ip address 5.5.5.5 255.255.255.128
interface serial 0/0
  encapsulation mtp2

cs7 sua 14001
  local-IP 5.5.5.5

```

```

cs7 m3ua 15000
  local-ip 5.5.5.5

cs7 route-table system

cs7 asp ASP1 10001 15000 m3ua
  remote-ip 1.1.1.1
cs7 asp ASP2 10001 15000 m3ua
  remote-ip 2.2.2.2
cs7 asp ASP3 14001 14001 sua
  remote-ip 3.3.3.3
cs7 asp ASP4 14001 14001 sua
  remote-ip 4.4.4.4

cs7 as BLUE m3ua
  routing-key 1 gtt
  asp ASP1
  asp ASP2
  traffic-mode override

cs7 as GREEN sua
  routing-key 2 gtt
  asp ASP3
  asp ASP4
  traffic-mode loadshare

cs7 as GREENASP3 sua
  routing-key 3 gtt
  asp ASP3

cs7 as GREENASP4 sua
  routing-key 4 gtt
  asp ASP4

cs7 linkset SS71 10.3.15
  link 0 serial 0/0
  route all table system

cs7 gtt selector 800NUM tt 255
  gta 800456 app-grp BLUE800
  gta 800457 app-grp GREEN800

cs7 gtt selector E164SEL tt 14
  gta 1123456789001 asname GREENASP3 pcssn
  gta 1123456789002 asname GREENASP4 pcssn

cs7 gtt application-group BLUE800
  multiplicity cost
  asname BLUE 1 pcssn
  pc 10.3.15 2 gt

cs7 gtt application-group GREEN800
  multiplicity cost
  asname GREEN 1 pcssn
  pc 10.3.15 2 pcssn

```

## ITP SG QoS Configuration Examples

### Example 1

In Example 1 all the traffic flowing to asp1 will be classified based on the QoS class 3 since asp1 belongs to AS as1.

```
cs7 qos class 3
  qos-ip-precedence 3
!
cs7 m3ua 2905
  local-ip 7.7.7.7
!
cs7 asp asp1 2905 2905 m3ua
  remote-ip 5.5.5.5
!
cs7 as as1 m3ua
  routing 05050505 4.4.4
  asp asp1
  qos-class 3
!
```

### Example 2

In Example 2, since asp2 has been provisioned with qos-class 4, all the traffic flowing to asp2 will be classified with QoS class 4.

```
cs7 qos class 4
  qos-ip-dscp 40
!
cs7 m3ua 2905
  local-ip 7.7.7.7
!
cs7 asp asp2 2905 2905 m3ua
  remote-ip 5.5.5.6
  qos-class 4
!
cs7 as as2 m3ua
  routing 05050506 4.4.4
  asp asp1
!
```

### Example 3

In Example 3 the ISUP and SCCP ASPs are located on the same host (same IP address, but different SCTP ports). They are defined as two different ASPs. Since isup-asp belongs to isup-as and isup-as-bk ASes, the QoS with highest IP Type Of Service (TOS), i.e. qos-class 5, will be used for the traffic flowing to isup-asp. Also the traffic flowing to sccp-asp will be classified based on QoS class 3 since this ASP belongs to AS sccp-as.

```
cs7 qos class 3
  qos-ip-precedence 3
cs7 qos class 5
  qos-ip-precedence 5
!
cs7 m3ua 2905
  local-ip 7.7.7.7
!
cs7 asp isup-asp 5500 2905 m3ua
  remote-ip 6.6.6.6
cs7 asp sccp-asp 6000 2905 m3ua
```

```

        remote-ip 6.6.6.6
    !
    cs7 as isup-as m3ua
        routing-key 06060606 5.5.5
        asp isup-asp
        qos-class 5
    !
    cs7 as isup-as-bk m3ua
        routing-key 07070707 6.6.6
        asp isup-asp
        qos-class 3
    !
    cs7 as sccp-as m3ua
        routing-key 08080808 7.7.7
        asp sccp-asp
        qos-class 3
    !

```

#### Example 4

In Example 4 any traffic coming in from asp3 will be classified as having QoS class 3. Also any ISUP (si=5) traffic coming in from asp4 will be classified as having QoS class 5. The packet is classified this way so that, if needed, it would properly get routed over M2PA links, as explained in the “Specifying QoS Routing Over M2PA Links” section on page 263.

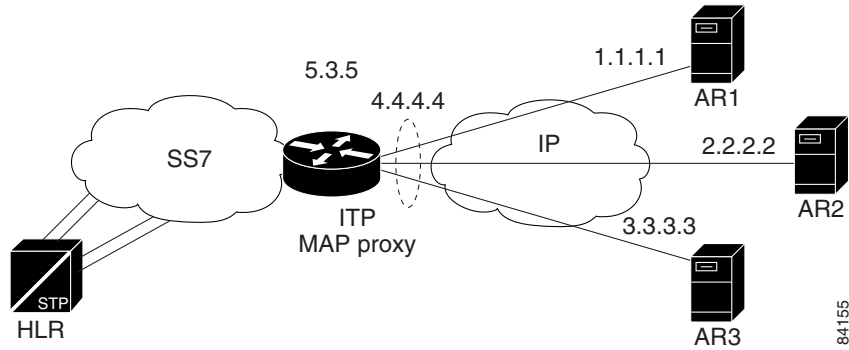
```

cs7 qos class 3
    qos-ip-precedence 3
cs7 qos class 5
    qos-ip-dscp 40
!
cs7 m3ua 2905
    local-ip 7.7.7.7
!
cs7 asp asp3 2905 2905 m3ua
    remote-ip 6.6.6.10
    match any qos-class 3
cs7 asp asp4 2905 2905 m3ua
    remote-ip 6.6.6.11
    match si 5 qos-class 5
!

```

## ITP MAP Proxy Example

Figure 26 ITP MAP Proxy



The following configuration example is illustrated in Figure 26.

```
cs7 mapua rad2000 radius 2000
local-ip 4.4.4.4
client 1.1.1.1 secret 0 client1111
client 2.2.2.2 secret 0 client2222
client 3.3.3.3 secret 0 client3333
map-source-addr digits 1234567890 tt 10
gsm-authent-vlr
authorize bs 26
cache-size 10000
max-return 2
```

## CS7 Monitor Configuration Example

```
card type 4 1

controller t1 4/1/0
clock source line primary
channel 0 timeslot 1 speed 56
channel 1 timeslot 2 speed 56

interface Serial4/1/0:0
encapsulation cs7monitor

interface Serial4/1/0:1
encapsulation cs7monitor

interface ATM5/0/0
atm cs7monitor
pvc 0/5 qsaal

cs7 monitor 9000
link Serial4/1/0:0
link Serial4/1/0:1
link ATM5/0/0
```





## ITP Command Set: A - D

---

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 Command Reference publications.

- **access-group**, page 402
- **access-list**, page 403
- **accounting**, page 406
- **active-asps-target**, page 407
- **addr (cs7 mlr address-table)**, page 408
- **addr (cs7 sms address-table)**, page 410
- **adjacent-sp-restart**, page 412
- **allow-multi-message-dialogue**, page 413
- **asname (cs7 gtt application group)**, page 414
- **asname (cs7 mlr result)**, page 416
- **asp**, page 418
- **assoc-retransmit (cs7 asp)**, page 420
- **assoc-retransmit (cs7 link)**, page 421
- **assoc-retransmit (cs7 mated-sg)**, page 422
- **assoc-retransmit (cs7 m3ua)**, page 423
- **assoc-retransmit (cs7 sgmp)**, page 424
- **assoc-retransmit (cs7 sua)**, page 425
- **assoc-retransmit (group peer)**, page 426
- **association**, page 427
- **atm cs7monitor**, page 428
- **atm nni**, page 429
- **authorize**, page 430
- **bind-type (cs7 sms profile parameters)**, page 434
- **bind-type (CS7 sms session parameters)**, page 436
- **block**, page 438
- **broadcast**, page 439

- **bundling (cs7 asp), page 441**
- **bundling (CS7 Link), page 442**
- **bundling (cs7 mated-sg), page 444**
- **bundling (cs7 m3ua), page 445**
- **bundling (cs7 profile), page 446**
- **bundling (cs7 sgmp), page 448**
- **bundling (cs7 sua), page 449**
- **bundling (group peer), page 451**
- **cache-size, page 452**
- **cdpa, page 453**
- **cdr-service, page 456**
- **cdr-service-queue, page 457**
- **cgpa, page 458**
- **clear cs7 accounting, page 461**
- **clear cs7 all, page 462**
- **clear cs7 as, page 463**
- **clear cs7 asp, page 464**
- **clear cs7 asroute, page 465**
- **clear cs7 dynamic-route, page 466**
- **clear cs7 gtt-meas, page 467**
- **clear cs7 mapua statistics, page 468**
- **clear cs7 mated-sg statistics, page 469**
- **clear cs7 monitor, page 470**
- **clear cs7 mtp3 event-history, page 471**
- **clear cs7 pointcode event-history, page 472**
- **clear cs7 offload mtp3, page 473**
- **clear cs7 statistics, page 474**
- **client, page 477**
- **clock source (controller), page 479**
- **clock source (interface), page 481**
- **congestion-threshold, page 483**
- **cs7 accounting, page 484**
- **cs7 address-table replace, page 485**
- **cs7 as, page 486**
- **cs7 asp, page 488**
- **cs7 asroute, page 490**
- **cs7 capability-pc, page 492**
- **cs7 cdr destination, page 494**

- **cs7 cdr service**, page 495
- **cs7 cli**, page 496
- **cs7 description**, page 497
- **cs7 display-name**, page 498
- **cs7 distribute-sccp-unsequenced**, page 499
- **cs7 fast-restart**, page 500
- **cs7 group**, page 501
- **cs7 gtt address-conversion**, page 502
- **cs7 gtt application-group**, page 503
- **cs7 gtt concern-pclist**, page 504
- **cs7 gtt load**, page 506
- **cs7 gtt map**, page 507
- **cs7 gtt map sp**, page 510
- **cs7 gtt map ss**, page 511
- **cs7 gtt replace-db**, page 513
- **cs7 gtt selector**, page 514
- **cs7 host**, page 516
- **cs7 inhibit**, page 518
- **cs7 instance pc-conversion**, page 519
- **cs7 instance pc-conversion default**, page 520
- **cs7 linkset**, page 522
- **cs7 local-peer**, page 524
- **cs7 log**, page 526
- **cs7 log checkpoint**, page 527
- **cs7 m3ua**, page 528
- **cs7 mapua**, page 530
- **cs7 mated-sg**, page 532
- **cs7 max-dynamic-routes**, page 534
- **cs7 mlr address-table**, page 535
- **cs7 mlr result**, page 536
- **cs7 mlr ruleset**, page 538
- **cs7 mlr table**, page 540
- **cs7 monitor**, page 542
- **cs7 mtp3 event-history**, page 543
- **cs7 mtp3 timer**, page 545
- **cs7 mtp3 tuning**, page 551
- **cs7 multi-instance**, page 553
- **cs7 national-options**, page 554

- **cs7 network-name**, page 557
- **cs7 network-indicator**, page 556
- **cs7 nso**, page 558
- **cs7 offload mtp3**, page 559
- **cs7 offload mtp3 restart**, page 560
- **cs7 paklog**, page 561
- **cs7 point-code**, page 563
- **cs7 point-code delimiter**, page 564
- **cs7 point-code format**, page 565
- **cs7 profile**, page 567
- **cs7 prompt enhanced**, page 569
- **cs7 qos class**, page 570
- **cs7 remote-congestion-msgs**, page 571
- **cs7 route-mgmt-sls**, page 572
- **cs7 route-table**, page 574
- **cs7 save address-table**, page 575
- **cs7 save gtt-table**, page 576
- **cs7 save log**, page 577
- **cs7 save route-table**, page 578
- **cs7 sccp gti-conversion**, page 579
- **cs7 sccp instance-conversion**, page 580
- **cs7 sccp ssn-conversion**, page 582
- **cs7 secondary-pc**, page 583
- **cs7 sg-event-history**, page 584
- **cs7 sgmp**, page 585
- **cs7 sls-shift**, page 587
- **cs7 sms address-table**, page 588
- **cs7 sms msc-table**, page 589
- **cs7 sms result-group**, page 590
- **cs7 sms route-table**, page 592
- **cs7 sms ruleset**, page 593
- **cs7 sms smpp**, page 594
- **cs7 sms smpp profile**, page 595
- **cs7 sms ucp**, page 597
- **cs7 sms ucp profile**, page 598
- **cs7 snmp dest-max-window**, page 600
- **cs7 snmp mgmt-max-window**, page 601
- **cs7 sua**, page 602

- **cs7 sua-allow-xudt-request**, page 604
- **cs7 summary-routing-exception**, page 605
- **cs7 tcap tid-timer**, page 606
- **cs7 tfc-pacing-ratio**, page 607
- **cs7 uninhibit**, page 608
- **cs7 util-abate**, page 609
- **cs7 util-plan-capacity**, page 610
- **cs7 util-sample-interval**, page 611
- **cs7 util-threshold**, page 612
- **cs7 variant**, page 613
- **cs7 xua-as-based-congestion**, page 615
- **cs7 xua-ssnm-filtering**, page 616
- **cs7 xua-tfc-allowed**, page 617
- **cumulative-sack (CS7 ASP)**, page 618
- **cumulative-sack (CS7 Link)**, page 619
- **cumulative-sack (cs7 mated-sg)**, page 620
- **cumulative-sack (CS7 M3UA)**, page 621
- **cumulative-sack (CS7 SGMP)**, page 622
- **cumulative-sack (cs7 sua)**, page 623
- **cumulative-sack (group peer)**, page 624
- **default**, page 625
- **description (cs7 link)**, page 627
- **description (cs7 linkset)**, page 628
- **dest-port (cs7 mlr ruleset rule)**, page 629
- **dest-port (cs7 sms set rule)**, page 630
- **dest-sme (cs7 mlr ruleset rule)**, page 632
- **dest-sme (cs7 sms set rule)**, page 635
- **dest-sme-table (cs7 mlr ruleset rule)**, page 637
- **dest-sme-table (cs7 sms set rule)**, page 639
- **dest-smsc (cs7 mlr ruleset rule)**, page 641
- **dest-smsc (cs7 sms set rule)**, page 643
- **destination (cs7 cdr service)**, page 645
- **destination (cs7 sms smpp)**, page 646
- **destination (cs7 sms ucp)**, page 647
- **digits**, page 648
- **display-name (cs7 link)**, page 650
- **display-name (cs7 linkset)**, page 651

# access-group

To enable Cisco ITP gateway screening on a linkset, use the **access-group** CS7 linkset submode command. To disable access lists on the linkset, use the **no** form of this command.

**access-group** {2700-2999 | *name*} [**in** | **out**]

**no access-group** [2700-2999 | *name*] [**in** | **out**]

|                    |                  |                                             |
|--------------------|------------------|---------------------------------------------|
| Syntax Description | <b>2700-2999</b> | Number of an access list.                   |
|                    | <i>name</i>      | Name of an access list.                     |
|                    | <b>in</b>        | Apply this access list to inbound packets.  |
|                    | <b>out</b>       | Apply this access list to outbound packets. |

**Defaults** No default behavior or values.

**Command Modes** CS7 linkset submode

|                 |                |                              |
|-----------------|----------------|------------------------------|
| Command History | <b>Release</b> | <b>Modification</b>          |
|                 | 12.2(1)MB      | This command was introduced. |

**Usage Guidelines** The access-group command allows you to assign an ITP access list to a linkset to screen either inbound or outbound packets.

**Examples** The following example assigns access list 2700 to filter inbound packets:

```
access-list 2700 permit dpc 4.100.0 0.0.255
.
cs7 linkset michael 10.1.1
  access-group 2700 in
```

|                  |                              |                                                     |
|------------------|------------------------------|-----------------------------------------------------|
| Related Commands | <b>Command</b>               | <b>Description</b>                                  |
|                  | <b>access-list</b>           | Defines an access list.                             |
|                  | <b>show cs7 access-lists</b> | Displays information about defined ITP access lists |

# access-list

To define a Cisco ITP access list, use the **access-list** global configuration command. To remove a Cisco SS7 access list, use the **no** form of this command.

```
access-list access-list-number [instance instance-number] [compiled] [dynamic-extended]
[rate-limit {precedence | mask precedence-bitmask} {deny | permit} [dpc point-code
wildcard-mask | opc point-code wildcard-mask | si {0-15} | pattern offset hex-pattern | aftpc
point-code ss-number wildcard-mask ss-number-mask | cdpa point-code ss-number
wildcard-mask ss-number-mask | cgpa point-code ss-number wildcard-mask ss-number-mask |
```

```
selector | all] [remark line]
```

**no access-list** *access-list-number*

## Syntax Description

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>access-list-number</i> | Number of an access list. The Cisco SS7 access list range is a decimal number from 2700 to 2999. The other access list ranges are:<br>1 - 99        IP standard access list<br>100 - 999    IP extended access list<br>1100 - 1199 Extended 48-bit MAC address access list<br>1300 - 1999 IP standard access list (expanded range)<br>200 - 299    Protocol type-code access list<br>2000 - 2699 IP extended access list (expanded range)<br>700 - 799    48-bit MAC address access list |
| <b>instance</b>           | Indicate the specific instance, if the Multiple Instances feature is enabled.                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>instance-number</i>    | Instance number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>compiled</b>           | Enable IP access-list compilation.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>dynamic-extended</b>   | Extend the dynamic ACL.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>rate-limit</b>         | Simple rate-limit access list.                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>precedence</i>         | Precedence. Valid range is 0 through 7.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>mask</b>               | Use a precedence bitmask.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>precedence-bitmask</i> | Precedence bitmask. Valid range is 0 through FF.                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>deny</b>               | Denies access if the conditions are matched.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>permit</b>             | Permits access if the conditions are matched.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>dpc</b>                | Applies the access list to the destination point code.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>point-code</i>         | The point code to which the packet is being sent.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>wildcard-mask</i>      | Specifies which bits of the point code to ignore for matching.                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>opc</b>                | Applies the access list to the origination point code.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>point-code</i>         | The point code from which the packet is being sent.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>wildcard-mask</i>      | Wildcard bits to be applied to the origination point code.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>si</b>                 | Service indicator.                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>si-value</i>           | Service indicator value. Range is 0 to 15.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>pattern</b>            | Keyword indicating that pattern-matching is to be used in determining access.                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>offset</i>             | Decimal number indicating the number of bytes into the packet where the byte comparison should begin.                                                                                                                                                                                                                                                                                                                                                                                    |

|                       |                                                                                          |
|-----------------------|------------------------------------------------------------------------------------------|
| <i>hex-pattern</i>    | Hexadecimal string of digits representing a byte pattern.                                |
| <b>aftpc</b>          | Applies the access list to the affected point code and SSN in SCCP management messages.  |
| <i>point-code</i>     | Affected point code in the SCCP management message.                                      |
| <i>ss-number</i>      | Subsystem number at the affected point code.                                             |
| <i>wildcard-mask</i>  | Specifies which bits of the point code to ignore for matching.                           |
| <i>ss-number-mask</i> | Specifies which bits of the subsystem number to ignore for matching.                     |
| <b>cdpa</b>           | Applies the access list to the called party address point code and SSN in SCCP messages. |
| <i>point-code</i>     | Called party point code in the SCCP message.                                             |
| <i>ss-number</i>      | The subsystem number at the point code.                                                  |
| <i>wildcard-mask</i>  | Specifies which bits of the point code to ignore for matching.                           |
| <i>ss-number-mask</i> | Specifies which bits of the subsystem number to ignore for matching.                     |
| <b>cgpa</b>           | Applies the access list to the calling party point code and SSN in SCCP messages.        |
| <i>point-code</i>     | The calling party point code in the SCCP management message.                             |
| <i>ss-number</i>      | Subsystem number at the point code.                                                      |
| <i>wildcard-mask</i>  | Specifies which bits of the point code to ignore for matching.                           |
| <i>ss-number-mask</i> | Specifies which bits of the subsystem number to ignore for matching.                     |
| <b>selector</b>       | Called Party (gti tt np nai).                                                            |
| <b>all</b>            | Permit or deny all (other) packets.                                                      |
| <b>remark line</b>    | Include a remark.                                                                        |

**Defaults**

Any message that does not match any of the access-list entries is, by default, denied.

**Command Modes**

Global configuration

**Command History**

| Release   | Modification                                                                   |
|-----------|--------------------------------------------------------------------------------|
| 12.2(1)MB | This command was introduced for Cisco ITP.                                     |
| 12.2(4)MB | <b>aftpc</b> , <b>cdpa</b> , <b>cgpa</b> , and <b>selector</b> keywords added. |

**Usage Guidelines**

The **access-list** command defines the access list. After defining the access list, you use the **access-group** command to apply the access list to a linkset.

SCCP screening is a method of screening MSUs on inbound and outbound linkset.

If the access list is inbound, when the ITP receives a packet it checks the access list criteria statements for a match. If the packet is permitted, the ITP continues to process the packet. If the packet is denied, the ITP discards it.

If the access list is outbound, after receiving and routing a packet to the outbound interface the ITP checks the access list criteria statements for a match. If the packet is permitted, the ITP transmits the packet. If the packet is denied, the ITP discards it.



The keywords **selector** and **cgpa** enable screening on the inbound linkset.

The keywords **aftpc** and **cdpa** enable screening on the outbound linkset.

### Examples

The following example defines an access list for the ITP.

```
access list 2700 permit dpc 4.100.0 0.0.255
!
!
cs7 linkset tony 4.100.2
  access-group 2700 out
!
```

The following example will cause all SCCP management packets with affected point code 7.5.4 and SSN 10 to be dropped, and permit all the rest.

```
access-list 2710 deny aftpc 7.5.4 10
access-list 2710 permit all

cs7 linkset tony 4.100.2
  access-group 2710 in
```

### Related Commands

| Command                      | Description                                         |
|------------------------------|-----------------------------------------------------|
| <b>access-group</b>          | Assigns an ITP access list to a linkset             |
| <b>cs7 paklog</b>            | Configures the ITP Packet Logging facility.         |
| <b>show cs7 access-lists</b> | Displays information about defined ITP access lists |

# accounting

To enable accounting of inbound and outbound frames on a linkset, use the **accounting** CS7 linkset submode command. To disable accounting, use the **no** form of this command.

**accounting**

**no accounting**

---

## Syntax Description

This command has no arguments or keywords.

---

## Defaults

Accounting is enabled by default.

---

## Command Modes

CS7 linkset submode

---

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

---

## Usage Guidelines

Because accounting is enabled by default, only the **no** form of the command will be displayed as output of the **show configuration** command.

---

## Examples

The following example disables accounting on the linkset named michael:

```
cs7 linkset michael 10.1.1
no accounting
```

---

## Related Commands

| Command                     | Description                          |
|-----------------------------|--------------------------------------|
| <b>clear cs7 accounting</b> | Clears the ITP accounting databases. |
| <b>show cs7 accounting</b>  | Displays ITP accounting details.     |

# active-asps-target

To enable sending an “Insufficient ASP Resources Active in AS” Notify message to maintain a minimum number of active ASPs in the AS, use the `active-asps-target` command in CS7 AS configuration mode. To remove the configuration, use the **no** form of this command.

**active-asps-target** *active-asps-target*

**no active-asps-target** *active-asps-target*

|                           |                           |                                                                                    |
|---------------------------|---------------------------|------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>active-asps-target</i> | The minimum desired number of active ASPs in the AS. The range is 1 to 4294967295. |
|---------------------------|---------------------------|------------------------------------------------------------------------------------|

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

|                      |        |
|----------------------|--------|
| <b>Command Modes</b> | CS7 AS |
|----------------------|--------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(19)SW | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | When an ASP becomes inactive in a loadshare (bindings or roundrobin) or broadcast AS, and the remaining number of ASPs is less than the <code>active-asps-target</code> specification, a Notify message is sent to all inactive ASPs in the AS.                                                |
|                         | The AS state remains independent of whether there are sufficient resources active. Because traffic mode is optional on the AS and can be defined by the first active ASP, the <code>active-asp-target</code> value is configurable on all ASes and is ignored if the traffic mode is override. |

|                 |                                                                                       |
|-----------------|---------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the minimum desired number of active ASPs in the AS to 50: |
|                 | <code>active-asps-target 50</code>                                                    |

| <b>Related Commands</b> | Command                   | Description              |
|-------------------------|---------------------------|--------------------------|
|                         | <code>show cs7 asp</code> | Display ASP information. |

## addr (cs7 mlr address-table)

To specify an MLR address within the MLR address table, use the **addr** CS7 MLR address table configuration mode command. To remove the definition, use the **no** form of this command.

```
addr address [exact] [result {asname asname | block | continue | group group-name | gt
addr-string [tt tt gti {2 | 4 np np nai nai}} | pc pc [ssn ssn]}]
```

```
no addr address [exact] [result {asname asname | block | continue | group group-name gt
addr-string [tt tt gti {2 | 4 np np nai nai}} | pc pc [ssn ssn]}]
```

### Syntax Description

|                    |                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>address</i>     | Address of 1 to 20 hexadecimal digits.                                                                                                                                                                                                                                                            |
| <b>exact</b>       | (Optional) Configured address must match addr exactly.                                                                                                                                                                                                                                            |
| <b>result</b>      | (Optional) Configure result.                                                                                                                                                                                                                                                                      |
| <b>asname</b>      | (Optional) Message will be routed to an AS.                                                                                                                                                                                                                                                       |
| <i>asname</i>      | AS name.                                                                                                                                                                                                                                                                                          |
| <b>block</b>       | (Optional) Message will be dropped.                                                                                                                                                                                                                                                               |
| <b>continue</b>    | (Message) Message processing will continue.                                                                                                                                                                                                                                                       |
| <b>group</b>       | (Optional) Message will be routed using a result group.                                                                                                                                                                                                                                           |
| <i>group-name</i>  | Group-name                                                                                                                                                                                                                                                                                        |
| <b>gt</b>          | (Optional) Specifies that the message will be routed using SCCP global title. The specified address will be placed in the SCCP Called Party Address (CdPA), the routing indicator (RI) will be changed to RI=GT, and then routed based on the locally provisioned global title translation table. |
| <i>addr-string</i> | Address string of 1 to 5 hexadecimal characters. The string is not input in BCD-string format, but in normal form.                                                                                                                                                                                |
| <b>tt</b>          | Specifies a translation type.                                                                                                                                                                                                                                                                     |
| <i>tt</i>          | Translation type. In the Called Party field of the GTT message, the SSP sets the TT to indicate which GTT table the STP should use. The TT is a 1 byte field that usually maps to a specific service. Valid numbers are in the range 0 through 255.                                               |
| <b>gti</b>         | (Optional) Specifies a Global Title Indicator. (Only specified when <b>cs7 variant</b> is ITU or China.)                                                                                                                                                                                          |
| <i>gti</i>         | Global Title Indicator. Valid numbers are 2 (primarily used in the ANSI domain) or 4 (used in the ITU domain).                                                                                                                                                                                    |
| <b>np</b>          | (Optional) Specifies a numbering plan value. (Only specified when the <i>gti</i> value is 4.)                                                                                                                                                                                                     |
| <i>np</i>          | Numbering plan value. Valid range is 0 through 15.                                                                                                                                                                                                                                                |
| <b>nai</b>         | (Optional) Specifies a nature of address indicator. (Only specified when the <i>gti</i> value is 4.)                                                                                                                                                                                              |
| <i>nai</i>         | (Optional) Nature of address indicator. Valid range is 0 through 127.                                                                                                                                                                                                                             |
| <b>pc</b>          | (Optional) Point code message will be routed using PC.                                                                                                                                                                                                                                            |
| <i>pc</i>          | Destination point code used to route message.                                                                                                                                                                                                                                                     |
| <b>ssn</b>         | (Optional) Specifies a subsystem number.                                                                                                                                                                                                                                                          |
| <i>ssn</i>         | Subsystem number. Valid range is 2 to 255.                                                                                                                                                                                                                                                        |

**Defaults**

No default behavior or values.

**Command Modes**

CS7 mlr address table configuration

**Command History**

| Release     | Modification                                                              |
|-------------|---------------------------------------------------------------------------|
| 12.2(21)SW  | This command was introduced.                                              |
| 12.2(25)SW1 | Added the ability to configure result gt for MLR address table addresses. |

**Examples****Example 1**

The following example specifies an MLR address table named TABLE1 with an MLR address of 24. The configured address must match exactly, and the result group is SMSC-GROUP1.

```
cs7 mlr address-table TABLE1
  addr 24 exact result group SMSC-GROUP1
```

**Example 2**

The following example specifies an MLR address table named TABLE1 with the result configured for a GT address:

```
cs7 instance 0 mlr address-table TABLE1
addr 123456 result gt 8282 tt 11 gti 2
addr 12345 result gt 4545 tt 10 gti 4 np 2 nai 1
addr 1234
addr 180002 exact
```

**Related Commands**

| Command                           | Description                                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>cs7 mlr address-table</b>      | Defines a table of addresses that is to be used when searching with the previously specified routing parameter. |
| <b>show cs7 mlr address-table</b> | Displays the addresses matched within the MLR address table.                                                    |

## addr (cs7 sms address-table)

To configure one or more addresses that can be used for blocking or routing SMS messages, use the **addr** command in CS7 SMS address table configuration mode. To remove the address, use the **no** form of this command.

```
addr address [exact] [result {block | next-rule | rule rule-number | group group-name | pc pc [ssn ssn] | gt addr-string [tt tt gti {2 | 4 np np nai nai}}]]
```

```
no addr address
```

### Syntax Description

|                    |                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>address</i>     | Address of 1 to 20 hexadecimal digits.                                                                                                                                                                                                                                                            |
| <b>exact</b>       | (Optional) Configured address must match addr exactly.                                                                                                                                                                                                                                            |
| <b>result</b>      | (Optional) Configure result.                                                                                                                                                                                                                                                                      |
| <b>block</b>       | (Optional) Message will be rejected.                                                                                                                                                                                                                                                              |
| <b>next-rule</b>   | (Optional) Message processing will continue with the next rule in the ruleset.                                                                                                                                                                                                                    |
| <b>rule</b>        | (Optional) Routing should proceed with the specified rule number.                                                                                                                                                                                                                                 |
| <i>rule-number</i> | Target rule number. The rule number must be greater than the rule number used to access the address table.                                                                                                                                                                                        |
| <b>group</b>       | (Optional) Message will be routed using a result group.                                                                                                                                                                                                                                           |
| <i>group-name</i>  | Group-name                                                                                                                                                                                                                                                                                        |
| <b>pc</b>          | (Optional) Point code message will be routed using PC.                                                                                                                                                                                                                                            |
| <i>pc</i>          | Destination point code used to route message.                                                                                                                                                                                                                                                     |
| <b>ssn</b>         | (Optional) Specifies a subsystem number.                                                                                                                                                                                                                                                          |
| <i>ssn</i>         | Subsystem number. Valid range is 2 to 255.                                                                                                                                                                                                                                                        |
| <b>gt</b>          | (Optional) Specifies that the message will be routed using SCCP global title. The specified address will be placed in the SCCP Called Party Address (CdPA), the routing indicator (RI) will be changed to RI=GT, and then routed based on the locally provisioned global title translation table. |
| <i>addr-string</i> | Address string of 1 to 5 hexadecimal characters. The string is not input in BCD-string format, but in normal form..                                                                                                                                                                               |
| <b>tt</b>          | Specifies a translation type.                                                                                                                                                                                                                                                                     |
| <i>tt</i>          | Translation type. In the Called Party field of the GTT message, the SSP sets the TT to indicate which GTT table the STP should use. The TT is a 1 byte field that usually maps to a specific service. Valid numbers are in the range 0 through 255.                                               |
| <b>gti</b>         | (Optional) Specifies a Global Title Indicator. (Only specified when <b>cs7 variant</b> is ITU or China.)                                                                                                                                                                                          |
| <i>gti</i>         | Global Title Indicator. Valid numbers are 2 (primarily used in the ANSI domain) or 4 (used in the ITU domain).                                                                                                                                                                                    |
| <b>np</b>          | (Optional) Specifies a numbering plan value. (Only specified when the <i>gti</i> value is 4.)                                                                                                                                                                                                     |
| <i>np</i>          | Numbering plan value. Valid range is 0 through 15.                                                                                                                                                                                                                                                |

|            |                                                                                                      |
|------------|------------------------------------------------------------------------------------------------------|
| <b>nai</b> | (Optional) Specifies a nature of address indicator. (Only specified when the <i>gti</i> value is 4.) |
| <i>nai</i> | (Optional) Nature of address indicator. Valid range is 0 through 127.                                |

## Defaults

No default behavior or values.

## Command Modes

CS7 SMS address table configuration

## Command History

| Release     | Modification                                     |
|-------------|--------------------------------------------------|
| 12.2(25)SW  | This command was introduced.                     |
| 12.2(25)SW1 | The <b>rule rule-number</b> parameter was added. |

## Usage Guidelines

An SMS result may be ignored only when multiple table-based rule parameters are specified, such as *dest-sme-table*, *orig-sme-table*, or *orig-imsi-table*.

If the result specified within the SMS address table is not valid within the context of the rule that references the address table, then the result specified by the address table is ignored. In this case, the result specified within the rule submode will be used.

## Examples

In the following example the address table named BLACKLIST includes 3 addresses that must be an exact match.

```
cs7 sms address-table BLACKLIST
addr 19195556661 exact
addr 19195557772 exact
addr 19195558883 exact
```

## Related Commands

| Command                             | Description                                                                                   |
|-------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>cs7 sms address-table</b>        | Creates and names a table of addresses that can be used for blocking or routing SMS messages. |
| <b>load (CS7 SMS address-table)</b> | Specifies an SMS address table file to load upon startup.                                     |

# adjacent-sp-restart

To indicate that the adjacent ITP node supports the adjacent-sp-restart process, use the **adjacent-sp-restart** CS7 linkset submode command. To remove the configuration, use the **no** form of the command.

**adjacent-sp-restart**

**no adjacent-sp-restart**

---

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

---

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

---

|                      |                     |
|----------------------|---------------------|
| <b>Command Modes</b> | CS7 linkset submode |
|----------------------|---------------------|

---

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

---

---

|                 |                                                                                         |
|-----------------|-----------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example enables the adjacent-sp-restart process to the adjacent ITP node: |
|-----------------|-----------------------------------------------------------------------------------------|

```
cs7 linkset to_doc 10.1.1
  adjacent-sp-restart
```

---

| Related Commands | Command                   | Description                   |
|------------------|---------------------------|-------------------------------|
|                  | show cs7 linkset detailed | Displays ITP linkset details. |

---

.



# allow-multi-message-dialogue

To specify that all messages including multi-message dialogues match the rule, use the **allow-multi-message-dialogue** command in cs7 mlr ruleset-rule configuration mode. To remove the specification, use the **no** form of this command.

**allow-multi-message-dialogue**

**no allow-multi-message-dialogue**

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or value

**Command Modes** CS7 mlr ruleset-rule configuration

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Usage Guidelines** If the **allow-multi-message-dialogue** command is configured, all messages match the rule. If the command is not specified, all messages excluding multi-message dialogues match the rule.

The **allow-multi-message-dialogue** command is allowed for default sms-mo rules, default sms-mt rules, and rules defined with the **all** operation.

Multi-Message dialogues include:

- Empty BEGIN messages
- CONTINUE messages
- BEGIN and CONTINUE messages containing an INVOKE component with the More-Messages-to-Send indicator (sms-mt only).
- Concatenated messages

**Examples** The following example specifies the **multi-message-dialogue** command:

```
cs7 mlr ruleset ruleset1
rule 10 sms-mt default
allow-multi-message-dialogue
```

| Related Commands | Command                       | Description                                                                                                                       |
|------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|                  | <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## asname (cs7 gtt application group)

To assign an M3UA or SUA AS directly to a global title, use the **asname** command in cs7 gtt application group configuration mode. To remove the configuration, use the **no** form of this command.

**asname** *as-name* [*cost* | *wf*] [*ssn* *ssn*] {*gt* | *pcssn*}

**no asname**

### Syntax Description

|                |                                                                                                                                                                                                                                                                                               |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>as-name</i> | Application server name. This parameter allows the user to assign a global title translation to an M3UA or SUA AS, instead of a point code and SSN. It also allows the administrator to have flexibility in assigning backup point-codes and alternate AS names to handle a specific service. |
| <i>cost</i>    | Index value (1-8) specifying the priority of the AS name within the application group.                                                                                                                                                                                                        |
| <i>wf</i>      | Weighing factor. Any items added to the group require a cost if the <b>multiplicity</b> is specified as <b>cgpa</b> .                                                                                                                                                                         |
| <b>gt</b>      | Set RI to route on GT.                                                                                                                                                                                                                                                                        |
| <b>pcssn</b>   | Set RI to route on point code and subsystem number.                                                                                                                                                                                                                                           |
| <b>ssn</b>     | Set subsystem number during translation process.                                                                                                                                                                                                                                              |
| <i>ssn</i>     | Subsystem number                                                                                                                                                                                                                                                                              |

### Defaults

No default behavior or values.

### Command Modes

CS7 gtt application group configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

The **asname** command allows you to assign an M3UA or SUA AS directly to a global title. You must configure a **cs7 as** command with the same name and a **routing-key** subcommand of the type **gtt** must be configured. Verification of the AS name is performed at execution time.

### Examples

The following example configures 2 asnames. AS1 has a cost value of 4 and RI set to route on GT. AS2 has a cost value of 5 and the RI set to route on point code and subsystem number.

```
cs7 gtt application-group abc
multiplicity cost
pc 7.7.1 3 gt
asname as1 4 gt
asname as2 5 pcssn
```

**Related Commands**

| Command                          | Description                                                            |
|----------------------------------|------------------------------------------------------------------------|
| <b>cs7 gtt application-group</b> | Defines a GTT application group                                        |
| <b>multiplicity</b>              | Specifies a method for selecting destination in the application group. |

## asname (cs7 mlr result)

To specify a particular destination M3UA or SUA application server use the **asname** command in cs7 mlr result configuration mode. To remove the definition, use the **no** form of this command.

**asname** *as-name* **weight** *weight*

**no asname** *as-name* **weight** *weight*

### Syntax Description

|                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>as-name</i> | 1 to 12 character name identifying an M3UA or SUA application server name.                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>weight</b>  | Specifies the weight applied to the weighted round-robin (WRR) distribution algorithm used for MLR result groups.                                                                                                                                                                                                                                                                                                                                                                |
| <i>weight</i>  | An integer value in the range of 0 to 10. A value of 10 indicates the resource should be selected 10 times more than a resource assigned a weight of 1. A weight of 0 indicates that the resource should only be used in the event that all non-zero weighted resources are unavailable. If multiple zero-weighted resources exist, then messages are equally distributed between them if all non-zero weighted resources fail. If not specified, a default weight of 1 is used. |

### Defaults

If not specified, a default weight of 1 is used.

### Command Modes

CS7 mlr result configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

If multiple zero-weighted resources exist, then messages are equally distributed between them if all non-zero weighted resources fail. If not specified, a default weight of 1 is used.

### Examples

The following example specifies a destination application server resource in the result group SMS-WEIGHTED. The application server, SMS\_AS1, is assigned a weighted round-robin (WRR) value of 10:

```
cs7 mlr result SMS-WEIGHTED
  as SMS_AS1 weight 10
```

**Related Commands**

| Command        | Description                                                                                                                                                      |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| cs7 mlr result | Specifies the name of the MLR results group. The result group contains the list of resources that process traffic to be routed based on multi-layer information. |

# asp

To list the ASPs contained in the AS, use the **asp** command in **cs7** as configuration mode. To remove the ASP from the AS definition, use the **no** form of this command.

**asp** *asp-name* [**weight** *weight*]

**no asp** *asp-name* [**weight** *weight*]

## Syntax Description

|                 |                                                                                                                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>asp-name</i> | ASP name. The ASP name may be up to 12 characters long. The first character must be alphabetic. The name must not match any reserved keyword (such as m3ua, sua, all, operational, active, statistics, bindings, or detail). |
| <b>weight</b>   | Specifies the weighted round-robin ASP distribution within an AS.                                                                                                                                                            |
| <i>weight</i>   | The weight assigned to the ASP. Valid range is 0 through 10. The default weight is 1.                                                                                                                                        |

## Defaults

No default behavior or values.

## Command Modes

CS7 as configuration

## Command History

| Release    | Modification                                |
|------------|---------------------------------------------|
| 12.2(4)MB5 | This command was introduced.                |
| 12.2(21)SW | The <b>weight</b> parameter was introduced. |

## Usage Guidelines

You can associate multiple ASPs to an AS by specifying multiple **asp** commands.

The ASP name must already be defined using the **cs7 asp** command before it can be associated with an AS.

The **no** form of this command will delete this ASP from the AS definition and will inactivate this routing context for this ASP by generating a Notify message with this routing context.

You can assign a weight value in the range 0 to 10 to an ASP. A higher weight indicates a higher priority (similar to MLR weighted round robin operation). If weight is not specified, the ASP has a default weight of 1. In an override or broadcast AS, the weight parameter is unused. In a loadshare AS an ASP of weight 0 receives packets only if all other ASPs in the AS are inactive or congested. If there are multiple active ASPs of weight 0, and no other active and uncongested ASPs, packets are evenly distributed to the ASPs of weight 0.

**Examples**

The following example defines an M3UA application server named AS1 with a routing key of 01010101 and a destination point code of 3.3.3. AS1 contains two ASPs named ASP1 and ASP2.

```
cs7 as as1 m3ua
  routing-key 01010101 3.3.3
  asp asp1
  asp asp2
```

**Related Commands**

| Command        | Description                            |
|----------------|----------------------------------------|
| <b>cs7 as</b>  | Defines an application server.         |
| <b>cs7 asp</b> | Defines an application server process. |

## assoc-retransmit (cs7 asp)

Retransmissions occur when the sender does not receive an acknowledgement within some specified time period. To configure the maximum number of consecutive retransmissions for the association, use the **assoc-retransmit** command in cs7 asp configuration mode. To disable the configuration, use the **no** form of this command.

**assoc-retransmit** *max-retrans*

**no assoc-retransmit** *max-retrans*

|                           |                    |                                                                                                                                  |
|---------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retrans</i> | Maximum association retransmissions. Range is 2 through 20. Default is the value specified under the local M3UA or SUA instance. |
|---------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------|
| <b>Defaults</b> | Default value of <i>max-retrans</i> is the value specified under the local M3UA or SUA instance |
|-----------------|-------------------------------------------------------------------------------------------------|

|                      |                       |
|----------------------|-----------------------|
| <b>Command Modes</b> | CS7 asp configuration |
|----------------------|-----------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB5     | This command was introduced. |

|                         |                                                                                                                                                                                              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The assoc-retransmit counter includes retransmissions of association initialization packets and retransmissions to all the destination transport addresses of the peer if it is multi-homed. |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                         |
|-----------------|-------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the maximum number of retransmissions to 20: |
|-----------------|-------------------------------------------------------------------------|

```
cs7 asp ASP1 2904 2905 m3ua
  remote-ip 1.1.1.1
  assoc-retransmit 20
```

| <b>Related Commands</b> | <b>Command</b>             | <b>Description</b>                                                 |
|-------------------------|----------------------------|--------------------------------------------------------------------|
|                         | <b>cs7 asp</b>             | Defines an Application Server Process and enables CS7 ASP submode. |
|                         | <b>show cs7 asp detail</b> | Displays ASP information.                                          |



## assoc-retransmit (cs7 link)

Retransmissions occur when the sender does not receive an acknowledgement within some specified time period. To configure the maximum number of consecutive retransmissions to a peer before the peer is considered unreachable, use the **assoc-retransmit** command in cs7 link configuration mode. When the maximum number is exceeded all transmission is stopped and the association is closed. To disable the configuration, use the **no** form of this command.

**assoc-retransmit** *max-retrans*

**no assoc-retransmit** *max-retrans*

|                           |                    |                                                             |
|---------------------------|--------------------|-------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retrans</i> | Maximum association retransmissions. Range is 2 through 20. |
|---------------------------|--------------------|-------------------------------------------------------------|

|                 |                    |
|-----------------|--------------------|
| <b>Defaults</b> | 10 retransmissions |
|-----------------|--------------------|

|                      |                        |
|----------------------|------------------------|
| <b>Command Modes</b> | CS7 link configuration |
|----------------------|------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(1)MB      | This command was introduced. |

|                         |                                                                                                                                                                                              |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The assoc-retransmit counter includes retransmissions of association initialization packets and retransmissions to all the destination transport addresses of the peer if it is multi-homed. |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                         |
|-----------------|-------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the maximum number of retransmissions to 20: |
|-----------------|-------------------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
  assoc-retransmit 20
```

| <b>Related Commands</b> | <b>Command</b>       | <b>Description</b>                                  |
|-------------------------|----------------------|-----------------------------------------------------|
|                         | <b>cs7 linkset</b>   | Specifies a linkset and enters CS7 linkset submode. |
|                         | <b>show cs7 m2pa</b> | Displays ITP M2PA statistics.                       |

## assoc-retransmit (cs7 mated-sg)

Retransmissions occur when the sender does not receive an acknowledgement within some specified time period. To configure the maximum number of association retransmissions for the association, use the **assoc-retransmit** command in cs7 mated-sg configuration mode. To disable the configuration, use the **no** form of this command.

**assoc-retransmit** *max-retrans*

**no assoc-retransmit** *max-retrans*

| Syntax Description       | <i>max-retrans</i> Maximum association retransmissions. Range is 2 through 20.                                                                                                                                                                            |  |         |              |              |                                                                       |                          |                                |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------------|--------------|-----------------------------------------------------------------------|--------------------------|--------------------------------|
| Defaults                 | The value of <i>max-retrans</i> defaults to the value specified under the local port instance.                                                                                                                                                            |  |         |              |              |                                                                       |                          |                                |
| Command Modes            | CS7 mated-sg configuration                                                                                                                                                                                                                                |  |         |              |              |                                                                       |                          |                                |
| Command History          | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(4)MB5</td><td>This command was introduced.</td></tr></table>                                                                                                                            |  | Release | Modification | 12.2(4)MB5   | This command was introduced.                                          |                          |                                |
| Release                  | Modification                                                                                                                                                                                                                                              |  |         |              |              |                                                                       |                          |                                |
| 12.2(4)MB5               | This command was introduced.                                                                                                                                                                                                                              |  |         |              |              |                                                                       |                          |                                |
| Usage Guidelines         | The assoc-retransmit counter includes retransmissions of association initialization packets and retransmissions to all the destination transport addresses of the peer if it is multi-homed.                                                              |  |         |              |              |                                                                       |                          |                                |
| Examples                 | <p>The following example sets the maximum number of retransmissions to 20:</p> <pre>cs7 mated-sg BLUE 5000 remote-ip 5.5.5.5 assoc-retransmit 20</pre>                                                                                                    |  |         |              |              |                                                                       |                          |                                |
| Related Commands         | <table><tr><th>Command</th><th>Description</th></tr><tr><td>cs7 mated-sg</td><td>Specifies a connection to a mated SG and enters CS7 Mated SG submode.</td></tr><tr><td>show cs7 mated-sg detail</td><td>Displays mated SG information.</td></tr></table> |  | Command | Description  | cs7 mated-sg | Specifies a connection to a mated SG and enters CS7 Mated SG submode. | show cs7 mated-sg detail | Displays mated SG information. |
| Command                  | Description                                                                                                                                                                                                                                               |  |         |              |              |                                                                       |                          |                                |
| cs7 mated-sg             | Specifies a connection to a mated SG and enters CS7 Mated SG submode.                                                                                                                                                                                     |  |         |              |              |                                                                       |                          |                                |
| show cs7 mated-sg detail | Displays mated SG information.                                                                                                                                                                                                                            |  |         |              |              |                                                                       |                          |                                |

## assoc-retransmit (cs7 m3ua)

Retransmissions occur when the sender does not receive an acknowledgement within some specified time period. To configure the maximum number of consecutive retransmissions to be allowed when a new SCTP association is started with the local port, use the **assoc-retransmit** command in **cs7 m3ua** configuration mode. When the maximum number is exceeded all transmission is stopped and the association is closed. To disable the configuration, use the **no** form of this command.

**assoc-retransmit** *max-retrans*

**no assoc-retransmit** *max-retrans*

|                           |                                                                                                                                                                                              |                                                                       |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retrans</i>                                                                                                                                                                           | Maximum association retransmissions. Range is 2 through 20.           |
| <b>Defaults</b>           | 10 retransmissions                                                                                                                                                                           |                                                                       |
| <b>Command Modes</b>      | CS7 m3ua configuration                                                                                                                                                                       |                                                                       |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                               | <b>Modification</b>                                                   |
|                           | 12.2(4)MB5                                                                                                                                                                                   | This command was introduced.                                          |
| <b>Usage Guidelines</b>   | The assoc-retransmit counter includes retransmissions of association initialization packets and retransmissions to all the destination transport addresses of the peer if it is multi-homed. |                                                                       |
| <b>Examples</b>           | The following example sets the maximum number of retransmissions to 20:<br><pre>cs7 m3ua 2905 local-ip 4.4.4.4 assoc-retransmit 20</pre>                                                     |                                                                       |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                               | <b>Description</b>                                                    |
|                           | <b>cs7 m3ua</b>                                                                                                                                                                              | Specifies the local port number for M3UA and enters CS7 M3UA submode. |
|                           | <b>show cs7 m3ua</b>                                                                                                                                                                         | Displays M3UA node information.                                       |

## assoc-retransmit (cs7 sgmp)

Retransmissions occur when the sender does not receive an acknowledgement within some specified time period. To configure the maximum number of consecutive retransmissions to be allowed when a new SCTP association is started with the local port, use the **assoc-retransmit** command in cs7 sgmp configuration mode. When the maximum number is exceeded all transmission is stopped and the association is closed. To disable the configuration, use the **no** form of this command.

**assoc-retransmit** *max-retrans*

**no assoc-retransmit** *max-retrans*

|                    |                                                                                                                                                                                              |                                                                       |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Syntax Description | <i>max-retrans</i> Maximum association retransmissions. Range is 2 through 20.                                                                                                               |                                                                       |
| Defaults           | 10 retransmissions                                                                                                                                                                           |                                                                       |
| Command Modes      | CS7 sgmp configuration                                                                                                                                                                       |                                                                       |
| Command History    | Release                                                                                                                                                                                      | Modification                                                          |
|                    | 12.2(4)MB5                                                                                                                                                                                   | This command was introduced.                                          |
| Usage Guidelines   | The assoc-retransmit counter includes retransmissions of association initialization packets and retransmissions to all the destination transport addresses of the peer if it is multi-homed. |                                                                       |
| Examples           | The following example sets the maximum number of retransmissions to 20:<br><br>cs7 sgmp 5000<br>local-ip 4.4.4.4<br>assoc-retransmit 20                                                      |                                                                       |
| Related Commands   | Command                                                                                                                                                                                      | Description                                                           |
|                    | cs7 sgmp                                                                                                                                                                                     | Specifies the local port number for SGMP and enters CS7 SGMP submode. |
|                    | show cs7 sgmp                                                                                                                                                                                | Displays SGMP information.                                            |

## assoc-retransmit (cs7 sua)

Retransmissions occur when the sender does not receive an acknowledgement within some specified time period. To configure the maximum number of consecutive retransmissions to be allowed when a new SCTP association is started with the local port, use the **assoc-retransmit** command in **cs7 sua** configuration mode. When the maximum number is exceeded all transmission is stopped and the association is closed. To disable the configuration, use the **no** form of this command.

**assoc-retransmit** *max-retrans*

**no assoc-retransmit** *max-retrans*

|                    |                                                                                                                                                                                              |                                                                     |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Syntax Description | <i>max-retrans</i> Maximum association retransmissions. Range is 2 through 20.                                                                                                               |                                                                     |
| Defaults           | 10 retransmissions                                                                                                                                                                           |                                                                     |
| Command Modes      | CS7 sua configuration                                                                                                                                                                        |                                                                     |
| Command History    | Release                                                                                                                                                                                      | Modification                                                        |
|                    | 12.2(4)MB5                                                                                                                                                                                   | This command was introduced.                                        |
| Usage Guidelines   | The assoc-retransmit counter includes retransmissions of association initialization packets and retransmissions to all the destination transport addresses of the peer if it is multi-homed. |                                                                     |
| Examples           | The following example sets the maximum number of retransmissions to 10:<br><pre>cs7 sua 15000 local-ip 4.4.4.4 assoc-retransmit 20</pre>                                                     |                                                                     |
| Related Commands   | Command                                                                                                                                                                                      | Description                                                         |
|                    | cs7 sua                                                                                                                                                                                      | Specifies the local port number for SUA and enters CS7 SUA submode. |
|                    | show cs7 sua                                                                                                                                                                                 | Displays SUA node information.                                      |

## assoc-retransmit (group peer)

To configure the maximum number of consecutive retransmissions SCTP will perform before failing an association, use the **assoc-retransmit** group peer submode command. When the maximum number is exceeded all transmission is stopped and the association is closed. To reset the association transmission threshold to its default value, use the **no** form of this command.

**assoc-retransmit** *max-retrans*

**no assoc-retransmit** *max-retrans*

| Syntax Description | <i>max-retrans</i> | Association retransmission threshold. Valid values range from 2 to 20. The default is 4. |
|--------------------|--------------------|------------------------------------------------------------------------------------------|
|--------------------|--------------------|------------------------------------------------------------------------------------------|

| Defaults | 4 retransmissions |
|----------|-------------------|
|----------|-------------------|

| Command Modes | Group peer |
|---------------|------------|
|---------------|------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Examples** The following example sets the maximum number of retransmissions to 20:

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 peer 4444
  remote-ip 1.1.1.2
  assoc-retransmit 20
```

| Related Commands | Command             | Description                                                                                         |
|------------------|---------------------|-----------------------------------------------------------------------------------------------------|
|                  | <b>peer (group)</b> | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode. |

# association

To configure an association between two devices in the IPC zone, use the **association** command in IPC zone configuration mode. To remove the association, use the **no** form of this command.

**association** *association-id*

**no association** *association-id*

## Syntax Description

|                       |                                            |
|-----------------------|--------------------------------------------|
| <i>association-id</i> | Valid association IDs range from 1 to 255. |
|-----------------------|--------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

IPC zone

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

The **association** command enables the IPC association mode.

## Examples

Line 2 of the following example configures association 1:

```
ipc zone default
association 1
```

## Related Commands

| Command          | Description                                                                                                              |
|------------------|--------------------------------------------------------------------------------------------------------------------------|
| ipc zone default | Enables IPC zone mode to configure the interdevice transport.                                                            |
| protocol sctp    | Enables IPC SCTP protocol mode to configure the local and remote association parameters for the interdevice association. |

# atm cs7monitor

To identify the ATM interface as a monitoring interface and to enable the interface to recognize received packets, use the **atm cs7monitor** command in interface configuration mode.

**atm cs7monitor**

**no atm cs7monitor**

---

**Syntax Description** This command has no arguments or keywords.

---

**Defaults** No default behavior or values.

---

**Command Modes** Interface configuration

---

| Command History | Release | Modification                 |
|-----------------|---------|------------------------------|
|                 | 12.2(4) | This command was introduced. |

---



---

**Examples** The following example identifies the ATM interface as a monitoring interface and enables the interface to recognize received packets:

```
interface atm5/0/0
  atm cs7monitor
  pvc 0/5 qsaal
```

---

| Related Commands | Command     | Description                                                                                                  |
|------------------|-------------|--------------------------------------------------------------------------------------------------------------|
|                  | cs7 monitor | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

---



# atm nni

To specify Service Specific Coordination Function for Network Node Interface (SSCF-NNI), use the **atm nni** command in interface configuration mode. To remove the specification, use the **no** form of the command.

**atm nni**

**no atm nni**

## Syntax Description

This command has no arguments or keywords.

## Defaults

No default behavior or values.

## Command Modes

Interface configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB2 | This command was introduced. |

## Examples

The following example shows an ATM interface configured for NNI:

```
interface atm1/0/0
 no shutdown
 atm nni
 pvc atm_pvc1 0/5 qsaal
```

## Related Commands

| Command    | Description        |
|------------|--------------------|
| <b>pvc</b> | Specifies the PVC. |

# authorize

The **authorize** command indicates that authorization of the IMSI must be performed by accessing the subscriber's profile stored in the HLR. This subscriber profile is obtained by initiating a MAP version 2 Restore Data operation to the HLR servicing the IMSI. To configure the authorize command, use the **authorize** command in gsm-authent-vlr configuration mode. To disable, use the **no** form of this command.

**authorize** {**bs** *bs-number* | **ts** *ts-number*}

**no authorize** {**bs** *bs-number* | **ts** *ts-number*}

## Syntax Description

|                  |                                                                                                                                                                                                                                       |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>bs</b>        | Specifies that the subscriber authorization check is to be made against a provisioned bearer service field in the subscriber's profile.                                                                                               |
| <i>bs-number</i> | A decimal coded integer in the range of 0 to 255. This value represents the decimal encoded value of the bearer service as specified in the GSM MAP specification 09.02 <sup>1</sup> . Refer to Table 20 for a list of common values. |
| <b>ts</b>        | Specifies that the subscriber authorization check is to be made against a provisioned teleservice field in the subscriber's profile.                                                                                                  |
| <i>ts-number</i> | A decimal coded integer with a range of 0 to 255. This value represents the decimal encoded value of the teleservice as specified in the GSM MAP specification (09.02). Refer to Table 21 for a list of common values.                |

1. ETS 300 599: "Digital cellular telecommunications system (Phase 2); Mobile Application Part (MAP) specification (GSM 09.02 version 4.19.1.)"

## Defaults

If the authorize command is not specified, then no authorization check is performed. There is no default bearer service or teleservice value.

## Command Modes

GSM-authent-vlr configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

## Usage Guidelines

Table 20 lists the bearer services defined in ETSI specification GSM 02.02 and the MAP encoded values in the MSU. The ITP uses the decimal representation of the MAP encoded value.

**Table 20 Bearer Services and Decimal MAP Values**

| Bearer Service      | GSM 02.02 Bearer Service Number | Decimal MAP Value for Configuring ITP |
|---------------------|---------------------------------|---------------------------------------|
| allBearerServices   |                                 | 0                                     |
| allDataCDA-Services |                                 | 16                                    |

**Table 20** ***Bearer Services and Decimal MAP Values (continued)***

| <b>Bearer Service</b>                | <b>GSM 02.02 Bearer Service Number</b> | <b>Decimal MAP Value for Configuring ITP</b>                   |
|--------------------------------------|----------------------------------------|----------------------------------------------------------------|
| Asynchronous General Bearer Service  | 20                                     | 23                                                             |
| Asynchronous 300 bps                 | 21                                     | 17                                                             |
| Asynchronous 1.2 kbps                | 22                                     | 18                                                             |
| Asynchronous 1200/75 kbps            | 23                                     | 19                                                             |
| Asynchronous 2.4 kbps                | 24                                     | 20                                                             |
| Asynchronous 4.8 kbps                | 25                                     | 21                                                             |
| Asynchronous 9.6 kbps                | 26                                     | 22                                                             |
| allDataCDS-Services                  |                                        | 24                                                             |
| Synchronous General Bearer Service   | 30                                     | 31                                                             |
| Synchronous 1.2 kbps                 | 31                                     | 26                                                             |
| Synchronous 2.4 kbps                 | 32                                     | 28                                                             |
| Synchronous 4.8 kbps                 | 33                                     | 29                                                             |
| Synchronous 9.6 kbps                 | 34                                     | 30                                                             |
| allPadAccessCA-Services              |                                        | 32                                                             |
| General PAD Access Bearer Service    | 40                                     | 39                                                             |
| PAD Access 300 bps                   | 41                                     | 33                                                             |
| PAD Access 1.2 kbps                  | 42                                     | 34                                                             |
| PAD Access 1 200/75 bps              | 43                                     | 35                                                             |
| PAD Access 2.4 kbps                  | 44                                     | 36                                                             |
| PAD Access 4.8 kbps                  | 45                                     | 37                                                             |
| PAD Access 9.6 kbps                  | 46                                     | 38                                                             |
| allDataPDS-Services                  |                                        | 40                                                             |
| General Packet Access Bearer Service | 50                                     | 47                                                             |
| Packet Access 2.4 kbps               | 51                                     | 44                                                             |
| Packet Access 4.8 kbps               | 52                                     | 45                                                             |
| Packet Access 9.6 kbps               | 53                                     | 46                                                             |
| Alternate Speech/Data                | 61                                     | 48 allAlternateSpeech-DataCDA<br>56 allAlternateSpeech-DataCDS |
| GPRS                                 | 70                                     |                                                                |
| Speech Followed by Data              | 81                                     | 64 allSpeechFollowedByDataCDA<br>72 allSpeechFollowedByDataCDS |
| allDataCircuitAsynchronous           |                                        | 80                                                             |
| allAsynchronousServices              |                                        | 96                                                             |
| allDataCircuitSynchronous            |                                        | 88                                                             |
| allSynchronousServices               |                                        | 104                                                            |

**Table 20**      ***Bearer Services and Decimal MAP Values (continued)***

| <b>Bearer Service</b> | <b>GSM 02.02 Bearer Service Number</b> | <b>Decimal MAP Value for Configuring ITP</b> |
|-----------------------|----------------------------------------|----------------------------------------------|
| allPLMN-specificBS    |                                        | 208                                          |
| plmn-specificBS-1     |                                        | 209                                          |
| plmn-specificBS-2     |                                        | 210                                          |
| plmn-specificBS-3     |                                        | 211                                          |
| plmn-specificBS-4     |                                        | 212                                          |
| plmn-specificBS-5     |                                        | 213                                          |
| plmn-specificBS-6     |                                        | 214                                          |
| plmn-specificBS-7     |                                        | 215                                          |
| plmn-specificBS-8     |                                        | 216                                          |
| plmn-specificBS-9     |                                        | 217                                          |
| plmn-specificBS-A     |                                        | 218                                          |
| plmn-specificBS-B     |                                        | 219                                          |
| plmn-specificBS-C     |                                        | 220                                          |
| plmn-specificBS-D     |                                        | 221                                          |
| plmn-specificBS-E     |                                        | 222                                          |
| plmn-specificBS-F     |                                        | 223                                          |

Table 21 lists the teleservices defined in ETSI specification GSM 02.03 and the MAP encoded values in the MSU. The ITP uses the decimal representation of the MAP encoded value.

**Table 21**      ***Teleservices and Decimal MAP Values***

| <b>Teleservice</b>                     | <b>GSM 02.03 Teleservice Number (Hex)</b> | <b>Decimal MAP Value for Configuring ITP</b> |
|----------------------------------------|-------------------------------------------|----------------------------------------------|
| allTeleservices                        | 0                                         | 0                                            |
| allSpeechTransmission                  |                                           | 16                                           |
| Speech Transmission - Telephony        | 11                                        | 17                                           |
| Speech Transmission - Emergency Calls  | 12                                        | 18                                           |
| allShortMessageServices                |                                           | 32                                           |
| SMS - Short Message MT/PP              | 21                                        | 33                                           |
| SMS - Short Message MO/PP              | 22                                        | 34                                           |
| SMS - Short Message Cell Broadcast     | 23                                        | 35                                           |
| allFacsimileTransmissionServices       |                                           | 96                                           |
| FAX - Alternate Speech and FAX group 3 | 61                                        | 97                                           |
| FAX - Automatic FAX group 3            | 62                                        | 98                                           |

**Table 21**      **Teleservices and Decimal MAP Values**

| <b>Teleservice</b>                             | <b>GSM 02.03<br/>Teleservice<br/>Number (Hex)</b> | <b>Decimal MAP Value for<br/>Configuring ITP</b> |
|------------------------------------------------|---------------------------------------------------|--------------------------------------------------|
| FAX - facsimileGroup4                          |                                                   | 99                                               |
| Voice Group Service - Voice Group Call Service | 91                                                | 145                                              |
| Voice Group Service - Voice Broadcast Service  | 92                                                | 146                                              |
| allPLMN-specificTS                             |                                                   | 208                                              |
| plmn-specificTS-1                              |                                                   | 209                                              |
| plmn-specificTS-2                              |                                                   | 210                                              |
| plmn-specificTS-3                              |                                                   | 211                                              |
| plmn-specificTS-4                              |                                                   | 212                                              |
| plmn-specificTS-5                              |                                                   | 213                                              |
| plmn-specificTS-6                              |                                                   | 214                                              |
| plmn-specificTS-7                              |                                                   | 215                                              |
| plmn-specificTS-8                              |                                                   | 216                                              |
| plmn-specificTS-9                              |                                                   | 217                                              |
| plmn-specificTS-A                              |                                                   | 218                                              |
| plmn-specificTS-B                              |                                                   | 219                                              |
| plmn-specificTS-C                              |                                                   | 220                                              |
| plmn-specificTS-D                              |                                                   | 221                                              |
| plmn-specificTS-E                              |                                                   | 222                                              |
| plmn-specificTS-F                              |                                                   | 223                                              |

**Examples**

In the following example bs 17 is configured on the ITP to specify that the subscriber authorization check is to be performed against bearer service 21 - Asynchronous 300 bps data service, provisioned in the subscriber's profile on the HLR.

```
gsm-authent-vlr
  authorize bs 17
  cache-size 10000
  max-return 2
```

**Related Commands**

| <b>Command</b>         | <b>Description</b>                                                                                                          |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>gsm-authent-vlr</b> | Enables the authent-vlr submode for provisioning parameters specific to the Process_Obtain_Authentication_Sets_VLR service. |

# bind-type (cs7 sms profile parameters)

To set the SMPP bind type parameter, use the **bind-type** command in CS7 sms profile parameters configuration mode. To return to the default bind type, use the **no** form of this command.

**bind-type** {any | receiver | transceiver | transmitter}

**no bind-type** {any | receiver | transceiver | transmitter}

## Syntax Description

|                    |                                                              |
|--------------------|--------------------------------------------------------------|
| <b>any</b>         | Allow receipt of any SMPP bind type; send transceiver binds. |
| <b>receiver</b>    | Receive or send SMPP receiver binds only.                    |
| <b>transceiver</b> | Receive or send SMPP transceiver binds only.                 |
| <b>transmitter</b> | Receive or send SMPP transmitter binds only.                 |

## Defaults

The default bind type is **any**.

## Command Modes

CS7 sms profile parameters configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

Received SMPP binds will be checked against this parameter and rejected if they do not match. The **bind-type** command is valid for SMPP profiles only. It cannot be configured in UCP profiles.

## Examples

The following example creates an SMPP profile named mmprofile and configures several parameters:

```
cs7 sms smpp profile mmprofile
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

## Related Commands

| Command                                              | Description                         |
|------------------------------------------------------|-------------------------------------|
| <b>inactivity-timer (cs7 sms profile parameters)</b> | Specifies session inactivity timer. |
| <b>keepalive-timer (CS7 SMS profile parameters)</b>  | Specifies session keepalive timer.  |
| <b>response-timer (cs7 sms profile parms)</b>        | Specifies session response timer.   |

| Command                                   | Description                        |
|-------------------------------------------|------------------------------------|
| send-window (cs7 sms profile parms)       | Specifies send window size.        |
| session-init-timer(cs7 sms profile parms) | Specifies session initiation time. |

## bind-type (CS7 sms session parameters)

To set the SMPP bind type parameter, use the **bind-type** command in CS7 sms session parameters configuration mode. To return to the default bind type, use the **no** form of this command.

**bind-type** { **any** | **receiver** | **transceiver** | **transmitter** }

**no bind-type** { **any** | **receiver** | **transceiver** | **transmitter** }

|                           |                    |                                                              |
|---------------------------|--------------------|--------------------------------------------------------------|
| <b>Syntax Description</b> | <b>any</b>         | Allow receipt of any SMPP bind type; send transceiver binds. |
|                           | <b>receiver</b>    | Receive or send SMPP receiver binds only.                    |
|                           | <b>transceiver</b> | Receive or send SMPP transceiver binds only.                 |
|                           | <b>transmitter</b> | Receive or send SMPP transmitter binds only.                 |

**Defaults** The default bind type is **any**.

**Command Modes** CS7 sms session parameters configuration

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

**Usage Guidelines** Received SMPP binds will be checked against this parameter and rejected if they do not match. The **bind-type** command is valid for SMPP profiles only. It cannot be configured in UCP profiles.

**Examples** The following example creates an SMPP connection, configures a destination and configures several parameters:

```
cs7 sms smpp 5000 local-ip 10.10.10.200
destination offisland 10.10.20.2 6000
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

|                         |                                                      |                                     |
|-------------------------|------------------------------------------------------|-------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                                       | <b>Description</b>                  |
|                         | <b>inactivity-timer (cs7 sms session parameters)</b> | Specifies session inactivity timer. |
|                         | <b>keepalive-timers (CS7 SMS session parameters)</b> | Specifies session keepalive timer.  |



| Command                                           | Description                        |
|---------------------------------------------------|------------------------------------|
| <b>response-timer (cs7 sms session parms)</b>     | Specifies session response timer.  |
| <b>send-window (cs7 sms session parms)</b>        | Specifies send window size.        |
| <b>session-init-timer (cs7 sms session parms)</b> | Specifies session initiation time. |

# block

To allow a new SCTP association to be established but prevent the ASP from going into the active state, use the **block** CS7 ASP submode command. To reverse the block, use the **no** form of this command.

**block**

**no block**

---

**Syntax Description** This command has no arguments or keywords.

---

**Defaults** No default behavior or values

---

**Command Modes** CS7 asp configuration

---

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

---



---

**Usage Guidelines**

There are significant differences between the **block** and **shutdown** CS7 ASP submode commands:

The **shutdown** command terminates the SCTP association with this ASP. New SCTP associations will be rejected if the ASP is in shutdown mode.

The **block** command sends an unsolicited asp-inactive acknowledgement. However, the ITP will not terminate the SCTP association.

When the ASP retries, in the shutdown case, the association must be reestablished, asp-up sent and failed. For block, ASP-ACT may just be retried.

---

**Examples** The following example blocks the ASP from entering an active state:

```
cs7 asp ASP1 2904 2905 m3ua
  block
```

---

| Related Commands | Command                   | Description                                                        |
|------------------|---------------------------|--------------------------------------------------------------------|
|                  | <b>cs7 asp</b>            | Defines an Application Server Process and enables CS7 ASP submode. |
|                  | <b>show cs7 asp</b>       | Displays ASP information.                                          |
|                  | <b>shutdown (CS7 ASP)</b> | Terminates the SCTP association with this ASP.                     |

---

# broadcast

To enable the broadcast of route management messages, use the **broadcast** command in CS7 linkset configuration mode. To disable broadcast, use the **no** form of this command.

## ANSI Variant

**broadcast** {all | txa-txr | txp}

**no broadcast** {all | txa-txr | txp}

## ITU or China Variant

**broadcast** {all | tfa | tfp}

**no broadcast** {all | tfa | tfp}

## Syntax Description

|                |                                          |
|----------------|------------------------------------------|
| <b>all</b>     | Broadcast all route management messages. |
| <b>tfa</b>     | Broadcast TFA.                           |
| <b>tfp</b>     | Broadcast TFP.                           |
| <b>txa-txr</b> | Broadcast TFA/TCA and TFR/TCR.           |
| <b>txp</b>     | Broadcast TFP/TCP.                       |

## Defaults

The default for ANSI, ITU and China variants is broadcast all route management messages.

## Command Modes

CS7 linkset configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

This command is used to manage the ITP. Whenever a destination status changes on the ITP (due to received route management messages and linkset status changes), the ITP broadcasts the new status to the adjacent nodes by sending route management messages (TFP, TFR, TFA, TCP, TCR, TCA). The adjacent nodes use these messages to update their route tables.

If a large number of messages are sent to any given adjacent node, that node can become temporarily overloaded, because processing such a large number of management messages can be processor intensive. The **broadcast** command allows you to regulate the broadcast of route management messages and enables you to prevent this potential overload situation. You can disable broadcast messages on a per linkset basis. If broadcast is disabled, the adjacent nodes do not receive the new status right away. However, when they attempt to route the next MSU to the concerned destination via the ITP, the ITP will send a response method TFP or TFR (if the destination status were to be inaccessible or restricted). In the case of response method TFP the MSU is dropped.

## Examples

### ANSI, ITU, China Variants

The following example enables the broadcast of all route management messages on linkset1:

```
cs7 linkset linkset1
 broadcast all
```

The following example disables the broadcast of all route management messages on linkset1:

```
cs7 linkset linkset1
 no broadcast all
```

### ANSI Variant

The following example enables the broadcast of TFA/TCA and TFR/TCR messages on linkset1:

```
cs7 linkset linkset1
 broadcast txa-txr
```

### ITU or China Variants

The following example enables the broadcast of TFP messages on linkset1:

```
cs7 linkset linkset1
 broadcast tfp
```

## Related Commands

| Command                             | Description                                                                       |
|-------------------------------------|-----------------------------------------------------------------------------------|
| <b>cs7 linkset</b>                  | Specifies a linkset and enters CS7 linkset submode.                               |
| <b>show cs7 linkset detail</b>      | The <b>detail</b> keyword displays whether broadcast is on or off on the linkset. |
| <b>snmp-server enable traps cs7</b> | Enables SNMP network management traps to be sent to the specified host.           |

## bundling (cs7 asp)

Multiple user messages can be bundled into a single SCTP packet. To configure message bundling, use the **bundling** command in cs7 asp configuration mode. To disable bundling, use the **no** form of this command.

**bundling** *msec*

**no bundling** *msec*

|                           |             |                                                                                                                                                                                                    |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Maximum amount of time, in milliseconds, that SCTP will wait for messages for bundling. Valid range is 5 through 1000 milliseconds. Default is the value specified under the M3UA or SUA instance. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                       |
|-----------------|-----------------------------------------------------------------------|
| <b>Defaults</b> | Packet defaults to the value specified under the local port instance. |
|-----------------|-----------------------------------------------------------------------|

|                      |                       |
|----------------------|-----------------------|
| <b>Command Modes</b> | CS7 asp configuration |
|----------------------|-----------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB5 | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>Packets sent while bundling is enabled can experience a delay before transmission. The delay is the amount of time the implementation waits for messages to encourage bundling. When bundling messages, the resulting packet (including IP and SCTP headers) must be less than or equal to the current path MTU.</p> <p>During periods of congestion, the implementation bundles messages (when possible) even if bundling is disabled. During periods of congestion, abatement messages are bundled whenever possible, with no impact to performance.</p> |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                       |
|-----------------|-----------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the bundling interval to 500 milliseconds: |
|-----------------|-----------------------------------------------------------------------|

```
cs7 asp ASP1 2905 2905 m3ua
  remote-ip 1.1.1.1
  bundling 500
```

| <b>Related Commands</b> | Command                    | Description                                                          |
|-------------------------|----------------------------|----------------------------------------------------------------------|
|                         | <b>cs7 asp</b>             | Specifies an Application Server Process and enables CS7 ASP submode. |
|                         | <b>show cs7 asp detail</b> | Displays ASP information.                                            |

## bundling (CS7 Link)

Multiple user messages can be bundled into a single packet. To configure message bundling, use the **bundling** command in cs7 link configuration mode. To disable bundling, use the **no** form of this command.

**bundling** *msec*

**no bundling** *msec*

### Syntax Description

|             |                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Maximum amount of time, in milliseconds, to wait for messages for bundling. Valid range is 5 through 1000 milliseconds. Default is 5 milliseconds. |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

Enabled.

The default maximum time to wait for messages for bundling is 5 milliseconds.

### Command Modes

CS7 link configuration

### Command History

| Release   | Modification                                                           |
|-----------|------------------------------------------------------------------------|
| 12.2(1)MB | This command was introduced, enabling bundling.                        |
| 12.2(4)MB | Added bundling capability between MTP3 on the RSP and MTP2 on the VIP. |

### Usage Guidelines

Packets sent while bundling is enabled can experience a delay before transmission. The delay is the amount of time the implementation waits for messages to encourage bundling. When messages are bundled, the resulting packet must be less than or equal to the current path MTU.

During periods of congestion, the implementation bundles messages (when possible) even if bundling is disabled. During periods of congestion, abatement messages are bundled whenever possible, with no impact to performance.

Bundling for MTP2 packets is supported on the Cisco 7500 router only.

MTP2 parameters can also be specified in a CS7 profile.

### Examples

The following example sets the bundling interval to 500 milliseconds:

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
bundling 500
```

| Related Commands | Command       | Description                                                                        |
|------------------|---------------|------------------------------------------------------------------------------------|
|                  | cs7 linkset   | Specifies a linkset and enters CS7 linkset submode.                                |
|                  | cs7 profile   | Defines a profile of MTP2 parameters that you can apply to all links in a linkset. |
|                  | show cs7 m2pa | Displays ITP M2PA statistics.                                                      |

## bundling (cs7 mated-sg)

Multiple user messages can be bundled into a single SCTP packet. To configure message bundling, use the **bundling** command in cs7 mated-sg configuration mode. To disable bundling, use the **no** form of this command.

**bundling** *msec*

**no bundling** *msec*

### Syntax Description

|             |                                                                                                                                                                                                   |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Maximum amount of time, in milliseconds, that SCTP will wait for messages for bundling. Valid range is 5 through 1000 milliseconds. Default is the value specified under the local port instance. |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

Packet defaults to the value specified under the SGMP instance.

### Command Modes

CS7 mated-sg configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

Packets sent while bundling is enabled can experience a delay before transmission. The delay is the amount of time the implementation waits for messages to encourage bundling. When bundling messages, the resulting packet (including IP and SCTP headers) must be less than or equal to the current path MTU.

During periods of congestion, the implementation bundles messages (when possible) even if bundling is disabled. During periods of congestion, abatement messages are bundled whenever possible, with no impact to performance.

### Examples

The following example sets the bundling interval to 500 milliseconds:

```
cs7 mated-sg BLUE 5000
 remote-ip 5.5.5.5
 bundling 500
```

### Related Commands

| Command                         | Description                                                           |
|---------------------------------|-----------------------------------------------------------------------|
| <b>cs7 mated-sg</b>             | Specifies a connection to a mated SG and enters CS7 mated-SG submode. |
| <b>show cs7 mated-sg detail</b> | Displays SGMP information.                                            |



# bundling (cs7 m3ua)

Multiple user messages can be bundled into a single SCTP packet. To specify if packet bundling is supported and the bundling interval to be used when a new SCTP association is started with the local port, use the **bundling** CS7 M3UA submode command. To disable bundling, use the **no** form of this command.

**bundling** *msec*

**no bundling** *msec*

|                           |             |                                                                                                                                                                |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Maximum amount of time, in milliseconds, that SCTP will wait for messages for bundling. Valid range is 5 through 1000 milliseconds. Default is 5 milliseconds. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                       |
|-----------------|-------------------------------------------------------------------------------------------------------|
| <b>Defaults</b> | Enabled.<br>The default maximum time that SCTP will wait for messages for bundling is 5 milliseconds. |
|-----------------|-------------------------------------------------------------------------------------------------------|

|                      |                        |
|----------------------|------------------------|
| <b>Command Modes</b> | CS7 m3ua configuration |
|----------------------|------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB5     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>Packets sent while bundling is enabled can experience a delay before transmission. The delay is the amount of time the implementation waits for messages to encourage bundling. When bundling messages, the resulting packet (including IP and SCTP headers) must be less than or equal to the current path MTU.</p> <p>During periods of congestion, the implementation bundles messages (when possible) even if bundling is disabled. During periods of congestion, abatement messages are bundled whenever possible, with no impact to performance.</p> |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                                                       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | <p>The following example sets the bundling interval to 500 milliseconds:</p> <pre>cs7 m3ua 2905  local-ip 4.4.4.4  bundling 500</pre> |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|

| <b>Related Commands</b> | <b>Command</b>       | <b>Description</b>                                                    |
|-------------------------|----------------------|-----------------------------------------------------------------------|
|                         | <b>cs7 m3ua</b>      | Specifies the local port number for M3UA and enters CS7 M3UA submode. |
|                         | <b>show cs7 m3ua</b> | Displays M3UA node information.                                       |

## bundling (cs7 profile)

Multiple user messages can be bundled into a single packet. To configure message bundling in a CS7 profile, use the **bundling** command in cs7 profile configuration mode. To disable bundling, use the **no** form of this command.

**bundling** *msec*

**no bundling** *msec*

### Syntax Description

|             |                                                                                                                                                    |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Maximum amount of time, in milliseconds, to wait for messages for bundling. Valid range is 5 through 1000 milliseconds. Default is 5 milliseconds. |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

Enabled.

The default maximum time to wait for messages for bundling is 5 milliseconds.

### Command Modes

CS7 profile configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

Packets sent while bundling is enabled can experience a delay before transmission. The delay is the amount of time the implementation waits for messages to encourage bundling. When messages are bundled, the resulting packet must be less than or equal to the current path MTU.

During periods of congestion, the implementation bundles messages (when possible) even if bundling is disabled. During periods of congestion, abatement messages are bundled whenever possible, with no impact to performance.

Bundling for MTP2 packets is supported on the Cisco 7500 router only.

### Examples

The following example defines a profile named timers, configures the profile to support MTP2, configures the packet bundling, t1, and t2 settings, then applies the timers profile to all the links in linkset ITPa:

```
cs7 profile timers
 mtp2
  timer t1 15000
  timer t2 9000
.
.
.
cs7 linkset itpa
 profile timers
```

| Related Commands | Command       | Description                                                                        |
|------------------|---------------|------------------------------------------------------------------------------------|
|                  | cs7 linkset   | Specifies a linkset and enters CS7 linkset submode.                                |
|                  | cs7 profile   | Defines a profile of MTP2 parameters that you can apply to all links in a linkset. |
|                  | show cs7 m2pa | Displays ITP M2PA statistics.                                                      |

## bundling (cs7 sgmp)

Multiple user messages can be bundled into a single SCTP packet. To specify if packet bundling is supported and the bundling interval to be used when a new SCTP association is started with the local port, use the **bundling** command in CS7 SGMP configuration mode. To disable bundling, use the **no** form of this command.

**bundling** *msec*

**no bundling** *msec*

### Syntax Description

|             |                                                                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Maximum amount of time, in milliseconds, that SCTP will wait for messages for bundling. Valid range is 5 through 1000 milliseconds. Default is 5 milliseconds |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

Enabled.

The default maximum time that SCTP will wait for messages for bundling is 5 milliseconds.

### Command Modes

CS7 sgmp configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

Packets sent while bundling is enabled can experience a delay before transmission. The delay is the amount of time the implementation waits for messages to encourage bundling. When bundling messages, the resulting packet (including IP and SCTP headers) must be less than or equal to the current path MTU.

During periods of congestion, the implementation bundles messages (when possible) even if bundling is disabled. During periods of congestion, abatement messages are bundled whenever possible, with no impact to performance.

### Examples

The following example sets the bundling interval to 500 milliseconds:

```
cs7 sgmp 5000
 local-ip 4.4.4.4
 bundling 500
```

### Related Commands

| Command              | Description                                                           |
|----------------------|-----------------------------------------------------------------------|
| <b>cs7 sgmp</b>      | Specifies the local port number for SGMP and enters CS7 SGMP submode. |
| <b>show cs7 sgmp</b> | Displays SGMP statistics.                                             |

## bundling (cs7 sua)

Multiple user messages can be bundled into a single SCTP packet. To specify if packet bundling is supported and the bundling interval to be used when a new SCTP association is started with the local port, use the **bundling** command in cs7 sua configuration mode. To disable bundling, use the **no** form of this command.

**bundling** *msec*

**no bundling** *msec*

|                           |             |                                                                                                                                                               |
|---------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Maximum amount of time, in milliseconds, that SCTP will wait for messages for bundling. Valid range is 5 through 1000 milliseconds. Default is 5 milliseconds |
|---------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                       |
|-----------------|-------------------------------------------------------------------------------------------------------|
| <b>Defaults</b> | Enabled.<br>The default maximum time that SCTP will wait for messages for bundling is 5 milliseconds. |
|-----------------|-------------------------------------------------------------------------------------------------------|

|                      |                       |
|----------------------|-----------------------|
| <b>Command Modes</b> | CS7 sua configuration |
|----------------------|-----------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB5 | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>Packets sent while bundling is enabled can experience a delay before transmission. The delay is the amount of time the implementation waits for messages to encourage bundling. When bundling messages, the resulting packet (including IP and SCTP headers) must be less than or equal to the current path MTU.</p> <p>During periods of congestion, the implementation bundles messages (when possible) even if bundling is disabled. During periods of congestion, abatement messages are bundled whenever possible, with no impact to performance.</p> |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                                                       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | <p>The following example sets the bundling interval to 500 milliseconds:</p> <pre>cs7 sua 15000  local-ip 4.4.4.4  bundling 500</pre> |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|

| <b>Related Commands</b> | Command             | Description                                                         |
|-------------------------|---------------------|---------------------------------------------------------------------|
|                         | <b>cs7 sua</b>      | Specifies the local port number for SUA and enters CS7 SUA submode. |
|                         | <b>show cs7 sua</b> | Displays SUA node information.                                      |

# burst-recovery-timeout

To specify the amount of time allowed for an association to recover from a burst of traffic due to failover, use the **burst-recovery-timeout** command in **cs7** as configuration mode. To disable the configuration, use the **no** form of this command.

**burst-recovery-timeout** *msec*

**no burst-recovery-timeout** *msec*

## Syntax Description

|             |                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Recovery timeout value in milliseconds. The valid range is 1000 through 10000 msec. The default is 4000 msec. |
|-------------|---------------------------------------------------------------------------------------------------------------|

## Defaults

4000 msec.

## Command Modes

CS7 as configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example sets the burst-recovery-timeout to 1000 msec:

```
cs7 as BLUE m3ua
  burst-recovery-timeout 1000
```

## Related Commands

| Command       | Description                    |
|---------------|--------------------------------|
| <b>cs7 as</b> | Defines an Application Server. |

# bundling (group peer)

Multiple user messages can be bundled into a single packet. To configure message bundling, use the **bundling** group peer submode command. To disable bundling, use the **no** form of this command.

**bundling** *msec*

**no bundling** *msec*

|                           |             |                                                                                                                                                    |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Maximum amount of time, in milliseconds, to wait for messages for bundling. Valid range is 5 through 1000 milliseconds. Default is 5 milliseconds. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------|
| <b>Defaults</b> | Enabled.<br>The default maximum time to wait for messages for bundling is 5 milliseconds. |
|-----------------|-------------------------------------------------------------------------------------------|

|                      |                    |
|----------------------|--------------------|
| <b>Command Modes</b> | Group peer submode |
|----------------------|--------------------|

| <b>Command History</b> | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(25)SW</td><td>This command was introduced.</td></tr></table> | Release | Modification | 12.2(25)SW | This command was introduced. |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------|---------|--------------|------------|------------------------------|
| Release                | Modification                                                                                                                   |         |              |            |                              |
| 12.2(25)SW             | This command was introduced.                                                                                                   |         |              |            |                              |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>Packets sent while bundling is enabled can experience a delay before transmission. The delay is the amount of time the implementation waits for messages to encourage bundling. When messages are bundled, the resulting packet must be less than or equal to the current path MTU.</p> <p>During periods of congestion, the implementation bundles messages (when possible) even if bundling is disabled. During periods of congestion, abatement messages are bundled whenever possible, with no impact to performance.</p> |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example set the maximum time to wait for messages for bundling to 500 milliseconds: |
|-----------------|---------------------------------------------------------------------------------------------------|

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 peer 4444
 remote-ip 1.1.1.2
 bundling 500
```

| <b>Related Commands</b> | <table><tr><th>Command</th><th>Description</th></tr><tr><td><b>peer (group)</b></td><td>Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode.</td></tr></table> | Command | Description | <b>peer (group)</b> | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode. |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------|---------------------|-----------------------------------------------------------------------------------------------------|
| Command                 | Description                                                                                                                                                                                                   |         |             |                     |                                                                                                     |
| <b>peer (group)</b>     | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode.                                                                                                           |         |             |                     |                                                                                                     |

# cache-size

To specify the total number of IMSIs for which authentication triplets will be cached, use the **cache-size** command in cs7 authentic-vlr configuration mode. To disable caching, use the **no** form of this command. (Also, if the value of 0 is specified, caching is disabled.)

**cache-size** *cache-size*

**no cache-size** *cache-size*

## Syntax Description

|                   |                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <i>cache-size</i> | Total number of IMSIs for which authentication triplets are cached. Valid values are decimal numbers in the range of 0 through 65535. |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

Default cache size is 65535.

## Command Modes

Authent-vlr

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

## Usage Guidelines

A maximum of 5 triplets are stored per IMSI, and the default cache size is 65535. If the value of 0 is specified, then caching is disabled. If not specified, the default value is 65535.

## Examples

The following example specifies a cache size of 100:

```
gsm-authent-vlr
 cache-size 100
 max-return 2
```

## Related Commands

| Command         | Description                                                                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ttd             | Specifies the amount of elapsed time in seconds that a cached authentication triplet will be stored.                                                          |
| gsm-authent-vlr | Enables authentic-VLR submode in which you can allow the user to provision parameters specific to the GSM MAP Process_Obtain_Authentication_Sets_VLR service. |
| max-return      | Specifies the maximum number of authentication triplets that may be returned to a MAPUA client for a single request                                           |



# cdpa

You can configure a secondary trigger in conjunction with the primary trigger address to create a combination trigger used to match a packet. To create a combination trigger based on the combination of the calling party and the called party, use the **cdpa** command in cs7 mlr trigger configuration mode within a calling party address trigger. To disable the specific routing trigger, use the **no** form of this command.

```
cdpa {gt addr-string [gt-addr-type] | pc point-code ssn ssn} {ruleset ruleset-name | block | continue}
```

```
no cdpa {gt addr-string [gt-addr-type] | pc point-code ssn ssn} {ruleset ruleset-name | block | continue}
```

| Syntax Description  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>gt</b>           | Indicates that the CdPA secondary trigger being defined is received with RI=GT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>addr-string</i>  | Address string of 1 to 15 hexadecimal characters. The string is not input in BCD-String format, but in normal form.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>gt-addr-type</i> | (Optional) Parameters that identify attributes of the global title address being used as a trigger. The parameters are variant-specific, and are identical to those parameters specified on the <b>cs7 gtt selector</b> command. If not specified, the default is the standard E.164 address type for the network variant being used.<br><br><b>tt tt</b> [ <b>gti</b> <i>gti</i> ] [ <b>np</b> <i>np</i> <b>nai</b> <i>nai</i> ]<br><b>tt</b> Identifies the translation type specified within the address.<br><i>tt</i> An integer value from 0 to 255.<br><b>gti</b> Identifies the global title indicator value for the specified address. This value is only specified when cs7 variant is ITU or China.<br><i>gti</i> Integer value of 2 or 4.<br><b>np</b> Identifies the numbering plan of the specified address. Only specified when the gti parameter value is 4.<br><i>np</i> Integer value from 0 to 15.<br><b>nai</b> Identifies the nature of specified address. Only specified when the gti parameter value is 4.<br><i>nai</i> Integer value from 0 to 127. |
| <b>pc</b>           | Specifies that the trigger will be matched if it contains the specified point code. The PC within the SCCP CgPA will be inspected first. If the PC is not present, then the OPC is used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>point-code</i>   | The point code in variant-specific point-code format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>ssn</b>          | Specifies that the trigger will be matched if it contains the specified subsystem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>ssn</i>          | Subsystem number in decimal. Valid range is 2 to 255.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>ruleset</b>      | Specifies the MLR ruleset table that should be used if this trigger is matched, and overrules the ruleset specified on the <b>trigger</b> command.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

|                     |                                                                                                                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>ruleset-name</i> | Name of a defined CS7 MLR ruleset table. The name is specified as a character string with a maximum of 12 characters.                                                                                                                                                              |
| <b>block</b>        | This trigger-action specifies that messages matching this trigger should be dropped. The <b>block</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode.                                                                                    |
| <b>continue</b>     | This trigger-action specifies that messages matching this trigger should be routed as received. This is the same behavior as if no primary trigger had been matched. The <b>continue</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode. |

**Defaults**

No default behavior or value.

**Command Modes**

CS7 mlr trigger configuration

**Command History**

| Release    | Modification                           |
|------------|----------------------------------------|
| 12.2(4)MB  | This command was introduced.           |
| 12.2(21)SW | The <b>continue</b> keyword was added. |

**Usage Guidelines**

A combination trigger uses more than one network layer address for identifying a trigger match. Within a combination trigger, one address is defined as the primary trigger and the other the secondary trigger.

The primary trigger must correlate with a defined GTT or GTT MAP entry. The GTT and GTT MAP databases are used as the lookup mechanism for primary triggers. Once a primary trigger match occurs, then the list of secondary triggers (defined within the primary trigger submode) is checked. If one or more secondary triggers have been defined, the secondary triggers are sequentially searched for a match. If no match on the secondary occurs, then the packet is not MLR routed. If no secondary triggers have been defined then MLR processing continues based on the primary trigger only.

If you configure a secondary address in the CS7 MLR trigger mode, then BOTH addresses must match for the packet to be blocked or routed using the specified ruleset.

The primary trigger must be for a calling party address for the **cdpa** command to be valid.

CDPA GT and CGPA GT secondary triggers do not require a matching GTT entry.

In all primary and secondary trigger definition:

- The **pc** keyword is matched only if RI=SSN
- The **ssn** keyword is matched only if RI=SSN.

**Examples**

The following example creates a combination trigger based on the combination of the primary trigger (the CgPA) and the secondary trigger (the CdPA) The example specifies that ruleset-5 should be applied if the combination trigger is found:

```
cs7 mlr table sms-router
trigger cgpa gt 9991117770 ruleset ruleset-5
cdpa gt 9991116 ruleset ruleset-5
```

The following example creates a combination trigger based on the combination of the primary trigger (the CgPA) and the secondary trigger (the CdPA), and places the **block** keyword at the end of the secondary trigger:

```
cs7 mlr table sms-blocking
trigger cgpa gt 9991117777 tt 10 ruleset ruleset-5
cdpa gt 9991115555 tt 10 block
```

**Related Commands**

| Command                   | Description                                                                                                            |
|---------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 mlr ruleset</b>    | Specifies sets of rules that will be used to process traffic matching triggers defined in a multi-layer routing table. |
| <b>default</b>            | Specifies the routing of packets on primary trigger when defined secondary triggers are not matched.                   |
| <b>show cs7 mlr table</b> | Displays the multi-layer SMS routing information.                                                                      |
| <b>trigger cgpa</b>       | Specifies a primary routing trigger that is located in the SCCP calling party address field of the incoming MSU.       |

# cdr-service

To specify a CDR service to be used by the SMS routing subsystem, use the **cdr-service** command in sms route table configuration mode. To remove the CDR service specification, use the **no** form of this command.

**cdr-service** *name*

**no cdr-service** *name*

## Syntax Description

|             |                                                                                                                                      |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <i>name</i> | The CDR service to be used by the SMS routing subsystem. Must match the <i>name</i> specified in the <b>cs7 cdr service</b> command. |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

SMS route table configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

The *name* of the CDR service must match the *name* configured in the global **cs7 cdr service** command.

## Examples

The following example shows a partial configuration. Notice that the same CDR service is named in the global configuration and in the SMS route table configuration:

```
cs7 cdr service FDASMSC
  destination psd1 10
  destination psd2 20
!
!
cs7 sms route-table
  cdr-service FDASMSC
  gsm-map sms-mo ssn 8
  ruleset SMS-RULES
```

## Related Commands

| Command                    | Description                    |
|----------------------------|--------------------------------|
| <b>cs7 cdr service</b>     | Configures a CDR service.      |
| <b>cs7 sms route-table</b> | Configures an SMS route table. |

# cdr-service-queue

To test the availability of CDR service queue as the input condition of the rule, use the **cdr-service-queue** command in cs7 sms rule configuration mode. To remove the specification, use the **no** form of this command.

**cdr-service-queue** [available | congested | unavailable]

**no cdr-service-queue**

## Syntax Description

|                    |                                            |
|--------------------|--------------------------------------------|
| <b>available</b>   | Matches if CDR service queue is available. |
| <b>congested</b>   | Matches if CDR service queue is congested. |
| <b>unavailable</b> | Matches if CDR queue is unavailable.       |

## Defaults

No default behavior or values

## Command Modes

CS7 sms rule configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

## Examples

The following example names a ruleset and rule order and specifies a CDR service queue match if CDR service queue is unavailable:

```
cs7 sms ruleset SMS-RULES protocol gsm-map
rule 10 sms-mo
cdr-service-queue unavailable
```

## Related Commands

| Command                | Description                |
|------------------------|----------------------------|
| <b>cs7 sms ruleset</b> | Configures an SMS ruleset. |

## cgpa

You can configure a secondary trigger in conjunction with the trigger address to create a combination trigger used to match a packet. To create a combination trigger based on the combination of the calling party and the called party, use the **cgpa** command in cs7 mlr trigger configuration mode within a called party address trigger. To disable the specific routing trigger, use the **no** form of this command.

```
cgpa {gt addr-string [gt-addr-type] | pc point-code ssn ssn} {ruleset ruleset-name | block | continue}
```

```
no cgpa {gt addr-string [gt-addr-type] | pc point-code ssn ssn} {ruleset ruleset-name | block | continue}
```

### Syntax Description

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>gt</b>           | Indicates that the CdPA trigger being defined is received with RI=GT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>addr-string</i>  | Address string of 1 to 15 hexadecimal characters. The string is not input in BCD-String format, but in normal form.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>gt-addr-type</i> | (Optional) Parameters that identify attributes of the global title address being used as a trigger. The parameters are variant-specific, and are identical to those parameters specified on the <b>cs7 gtt selector</b> command. If not specified, the default is the standard E.164 address type for the network variant being used.<br><br><b>tt</b> <i>tt</i> [ <b>gti</b> <i>gti</i> ] [ <b>np</b> <i>np</i> <b>nai</b> <i>nai</i> ]<br><b>tt</b> Identifies the translation type specified within the address.<br><i>tt</i> An integer value from 0 to 255.<br><b>gti</b> Identifies the global title indicator value for the specified address. This value is only specified when cs7 variant is ITU or China.<br><i>gti</i> Integer value of 2 or 4.<br><b>np</b> Identifies the numbering plan of the specified address. Only specified when the gti parameter value is 4.<br><i>np</i> Integer value from 0 to 15.<br><b>nai</b> Identifies the nature of specified address. Only specified when the gti parameter value is 4.<br><i>nai</i> Integer value from 0 to 127. |
| <b>pc</b>           | Specifies that the trigger will be matched if it contains the specified point code. The PC within the SCCP CdPA will be inspected first. If the PC is not present, then the DPC in the routing label is used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>point-code</i>   | The point code in variant-specific point-code format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>ssn</b>          | Specifies that the trigger will be matched if it contains the specified subsystem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>ssn</i>          | Subsystem number in decimal. Valid range is 2 to 255.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>ruleset</b>      | Specifies the MLR ruleset table that should be used if this trigger is matched, and not overruled by a secondary trigger ruleset.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>ruleset-name</i> | Name of an already defined CS7 MLR ruleset table. The name is specified as a character string with a maximum of 12 characters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|                 |                                                                                                                                                                                                                                                                                    |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>block</b>    | This trigger-action specifies that messages matching this trigger should be dropped. The <b>block</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode.                                                                                    |
| <b>continue</b> | This trigger-action specifies that messages matching this trigger should be routed as received. This is the same behavior as if no primary trigger had been matched. The <b>continue</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode. |

**Defaults**

No default behavior or value.

**Command Modes**

CS7 mlr trigger configuration

**Command History**

| Release    | Modification                           |
|------------|----------------------------------------|
| 12.2(4)MB  | This command was introduced.           |
| 12.2(21)SW | The <b>continue</b> keyword was added. |

**Usage Guidelines**

A combination trigger uses more than one network layer address for identifying a trigger match. Within a combination trigger, one address is defined as the primary trigger and the other the secondary trigger.

The primary trigger must correlate with a defined GTT or GTT MAP entry. The GTT and GTT MAP databases are used as the lookup mechanism for primary triggers. Once a primary trigger match occurs, then the list of secondary triggers (defined within the primary trigger submode) is checked. If one or more secondary triggers have been defined, the secondary triggers are sequentially searched for a match. If no match on the secondary occurs, then the packet is not MLR routed. If no secondary triggers have been defined, then MLR processing continues based on the primary trigger only.

If you configure a secondary address in the trigger submode, then BOTH addresses must match for the packet to be blocked or routed using the specified ruleset.

The primary trigger must be for a called party for the **cgpa** submode command to be valid.

CDPA GT and CGPA GT secondary triggers do not require a matching GTT entry.

In all primary and secondary trigger definition:

- The **pc** keyword is matched only if RI=SSN
- The **ssn** keyword is matched only if RI=SSN.

**Examples**

The following example creates a combination trigger based on the combination of the primary trigger (the called party, cdpa) and the secondary trigger (the calling party, cgpa) The example specifies that ruleset-5 should be applied if the combination trigger is found:

The following example creates a combination trigger based on the combination of the calling party and the called party by configuring the **cgpa** CS7 MLR trigger mode command within a called party address trigger.

```
cs7 mlr table sms-router
trigger cdpa gt 9991117770 ruleset ruleset-5
cgpa gt 9991116 ruleset ruleset-5
```

The following example creates a combination trigger based on the combination of the primary trigger (the CdPA) and the secondary trigger (the CgPA), and places the **block** keyword at the end of the secondary trigger:

```
cs7 mlr table sms-blocking
trigger cdpa gt 11111 tt 10 ruleset ruleset-5
cgpa gt 22222 tt 10 block
```

#### Related Commands

| Command                   | Description                                                                                                            |
|---------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 mlr ruleset</b>    | Specifies sets of rules that will be used to process traffic matching triggers defined in a multi-layer routing table. |
| <b>default</b>            | Creates a trigger to be used if all other subtriggers are unmatched.                                                   |
| <b>show cs7 mlr table</b> | Displays the multi-layer SMS routing information.                                                                      |
| <b>trigger cdpa</b>       | Specifies a routing trigger that is located in the SCCP called party address field of the incoming MSU.                |



# clear cs7 accounting

To clear the ITP accounting databases, use the **clear cs7 accounting** EXEC command.

```
clear cs7 [instance-number] accounting [access-violations] [[checkpoint] | [gtt [checkpoint]]]
```

## Syntax Description

|                          |                                                    |
|--------------------------|----------------------------------------------------|
| <b>access-violations</b> | Clears Cisco ITP access-violations database.       |
| <b>checkpoint</b>        | Clears Cisco ITP checkpointed accounting database. |
| <b>gtt</b>               | Clear SCCP GTT accounting database.                |
| <i>instance-number</i>   | Instance number.                                   |

## Command Modes

EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |
| 12.2(4)MB | GTT keywords added.          |

## Usage Guidelines

The **clear cs7 accounting** command resets counters. It is useful in debugging, to track new message activity.

This command can be issued either globally or on an instance.

## Examples

The following example clears the ITP access violations database:

```
clear cs7 accounting access-violations
```

## Related Commands

| Command                    | Description                                                 |
|----------------------------|-------------------------------------------------------------|
| <b>accounting</b>          | Enables accounting of in- and outbound frames on a linkset. |
| <b>show cs7 accounting</b> | Displays ITP accounting details.                            |

# clear cs7 all

To clear all accounting, statistics, and GTT measurements, use the **clear cs7 all** EXEC command.

**clear cs7** [*instance-number*] **all** [**checkpoint**]

|                           |                        |                                                       |
|---------------------------|------------------------|-------------------------------------------------------|
| <b>Syntax Description</b> | <b>checkpoint</b>      | (Optional) Clear all including all checkpoint tables. |
|                           | <i>instance-number</i> | Instance number.                                      |

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

|                         |                                                               |
|-------------------------|---------------------------------------------------------------|
| <b>Usage Guidelines</b> | This command can be issued either globally or on an instance. |
|-------------------------|---------------------------------------------------------------|

|                 |                                                                                                                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example clears all accounting, statistics, and GTT measurements, including all checkpoint tables: |
|-----------------|-----------------------------------------------------------------------------------------------------------------|

```
clear cs7 all checkpoint
```

|                         |                                     |                                                                 |
|-------------------------|-------------------------------------|-----------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                      | <b>Description</b>                                              |
|                         | <b>clear cs7 accounting</b>         | Clears the ITP accounting databases.                            |
|                         | <b>clear cs7 gtt-meas</b>           | Resets all GTT measurements to 0.                               |
|                         | <b>clear cs7 mtp3 event-history</b> | Clears the MTP3 event-history log.                              |
|                         | <b>clear cs7 statistics</b>         | Clears statistics concerning MSU throughput on a linkset basis. |
|                         | <b>show cs7</b>                     | Displays ITP basic configuration status.                        |

# clear cs7 as

To clear all application server statistics, use the **clear cs7 as** EXEC command.

**clear cs7** [*instance-number*] **as** {**event-history** | **statistics**} {*as-name* | **all**}

| Syntax Description | <i>instance-number</i> | Instance number.  |
|--------------------|------------------------|-------------------|
|                    | <b>event-history</b>   | Event history log |
|                    | <b>statistics</b>      | AS statistics     |
|                    | <i>as-name</i>         | AS name           |
|                    | <b>all</b>             | Clear all         |

| Command Modes | EXEC |
|---------------|------|
|---------------|------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Examples | The following example clears all application server statistics: |
|----------|-----------------------------------------------------------------|
|          | <pre>clear cs7 as statistics all</pre>                          |

| Related Commands | Command                        | Description                                                |
|------------------|--------------------------------|------------------------------------------------------------|
|                  | <b>cs7 as</b>                  | Specifies an Application Server and enters CS7 AS submode. |
|                  | <b>show cs7 as</b>             | Displays AS and routing key information.                   |
|                  | <b>show cs7 asp statistics</b> | Displays ASP statistics.                                   |

# clear cs7 asp

To clear all application server process statistics, use the **clear cs7 asp** EXEC command.

**clear cs7 asp** {event-history | statistics} {asp-name | all}

## Syntax Description

|                      |                   |
|----------------------|-------------------|
| <b>event-history</b> | Event history log |
| <b>statistics</b>    | ASP statistics    |
| <i>asp-name</i>      | ASP name          |
| <b>all</b>           | Clear all         |

## Command Modes

EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example clears all application server process statistics:

```
clear cs7 asp statistics all
```

## Related Commands

| Command                        | Description                                                          |
|--------------------------------|----------------------------------------------------------------------|
| <b>cs7 asp</b>                 | Specifies an Application Server Process and enables CS7 ASP submode. |
| <b>show cs7 asp statistics</b> | Displays ASP statistics.                                             |

# clear cs7 asroute

To clear CS7 AS route measurements, use the **clear cs7 asroute** EXEC command.

```
clear cs7 [instance-number] asroute {event-history {all | name}| statistics} {all | name}}
```

## Syntax Description

|                        |                        |
|------------------------|------------------------|
| <i>instance-number</i> | Instance number.       |
| <b>event-history</b>   | AS route event history |
| <b>statistics</b>      | AS route statistics    |
| <b>all</b>             | All AS route events    |
| <i>name</i>            | AS route name          |

## Command Modes

EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example clears all AS route statistics:

```
clear cs7 asroute statistics all
```

## Related Commands

| Command                            | Description                                                            |
|------------------------------------|------------------------------------------------------------------------|
| <b>cs7 asroute</b>                 | Defines a set of routes to a virtual point code within the IP network. |
| <b>show cs7 asroute statistics</b> | Displays AS route statistics.                                          |

# clear cs7 dynamic-route

To clear a dynamic route, use the **clear cs7 dynamic-route** EXEC command.

**clear cs7** [*instance-number*] **dynamic-route all**}

| Syntax Description | <i>instance-number</i> | Instance number.                                                                  |
|--------------------|------------------------|-----------------------------------------------------------------------------------|
|                    | <b>all</b>             | Clear all dynamic routes.                                                         |
|                    | <i>minutes</i>         | Purge only if older than specified time, in minutes. Range is 0 to 20160 minutes. |
|                    |                        |                                                                                   |

| Command Modes | EXEC |
|---------------|------|
|---------------|------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Usage Guidelines | This command can be issued either globally or on an instance. |
|------------------|---------------------------------------------------------------|
|------------------|---------------------------------------------------------------|

| Examples | The following example clears all dynamic routes:<br><code>clear cs7 dynamic-route all</code> |
|----------|----------------------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------------------|

| Related Commands | Command | Description |
|------------------|---------|-------------|
|                  |         |             |
|                  |         |             |
|                  |         |             |

# clear cs7 gtt-meas

To reset all GTT measurements to 0, use the **clear cs7 gtt-meas** privileged EXEC command.

**clear cs7** [*instance-number*] **gtt-meas**

|                           |                                                               |                                                  |
|---------------------------|---------------------------------------------------------------|--------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i>                                        | Instance number.                                 |
| <b>Command Modes</b>      | EXEC                                                          |                                                  |
| <b>Command History</b>    | <b>Release</b>                                                | <b>Modification</b>                              |
|                           | 12.2(4)MB                                                     | This command was introduced.                     |
| <b>Usage Guidelines</b>   | This command can be issued either globally or on an instance. |                                                  |
| <b>Examples</b>           | The following example clears all GTT measurements:            |                                                  |
|                           | <pre>clear cs7 gtt-meas</pre>                                 |                                                  |
| <b>Related Commands</b>   | <b>Command</b>                                                | <b>Description</b>                               |
|                           | show cs7 gtt measurements                                     | Displays a summary of CS7 GTT/SCCP measurements. |

# clear cs7 mapua statistics

To clear all CS7 MAPUA measurements, use the **clear cs7 mapua statistics** EXEC command.

**clear cs7** [*instance-number*] **mapua statistics**

## Syntax Description

|                        |                  |
|------------------------|------------------|
| <i>instance-number</i> | Instance number. |
|------------------------|------------------|

## Command Modes

EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Usage Guidelines

This command can be issued either globally or on an instance.

## Examples

The following example clears all CS7 MAPUA measurements:

```
clear cs7 mapua statistics
```

## Related Commands

| Command | Description |
|---------|-------------|
|         |             |
|         |             |
|         |             |



# clear cs7 mated-sg statistics

To clear all SG mated pair statistics, use the **clear cs7 mated-sg statistics** EXEC command.

**clear cs7 mated-sg statistics**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

|                 |                                                                                                              |
|-----------------|--------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example clears all SG mated pair statistics:<br><br><code>clear cs7 mated-sg statistics</code> |
|-----------------|--------------------------------------------------------------------------------------------------------------|

|                         |                                           |                                                                       |
|-------------------------|-------------------------------------------|-----------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                            | <b>Description</b>                                                    |
|                         | <code>cs7 mated-sg</code>                 | Specifies a connection to a mated-SG and enters CS7 mated-SG submode. |
|                         | <code>show cs7 mated-sg statistics</code> | Displays mated SG statistics.                                         |

# clear cs7 monitor

To clear the CS7 monitor counters for a specific TCP port (or all ports), use the **clear cs7 monitor** command in EXEC mode.

**clear cs7 monitor** [*tcp-listen-port* ]

| Syntax Description | <i>tcp-listen-port</i> | The port number. Valid port numbers are in the range 1024 to 49151. If no port number is specified, counters are cleared for all TCP ports. |
|--------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
|--------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | EXEC |
|---------------|------|
|---------------|------|

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | 12.2(4)MB12 | This command was introduced. |

| Examples | The following example clears CS7 monitor counters for port 9000: |
|----------|------------------------------------------------------------------|
|----------|------------------------------------------------------------------|

```
clear cs7 monitor 9000
```

| Related Commands | Command     | Description                                                                                                  |
|------------------|-------------|--------------------------------------------------------------------------------------------------------------|
|                  | cs7 monitor | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

# clear cs7 mtp3 event-history

To clear the MTP3 event-history log, use the **clear cs7 mtp3 event-history** EXEC command.

**clear cs7** [*instance-number*] **mtp3 event-history**

|                           |                                         |
|---------------------------|-----------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> Instance number. |
|---------------------------|-----------------------------------------|

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(1)MB      | This command was introduced. |

|                         |                                                                                                                                                                                                                                               |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | To collect MTP3 problem determination information for further analysis of a known problem, clear the event history just before a known problem is about to recur. Do not clear event history otherwise, since vital information will be lost. |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

This command can be issued either globally or on an instance.

|                 |                                                          |
|-----------------|----------------------------------------------------------|
| <b>Examples</b> | The following example clears the MTP3 event history log: |
|-----------------|----------------------------------------------------------|

```
clear cs7 mtp3 event history
```

|                         |                                    |                                                            |
|-------------------------|------------------------------------|------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                     | <b>Description</b>                                         |
|                         | <b>cs7 mtp3 event-history</b>      | Specifies the maximum number of events to store in memory. |
|                         | <b>show cs7 mtp3 event-history</b> | Displays logged ITP MTP3 events.                           |

# clear cs7 pointcode event-history

To clear the CS7 M3UA or SUA point code measurements, use the **clear cs7 pointcode event-history** privileged EXEC command.

**clear cs7** [*instance-number*] **pointcode event-history**

## Syntax Description

|                        |                  |
|------------------------|------------------|
| <i>instance-number</i> | Instance number. |
|------------------------|------------------|

## Command Modes

EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example clears the CS7 point code measurements:

```
clear cs7 pointcode event-history
```

## Related Commands

| Command                                   | Description                                                 |
|-------------------------------------------|-------------------------------------------------------------|
| <b>show cs7 point-codes event-history</b> | Displays the point codes that this router is responding to. |

# clear cs7 offload mtp3

To clear all counters maintained by the MTP3 offload feature, use the **clear cs7 offload mtp3** EXEC command.

**clear cs7 offload mtp3** *slot*

|                           |                              |
|---------------------------|------------------------------|
| <b>Syntax Description</b> | <i>slot</i> VIP slot number. |
|---------------------------|------------------------------|

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB12    | This command was introduced. |

|                 |                                                                                                                |
|-----------------|----------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example clears all MTP3 offload counters for VIP 0:<br><br><code>clear cs7 offload mtp3 0</code> |
|-----------------|----------------------------------------------------------------------------------------------------------------|

|                         |                                       |                                                                                           |
|-------------------------|---------------------------------------|-------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                        | <b>Description</b>                                                                        |
|                         | <b>show cs7 offload mtp3 detailed</b> | Displays the current status, counters, and events maintained by the MTP3 offload feature. |

# clear cs7 statistics

To clear statistics concerning MSU throughput on a linkset basis, use the **clear cs7 statistics** EXEC command.

**clear cs7** [*instance-number*] **statistics** [*linkset* [*link*]]

## Syntax Description

|                        |                          |
|------------------------|--------------------------|
| <i>instance-number</i> | Instance number.         |
| <i>linkset</i>         | The name of the linkset. |
| <i>link</i>            | The number of the link.  |

## Command Modes

EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Usage Guidelines

This command can be issued either globally or on an instance.

The ITP statistics are helpful in debugging and analyzing MSU throughput. The **clear cs7 statistics** command can be used by a customer or TAC engineer any time a starting point is desired to see statistics counted.

The following statistics are kept:

- MSU In
- MSU Out
- LSSU In
- LSSU Out
- ByteCnt In
- ByteCnt Out
- Drop

Statistics are displayed via the **show cs7 linkset statistics** command

## Examples

The following example resets to zero all counters for all linksets, then resets to zero all counters on the linkset named rosebud:

```
clear cs7 statistics
!resets all counts to zero for all linksets)
clear cs7 statistics rosebud
!resets all counts on the linkset rosebud to zero)
```

## Related Commands

| Command                     | Description             |
|-----------------------------|-------------------------|
| show cs7 linkset statistics | Displays ITP statistics |

# clear cs7 tcp statistics

To clear CS7 TCP measurements, use the **clear cs7 tcp statistics** EXEC command.

**clear cs7** [*instance-number*] **tcp statistics**

|                           |                                                               |                              |
|---------------------------|---------------------------------------------------------------|------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> Instance number.                       |                              |
| <b>Command Modes</b>      | EXEC                                                          |                              |
| <b>Command History</b>    | <b>Release</b>                                                | <b>Modification</b>          |
|                           | 12.2(4)MB5                                                    | This command was introduced. |
| <b>Usage Guidelines</b>   | This command can be issued either globally or on an instance. |                              |
| <b>Examples</b>           | The following example clears all CS7 TCP measurements:        |                              |
|                           | <pre>clear cs7 tcp statistics</pre>                           |                              |
| <b>Related Commands</b>   | <b>Command</b>                                                | <b>Description</b>           |
|                           | show cs7 tcp                                                  | Displays TCP information.    |



# client

To configure the list of clients that are allowed by the MAP Proxy, use the **client** command in cs7 mapua configuration mode. To disable client requests for MAPUA, use the **no** form of this command.

**client** *remote-ip* [**dynamic**] [**port** *remote-port*] [**encryption-off**] **secret** {0 | 7 | LINE} *shared-secret*

**no client** *remote-ip* [**port** *remote-port*] [**encryption-off**] **secret** {0 | 7 | LINE} *shared-secret*

| Syntax                | Description                                                                                                                     |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <i>remote-ip</i>      | Client's IP address. The source IP address within the MAPUA client request is used to match this specified client IP address.   |
| <b>dynamic</b>        | (Optional) Specifies that any client can connect.                                                                               |
| <b>port</b>           | (Optional) Allows specification of the MAPUA client port. If not specified, the client may connect using any valid port number. |
| <i>remote-port</i>    | Client's port number.                                                                                                           |
| <b>encryption-off</b> | (Optional) Specifies that the MAP Proxy RADIUS packets are not encrypted.                                                       |
| <b>secret</b>         | Specifies a shared-secret string used to authenticate the MAPUA client request.                                                 |
| <b>0</b>              | Shared-secret is unencrypted.                                                                                                   |
| <b>7</b>              | Shared-secret is encrypted.                                                                                                     |
| <i>shared-secret</i>  | Shared-secret string used to authenticate this MAPUA client.                                                                    |

**Defaults** No default behavior or values.

**Command Modes** CS7 mapua configuration

| Command History | Release    | Modification                          |
|-----------------|------------|---------------------------------------|
|                 | 12.2(4)MB7 | This command was introduced.          |
|                 | 12,2(25)SW | The <b>dynamic</b> keyword was added. |

**Examples** The following example shows a MAP proxy configuration for performing GSM MAP authentication service:

```
cs7 mapua rad2000 radius 2000
client 1.1.1.1 secret client1111
client 2.2.2.2 secret client2222
client 3.3.3.3 secret client3333
```

The following example shows a MAP proxy configuration for an MMSC Gateway implementation:

```
cs7 mapua GetIMSI smpp 9000
local-ip 4.4.4.4
client 1.1.1.1
client 2.2.2.2
```

```
client dynamic
map-source-addr digits 1234567890 type 9
get-imsi include-msc
smp response-timer 6000
smp session-init-timer 3000
```

**Related Commands**

| Command                     | Description                                                                                                      |
|-----------------------------|------------------------------------------------------------------------------------------------------------------|
| cs7 mapua                   | Specifies the name, protocol, and local port number for the MAP Proxy feature and enables the CS7 MAPUA submode. |
| service password-encryption | Encrypts the shared-secret string.                                                                               |

# clock source (controller)

To set the clock source, use the **clock source** command in controller configuration mode. To restore the clock source to its default setting, use the **no** form of this command.

**clock source {bits | line} {primary | secondary priority} | {free-running | internal}**

**no clock source**

| Syntax Description | bits         | Specifies that clocking for all nodes is derived from one designated source.                |
|--------------------|--------------|---------------------------------------------------------------------------------------------|
|                    | line         | Specifies that clocking is derived from the external source to which the port is connected. |
|                    | primary      | Specifies the primary source of clock.                                                      |
|                    | secondary    | Specifies the secondary source of clock.                                                    |
|                    | priority     | Specifies the priority of the clock source. The valid range is 1 to 8.                      |
|                    | free-running | Specifies a free-running clock derived from the oscillator on the motherboard.              |
|                    | internal     | Specifies that clocking is derived from the controller's internal phase-locked loop (PLL).  |

**Defaults** line

**Command Modes** Controller configuration

| Command History | Release   | Modification                                                                                   |
|-----------------|-----------|------------------------------------------------------------------------------------------------|
|                 | 10.3      | This command was introduced.                                                                   |
|                 | 11.1      | This command was modified to include the T3 serial port adapter and PA-T3 serial port adapter. |
|                 | 12.2(8)T  | This command was modified to include <b>free-running</b> keyword.                              |
|                 | 12.2(4)MB | This command was modified to include the <b>bits</b> keyword and the <i>priority</i> argument. |

**Usage Guidelines** A controller that is configured for BITS clocking cannot be used to carry data. If BITS clocking has been set, no channel groups can be configured. If channel groups have been configured, BITS cannot be configured.

**Examples** The following example specifies BITS clock source as the primary clock:

```
controller t1 4/0/7
clock source bits primary
```

■ clock source (controller)

| Related Commands | Command         | Description                                        |
|------------------|-----------------|----------------------------------------------------|
|                  | <b>framing</b>  | Selects the frame type for the T1 or E1 data line. |
|                  | <b>linecode</b> | Selects the linecode type for the T1 or E1 line.   |

# clock source (interface)

To set the clock source, use the **clock source** command in interface configuration mode. To restore the clock source to its default setting, use the **no** form of this command.

**clock source** { **common** | **internal** | **line** } *interface-number*

**no clock source**

|                    |                         |                                                                                                                                               |
|--------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax Description | <b>common</b>           | Specifies that the interface will clock its transmitted data from a common clock source.                                                      |
|                    | <b>internal</b>         | Specifies that the interface will clock its transmitted data from its internal clock.                                                         |
|                    | <b>line</b>             | Specifies that the interface will clock its transmitted data from a clock recovered from the line's receive data stream. This is the default. |
|                    | <i>interface-number</i> | Specific physical link or port number of the common clock source. Valid range is 0 - 7.                                                       |

|          |      |
|----------|------|
| Defaults | line |
|----------|------|

|               |                         |
|---------------|-------------------------|
| Command Modes | Interface configuration |
|---------------|-------------------------|

|                 |                |                                                                                                    |
|-----------------|----------------|----------------------------------------------------------------------------------------------------|
| Command History | <b>Release</b> | <b>Modification</b>                                                                                |
|                 | 12.2(23)SW1    | The <b>common</b> parameter was added to provide a common BITS clock to IMA interfaces in the ITP. |

The **common** keyword is used as part of a configuration that provides BITS clocking to SS7 ATM High Speed Links (HSL). A BITS clock is delivered, via a T1 crossover cable, **from** an SS7 port adapter controller that has been configured as the primary BITS clock **to** a T1 Inverse Multiplexing for ATM (IMA) port adapter interface. The IMA port adapter interface receives the BITS clock source for all other interfaces on that IMA port adapter. All other interfaces on the IMA port adapter accept the BITS clock by specifying **clock source common interface-number**, where *interface-number* is the IMA port adapter interface that is crossover cabled to the SS7 port adapter.

As of IOS Release 12.2(23)SW1, this functionality is available for T1 IMA PAs only. E1 support will be available in a future release.

The following example provides BITS clocking to ATM HSLs. Controller 0 of the SS7 port adapter is configured as the primary source of the BITS clock. Controller 1 of the SS7 port adapter is configured as the secondary source. Controller 2 of the SS7 port adapter is connected to the IMA port adapter interface 0 with a T1 crossover cable and provides the BITS clock to the IMA.

```
controller T1 2/0/0
```

## clock source (interface)

```

clock source bits primary
description PRIMARY BITS CLOCK RCVD

controller T1 2/0/1
clock source bits secondary 1
description SECONDARY BITS CLOCK RCVD

controller T1 2/0/2
clock source internal
description PROVIDES BITS CLOCK TO T1 ATM12/0/0
description INTERFACE IS CONNECTED TO ATM12/0/0

interface ATM12/0/0
no ip address
no ima-group
no atm ilmi-keepalive
description RECEIVES BITS CLOCK SOURCE FOR ALL INTERFACES ON THIS IMA PA
description INTERFACE IS CONNECTED TO T1 2/0/3

interface ATM12/0/1
clock source common 0
atm nni
pvc 0/5 qsaal

interface ATM12/0/2
clock source common 0
atm nni
pvc 0/5 qsaal

```

### Related Commands

| Command | Description |
|---------|-------------|
|         |             |
|         |             |
|         |             |

# congestion-threshold

To set the congestion-threshold for the CDR service, use the **congestion-threshold** command in `cs7 cdr` service configuration mode. To return the default congestion-threshold, use the **no** form of this command.

**congestion-threshold** *percentage*

**no congestion-threshold** *percentage*

|                           |                   |                                                                                                                                       |
|---------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percentage</i> | Valid range is 0 to 99%. 0 specifies never report congestion. 99 specifies report congestion when 99% is reached. The default is 80%. |
|---------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|

|                 |     |
|-----------------|-----|
| <b>Defaults</b> | 80% |
|-----------------|-----|

|                      |                               |
|----------------------|-------------------------------|
| <b>Command Modes</b> | CS7 cdr service configuration |
|----------------------|-------------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                              |
|-------------------------|----------------------------------------------|
| <b>Usage Guidelines</b> | The default for congestion threshold is 80%. |
|-------------------------|----------------------------------------------|

|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| <b>Examples</b> | The following example sets the congestion-threshold to 50%: |
|-----------------|-------------------------------------------------------------|

```
cs7 cdr service CDR1
congestion-threshold 50
```

|                         |                                      |                                                    |
|-------------------------|--------------------------------------|----------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                       | <b>Description</b>                                 |
|                         | <b>cs7 cdr service</b>               | Specifies a Call Data Record (CDR) service.        |
|                         | <b>queue-depth (cs7 cdr service)</b> | Set the available queue depth for the CDR service. |

# cs7 accounting

To configure CS7 accounting options, use the **cs7 accounting** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7 accounting** { **checkpoint-interval** | **gtt-checkpoint-interval** } *min*

## Syntax Description

|                                |                                                                                        |
|--------------------------------|----------------------------------------------------------------------------------------|
| <b>checkpoint-interval</b>     | Specifies an accounting checkpoint interval.                                           |
| <b>gtt-checkpoint-interval</b> | Specifies an GTT accounting checkpoint interval.                                       |
| <i>min</i>                     | Checkpoint interval in minutes. Range is 1 through 3600 minutes. Default is 5 minutes. |

## Defaults

Default accounting checkpoint interval is 5 minutes.  
Default GTT accounting checkpoint interval is 5 minutes.

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

This command is not instance related and cannot be specified with the **instance** keyword.

## Examples

The following example sets the GTT accounting checkpoint interval to 30 minutes:

```
cs7 accounting gtt-checkpoint-interval 30
```

## Related Commands

| Command                    | Description                      |
|----------------------------|----------------------------------|
| <b>show cs7 accounting</b> | Displays ITP accounting details. |



# cs7 address-table replace

To replace an already configured or new address table with one specified in a URL, use the **cs7 address-table replace** command in global configuration mode. To remove the line from the configuration, use the **no** form of this command.

**cs7 address-table replace** {mlr | sms} *tablename URL*

**nocs7 address-table replace** {mlr | sms} *tablename URL*

## Syntax Description

|                  |                                                                                                                      |
|------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>mlr</b>       | Specifies table type <b>mlr</b> .                                                                                    |
| <b>sms</b>       | Specifies table type <b>sms</b> .                                                                                    |
| <i>tablename</i> | Identifies the existing address table that is to be replaced.                                                        |
| <i>URL</i>       | The user-assigned local or remote location representing the file name and path from which the file will be replaced. |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

The replacement does not impact routing until the entire replacement address table is loaded successfully. If an error occurs, the old address table (if present) remains intact. Each time an address table is replaced, the corresponding **load** command is added to the running configuration.

## Examples

The following command replaces an SMS address table named addrtbl1 with the file at disk0:smsaddrtbl:

```
cs7 address-table replace sms addrtbl1 disk0:smsaddrtbl
```

## Related Commands

| Command                             | Description                                                                             |
|-------------------------------------|-----------------------------------------------------------------------------------------|
| <b>addr (cs7 sms address-table)</b> | Configures one or more addresses that can be used for blocking or routing SMS messages. |
| <b>cs7 sms address-table</b>        | Specifies an address table and enables CS7 SMS address-table configuration mode.        |
| <b>load (CS7 SMS address-table)</b> | Specifies the file to load upon startup.                                                |

## cs7 as

To define an Application Server (AS), use the **cs7 as** command in global configuration mode. To inactivate an AS and delete the AS definition from configuration, use the **no** form of this command.

**cs7** [**instance** *instance-number*] **as** *as-name* { **m3ua** | **sua** }

**no** [**instance** *instance-number*] **cs7 as** *as-name* { **m3ua** | **sua** }

### Syntax Description

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Associate an Application Server (AS) with a defined instance.                                                                                                                                                                                                                                                                                                                                        |
| <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                                                                                                                                                                                                                                                                                                                            |
| <i>as-name</i>         | The AS name is a unique name used to identify an AS for configuration and monitoring. This name may be up to 12 characters long. The first character must be alphabetic. The AS name cannot duplicate an AS Route name, and cannot match the following reserved keywords: <b>m3ua</b> , <b>sua</b> , <b>all</b> , <b>operational</b> , <b>active</b> , <b>statistics</b> , <b>bindings</b> , or <b>detail</b> . |
| <b>m3ua</b>            | The <b>m3ua</b> keyword indicates that this is an M3UA AS.                                                                                                                                                                                                                                                                                                                                                      |
| <b>sua</b>             | The <b>sua</b> keyword indicates that this is an SUA AS.                                                                                                                                                                                                                                                                                                                                                        |

### Defaults

No default behavior or values.

### Command Modes

Global configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

You must configure the ASPs before you configure the AS.

You must specify both a routing key and at least 1 ASP in the AS submode, or this incomplete AS definition will be deleted.

You cannot delete an AS that is currently defined in an AS route. You must first remove this AS from the AS route.

This command is not instance related and cannot be specified with the **instance** keyword.

Issuing the **cs7 as** command enables the CS7 AS submode. In CS7 AS submode, you can configure the routing-key, the ASP, the traffic-mode AS parameters and QoS class. You cannot modify the parameters of an active AS.

When an AS is inactivated, the ASPs associated with this AS are also inactivated for this routing context by generating a NOTIFY with the routing context.

### Examples

The following example configures an M3UA AS named BLUE:

```
cs7 as BLUE m3ua
```

**Related Commands**

| Command                                         | Description                                                                                                  |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>asp</b>                                      | Associates ASPs to an AS.                                                                                    |
| <b>burst-recovery-timeout</b>                   | Specifies the amount of time allowed for an association to recover from a burst of traffic due to failover   |
| <b>cs7 asp</b>                                  | Defines an ASP.                                                                                              |
| <b>cs7 m3ua</b>                                 | Specifies the local port number for M3UA.                                                                    |
| <b>cs7 multi-instance</b>                       | Enables multiple instances of a variant and network indicator combination.                                   |
| <b>cs7 sua</b>                                  | Specifies the local port number for SUA.                                                                     |
| <b>qos-class (CS7 AS),<br/>recovery-timeout</b> | Configures a QoS class for the packets sent to the ASPs in this AS.<br>specifies the recovery timeout value. |
| <b>routing-key (CS7 AS)</b>                     | Specifies the routing key for the AS.                                                                        |
| <b>show cs7 as</b>                              | Displays AS and routing key information.                                                                     |
| <b>shutdown (CS7 AS)</b>                        | Disables an AS without deleting the configuration.                                                           |
| <b>traffic-mode</b>                             | Specifies the traffic mode of operation for the ASP within an AS.                                            |

## cs7 asp

To specify an Application Server Process and enable CS7 ASP submode., use the **cs7 asp** command in global configuration mode. To delete an ASP definition from the configuration, use the **no** form of this command.

**cs7 asp** *asp-name remote-port [local-port] [m3ua | sua]*

**no cs7 asp** *asp-name remote-port [local-port] [m3ua | sua]*

### Syntax Description

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>asp-name</i>    | The ASP name is a unique name used to identify an ASP for configuration and monitoring. This name may be up to 12 characters long. The first character must be alphabetic. The ASP name cannot match a reserved keyword (such as m3ua, sua, all, operational, active, statistics, bindings, or detail).                                                                                                                                                                                                                                                |
| <i>remote-port</i> | Remote port number of the ASP. Valid range is 0 to 65535. This parameter is used for validation. The SCTP connection requests from the ASP must come in with this remote port number. If 2 ASPs are configured with the same remote IP address, then the remote port and local port is used to differentiate between the 2 ASPs. If a remote port of 0 is configured, the ASP will match on any remote port (providing remote-ip and local port match). The remote IP, remote port, and local port combination must be unique for each configured ASP. |
| <i>local-port</i>  | Local port number of the ITP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>m3ua</b>        | (Optional) The <b>m3ua</b> keyword indicates that this is an M3UA ASP. This value must match the protocol of the specified local port.                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>sua</b>         | (Optional) The <b>sua</b> keyword indicates that this is an SUA ASP. This value must match the protocol of the specified local port.                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Defaults

No default behavior or values.

### Command Modes

Global configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

The **cs7 asp** command allows you to define an ASP and enables the CS7 ASP submode. The remote IP address and remote port number combination must be unique for each configured ASP. An SCTP association for an ASP will be failed if the ASP is not associated with an AS. An ASP may be associated with multiple ASs.

You can modify the remote port, local port and protocol of a previously configured ASP. If you enter a valid remote port, local port, and protocol combination, the ASP will be updated if its SCTP association is down. You cannot change both the local port and protocol of an ASP that is defined in an AS.

The **no** form of the **cs7 asp** command deletes this ASP definition from configuration. If an association is up with this ASP, you must first shutdown the ASP and remove the ASP from all CS7 AS definitions before this command can be deleted from the configuration.

In the CS7 ASP submode, you can disable the ASP by entering the **shutdown** or **block** commands. New SCTP associations will be rejected if the ASP is in shutdown mode.

You cannot delete an ASP that is currently configured in an AS. You must first remove this ASP from the AS configuration.

You must specify at least 1 remote-ip address in the ASP submode, or this incomplete ASP definition will be deleted.

This command is not instance related and cannot be specified with the **instance** keyword.

### Examples

The following example configures an M3UA ASP named ASP1 with remote port number 5000 and local port number 5000:

```
cs7 m3ua 5000
  local-ip 1.1.1.1
!
cs7 asp ASP1 5000 5000 m3ua
  remote-ip 2.2.2.2
```

### Related Commands

| Command                             | Description                                                                                            |
|-------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>assoc-retransmit (cs7 asp)</b>   | Configures the maximum number of consecutive retransmissions for the association.                      |
| <b>block</b>                        | Allows a new SCTP association to be established but prevents the ASP from going into the active state. |
| <b>bundling (cs7 asp)</b>           | Specifies the maximum amount of time, in milliseconds, that SCTP will wait for messages for bundling.  |
| <b>cs7 as</b>                       | Defines an application server.                                                                         |
| <b>cs7 qos class</b>                | Defines a CS7 QoS class.                                                                               |
| <b>cumulative-sack (CS7 ASP)</b>    | Specifies the cumulative selective acknowledgment time-out value, in milliseconds.                     |
| <b>keepalive (CS7 ASP)</b>          | Specifies the keepalive interval, in milliseconds.                                                     |
| <b>match any (CS7 ASP)</b>          | Assigns a QoS class number to all inbound traffic.                                                     |
| <b>match si (cs7 asp))</b>          | Assign a QoS class number to any inbound packet that has a specific service indicator.                 |
| <b>path-retransmit (CS7 ASP)</b>    | Specifies the maximum number of path retransmissions on a remote address for the association.          |
| <b>qos-class (CS7 ASP)</b>          | Defines a QoS class for the packets sent to this ASP.                                                  |
| <b>remote-ip (CS7 ASP)</b>          | Configure a remote IP address to associate incoming packets from an ASP to a configured ASP.           |
| <b>retransmit-timeout (CS7 ASP)</b> | Specifies the minimum retransmission timeout value for the association.                                |
| <b>show cs7 asp</b>                 | Displays ASP information.                                                                              |
| <b>shutdown (CS7 ASP)</b>           | Disables an ASP without deleting the configuration.                                                    |
| <b>tx-queue-depth (CS7 ASP)</b>     | Specifies the maximum transmit queue depth for the association.                                        |

# cs7 asroute

To define a set of routes to a virtual point code within the IP network, use the **cs7 asroute** command in global configuration mode. To inactivate an AS Route table and delete the AS Route table definition from configuration, use the **no** form of this command.



## Note

The **cs7 asroute** command is valid in the M3UA configuration only.

**cs7** [*instance instance-number*] **asroute** *asroute*

**no cs7** [*instance instance-number*] **asroute** *asroute*

## Syntax Description

|                        |                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Associate a set of routes to a virtual point code within the IP network with a defined instance.                                                                                                                                                                                                                                                                                  |
| <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                                                                                                                                                                                                                                                                                                         |
| <i>asroute</i>         | AS route table name. The AS route table name is a unique name used to identify an AS Route table or configuration and monitoring. This name may be up to 12 characters long. The first character must be alphabetic. The AS Route table name cannot duplicate an AS name and cannot match a reserved keyword (such as m3ua, sua, all, operational, active, statistics, bindings, or detail). |

## Defaults

No default behavior or values.

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Usage Guidelines

The **cs7 asroute** command allows you to define a set of routes to a virtual point code within the IP network. The IP destination must be accessible by an ASP defined on the SG or the SG mate.

The **cs7 asroute** command enables the CS7 AS route configuration submode.

The **cs7 asroute** command is valid for M3UA only.

The routing key routing context defined in the ASroute must be unique from routing contexts used by other ASes and ASroutes. This context is used to communicate state information regarding the route with the mated ITP.

When multiple instances is configured, duplicate routing keys are allowed for ASes or AS routes in different instances.

You must configure a routing-key and an “update route” in the CS7 AS route submode, or this incomplete AS route configuration will be deleted when you exit the AS Route submode. The routing-key specifies the routing context and the dpc that uniquely defines the range of signaling traffic to be handled by a particular AS Route.

### Examples

The following command specifies an AS route named route1:

```
cs7 asroute route1
```

### Related Commands

| Command                            | Description                                                                                                                       |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>remove route (CS7 AS route)</b> | Deletes ASPs or the SG Mate associated with this AS Route.                                                                        |
| <b>routing-key (CS7 AS Route)</b>  | Specifies the routing key and the dpc that uniquely defines the range of signaling traffic to be handled by a particular AS Route |
| <b>show cs7 asroute</b>            | Displays AS Route information.                                                                                                    |
| <b>update route (CS7 AS route)</b> | Lists ASPs and the SG Mate contained in this AS Route.                                                                            |

## cs7 capability-pc

To configure the capability point code for the ITP and its mated node, use the **cs7 capability-pc** command in global configuration mode. To remove the capability point code, use the **no** form of this command.

**cs7** [*instance instance*] **capability-pc** *zone.region.sp*

**no cs7** [*instance instance*] **capability-pc** *zone.region.sp*

### Syntax Description

|                        |                                                                                                        |
|------------------------|--------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Configure the capability point code for a specified instance of the ITP and its mated node. |
| <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                   |
| <i>zone.region.sp</i>  | The capability point code.                                                                             |

### Defaults

No default behavior or values

### Command Modes

Global configuration

### Command History

| Release     | Modification                                                      |
|-------------|-------------------------------------------------------------------|
| 12.2(4)MB   | This command was introduced.                                      |
| 12.2(25)SW1 | ITP supports multiple capability points (Up to 200 per instance). |

### Usage Guidelines

The ITP supports configuration of up to 200 capability point codes per instance.

A capability point code must be configured according to the existing point code format.

The capability point code functions like an alias for a mated pair of ITPs. For example, a capability point code could be assigned to a mated pair of ITPs that share a GTT database for redundancy purposes. In this case all SCCP messages could be directed to a single “capable” point-code and either ITP could handle the processing.

### Examples

The following example shows excerpts from two separate ITP configurations, with both ITPs assigned the same capability point code:

```
hostname itpa
cs7 multi-instance
cs7 instance 0 variant itu
cs7 instance 0 point-code 5.100.2
cs7 instance 0 capability-pc 5.100.12

hostname itpb
cs7 multi-instance
cs7 instance 0 variant itu
cs7 instance 0 point-code 5.100.3
```



```
cs7 instance 0 capability-pc 5.100.12
```

**Related Commands**

| Command                   | Description                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------|
| <b>cs7 point-code</b>     | Assigns a local point code to an instance.                                                |
| <b>cs7 variant</b>        | Specifies the variant for an instance.                                                    |
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination.                |
| <b>show cs7</b>           | Displays the ITP basic configuration, including the point code and capability point code. |

# cs7 cdr destination

To configure a call data record (CDR) destination to connect to a persistent Storage Device (PSD), use the **cs7 cdr destination** command in global configuration mode. To disable the configuration, use the **no** form of this command.

**cs7 cdr destination** *name* [*remote-port remote-ip-addr local-ip-addr*]

**no cs7 cdr destination** *name* [*remote-port remote-ip-addr local-ip-addr*]

## Syntax Description

|                       |                                                                                                                                                      |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>name</i>           | Name of CDR destination.                                                                                                                             |
| <i>remote-port</i>    | Remote port number. Valid range is 1024 to 49151. Required for configuring a new destination. Optional for subsequent reference to that destination. |
| <i>remote-ip-addr</i> | Remote IP address. Required for configuring a new destination. Optional for subsequent reference to that destination.                                |
| <i>local-ip-addr</i>  | Local IP address. Required for configuring a new destination. Optional for subsequent reference to that destination.                                 |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

The complete command syntax, including specification of the *remote-port*, *remote-ip-addr*, and *local-ip-addr*, is required for configuring a new destination or for changing that destination.

The **cs7 cdr destination** command enables the CS7 CDR destination configuration mode.

To shutdown traffic to or from a CDR Destination, use the **cs7 cdr destination** command, then use the **shutdown** command in CS7 CDR destination configuration mode, as shown here:

```
ITP(config)#cs7 cdr destination CDR1
ITP(config-cs7-cdr-dest)#shutdown
```

## Examples

The following example specifies a new CDR destination:

```
cs7 cdr destination CDR1 8000 10.10.1.100 10.10.2.15
```

## Related Commands

| Command                         | Description                                   |
|---------------------------------|-----------------------------------------------|
| <b>cs7 cdr service</b>          | Specifies a CDR service.                      |
| <b>tx-window (cs7-cdr-dest)</b> | Specifies the tx-window for a CDR Destination |

# cs7 cdr service

To configure a Call Data Record (CDR) service, use the **cs7 cdr service** command in global configuration mode. To remove the service, shutdown use the **no** form of this command.

**cs7 cdr service** *service-name*

**no cs7 cdr service** *name*

## Syntax Description

|                     |                   |
|---------------------|-------------------|
| <i>service-name</i> | CDR service name. |
|---------------------|-------------------|

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

A CDR service must be configured before any ITP subsystem can send CDRs

A CDR service named in an SMS route table must match the CDR service named in the global configuration.

The **cs7 cdr service** command enables CS7 CDR service configuration mode.

## Examples

The following example specifies a CDR service named FDASMSC and adds two existing CDR destinations, psd1 and psd2, to this service.

```
cs7 cdr service FDASMSC
 destination CDR1 10
 destination psd2 20
```

## Related Commands

| Command                              | Description                                                      |
|--------------------------------------|------------------------------------------------------------------|
| <b>cdr-service</b>                   | Specifies a CDR service to be used by the SMS routing subsystem. |
| <b>congestion-threshold</b>          | Specifies the congestion-threshold for the CDR service.          |
| <b>destination (cs7 cdr service)</b> | Specifies a CDR Destination within a service.                    |
| <b>queue-depth (cs7 cdr service)</b> | Specifies the available queue depth for the CDR service.         |
| <b>share-mode (cs7 cdr service)</b>  | Specifies the share mode within a service.                       |

# cs7 cli

A Common Language Location Code (CLLI code) is an 11-character standardized geographic identifier that uniquely identifies the geographic location of telecommunication equipment. To define a CLLI code for an ITP, use the **cs7 cli** command in global configuration mode. To remove the definition, use the **no** form of this command.

**cs7 cli** *line*

**no cli** *line*

## Syntax Description

|             |                                                                                                                                              |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <i>line</i> | A text string used to define a common language location code for the ITP. Length of <i>line</i> can be from 1 to 11 alphanumeric characters. |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

The CLLI *line* value will be included on traps that apply to the SS7 resources on the ITP. The value will also be used by network management stations.

Complete listings of geographical and geopolitical codes can be found in the BR 751-401-xxx series and BR 751-100-055, respectively.

This command is not instance related and cannot be specified with the **instance** keyword.

## Examples

The following example defines a common language location code for the ITP:

```
cs7 cli QSWYNJPIDS5
```

## Related Commands

| Command                    | Description                                                        |
|----------------------------|--------------------------------------------------------------------|
| <b>show running config</b> | Displays the contents of the currently running configuration file. |

# cs7 description

To specify a description of the ITP to be used by the administrator or the network management stations, use the **cs7 description** command in global configuration mode. To remove the text string, use the **no** form of this command.

**cs7** [*instance instance-number*] **description** *line*

**no cs7** [*instance instance-number*] **description** *line*

|                    |                        |                                                                                                         |
|--------------------|------------------------|---------------------------------------------------------------------------------------------------------|
| Syntax Description | <b>instance</b>        | (Optional) Specifies a description of an instance.                                                      |
|                    | <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                    |
|                    | <i>line</i>            | Text string description of the ITP. Length of <i>line</i> can be from 1 to 254 alphanumeric characters. |

|          |                               |
|----------|-------------------------------|
| Defaults | No default behavior or values |
|----------|-------------------------------|

|               |                      |
|---------------|----------------------|
| Command Modes | Global configuration |
|---------------|----------------------|

|                 |                |                              |
|-----------------|----------------|------------------------------|
| Command History | <b>Release</b> | <b>Modification</b>          |
|                 | 12.2(4)MB      | This command was introduced. |

|                  |                                                                                                                                                                                                    |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Usage Guidelines | The <b>cs7 description</b> command is used to provide extra data to help service the point code.<br>This command is not instance related and cannot be specified with the <b>instance</b> keyword. |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|          |                                                                                                                                                                                                                                                                  |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Examples | The following are two examples of text in a <b>cs7 description</b> command:<br><br>cs7 description "Houston 1.2.1 Primary contact Mike Workhard at 111-222-3456"<br><br>cs7 instance 1 description "Houston 1.2.1 Primary contact Mike Workhard at 111-222-3456" |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                  |                            |                                                                    |
|------------------|----------------------------|--------------------------------------------------------------------|
| Related Commands | <b>Command</b>             | <b>Description</b>                                                 |
|                  | <b>show running config</b> | Displays the contents of the currently running configuration file. |

## cs7 display-name

The **cs7 display-name** command allows you to assign a descriptive name to an ITP instance. The name is included on traps that apply to the SS7 resources on the ITP instance and is displayed with such information on the NMS. To define a display-name, use the **cs7 display-name** command in global configuration mode. To remove the definition, use the **no** form of this command.

**cs7** [*instance instance-number*] **display-name** *line*

**no cs7** [*instance instance-number*] **display-name** *line*

|                           |                        |                                                                                                                                               |
|---------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>instance</b>        | (Optional) Assign a descriptive name to an ITP instance.                                                                                      |
|                           | <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                                                          |
|                           | <i>line</i>            | Text string description or the ITP point code formatted as an ASCII string in dotted decimal format. Length of <i>line</i> can 30 characters. |

|                 |                                                                                                                                                    |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Defaults</b> | The default value of <i>line</i> is the point code formatted as an ASCII string in the format defined by the <b>cs7 point-code format</b> command. |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

|                         |                                                                                                                                                             |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The display name is included on traps that apply to the SS7 resources on the router. The display name is included with information that is sent to the NMS. |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                             |
|-----------------|-----------------------------------------------------------------------------|
| <b>Examples</b> | The following are two examples of configuring the display-name for the ITP: |
|-----------------|-----------------------------------------------------------------------------|

```
cs7 display-name West-Chicago
```

```
cs7 instance 1 display-name West-Chicago
```

|                         |                 |                                                                                           |
|-------------------------|-----------------|-------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>  | <b>Description</b>                                                                        |
|                         | <b>show cs7</b> | Displays the ITP basic configuration, including the point code and capability point code. |

# cs7 distribute-sccp-unsequenced

To enable the Cisco ITP to determine how to forward packets when in-sequence delivery is not required, use the **cs7 distribute-sccp-unsequenced** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7** [*instance instance-number*] **distribute-sccp-unsequenced**

**no cs7** [*instance instance-number*] **distribute-sccp-unsequenced**

## Syntax Description

|                        |                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Specifies on an instance how to forward packets when in-sequence delivery is not required. |
| <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                  |

## Defaults

The default behavior is to include distributed links in round-robin selection.

## Command Modes

Global configuration

## Command History

| Release   | Modification                           |
|-----------|----------------------------------------|
| 12.2(1)MB | This command was introduced.           |
| 12.2(4)MB | The <b>instance</b> keyword was added. |

## Usage Guidelines

Although some high level SS7 protocols require in-sequence delivery of packets, other high level SS7 protocols, such as SCCP and TCAP, do not. When **cs7 distribute-sccp-unsequenced** is enabled, the Cisco ITP examines the packet header and determines whether or not that protocol requires in-sequence delivery. If in-sequence delivery is not required, the SLS field value is ignored and the Cisco ITP makes a round-robin selection of the link or ASP on which to forward the packet.

## Examples

The following example two examples enable **cs7 distribute-sccp-unsequenced**:

```
cs7 distribute-sccp-unsequenced
```

```
cs7 instance 1 distribute-sccp-unsequenced
```

## Related Commands

| Command                   | Description                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination.                |
| <b>show cs7</b>           | Displays the ITP basic configuration, including the point code and capability point code. |

# cs7 fast-restart

To enable MTP3 fast restart, use the **cs7 fast-restart** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7** [*instance instance-number*] **fast-restart**

**no cs7** [*instance instance-number*] **fast-restart**

## Syntax Description

|                        |                                                                                      |
|------------------------|--------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Enable MTP3 fast restart on an instance.                                  |
| <i>instance-number</i> | Instance Number. The valid range is 0 through 7. The default instance is instance 0. |

## Defaults

Fast restart is disabled by default.

## Command Modes

Global configuration

## Command History

| Release   | Modification                           |
|-----------|----------------------------------------|
| 12.2(1)MB | This command was introduced.           |
| 12.2(4)MB | The <b>instance</b> keyword was added. |

## Usage Guidelines

When an SP restarts, it normally waits to receive a TRA from each of its adjacent nodes before it will mark the links available for passing user traffic. If TRAs are not received from each of the adjacent nodes, it will eventually time out (30 seconds default) and start passing user traffic.

The **cs7 fast-restart** command bypasses this so that the SP will not need to wait for TRAs from the adjacent nodes.

## Examples

The following two examples enable fast restart:

```
cs7 fast-restart
```

```
cs7 instance 2 fast-restart
```

## Related Commands

| Command                   | Description                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination.                |
| <b>show cs7</b>           | Displays the ITP basic configuration, including the point code and capability point code. |



# cs7 group

To configure ITP group, use the **cs7 group** command in global configuration mode. To remove the group configuration, use the **no** form of this command.

**cs7 group** *name port-number*

**no cs7 group** *name port-number*

|                           |                    |                                                                                                        |
|---------------------------|--------------------|--------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>name</i>        | Group member name of ITP.                                                                              |
|                           | <i>port-number</i> | Local group association port number. Valid port numbers range from 1024 to 49151. There is no default. |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The <b>cs7 group</b> command enables the group submode.                                                                                                                                                                                                                                                                                                                                                                                                                |
|                         | The port number for the local IPC SCTP association can not be the same as the port number for the CS7 group association. When you define a local IPC SCTP port number (for example port number 1024) the next available port number (in this example port number 1025) is automatically created for the IPC SCTP association used for checkpointing. Neither of these port numbers (in this example, neither 1024 nor 1025) may be used for the CS7 group port number. |

|                 |                                                                                                           |
|-----------------|-----------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The first command in the following example configures the ITP group named ITP1 with the port number 3333: |
|                 | <pre>cs7 group ITP1 3333  local-ip 1.1.1.1  peer 4444  remote-ip 1.1.1.2</pre>                            |

|                         |                         |                                                  |
|-------------------------|-------------------------|--------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>          | <b>Description</b>                               |
|                         | <b>local-ip (group)</b> | Configure a local IP address for an association. |
|                         | <b>show cs7 group</b>   | Display ITP Group information.                   |

# cs7 gtt address-conversion

To configure a global title address conversion table, use the **cs7 gtt address-conversion** command in global configuration mode. To remove the definition, use the **no** form of this command.

**cs7** [**instance** *instance-number*] **gtt address-conversion** *tablename*

**no cs7** [**instance** *instance-number*] **gtt address-conversion** *tablename*

## Syntax Description

|                        |                                                                                              |
|------------------------|----------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Configure a global title address conversion table on an instance                  |
| <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.         |
| <i>tablename</i>       | Global Title Address Conversion table name. The table name may be 1-12 characters in length. |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB2 | This command was introduced. |

## Usage Guidelines

The address conversion tables are used to specify mappings such as E.212 - E.214 address conversion. Issuing the **cs7 gtt address-conversion** command enables CS7 GTT address conversion submode. After you have defined a GTT address conversion table, you can apply the table on a GTT selector basis.

## Examples

The following command specifies a global title address conversion table named conv1:

```
cs7 gtt address-conversion conv1
```

The following command specifies a global title address conversion table named conv1 for instance 1:

```
cs7 instance 2 gtt address-conversion conv1
```

## Related Commands

| Command                                    | Description                                                                |
|--------------------------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>                  | Enables multiple instances of a variant and network indicator combination. |
| <b>show cs7 gtt address-conversion</b>     | Displays CS7 GTT address conversion entries.                               |
| <b>update (CS7 GTT Address Conversion)</b> | Adds, removes, or changes a GTT address-conversion entry                   |

# cs7 gtt application-group

To configure a GTT application group, use the **cs7 gtt application-group** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7** [*instance instance-number*] **gtt application-group** *name*

**no** **cs7** [*instance instance-number*] **gtt application-group** *name*

| Syntax Description | <b>instance</b>        | (Optional) Configure a GTT application group on an instance.                                                         |
|--------------------|------------------------|----------------------------------------------------------------------------------------------------------------------|
|                    | <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                                 |
|                    | <i>name</i>            | The name of the application-group that will be specified in the <b>gta app-grp</b> CS7 GTT selector submenu command. |
|                    |                        |                                                                                                                      |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

|                         |                                                                                          |
|-------------------------|------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The application-group must be defined prior to defining the gta subcommands that use it. |
|-------------------------|------------------------------------------------------------------------------------------|

|                 |                                                                     |
|-----------------|---------------------------------------------------------------------|
| <b>Examples</b> | The following example configures an application group named group1: |
|-----------------|---------------------------------------------------------------------|

```
cs7 gtt application-group group1
```

The following example configures an application group named group1 on instance 3:

```
cs7 instance 3 gtt application-group group1
```

| Related Commands | Command                         | Description                                                                |
|------------------|---------------------------------|----------------------------------------------------------------------------|
|                  | <b>cs7 multi-instance</b>       | Enables multiple instances of a variant and network indicator combination. |
|                  | <b>gta app-grp</b>              | Translates a GTA to a GTT application group.                               |
|                  | <b>multiplicity</b>             | Specifies a method for selecting destination in the application group.     |
|                  | <b>show cs7 gtt consistency</b> | Displays GTT point codes that do not have routes provisioned for them.     |
|                  | <b>show cs7 gtt gta</b>         | Displays CS7 GTT GTA entries.                                              |

## cs7 gtt concern-pclist

To configure a GTT concerned point code list, use the **cs7 gtt concern-pclist** command in global configuration mode. To remove a point code from an existing concerned point code list, use the **no** form of the command. To delete the concerned point code list, remove all point codes from the list.

**cs7** [**instance** *instance-number*] **gtt concern-pclist** *listname cpc*

**no cs7** [**instance** *instance-number*] **gtt concern-pclist** *listname cpc*

### Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>cpc</i>             | Concerned point code, in the form zone.region.sp.                                           |
| <b>instance</b>        | (Optional) Configure a GTT concerned point code list on an instance.                        |
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <i>name</i>            | The name of the concerned point code list.                                                  |

### Defaults

No default behavior or values

### Command Modes

Global configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

To create a new concerned point code list with one point code, the list name must be unique. Use the following syntax: **cs7 gtt concern-pclist** *listname cpc*

To add a new point code to an existing list, the point code specified must be unique for the list. Use the following syntax: **cs7 gtt concern-pclist** *existinglistname newcpc*

To remove a point code from an existing concerned point code list, the point code must exist. Use the following syntax: **cs7 gtt concern-pclist** *existinglistname cpc*

To delete the concerned point code list, remove all point codes from the list. You cannot delete the last point code in a list if it is referenced by a MAP entry.

### Examples

The following example creates a new concerned point code list named mylist with the point code 5.100.5:

```
cs7 gtt concern-pclist mylist 5.100.5
```

The following example creates a new concerned point code list on instance 2 named mylist with the point code 5.100.5:

```
cs7 instance 2 gtt concern-pclist mylist 5.100.5
```

# Related Commands

| Command                            | Description                                                                |
|------------------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>          | Enables multiple instances of a variant and network indicator combination. |
| <b>show cs7 gtt concern-pclist</b> | Displays a CS7 GTT Concerned Point Code list.                              |
| <b>show cs7 gtt map</b>            | Displays CS7 GTT MAP entries.                                              |

# cs7 gtt load

To specify the URL location from which, upon ITP reload, the GTT database will be loaded, use the **cs7 gtt load** command in global configuration mode.

**cs7** [**instance** *instance-number*] **gtt load** *url* [**execute**]

## Syntax Description

|                        |                                                                                                                              |
|------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <i>url</i>             | The path and filename for the gtt load file.                                                                                 |
| <b>execute</b>         | Keyword to execute the load immediately.                                                                                     |
| <b>instance</b>        | (Optional) Specifies the URL location from which, upon ITP reload, the GTT database for a specified instance will be loaded. |
| <i>instance-number</i> | Instance Number. The valid range is 0 through 7. The default instance is instance 0.                                         |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Examples

The following example specifies that when the ITP is reloaded, the GTT database will be loaded from a file named gttdata.txt in flash:

```
cs7 gtt load flash:gttdata.txt
```

The following example specifies that when the ITP is reloaded, the GTT database for instance 4 will be loaded from a file named gttdata.txt in flash:

```
cs7 instance 4 gtt load flash:gttdata.txt
```

## Related Commands

| Command                   | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
| <b>cs7 save gtt-table</b> | Saves the CS7 GTT table to a file.                                         |

# cs7 gtt map

To configure a Global Title Mated Application (MAP) entry, use the **cs7 gtt map** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7** [**instance** *instance-number*] **gtt map** *ppc pssn* [*flags*] *mult* [*bpc*] [*bssn*]

**no** **cs7 gtt map** [**instance** *instance-number*]



## Note

You cannot delete any map entry that references another map entry. You must first change all entries that reference it to **sol** before you can delete the entry with the **no cs7 gtt map** command.

## Syntax Description

|                        |                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Configure a Global Title Mated Application (MAP) entry for an instance.                                                                                                                                                                                                                                                                                                          |
| <i>instance-number</i> | Instance Number. The valid range is 0 through 7. The default instance is instance 0.                                                                                                                                                                                                                                                                                                        |
| <i>ppc</i>             | Primary SS7 point code, in the form zone.region.sp.                                                                                                                                                                                                                                                                                                                                         |
| <i>pssn</i>            | Primary subsystem number.                                                                                                                                                                                                                                                                                                                                                                   |
| <i>flags</i>           | One of the following flags:<br><b>adj</b> - Mark ppc/pssn as adjacent.<br><b>csplist</b> <i>name</i> - Specifies a concerned point code list name.<br><b>rrc</b> - Reroute if congested.                                                                                                                                                                                                    |
| <i>mult</i>            | The entry in the MAP table may be modified to work in 1 of 3 multiplicities or modes:<br><b>solitary</b> - Use a single PC, no alternate if PC and/or SSN is not available.<br><b>share</b> - Load share equally across the primary PC/SSN and backup PC/SSN.<br><b>dominant</b> - Always translate to primary PC/SSN if available, and only translate to backup if primary is unavailable. |
| <i>bpc</i>             | Backup point code, in the form zone.region.sp.                                                                                                                                                                                                                                                                                                                                              |
| <i>bssn</i>            | Backup subsystem number. Valid range is 2 through 255.                                                                                                                                                                                                                                                                                                                                      |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

A GTT MAP entry has two main purposes. It is used internally by the SCCP application to track point-code and SSN states such as congestion and availability. In addition it is used to define backups or alternates for a particular PC/SSN combination. An entry in the GTA table that contains a PC and SSN will have a corresponding entry in the MAP table. The following rules apply:

- A backup point code and subsystem must be specified if the mode (multiplicity) is shared or dominant.
- A backup point code and subsystem cannot be specified if the mode (multiplicity) is solitary.
- A PC/SSN entry cannot be deleted if it is being used as a backup by another PC/SSN entry.
- A PC/SSN entry cannot be deleted if it is referenced by an entry in the GTA table.
- The primary and backup point codes cannot be identical.
- A maximum of 9 subsystems per point-code is allowed.
- The PC can not be equal to the node's self PC.

When a CS7 node changes the RI of a message requiring GTT to "Route on Subsystem" SCRC must look in the GTT Map table to see if the subsystem is available and to determine which method to route the message.

There are three modes described in ITU-T Q.714 section 5.1: solitary, dominant, and shared.

**Solitary mode:** The destination subsystem or next translation node is chosen from the one single SCCP node. When that node or its SCCP fails, the SCCP management will notify the SCCP routing control; and the traffic towards the **solitary** nodes will be discarded or returned if return-option is set.

Replicated service in **dominant mode:** The next translation node or destination subsystem can be chosen from two SCCP nodes. Traffic towards a specific subdomain (characterized by ranges of Global Titles) is normally sent to the SCCP of a primary node. When the primary node is inaccessible, the SCCP management will notify the routing control and this traffic is routed to the SCCP of a backup node. As soon as the primary node becomes accessible again, the traffic is again routed to it.

Replicated service in dynamically load **shared mode:** The next translation node or destination subsystem is chosen from two SCCP nodes. The traffic is dynamically distributed to the next two nodes by the traffic-sending node. The next pair of SCCP nodes receiving the traffic will backup each other. If one of the nodes becomes inaccessible, the SCCP management will notify the routing control and the traffic will be routed to the other one. As soon as the previously inaccessible node becomes accessible again, the traffic is dynamically distributed to those two nodes again.

In the ANSI domain, GR-82 describes the requirement to support 8 different destinations each having a relative cost, rather than supporting only a primary and secondary node.

## Examples

The following example configures a solitary mated application for instance 2 with PC=1.10.1 and SSN=20

```
cs7 instance 2 gtt map 1.10.1 20 sol
```

The following example configures a primary mated application with PC=1.20.1 and SSN=250. The backup is PC=2.20.2 SSN=20 operating in the dominant mode:

```
cs7 gtt map 1.20.1 250 dom 2.20.2 250
```

The following example configures a primary mated application with PC=1.30.1 and SSN=250. The backup is PC=2.30.2 SSN=250 operating in the shared mode:

```
cs7 gtt map 1.30.1 250 share 2.30.2 250
```



| Related Commands | Command                  | Description                                                                |
|------------------|--------------------------|----------------------------------------------------------------------------|
|                  | cs7 gtt map sp           | Changes the state of a point code in the MAP table.                        |
|                  | cs7 gtt map ss           | Changes the state of a subsystem in the MAP table.                         |
|                  | cs7 multi-instance       | Enables multiple instances of a variant and network indicator combination. |
|                  | show cs7 gtt consistency | Displays GTT point-codes that do not have routes provisioned for them      |
|                  | show cs7 gtt map         | Displays CS7 GTT MAP entries.                                              |

## cs7 gtt map sp

To change the state of a point code in the map table, use the **cs7 gtt map** privileged EXEC command.

**cs7** [**instance** *instance-number*] **gtt map sp** {**available** | **prohibited**} *point-code*

|                           |                        |                                                                                      |
|---------------------------|------------------------|--------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>available</b>       | Override the current state of the point code and set it to available.                |
|                           | <b>instance</b>        | (Optional) Change the state of a point code in the map table for an instance         |
|                           | <i>instance-number</i> | Instance Number. The valid range is 0 through 7. The default instance is instance 0. |
|                           | <b>prohibited</b>      | Override the current state of the point code and set it to prohibited.               |
|                           | <i>point-code</i>      | Remote SP point code.                                                                |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

**Usage Guidelines** Use this command when it becomes necessary (e.g. for maintenance purposes) to prevent GTT translated messages from being sent to a point code in the map table.

**Examples** The following example sets the state of the remote point code 2.3.4 in the map table to prohibited:

```
cs7 gtt map sp prohibited 2.3.4
```

The following example sets the state of the remote point code 2.3.4 in the map table for instance 2 to prohibited:

```
cs7 instance 2 gtt map sp prohibited 2.3.4
```

|                         |                           |                                                                            |
|-------------------------|---------------------------|----------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>            | <b>Description</b>                                                         |
|                         | <b>cs7 gtt map ss</b>     | Changes the state of a subsystem in the map table.                         |
|                         | <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
|                         | <b>show cs7 gtt map</b>   | Displays CS7 GTT MAP entries.                                              |

## cs7 gtt map ss

To change the state of a subsystem in the map table, use the **cs7 gtt map ss** privileged EXEC command.

```
cs7 [instance instance-number] gtt map ss {available | prohibited | ignore-ss | accept-ss}
    point-code ssn
```

| Syntax Description     |                                                                                      |
|------------------------|--------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Change the state of a subsystem in the map table for an instance.         |
| <i>instance-number</i> | Instance Number. The valid range is 0 through 7. The default instance is instance 0. |
| <b>accept-ss</b>       | Process subsystem test messages received for the affected point code and subsystem.  |
| <b>available</b>       | Override the current state of the subsystem and set it to available.                 |
| <b>ignore-ss</b>       | Ignore subsystem test messages received for the affected point code and subsystem.   |
| <b>prohibited</b>      | Override the current state of the subsystem and set it to prohibited.                |
| <i>point-code</i>      | Remote SP point code.                                                                |
| <i>ssn</i>             | Subsystem number.                                                                    |

**Defaults** No default behavior or values

**Command Modes** Privileged EXEC

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Usage Guidelines** When the ITP receives a subsystem prohibited message from the network, it changes the state of the subsystem to “prohibited” and starts sending subsystem test messages to the node that sent the message. It continues to send test messages until it receives a subsystem available message.

The **cs7 gtt map ss** command allows the user to manually change the subsystem state to prohibited. Since the user is performing a manual operation on the ITP, the ITP cannot send a subsystem test message (as it normally would) because it does not have a point code to sent the message to.

**Examples** The following example sets the state of the remote point code 2.3.4 in the map table to prohibited:

```
cs7 gtt map ss prohibited 2.3.4 10
```

The following example sets the state of the remote point code 2.3.4 in the map table to prohibited for instance 1:

```
cs7 instance 1 gtt map ss prohibited 2.3.4 10
```

**Related Commands**

| Command            | Description                                                                |
|--------------------|----------------------------------------------------------------------------|
| cs7 gtt map ss     | Changes the state of a subsystem in the map table.                         |
| cs7 multi-instance | Enables multiple instances of a variant and network indicator combination. |
| show cs7 gtt map   | Displays CS7 GTT MAP entries.                                              |

# cs7 gtt replace-db

To replace the entire contents of the GTT database, use the **cs7 gtt replace-db** privileged EXEC command.

```
cs7 [instance instance-number] gtt replace-db url
```

| Syntax Description | <b>instance</b>        | (Optional) Replace the entire contents of the GTT database for an instance           |
|--------------------|------------------------|--------------------------------------------------------------------------------------|
|                    | <i>instance-number</i> | Instance Number. The valid range is 0 through 7. The default instance is instance 0. |
|                    | <i>url</i>             | URL of replacement contents.                                                         |
|                    |                        |                                                                                      |

|          |                               |
|----------|-------------------------------|
| Defaults | No default behavior or values |
|----------|-------------------------------|

|               |                 |
|---------------|-----------------|
| Command Modes | Privileged EXEC |
|---------------|-----------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

|                  |                                                                             |
|------------------|-----------------------------------------------------------------------------|
| Usage Guidelines | GTT database replacement is a non-disruptive as of IOS release 12.2(4)MB13. |
|------------------|-----------------------------------------------------------------------------|

|          |                                                                                                              |
|----------|--------------------------------------------------------------------------------------------------------------|
| Examples | The following example specifies that the GTT database will be replaced by a file named gttdata.txt in flash: |
|----------|--------------------------------------------------------------------------------------------------------------|

```
cs7 gtt replace-db flash:gttdata.txt
```

The following example specifies that the GTT database will be replaced by a file named gttdata.txt in flash for instance 1:

```
cs7 instance 1 gtt replace-db flash:gttdata.txt
```

| Related Commands | Command                   | Description                                                                |
|------------------|---------------------------|----------------------------------------------------------------------------|
|                  | <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
|                  | <b>show cs7 gtt map</b>   | Displays CS7 GTT MAP entries.                                              |

## cs7 gtt selector

To create and configure a GTT selector and enter the submode for modifying the attributes of an existing selector, use the **cs7 instance gtt selector** command in global configuration mode. To delete a selector, use the **no** form of the command.

**cs7** [**instance** *instance-number*] **gtt selector** *selector* **tt** *tt* [**gti** *gti*] [**np** *np*] [**nai** *nai*]

**no** **cs7** *instance-number* **gtt selector** *selector*

| Syntax Description     |                                                                                                                                                                                                                                                     |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Create and configure a GTT selector for an instance.                                                                                                                                                                                     |
| <i>instance-number</i> | Instance Number. The valid range is 0 through 7. The default instance is instance 0.                                                                                                                                                                |
| <i>selector</i>        | Name of the GTT selector. Selector name must be unique and no longer than 12 characters.                                                                                                                                                            |
| <b>tt</b>              | Specifies a translation type.                                                                                                                                                                                                                       |
| <i>tt</i>              | Translation type. In the Called Party field of the GTT message, the SSP sets the TT to indicate which GTT table the STP should use. The TT is a 1 byte field that usually maps to a specific service. Valid numbers are in the range 0 through 255. |
| <b>gti</b>             | Specifies a Global Title Indicator.                                                                                                                                                                                                                 |
| <i>gti</i>             | (Optional) Global Title Indicator. Valid numbers are 2 (primarily used in the ANSI domain) or 4 (used in the ITU domain).                                                                                                                           |
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0.                                                                                                                                                         |
| <b>np</b>              | Specifies a numbering plan value.                                                                                                                                                                                                                   |
| <i>np</i>              | (Optional) Numbering plan value. Valid range is 0 through 15.                                                                                                                                                                                       |
| <b>nai</b>             | Specifies a nature of address indicator.                                                                                                                                                                                                            |
| <i>nai</i>             | (Optional) Nature of address indicator. Required for GTI 4. Optional for GTI 2. Valid range is 0 through 127.                                                                                                                                       |

**Defaults** The default instance is 0.

**Command Modes** Global configuration

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Usage Guidelines** The following are the rules for creating a GTT selector:

- NP and NAI can not be specified if the variant is ANSI.
- GTI can be specified only if the variant is ITU.

- NP and NAI must be specified if GTI=4.
- For ITU nodes, GTI must be 2 or 4.
- For ANSI nodes, GTI must be 2.

The command in the form **cs7 gtt selector** *selector* with no other arguments exits global configuration and enters CS7 GTT selector mode. CS7 GTT selector mode is used to modify attributes of a selector or to update Global Title Addresses (GTAs) of a selector.

### Examples

The following example configures for instance 2 a selector named itp\_gtt, with tt=0, gti=4, np=1, nai=3:

```
cs7 instance 2 gtt selector itp_gtt 0 4 1 3
```

The following example configures a selector named itp\_gtt, with tt=0, gti=4, np=1, nai=3:

```
cs7 gtt selector itp_gtt 0 4 1 3
```

### Related Commands

| Command                      | Description                                                                |
|------------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>    | Enables multiple instances of a variant and network indicator combination. |
| <b>show cs7 gtt selector</b> | Displays CS7 GTT selectors.                                                |

# cs7 host

To map a host name to a point code, use the **cs7 host** command in global configuration mode. To remove all point-code mappings for a name use the **no cs7 host host-name** form of this command. To remove only one point-code from a name mapping use the **no cs7 host host-name point-code** form of the command.

**cs7 host** *host-name* [**additional**] {*point-code* [*point-code* ...]} | {*point-code:instance-number* [*point-code:instance-number*...]}

**no cs7 host** *host-name* [**additional**] {*point-code* [*point-code* ...]} | {*point-code:instance-number* [*point-code:instance-number*...]}

## Syntax Description

|                        |                                                                                |
|------------------------|--------------------------------------------------------------------------------|
| <b>additional</b>      | Append an additional point code.                                               |
| <i>host-name</i>       | Name of the SS7 node.                                                          |
| <i>instance-number</i> | When the multiple instances feature is enabled, specifies the instance number. |
| <i>point-code</i>      | Point code to be mapped.                                                       |

## Defaults

No default behavior or value.

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

It is possible to map multiple point codes to the same name. This allows a node that is part of multiple instances to have the same name in all instances. However, a point-code can **not** be mapped to multiple names.

The optional keyword **additional** must be used when assigning an additional point-code to a name. If you do not specify **additional**, an existing mapping of point-codes to the name will be replaced with the new configuration.

When the multiple instance feature is enable, include the instance number.

To display name to point-code mapping use the **show hosts** command.

A name instead of a point-code is displayed if the point code represents a node (no clusters, networks or summarized routes) and a name for the point-code is configured. Otherwise, the numeric point-code is displayed.

You can specify a name instead of a point-code in the **show cs7** and **ping cs7** commands. However, configuration statements require a numeric point-code.



## Examples

The following configuration includes an example of the cs7 host command

```
cs7 multi-instance
cs7 instance 0 variant ITU
cs7 instance 0 point-code format 14
cs7 instance 1 variant ANSI
cs7 instance 1 network-name ansi

cs7 host red 1.1.1:1 1234:0
cs7 host green 5121:0
!
cs7 instance 0 route-table
update route 5221 16383 linkset one
update route 5121 16383 linkset one
update route 5120 16376 linkset one
update route 1234 16383 linkset one
!
cs7 instance 1 route-table
update route 1.1.1 255.255.255 linkset two
!
cs7 instance 0 linkset one 666
!
cs7 instance 1 linkset two 3.3.3
!
```

## Related Commands

| Command                   | Description                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------|
| <b>cs7 point-code</b>     | Assigns a local point code to an instance.                                                |
| <b>cs7 variant</b>        | Specifies the variant for an instance.                                                    |
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination.                |
| <b>show cs7</b>           | Displays the ITP basic configuration, including the point code and capability point code. |
| <b>show hosts</b>         | Displays information about a host.                                                        |

# cs7 inhibit

To inhibit a link, use the **cs7 inhibit** user EXEC command with the linkset name and the link number. To reverse the inhibit, use the **cs7 uninhibit** command.

**cs7 inhibit** *linkset link*

**cs7 uninhibit** *linkset link*

## Syntax Description

|                |               |
|----------------|---------------|
| <i>linkset</i> | Linkset name. |
| <i>link</i>    | Link.         |

## Command Modes

User EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Usage Guidelines

Inhibit is used when it becomes necessary (e.g. for maintenance purposes) to make or keep a signaling link unavailable to user-generated signaling traffic. Inhibiting a link is allowed only if the inhibiting action does not cause any previously accessible destinations to become inaccessible at either end of the signaling link.

Inhibit is a signaling traffic management action, and does not cause any link status changes at Level 2. In particular, a signaling link that was active and in service prior to being inhibited will remain so, and will thus be able to transmit and receive maintenance and test messages.

## Examples

The following command inhibits link 0 on the linkset named tony:

```
cs7 inhibit tony 0
```

## Related Commands

| Command                    | Description                               |
|----------------------------|-------------------------------------------|
| <b>shutdown (CS7 link)</b> | Disables a link or linkset.               |
| <b>cs7 uninhibit</b>       | Puts the link or linkset back in service. |

## cs7 instance pc-conversion

Instance translation is the conversion of packets between two instances on the ITP, which creates a virtual link between the instance of the real point code and the instance of the alias point code. To configure instance translation, use the **cs7 instance pc-conversion** command in global configuration mode. To remove the instance translation virtual link, use the **no** form of this command.

**cs7 instance** *instance-number* **pc-conversion** *pc* **alias-pc** *alias-instance* *alias-pc*

**no cs7 instance** *instance-number* **pc-conversion** *pc* **alias-pc** *alias-instance* *alias-pc*

|                           |                        |                                                                                                          |
|---------------------------|------------------------|----------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> | The instance number of the real point code. The valid range is 0 through 7.                              |
|                           | <i>pc</i>              | The CS7 point code. This point code must already exist in the instance's routing table.                  |
|                           | <b>alias-pc</b>        | Map the alias point code to the real point code.                                                         |
|                           | <i>alias-instance</i>  | The instance number of the alias point code. The valid range is 0 through 7.                             |
|                           | <i>alias-pc</i>        | The alias point code. The alias point code must not already exist in the alias instance's routing table. |

**Defaults** No default behavior or value.

**Command Modes** Global configuration

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB      | This command was introduced. |

**Usage Guidelines** Prior to IOS Release 12.2(20)SW, point code conversion was limited to instances with the same variant. That limitation now pertains to default conversions only. However, conversion from ANSI or ITU to China or TTC variant is not supported. In the case of conversion between ITU and either ANSI or China variants, the MSU size will change as a result of the different point code size. If the conversion causes the MSU size to grow beyond the maximum MSU size of 273 bytes, the MSU is discarded.

**Examples** The following example maps the alias point code to the real point code:

```
cs7 instance 0 pc-conversion 1.1.1 alias-pc 1 2.2.5
cs7 instance 1 pc-conversion 1.1.1 alias-pc 0 1.1.3
```

| <b>Related Commands</b> | <b>Command</b>                  | <b>Description</b>                                                                                  |
|-------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------|
|                         | <b>show cs7 virtual linkset</b> | Displays information about virtual linksets, including link utilization and associated measurement. |
|                         | <b>show cs7 pc-conversion</b>   | Displays the status of the Instance Translation.                                                    |

## cs7 instance pc-conversion default

Default conversion sends any MSUs with unknown point codes in one instance to another instance. Also, any PCs in the MSU that require conversion but do not have an alias point code assigned will be unchanged in the new instance. To configure the default conversion, use the **cs7 instance pc-conversion default** command in global configuration mode. To disable default conversion, use the **no** form of this command.

**cs7 instance** *dest-instance* **pc-conversion default** *orig-instance*

**no cs7 instance** *dest-instance* **pc-conversion default** *orig-instance*

### Syntax Description

|                      |                                                                         |
|----------------------|-------------------------------------------------------------------------|
| <i>dest-instance</i> | Indicates the instance where the MSUs are sent. Valid range is 0 to 7.  |
| <i>orig-instance</i> | Indicates the instance where the MSUs originate. Valid range is 0 to 7. |

### Defaults

No default behavior or value.

### Command Modes

Global configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB12 | This command was introduced. |

### Usage Guidelines

This command accomplishes the following:

- Enters a summary route for mask length 0 in *orig-instance* going over the virtual linkset to *dest-instance*. This means that any MSUs routed in *orig-instance* that do not match other routes, will be sent to *dest-instance*.
- Enters a default conversion for point codes between instance *orig-instance* and *dest-instance*. This means that if point code conversion between the two instances is required, and the point code does not match a specified pc conversion, or the ITP's point code, then the point code is unchanged in the new instance, and conversion still succeeds.

Default conversion can only be configured in one direction between two instances. If you configure default conversion from instance 0 to instance 1, then you must configure specific conversion from instance 1 to instance 0 for destinations in instance 0 to allow traffic to be routed from instance 1 to instance 0.

We recommend that you also configure **cs7 instance summary-routing-exception** if you configure default routing from one instance to another. For example, instance 0 has a full point code entry for 4.4.4, and has default conversion configured from instance 0 to instance 1. If summary-routing-exception is not configured, then when 4.4.4 becomes unavailable, the ITP will send MSUs destined for 4.4.4 to instance 1. If summary-routing-exception is configured for instance 0, then when 4.4.4 becomes unavailable the ITP will send TFPs for 4.4.4 and will **not** try to route MSUs destined for 4.4.4 to instance 1.

**Examples**

The following example sends MSUs with unknown point code in instance 0 to instance 1:

```
cs7 instance 1 pc-conversion default 0
```

**Related Commands**

| Command                              | Description                                                                                  |
|--------------------------------------|----------------------------------------------------------------------------------------------|
| <b>cs7 instance pc-conversion</b>    | Enables the conversion of packets between instances.                                         |
| <b>cs7 summary-routing-exception</b> | Disables the use of summary/cluster routes (for the purpose of routing MSU) for an instance. |
| <b>show cs7 pc-conversion</b>        | Displays the status of the Instance Translation.                                             |

# cs7 linkset

To specify a linkset and enter CS7 linkset submode, use the **cs7 linkset** command in global configuration mode. To disable the specification, use the **no** form of this command.

**cs7** [**instance** *instance-number*] **linkset** *ls-name* *adj-pc* [**local-pc** [*pc*]]

**no cs7** [**instance** *instance-number*] **linkset** *ls-name* *adj-pc*

## Syntax Description

|                        |                                                                                                                     |
|------------------------|---------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Specifies a linkset for an instance.                                                                     |
| <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                                |
| <i>ls-name</i>         | Name of the linkset. (Linkset names are case-specific.)                                                             |
| <i>adj-pc</i>          | Point code of the adjacent signaling point.                                                                         |
| <b>local-pc</b>        | (Optional) Specifies another point code, which functions as a second linkset between the ITP and the adjacent node. |
| <i>pc</i>              | Can be the ITPs primary or secondary point code. The default is the primary point code.                             |

## Defaults

No default behavior or values.

## Command Modes

Global configuration

## Command History

| Release   | Modification                                                                                      |
|-----------|---------------------------------------------------------------------------------------------------|
| 12.2(1)MB | This command was introduced.                                                                      |
| 12.2(4)MB | The optional parameter <i>local-pc</i> was added to enable multiple linksets to an adjacent node. |

## Usage Guidelines

You must specify the SS7 variant and the point code before you can configure linksets.

The optional multiple linkset feature enables you can configure two linksets to an adjacent node, each having 16 links, for a total of 32 links. To do so, use the optional parameter *local-pc*. This *local-pc* must be either the ITP's primary *pc* (configured with the **cs7 point-code** command) or the ITP's secondary-*pc*, configured with the **cs7 secondary-pc** command. (The default is primary *pc*.)

When a linkset is created using the **cs7 linkset** command, a route table entry is automatically created for destination *adj-pc*. Since this is the direct linkset to this destination it is assigned the highest priority, 1.

When two linksets to the adjacent node are created, they are automatically entered in the route table as a combined route to the adjacent node. Traffic going to the adjacent node will be divided between the two linksets based on the signaling link selector (SLS).

When you issue the **cs7 linkset** command you enter CS7 linkset submode. In CS7 linkset submode you have access to commands that allow you to further configure linksets.

**Examples**

The following example configures a single linkset named linkset1 with an adjacent node at point code 2.2.2.:

```
cs7 linkset linkset1 2.2.2
```

The following example configures two linksets to the adjacent node 2.2.2.

Linkset1 specifies the adjacent signaling point 2.2.2 and the ITP's primary point code 1.1.1.

Linkset2 specifies the adjacent signaling point 2.2.2 and the ITP's secondary point code 1.1.2.

```
cs7 linkset linkset1 2.2.2 local-pc 1.1.1
```

```
cs7 linkset linkset2 2.2.2 local-pc 1.1.2
```

The following example configures two linksets on instance 1 to the adjacent node 2.2.2.

Linkset1 specifies the adjacent signaling point 2.2.2 and the ITP's primary point code 1.1.1.

Linkset2 specifies the adjacent signaling point 2.2.2 and the ITP's secondary point code 1.1.2.

```
cs7 instance 1 linkset linkset1 2.2.2 local-pc 1.1.1
```

```
cs7 instance 1 linkset linkset2 2.2.2 local-pc 1.1.2
```

**Related Commands**

| Command                   | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
| <b>show cs7 linkset</b>   | Displays ITP linkset information.                                          |

# cs7 local-peer

To specify the local peer and, optionally, configure M2PA/SCTP offload, use the **cs7 local-peer** command in global configuration mode. To remove the local peer from the ITP configuration, use the **no** form of this command.

**cs7 local-peer** [*name*] *local-port-number* [**offload** *slot*]

**no cs7 local-peer** [*name*] *local-port-number* [**offload** *slot*]

## Syntax Description

|                          |                                                                                                                                                                     |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>name</i>              | Name of group peer on which the local peer physically resides. The <i>name</i> parameter is only valid (and required) if the ITP Group feature has been configured. |
| <i>local-port-number</i> | Port number of the local peer. Range is 1024 to 49151.                                                                                                              |
| <b>offload</b>           | (Optional) Configure local peer for M2PA/SCTP offload onto a VIP.                                                                                                   |
| <i>slot</i>              | VIP slot number. Valid range is 0 to 16.                                                                                                                            |

## Defaults

No default behavior or values.

## Command Modes

Global configuration

## Command History

| Release    | Modification                                                                         |
|------------|--------------------------------------------------------------------------------------|
| 12.2(1)MB  | This command was introduced.                                                         |
| 12.2(4)MB  | The offload keyword was added to enable M2PA/SCTP offload.                           |
| 12.2(4)MB8 | The range of ports that can be configured was changed from 4096-32767 to 1024-49151. |
| 12.2(23)SW | The <i>name</i> parameter was added.                                                 |

## Usage Guidelines

The local peer is the local end point for SS7 over IP SCTP connections. A local peer, also called an instance, is identified by its local port number.

At least one, and at most four, local ip addresses can be configured for each local peer. The first address is primary. The other three are backup.

The **cs7 local-peer** command can be repeated up to four times, each with 4 IP addresses. IP addresses can be reused.

The **cs7 local-peer** command with the **offload** keyword and a VIP slot number offloads the M2PA/SCTP protocol onto the specified VIP, enabling management of peer links on the VIP and freeing the RSP CPU for MTP3 management and routing.



### Note

Offload is available on the Cisco 7500 router only.

This command is not instance related and cannot be specified with the **instance** keyword.



When you issue the **cs7 local-peer** command, you enter CS7 local peer submode. In CS7 local peer submode, you can configure a local IP address for an instance.

### Examples

The following example specifies a local peer with a local port number of 7000:

```
cs7 local-peer 7000
```

The following example specifies M2PA/SCTP offload onto the VIP in slot 2:

```
cs7 local-peer 7000 offload 2
```

### Related Commands

| Command                          | Description                              |
|----------------------------------|------------------------------------------|
| <b>local-ip (CS7 local peer)</b> | Assigns an IP address to the local peer. |
| <b>show cs7 m2pa</b>             | Displays ITP M2PA statistics.            |

# cs7 log

To enable the ITP to log events, errors, and traces, use the **cs7 log** command in global configuration mode. To disable logging, use the **no** form of this command.

**cs7 log** *type* **size** *size*

**no cs7 log** *type*

## Syntax Description

|                         |                                                                                                                                                                                                           |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>type</i>             | Specifies the type of log.                                                                                                                                                                                |
| <b>size</b> <i>size</i> | Defines the maximum number of entries in the log. The valid range is 0 to 100,000 entries. When the 100,000 limit is reached, new entries will overwrite existing entries, starting from the first entry. |

## Defaults

Logging is off by default. (The default log size is 0.)

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following example enables logging for GTT errors and limits the log size to 100,000 entries:

```
cs7 log gtt size 100000
```

## Related Commands

| Command                   | Description                                                                                                                 |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 log checkpoint</b> | Enables automatic archiving of a log to a remote or local destination at a specified interval of every <i>secs</i> seconds. |
| <b>cs7 save log</b>       | Saves a log to a file.                                                                                                      |
| <b>show cs7 log</b>       | Displays the current log.                                                                                                   |

# cs7 log checkpoint

To enable automatic archiving of a log to a remote or local destination at a specified interval of time, use the **cs7 log checkpoint** command in global configuration mode. To disable the checkpoint operation, use the **no** form of this command.

**cs7 log type checkpoint** *secs destination*

**no cs7 log type checkpoint** *secs destination*

## Syntax Description

|                    |                                                   |
|--------------------|---------------------------------------------------|
| <i>type</i>        | Specifies the type of log.                        |
| <i>secs</i>        | Specifies the interval in seconds.                |
| <i>destination</i> | Path and filename of the log archive destination. |

## Defaults

Log checkpointing is off by default.

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following example archives the GTT log every hour and sends the log to the destination tftp://10.1.1.2/logs with the filename gtt and the date and timestamp:

```
cs7 log gtt checkpoint 3600 tftp://10.1.1.2/logs/
```

## Related Commands

| Command             | Description                                       |
|---------------------|---------------------------------------------------|
| <b>cs7 log</b>      | Enables the ITP to log events, errors, and traces |
| <b>cs7 save log</b> | Saves a log to a file.                            |
| <b>show cs7 log</b> | Displays the current log.                         |

## cs7 m3ua

To specify the local port number for M3UA and enter M3UA submode, use the **cs7 m3ua** command in global configuration mode. To delete the M3UA configuration (if there are no configured M3UA ASs or ASPs) use the **no** form of this command.

**cs7 m3ua** *local-port* [**offload** *slot-number*]

**no cs7 m3ua** *local-port*

### Syntax Description

|                    |                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>local-port</i>  | The local port number, in the range 1024 to 65535. This port may not currently be configured for M2PA, SUA, or SGMP. (2905 is the well-known port for M3UA.) |
| <b>offload</b>     | (Optional for the Cisco 7500 Router) Enables the ITP to perform M3UA SCTP message processing on the VIP.                                                     |
| <i>slot-number</i> | VIP slot number.                                                                                                                                             |

### Defaults

There is no default configuration. The M3UA well-known port is 2905.

### Command Modes

Global configuration

### Command History

| Release     | Modification                                                                 |
|-------------|------------------------------------------------------------------------------|
| 12.2(4)MB5  | This command was introduced.                                                 |
| 12.2(4)MB13 | The <b>offload</b> keyword was added, enabling the xUA SCTP Offload feature. |

### Usage Guidelines

M3UA uses SCTP to communicate with Application Server Processes (ASPs). The **offload** keyword enables the ITP to offload M3UA SCTP message processing to the VIP. This feature, available on the Cisco 7500 Router only, increases forwarding performance.

If offloaded, a specific M3UA instance can run on only one VIP. But different offloaded M3UA instances can run on different VIPs or on the same VIP.

If you offload M3UA or SUA to a VIP, that VIP cannot also be used for M2PA offload.

If you are configuring M3UA SCTP offload, the **local-ip** *ip-address* must be an IP address that was already configured on the VIP to which you are offloading this M3UA instance.

Issuing the **cs7 m3ua** command enables the CS7 M3UA submode.

The **cs7 m3ua** command cannot be specified with the **instance** keyword.

The M3UA configuration must be removed before the variant or local point code can be removed.

## Examples

The following example specifies a local port number of 2000 for M3UA:

```
cs7 m3ua 2000
 local-ip 10.10.10.7
```

The following example offloads two different instances of M3UA processing to the VIP in slot 5 and another instance to the VIP in slot 6:

```
cs7 m3ua 3000 offload 5
 local-ip 10.10.10.8
!
cs7 m3ua 3500 offload 5
 local-ip 10.10.10.8
!
cs7 m3ua 4000 offload 6
 local-ip 10.10.10.9
```

## Related Commands

| Command                    | Description                                                           |
|----------------------------|-----------------------------------------------------------------------|
| <b>local-ip (CS7 M3UA)</b> | Configures up to 4 local IP addresses that will receive M3UA packets. |
| <b>show cs7 asp</b>        | Displays ASP information.                                             |
| <b>show cs7 m3ua</b>       | Displays M3UA node information.                                       |

# cs7 mapua

To specify the name, protocol, and local port number for the MAP Proxy feature and enable the CS7 MAPUA submode, use the **cs7 mapua** command in global configuration mode. To delete the command and disable the MAP Proxy feature, use the **no** form of this command.

**cs7 mapua** *name protocol local-port*

**no cs7 mapua** *name protocol local-port*

## Syntax Description

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>name</i>       | The name to be associated with this MAP User API (MAPUA) instance. The name is specified as a character string with a maximum of 12 characters. It must be unique among all MAPUA instances.                                                                                                                                                                                                                                                                                           |
| <i>protocol</i>   | The supported protocol. The supported protocols are <b>radius</b> and <b>smpp</b> .                                                                                                                                                                                                                                                                                                                                                                                                    |
| <i>local-port</i> | The local port number that the MAP Proxy will listen to on the specified protocol. Only one MAPUA local port may be configured for the ITP router.<br><br>Valid local port numbers are in the range 1024-65535 for the RADIUS protocol. The default RADIUS port used by the existing IOS RADIUS client code (1645) is not allowed for MAP-Proxy use.<br><br>A well-known port number 9000 is used for GetIMSI requests and a well-known port number 9001 is used for GetMSRN requests. |

## Defaults

No default behavior or values.

## Command Modes

Global configuration

## Command History

| Release    | Modification                                                                                                                  |
|------------|-------------------------------------------------------------------------------------------------------------------------------|
| 12.2(4)MB7 | This command was introduced.                                                                                                  |
| 12.2(25)SW | The <b>smpp</b> protocol keyword was added to support a Multimedia Messaging Service Center (MMSC) Gateway MAP Proxy service. |

## Examples

The following example specifies the name (rad2000), protocol (radius), and local port number (2000) for the MAP Proxy feature and enables the CS7 MAPUA submode:

```
cs7 mapua rad2000 radius 2000
 local-ip 4.4.4.4
 client 1.1.1.1 secret client1111
```

The following example specifies the name (GetIMSI), protocol (smpp), and local port number 9000 for the MAP Proxy feature

## Related Commands

| Command                     | Description                                                                                                                          |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| client                      | Configures the list of clients that are allowed by the MAP Proxy.                                                                    |
| gsm-authent-vlr             | Enables authent-vlr submode for provisioning parameters specific to the Process_Obtain_Authentication_Sets_VLR service               |
| local-ip (CS7 MAPUA)        | Configure up to four local IP addresses that will receive MAPUA packets.                                                             |
| map-dest-addr               | Provisions destination address parameters used in IMSI.                                                                              |
| map-source-addr (cs7 mapua) | Provisions a global title address, such as an E.164 address, to be used as the calling party address for all MAP-generated messages. |
| show cs7 mapua              | Displays MAP Proxy information.                                                                                                      |
| shutdown (CS7 MAPUA)        | Disables the MAPUA on this MAP Proxy ITP router                                                                                      |

## cs7 mated-sg

The Signaling Gateway Mate Protocol (SGMP) is used to establish an association to the mated SG with an equivalent SG configuration. To configure a connection to a mated SG, use the **cs7 mated-sg** command in global configuration mode. To remove the mate definition from the configuration, use the **no** form of this command.

**cs7 mated-sg** *name remote-port* [**passive**]

**no cs7 mated-sg** *name remote-port* [**passive**]

|                           |                    |                                                                                                                                                                                                                                                                                                                                       |
|---------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>name</i>        | Name of the mated SG. The mated SG name is a unique name used to identify the mate for configuration and monitoring. This name may be up to 12 characters long. The first character must be alphabetic. The mate name cannot match a reserved keyword (such as m3ua, sua, all, operational, active, statistics, bindings, or detail). |
|                           | <i>remote-port</i> | Remote port number of the mate, in the range 1024 to 65535. This parameter is used for validation. The SCTP connection requests from the mate must come in with this remote port number.                                                                                                                                              |
|                           | <b>passive</b>     | (Optional) Keyword to specify no attempt to initiate the connection to the mate.                                                                                                                                                                                                                                                      |

**Defaults** No default behavior or values.

**Command Modes** Global configuration

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

**Usage Guidelines** The **cs7 mated-sg** command allows you to define the mate SG and enables the CS7 mated-sg configuration submenu. Only one mate can be defined on a SG. The mate uses the SGMP local port. The **no** form of the **cs7 mated-sg** command deletes the mate definition from configuration. The user must remove the mate from all **cs7 asroute** definitions before this command can be deleted from the configuration.

This command is not instance related and cannot be specified with the **instance** keyword.

**Examples** The following example specifies a mated SG named mate2 at remote port 5000 with the passive keyword:

```
cs7 mated-sg mate2 5000 passive
```



**Related Commands**

| Command                         | Description                                                                 |
|---------------------------------|-----------------------------------------------------------------------------|
| <b>cs7 sgmp</b>                 | Specifies the local port number for SGMP and enters CS7 SGMP submode.       |
| <b>remote-ip (CS7 Mated-SG)</b> | Configures a remote IP address to associate incoming packets from the mate. |
| <b>show cs7 mated-sg</b>        | Displays mated SG information.                                              |

# cs7 max-dynamic-routes

To specify the maximum number of dynamic routes, use the **cs7 max-dynamic routes** command in global configuration mode. To restore the default maximum of 1000 dynamic routes, use the **no** form of this command.

**cs7 max-dynamic-routes** *number*

**no cs7 max-dynamic-routes** *number*

## Syntax Description

|               |                                                                                     |
|---------------|-------------------------------------------------------------------------------------|
| <i>number</i> | The maximum number of dynamic routes that can be created. The range is 100 to 2000. |
|---------------|-------------------------------------------------------------------------------------|

## Defaults

1000 dynamic routes.

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

This command is not instance related and cannot be specified with the **instance** keyword.

## Examples

The following example specifies a maximum of 500 dynamic routes:

```
cs7 max-dynamic-routes 500
```

## Related Commands

| Command               | Description                     |
|-----------------------|---------------------------------|
| <b>show cs7 route</b> | Displays the ITP routing table. |

## cs7 mlr address-table

To define a table of addresses that is to be used when searching with the previously specified routing parameter, use the **cs7 mlr address-table** command in global configuration mode. To remove the definition, use the **no** form of the command.

**cs7** [*instance instance-number*] **mlr address-table** *table-name*

**no** [*instance instance-number*] **cs7 mlr address-table** *table-name*

| Syntax Description     |                                                                                                                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Specifies the ITP network instance in which the MLR table is valid.                                                                                                                                    |
| <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                                                                                                                              |
| <i>table-name</i>      | Identifies a name to be associated with this multi-layer result table. The name must be unique among all multi-layer routing tables. The name is specified as a character string with a maximum of 12 characters. |

**Defaults** No default behavior or value.

**Command Modes** Global configuration

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(21)SW | This command was introduced. |

**Usage Guidelines** The MLR address table is a table of addresses and destinations that more than one rule may reference. If a table is required in more than one instance, then it must be defined in each appropriate instance. If the instance is not specified, then the table may be used in only the default network instance, 0.

The **cs7 mlr address-table** command enables CS7 MLR address-table configuration mode.

**Examples** The following example defines a table of addresses named VSMSC-ADDRS

```
cs7 mlr address-table VSMSC-ADDRS
```

| Related Commands | Command                             | Description                                                  |
|------------------|-------------------------------------|--------------------------------------------------------------|
|                  | <b>addr (cs7 mlr address-table)</b> | Specifies an MLR address within the MLR address table.       |
|                  | <b>show cs7 mlr address-table</b>   | Displays addresses matched within the CS7 MLR address table. |

## cs7 mlr result

To name a multi-layer result group use the **cs7 mlr result** command in global configuration mode. The result group lists destination resources that process traffic to be routed based on multi-layer information.

**cs7** [**instance** *instance-number*] **mlr result** *name*

**no cs7** [**instance** *instance-number*] **mlr result** *name*

|                           |                        |                                                                                                                                                                                                                                                                                                |
|---------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>instance</b>        | (Optional) Specifies the ITP network instance in which the MLR table is valid. If a table is required in more than one instance, then it must be defined in each appropriate instance. If <b>instance</b> is not specified, then the table may only be used in the default network instance 0. |
|                           | <i>instance-number</i> | Instance number. The valid range is 0 through 7. The default instance is instance 0.                                                                                                                                                                                                           |
|                           | <i>name</i>            | Identifies a name to be associated with this multi-layer result table. The name must be unique among all multi-layer routing tables. The name is specified as a character string with a maximum of 12 characters.                                                                              |

**Defaults** No default behavior or value.

**Command Modes** Global configuration

|                        |                |                                        |
|------------------------|----------------|----------------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                    |
|                        | 12.2(4)MB      | This command was introduced.           |
|                        | 12.2(21)SW     | The <b>instance</b> keyword was added. |

**Usage Guidelines** The result group lists the appropriate destination resources, and the mechanism used to select a single destination for a given packet. State information is determined for each possible destination. Congested resources will be used only if no available, non-congested destinations exist. Only available destinations are considered for routing.

**Examples** The following example identifies a multi-layer result group named vas-grp:

```
cs7 mlr result vas-grp
  asname voting-as1 weight 1
  asname voting-as2 weight 1
  pc 3.3.1 weight 0
  pc 3.3.2 weight 0
  pc 3.3.3 weight 0
```

**Related Commands**

| Command                              | Description                                                                                          |
|--------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>asname</b> (cs7 mlr result)       | Specifies a particular destination M3UA or SUA application server                                    |
| <b>pc</b> (cs7 mlr result)           | Specifies the destination point code.                                                                |
| <b>result</b> (cs7 mlr ruleset rule) | Specifies the processing that will be performed on a packet matching the specified trigger and rule. |
| <b>show cs7 mlr result</b>           | Specifies a multi-layer result group.                                                                |

## cs7 mlr ruleset

To specify sets of rules that will be used to process traffic matching triggers defined in a multi-layer routing table, use the **cs7 mlr ruleset** command in global configuration mode. To remove the **cs7 mlr ruleset** command, provided that no defined MLR triggers are using the ruleset, use the **no** form of the command.

**cs7** [*instance instance-number*] **mlr ruleset** *name* [**protocol** {**gsm-map** | **ansi-41**}]

**no cs7**[*instance instance-number*] **mlr ruleset** *name* [**protocol** {**gsm-map** | **ansi-41**}]

| Syntax Description                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>                                                                                                                                                                                                                                                                                                           | (Optional) Specifies the ITP network instance in which the MLR table is valid. If a table is required in more than one instance, then it must be defined in each appropriate instance. If an instance is not specified, then the table may only be used in the default network instance 0. |
| <i>instance-number</i>                                                                                                                                                                                                                                                                                                    | An integer value in the range 0 to 7.                                                                                                                                                                                                                                                      |
| <i>name</i>                                                                                                                                                                                                                                                                                                               | Identifies a name to be associated with this multi-layer rule set table. The name must be unique among all multi-layer rule set tables. The name is specified as a character string with a maximum of 12 characters.                                                                       |
| <b>protocol</b>                                                                                                                                                                                                                                                                                                           | (Optional) Configure an application layer protocol for this ruleset.                                                                                                                                                                                                                       |
| <b>gsm-map</b>                                                                                                                                                                                                                                                                                                            | (Optional) Specifies that GSM MAP <sup>1</sup> is the application layer protocol to be used within the ruleset. For networks with mixed application layer protocols, the protocol should not be specified to allow all protocol operations on the rule statement.                          |
| <b>ansi-41</b>                                                                                                                                                                                                                                                                                                            | Specifies that ANSI-41 <sup>2</sup> or IS-41 is the application layer protocol to be used within the ruleset. For networks with mixed application layer protocols, the protocol should not be specified to allow all protocol operations on the rule statement.                            |
| <ol style="list-style-type: none"> <li>1. GSM 09.02: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) Specification", ETSI, document TS 100 974 V7.3.0.</li> <li>2. TIA/EIA-41-D, Cellular Radiotelecommunications Intersystem Operations, December 1997 SMS flows 3-373.</li> </ol> |                                                                                                                                                                                                                                                                                            |

**Defaults** No default behavior or value.

**Command Modes** Global configuration

| Command History | Release    | Modification                                                                   |
|-----------------|------------|--------------------------------------------------------------------------------|
|                 | 12.2(4)MB  | This command was introduced.                                                   |
|                 | 12.2(21)SW | The <b>instance</b> , <b>gsm-map</b> , and <b>ansi-41</b> keywords were added. |

**Usage Guidelines** This command enables the CS7 MLR ruleset configuration submenu.

## Examples

The following example creates a ruleset named ruleset-5:

```
cs7 mlr ruleset ruleset-5
rule 10 sms-mo
  dest-sme 1234
  result group vas-grp
rule 20 sms-mo
  dest-sme 5678
  result group vas-grp
```

## Related Commands

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>cdpa</b>                   | Creates a combination trigger based on the combination of the calling party and the called party                                  |
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

# cs7 mlr table

To specify the name of the multi-layer SMS routing table and enable CS7 MLR table mode, use the **cs7 mlr table** command in global configuration mode. To disable the Multi-layer SMS routing feature use the **no** form of the command.

**cs7** [*instance instance-number*] **mlr table** *name*

**no cs7** [*instance instance-number*] **mlr table** *name*

|                           |                        |                                                                                                                                                                                                                                                                                         |
|---------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>instance</b>        | (Optional) Specifies the ITP network instance in which the MLR table is valid. If a table is required in more than one instance, then it must be defined in each appropriate instance. If instance is not specified, then the table may only be used in the default network instance 0. |
|                           | <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.                                                                                                                                                                                                                                  |
|                           | <i>name</i>            | Identifies a name to be associated with this multi-layer routing table. The name must be unique among all multi-layer routing tables. The name is specified as a character string with a maximum of 12 characters.                                                                      |

**Defaults** No default behavior or value.

**Command Modes** Global configuration

|                        |                |                                        |
|------------------------|----------------|----------------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                    |
|                        | 12.2(4)MB      | This command was introduced.           |
|                        | 12.2(21)SW     | The <b>instance</b> keyword was added. |

**Usage Guidelines** This command enables the CS7 MLR table mode.  
In the current release, only a single multi-layer routing table is allowed.

**Examples** The following example specifies a CS7 MLR routing table named SMS-TABLE

```
cs7 mlr table SMS-TABLE
  trigger cdpa gt 9991117770 ruleset ruleset-5
  cgpa gt 9991116 ruleset ruleset-5
```

The following example specifies a CS7 MLR routing table named SMS-TABLE and specified that the MLR table is valid in instance 2:

```
cs7 instance 2 mlr table SMS-TABLE
```



| Related Commands | Command                   | Description                                                                                             |
|------------------|---------------------------|---------------------------------------------------------------------------------------------------------|
|                  | <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination.                              |
|                  | <b>trigger cdpa</b>       | Specifies a routing trigger that is located in the SCCP called party address field of the incoming MSU. |
|                  | <b>trigger cgpa</b>       | Specifies a routing trigger that is located in the SCCP calling party address field of the incoming MSU |
|                  | <b>trigger default</b>    | Specifies a routing trigger that matches all packets in the incoming MSU.                               |

# cs7 monitor

To configure the ITP as a monitor and define the port number on which to listen for incoming TCP connections, use the **cs7 monitor** command in global configuration mode. To disable the ITP monitor, use the **no** form of this command.

**cs7 monitor** [**sctp** | **tcp**] *tcp-listen-port*

**no cs7 monitor** [**sctp** | **tcp**] *tcp-listen-port*

## Syntax Description

|                        |                                                                     |
|------------------------|---------------------------------------------------------------------|
| <b>sctp</b>            | (Optional) Use SCTP protocol.                                       |
| <b>tcp</b>             | (Optional) Use TCP protocol.                                        |
| <i>tcp-listen-port</i> | The port number. Valid port numbers are in the range 1024 to 49151. |

## Defaults

No default behavior or values.

## Command Modes

Global configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB12 | This command was introduced. |

## Usage Guidelines

Issuing the **cs7 monitor** command enables CS7 monitor configuration mode. When the CS7 Monitor feature is enabled, no other CS7 feature or function can be enabled on the ITP.

## Examples

The following example enables the ITP as a monitor and specifies that the TCP listen port is port 9000:

```
cs7 monitor 9000
```

## Related Commands

| Command                         | Description                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>atm cs7monitor</b>           | Identifies the ATM interface as a monitoring interface enables the interface to recognize received packets. |
| <b>encapsulation cs7monitor</b> | Sets the encapsulation type on an interface to CS7 monitor.                                                 |

## cs7 mtp3 event-history

To specify the maximum number of events to store in memory, use the **cs7 mtp3 event-history** command in global configuration mode. To return to the default number of events to store (512), use the **no** form of this command.

**cs7** [*instance instance-number*] **mtp3 event-history** *number*

**no cs7** [*instance instance-number*] **mtp3 event-history**

| Syntax Description | instance        | (Optional) Speciy the maximum number of events to store in memory for an instance.                                                                                                                                                                                                                               |
|--------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | instance-number | Instance number. The valid range is 0 through 7. The default instance is instance 0.                                                                                                                                                                                                                             |
|                    | number          | Maximum number of events to log in history. Valid numbers are in the range 0 to 1024. Setting the number to 0 removes all saved events and discontinues the logging of events. The default number of events logged if this command is not configured, or if the <b>no</b> form of the command is issued, is 512. |

|                 |                                   |
|-----------------|-----------------------------------|
| <b>Defaults</b> | 512 events are logged by default. |
|-----------------|-----------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

|                         |                                                                                                                                        |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | Since events are continuously logged in round-robin fashion, new events will overwrite the old ones when the maximum value is reached. |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                           |
|-----------------|---------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the maximum number event to be logged at 1024: |
|-----------------|---------------------------------------------------------------------------|

```
cs7 mtp3 event history 1024
```

The following example sets the maximum number event to be logged to 1024 for instance 2:

```
cs7 instance 2 mtp3 event history 1024
```

| Related Commands | Command                     | Description                                                                                       |
|------------------|-----------------------------|---------------------------------------------------------------------------------------------------|
|                  | cs7 multi-instance          | Enables multiple instances of a variant and network indicator combination.                        |
|                  | show cs7 mtp3 event-history | Displays logged events exchanged among the 3 MTP components, traffic, link, and route management. |

## cs7 mtp3 timer

To configure the ITP MTP3 management timers globally, use the **cs7 mtp3 timer** command in global configuration mode. To reset a timer to its default value, use the **no** form of this command.

```
cs7 [instance instance-number] mtp3 timer {retry msec | slt-t1 msec | slt-t2 msec | t01 msec | t02 msec | t03 msec | t04 msec | t05 msec | t6 msec | t8 msec | t10 msec | t11 msec | t12 msec | t13 msec | t14 msec | t15 msec | t16 msec | t17 msec | t18 msec | t19 msec | t20 msec | t21 msec | t22 msec | t23 msec | t24 msec | t25 msec | t26 msec | t28 msec | t29 msec | t30 msec | t32 msec | tc msec}
```

```
no cs7 [instance instance-number] mtp3 timer {retry | slt-t1 | slt-t2 | t01 | t02 | t03 | t04 | t05 | t6 | t8 | t10 | t11 | t12 | t13 | t14 | t15 | t16 | t17 | t18 | t19 | t20 | t21 | t22 | t23 | t24 | t25 | t26 | t28 | t29 | t30 | t32 | tc}
```



### Note

Ranges are ANSI, ITU, or TTC defined. MTP3 timer values for China Variant are the same as ITU. When used, the MTP3 timer values for TTC match ITU.

### Syntax Description

|                        |                                                                                                                                                                                                  |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Configure the ITP MTP3 management timers globally on an instance.                                                                                                                     |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.                                                                                                                                           |
| <b>retry msec</b>      | (ANSI, ITU) Link activation retry timer.<br>(ANSI, ITU) Range of <i>msec</i> is 60000 through 90000 milliseconds.<br>Default is 60000 milliseconds.                                              |
| <b>slt-t1 msec</b>     | (ANSI, ITU) Link test acknowledgment timer.<br>(ANSI, ITU) ITU Range of <i>msec</i> is 4000 through 12000 milliseconds.<br>Default is 8000 milliseconds.                                         |
| <b>slt-t2 msec</b>     | (ANSI, ITU) Interval timer for sending test messages.<br>(ANSI, ITU) Range of <i>msec</i> is 30000 through 90000 milliseconds.<br>(ANSI, ITU) Default is 60000 milliseconds.                     |
| <b>t01 msec</b>        | (ANSI, ITU, TTC) Delay to avoid message mis-sequencing.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU, TTC) Default is 800 milliseconds.              |
| <b>t02 msec</b>        | (ANSI, ITU, TTC) Wait for changeover acknowledgment.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 700 through 1200 milliseconds.<br>(ANSI, ITU, TTC) Default is 1400 milliseconds.                |
| <b>t03 msec</b>        | (ANSI, ITU, TTC) Delay to avoid mis-sequencing in changeback.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU, TTC) Default is 800 milliseconds.        |
| <b>t04 msec</b>        | (ANSI, ITU, TTC) Wait for changeback acknowledgment (first attempt).<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU, TTC) Default is 800 milliseconds. |
| <b>t05 msec</b>        | (ANSI, ITU) Wait for changeback acknowledgment (second attempt).<br>(ANSI, ITU) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds.               |

|                 |                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t06 msec</b> | (ANSI, ITU, TTC) Delay to avoid message mis-sequencing on controlled rerouting.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU, TTC) Default is 800 milliseconds.                                                                                                                              |
| <b>t08 msec</b> | (ANSI, ITU, TTC) Transfer-prohibited inhibited timer.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 800 through 1200 milliseconds.<br>(ANSI, ITU, TTC) Default is 1000 milliseconds.                                                                                                                                                       |
| <b>t10 msec</b> | (ANSI, ITU, TTC) Waiting to repeat signaling-route-set-test message.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 30,000 through 60,000 milliseconds.<br>(ANSI, ITU, TTC) Default is 45,000 milliseconds.                                                                                                                                 |
| <b>t11 msec</b> | (ANSI, ITU) Transfer-restricted timer.<br>(ANSI, ITU) Range of <i>msec</i> is 30,000 through 90,000 milliseconds.<br>(ANSI, ITU) Default is 60,000 milliseconds.                                                                                                                                                                         |
| <b>t12 msec</b> | (ANSI, ITU) Wait for uninhibited acknowledgment.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                                                                                                                                                                      |
| <b>t13 msec</b> | (ANSI, ITU) Wait for force uninhibited.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                                                                                                                                                                               |
| <b>t14 msec</b> | (ANSI, ITU) Wait for inhibition acknowledgment.<br>(ANSI, ITU) Range of <i>msec</i> is 2000 through 3000 milliseconds.<br>(ANSI, ITU) Default is 2500 milliseconds.                                                                                                                                                                      |
| <b>t15 msec</b> | (ANSI) Waiting to repeat signaling route set congestion test.<br>(ITU, TTC) Waiting to start route set congestion test.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 2000 through 3000 milliseconds.<br>(ANSI, ITU, TTC) Default is 2500 milliseconds.                                                                                    |
| <b>t16 msec</b> | (ANSI, ITU, TTC) Waiting for route set congestion update.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 1400 through 2000 milliseconds.<br>(ANSI, ITU, TTC) Default is 1700 milliseconds.                                                                                                                                                  |
| <b>t17 msec</b> | (ANSI, ITU) Delay to avoid oscillation of alignment failure and link restart.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                                                                                                                                         |
| <b>t18 msec</b> | (ANSI) Repeat TFR once by response method.<br>(ANSI) Range of <i>msec</i> is 2000 through 20000 milliseconds.<br>(ANSI) Default is 11000 milliseconds.<br><br>(ITU) MTP restarts for supervising link and link set activation.<br>(ITU) Range of <i>msec</i> is 1000 through 31000 milliseconds.<br>(ITU) Default is 30000 milliseconds. |
| <b>t19 msec</b> | (ANSI) Failed link craft referral timer.<br>(ANSI) Range of <i>msec</i> is 480000 through 600000 milliseconds.<br>(ANSI) Default is 540000.<br><br>(ITU) Supervision timer during MTP restart.<br>(ITU) Range of <i>msec</i> is 67000 through 69000 milliseconds.<br>(ITU) Default is 68000 milliseconds.                                |

|                 |                                                                                                                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t06 msec</b> | (ANSI, ITU, TTC) Delay to avoid message mis-sequencing on controlled rerouting.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU, TTC) Default is 800 milliseconds.                                                                                                                              |
| <b>t08 msec</b> | (ANSI, ITU, TTC) Transfer-prohibited inhibited timer.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 800 through 1200 milliseconds.<br>(ANSI, ITU, TTC) Default is 1000 milliseconds.                                                                                                                                                       |
| <b>t10 msec</b> | (ANSI, ITU, TTC) Waiting to repeat signaling-route-set-test message.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 30,000 through 60,000 milliseconds.<br>(ANSI, ITU, TTC) Default is 45,000 milliseconds.                                                                                                                                 |
| <b>t11 msec</b> | (ANSI, ITU) Transfer-restricted timer.<br>(ANSI, ITU) Range of <i>msec</i> is 30,000 through 90,000 milliseconds.<br>(ANSI, ITU) Default is 60,000 milliseconds.                                                                                                                                                                         |
| <b>t12 msec</b> | (ANSI, ITU) Wait for uninhibited acknowledgment.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                                                                                                                                                                      |
| <b>t13 msec</b> | (ANSI, ITU) Wait for force uninhibited.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                                                                                                                                                                               |
| <b>t14 msec</b> | (ANSI, ITU) Wait for inhibition acknowledgment.<br>(ANSI, ITU) Range of <i>msec</i> is 2000 through 3000 milliseconds.<br>(ANSI, ITU) Default is 2500 milliseconds.                                                                                                                                                                      |
| <b>t15 msec</b> | (ANSI) Waiting to repeat signaling route set congestion test.<br>(ITU, TTC) Waiting to start route set congestion test.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 2000 through 3000 milliseconds.<br>(ANSI, ITU, TTC) Default is 2500 milliseconds.                                                                                    |
| <b>t16 msec</b> | (ANSI, ITU, TTC) Waiting for route set congestion update.<br>(ANSI, ITU, TTC) Range of <i>msec</i> is 1400 through 2000 milliseconds.<br>(ANSI, ITU, TTC) Default is 1700 milliseconds.                                                                                                                                                  |
| <b>t17 msec</b> | (ANSI, ITU) Delay to avoid oscillation of alignment failure and link restart.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                                                                                                                                         |
| <b>t18 msec</b> | (ANSI) Repeat TFR once by response method.<br>(ANSI) Range of <i>msec</i> is 2000 through 20000 milliseconds.<br>(ANSI) Default is 11000 milliseconds.<br><br>(ITU) MTP restarts for supervising link and link set activation.<br>(ITU) Range of <i>msec</i> is 1000 through 31000 milliseconds.<br>(ITU) Default is 30000 milliseconds. |
| <b>t19 msec</b> | (ANSI) Failed link craft referral timer.<br>(ANSI) Range of <i>msec</i> is 480000 through 600000 milliseconds.<br>(ANSI) Default is 540000.<br><br>(ITU) Supervision timer during MTP restart.<br>(ITU) Range of <i>msec</i> is 67000 through 69000 milliseconds.<br>(ITU) Default is 68000 milliseconds.                                |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t20</b> msec | <p>(ANSI) Waiting to repeat local inhibit test.<br/> (ANSI) Range of <i>msec</i> is 90000 through 120000 milliseconds.<br/> (ANSI) Default is 105000 milliseconds.</p> <p>(ITU) MTP restart timer at the signaling point whose MTP restarts.<br/> (ITU) Range of <i>msec</i> is 1000 through 61000 milliseconds.<br/> (ITU) Default is 60000 milliseconds.</p>                                                                                                               |
| <b>t21</b> msec | <p>(ANSI) Waiting to repeat remote inhibit test.<br/> (ANSI) Range of <i>msec</i> is 90000 through 120000 milliseconds.<br/> (ANSI) Default is 105000 milliseconds.</p> <p>(ITU) MTP restart timer at signaling point adjacent to one whose MTP restarts.<br/> (ITU) Range of <i>msec</i> is 63000 through 65000 milliseconds.<br/> (ITU) Default is 64000 milliseconds.</p>                                                                                                 |
| <b>t22</b> msec | <p>(ANSI) Timer at restarting SP waiting for signaling links to become available all traffic restart allowed messages.<br/> (ANSI) Range of <i>msec</i> is 36000 through 60000 milliseconds.<br/> (ANSI) Default is 30000 milliseconds.</p> <p>(ITU) Local inhibit test timer.<br/> (ITU) Range of <i>msec</i> is 180000 through 360000 milliseconds.<br/> (ITU) Default is 300000 milliseconds.</p>                                                                         |
| <b>t23</b> msec | <p>(ANSI) Timer at restarting SP with transfer function, started after T22, waiting to broadcast all traffic restart allowed messages.<br/> (ANSI) Range of <i>msec</i> is 9000 through 60000 milliseconds.<br/> (ANSI) Default is 30000 milliseconds.</p> <p>(ITU) Remote inhibit test timer.<br/> (ITU) Range of <i>msec</i> is 180000 through 360000 milliseconds.<br/> (ITU) Default is 300000 milliseconds.</p>                                                         |
| <b>t24</b> msec | <p>(ANSI) Timer at restarting SP with transfer function, started after T23, waiting to broadcast all traffic restart allowed messages.<br/> (ANSI) Range of <i>msec</i> is 9000 through 60000 milliseconds.<br/> (ANSI) Default is 30000 milliseconds.</p> <p>(ITU) Stabilizing timer after removal of local processor outage, used in LPO latching to RPO.<br/> (ITU) The only valid value for <i>msec</i> is 500 milliseconds.<br/> (ITU) Default is 500 milliseconds.</p> |
| <b>t25</b> msec | <p>(ANSI) Timer at SP adjacent to restarting SP, waiting for traffic restart allowed message.<br/> (ANSI) Range of <i>msec</i> is 30000 through 35000 milliseconds.<br/> (ANSI) Default is 30000 milliseconds.</p>                                                                                                                                                                                                                                                           |
| <b>t26</b> msec | <p>(ANSI) Timer at restarting SP waiting to repeat traffic restart waiting message.<br/> (ANSI) Range of <i>msec</i> is 12000 through 15000 milliseconds.<br/> (ANSI) Default is 12000 milliseconds.</p>                                                                                                                                                                                                                                                                     |
| <b>t28</b> msec | <p>(ANSI) Timer at SP adjacent to restarting SP waiting for traffic restart waiting message.<br/> (ANSI) Range of <i>msec</i> is 3000 through 35000 milliseconds.<br/> (ANSI) Default is 30000 milliseconds.</p>                                                                                                                                                                                                                                                             |



|                 |                                                                                                                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t29 msec</b> | (ANSI) Timer started when TRA sent in response to unexpected TRA or TRW.<br>(ANSI) Range of <i>msec</i> is 60000 through 65000 milliseconds.<br>(ANSI) Default is 63000 milliseconds.           |
| <b>t30 msec</b> | (ANSI) Timer to limit sending TFPs and TFRs in response to unexpected TRA and TRW.<br>(ANSI) Range of <i>msec</i> is 30000 through 35000 milliseconds.<br>(ANSI) Default is 33000 milliseconds. |
| <b>t32 msec</b> | (ANSI) Link oscillation timer - Procedure A.<br>Range of <i>msec</i> is 60000 through 120000 milliseconds.<br>Default is 60000 milliseconds.                                                    |
| <b>tc msec</b>  | (TTC) Congestion test timer. Range of <i>msec</i> is 3000 through 30000.<br>Default is 3000 milliseconds.                                                                                       |

**Defaults**

Defaults listed in Syntax Description.

**Command Modes**

Global configuration

**Command History**

| Release    | Modification                                                                   |
|------------|--------------------------------------------------------------------------------|
| 12.2(1)MB  | This command was introduced.                                                   |
| 12.3(20)SW | The MTP3 timer values were updated to include TTC. The TTC tc timer was added. |

**Usage Guidelines**

MTP3 timers can be defined at 3 levels, global, linkset, and link.

All global, linkset, and link specific timers can be defined at the global level. These values serve as defaults and are propagated down to the lower levels.

All linkset and link specific timers can be defined at the linkset level. These values serve as defaults for the linkset and all links defined within that linkset. Any values defined here will override any global values.

All timers defined at the link level will apply to the link and will override any values for that timer defined at either the linkset, or global level.

**Examples**

The following example sets the ITP MTP3 T6 timer to 1000 milliseconds:

```
cs7 mtp3 timer t6 1000
```

The following example sets the ITP MTP3 T6 timer to 1000 milliseconds:

```
cs7 mtp3 timer t6 1000
```

**Related Commands**

| Command                     | Description                                                                         |
|-----------------------------|-------------------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>   | Enables multiple instances of a variant and network indicator combination.          |
| <b>link-timer</b>           | Configures timers for a link.                                                       |
| <b>show cs7 mtp3 timers</b> | Displays the values of the MTP3 timers.                                             |
| <b>timer (CS7 Linkset)</b>  | Configures timers for a linkset (and, optionally, timers for links on the linkset). |

## cs7 mtp3 tuning

To specify MTP3 performance tuning parameters, use the **cs7 mtp3 tuning** command in global configuration mode. To return to the default MTP3 tuning parameters, use the **no** form of this command.

**cs7** [*instance instance-number*] **mtp3 tuning buffered-packet-threshold** *bufferedPaks*  
**rx-congestion-threshold** *queuedPaks*

**no cs7** [*instance instance-number*]**mtp3 tuning**

| Syntax Description                                      |                                                                                                                                                                                                                     |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>                                         | (Optional) Specifies MTP3 performance tuning parameters                                                                                                                                                             |
| <i>instance-number</i>                                  | Instance number. An integer value in the range 0 to 7.                                                                                                                                                              |
| <b>buffered-packet-threshold</b><br><i>bufferedPaks</i> | Threshold number of packets buffered at MTP3 for changeover/changeback after which packets begin to be dropped. The range is 1000 to 80000 buffered packets per ITP. The default is 20000 buffered packets per ITP. |
| <b>rx-congestion-threshold</b><br><i>queuedPaks</i>     | Threshold percentage of the maximum number of packets on the MTP3 link's interface input queue at which the link is declared to be congested. The range is 0 to 100%. The default is 75%.                           |

### Defaults

The default **buffered-packet-threshold** is 20000 buffered packets per ITP.

The default **rx-congestion-threshold** is 75% of the maximum number packets on the MTP3 link's interface input queue.

### Command Modes

Global configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

### Examples

The following example sets the buffered-packet-threshold to 1000 and the rx-congestion-threshold to 50%:

```
cs7 mtp3 tuning buffered-packets-threshold 1000 rx-congestion-threshold 50
```

The following example sets the buffered-packet-threshold to 1000 and the rx-congestion-threshold to 50% for instance 2:

```
cs7 instance 2mtp3 tuning buffered-packets-threshold 1000 rx-congestion-threshold 50
```

### Related Commands

| Command               | Description             |
|-----------------------|-------------------------|
| <b>cs7 mtp3 timer</b> | Configures MTP3 timers. |

| Command                     | Description                                                                |
|-----------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>   | Enables multiple instances of a variant and network indicator combination. |
| <b>show cs7 mtp3 timers</b> | Displays the values of the MTP3 timers.                                    |

# cs7 multi-instance

To enable multiple instances of a variant and network indicator combination, use the **cs7 multi-instance** command in global configuration mode.

**cs7 multi-instance**

**no cs7 multi-instance**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or value. |
|-----------------|-------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                     |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>Use the <b>cs7 multi-instance</b> command to enable multiple variants and network indicator combinations to run concurrently on one ITP. Up to 8 instances can be configured.</p> <p>The multiple instance feature cannot be enabled until the default instance is first assigned a variant.</p> |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                                                             |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | <p>The following example enables the configuration of multiple variant and network indicator “instances.”</p> <pre>cs7 multi-instance</pre> |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------|

| Related Commands | Command     | Description                                                              |
|------------------|-------------|--------------------------------------------------------------------------|
|                  | cs7 variant | Indicates which of the SS7 variations the ITP is running on an instance. |

# cs7 national-options

To configure the national options, use the **cs7 national-options** command in global configuration mode. To remove national options, use the **no** form of this command.

**cs7** [*instance instance-number*] **national-options** { **TFR** | **multiple-congestion** | **route-set-congestion-test** | **combined-linkset-loadsharing** }

**no cs7** [*instance instance-number*] **national-options**

## Syntax Description

|                                     |                                                                                                              |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>instance</b>                     | (Optional) Configure the national options on an instance.                                                    |
| <i>instance-number</i>              | Instance number. An integer value in the range 0 to 7.                                                       |
| <b>TFR</b>                          | (Applies to ITU and China SS7 variants.)<br>Sends Transfer Restricted Messages.                              |
| <b>multiple-congestion</b>          | (Applies to ITU and China SS7 variants.)<br>Uses multiple congestions levels.                                |
| <b>route-set-congestion-test</b>    | (Applies to TTC SS7 variant.)<br>Enables route set congestion test (RSCT).                                   |
| <b>combined-linkset-loadsharing</b> | (Applies to TTC SS7 variant.)<br>Allows ITPs with the TTC variant to use the enhanced loadsharing algorithm. |

## Defaults

No default behavior or values.

## Command Modes

Global configuration

## Command History

| Release     | Modification                                               |
|-------------|------------------------------------------------------------|
| 12.2(1)MB   | This command was introduced.                               |
| 12.2(20)SW  | The <b>route-set-congestion-test</b> keyword was added.    |
| 12.2(25)SW1 | The <b>combined-linkset-loadsharing</b> keyword was added. |

## Usage Guidelines

The national options apply to the variants as follows:

- **TFR:** ITU and China SS7 Variants
- **multiple-congestion:** ITU and China SS7 Variants
- **route-set-congestion-test:** TTC SS7 Variant
- **combined-linkset-loadsharing:** TTC SS7 Variant

Previous to Release 12.2(25)SW1, all SS7 variants used an enhanced loadsharing algorithm for distributing messages across the available links within a linkset and combined linkset. (This algorithm allows for efficient load balancing when an unequal number of available links exist in the two linksets that comprise the combined linkset.) In Release 12.2(25)SW1, the TTC variant reverted to using the A/B

linkset selection bit that exists as part of the SLS in the MSU routing label. To allow ITPs configured with the TTC variant to use the enhanced loadsharing algorithm, the **combined-linkset-loadsharing** keyword was added.

There is currently no command to display national options, other than **show running config**.

Refer to Q.704 section 11.2.4 for multiple-congestion, and Q.704 section 13.4 for TFR.

### Examples

The following example configures the national options to send transfer restricted messages:

```
cs7 national-options TFR
```

### Related Commands

| Command                   | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
| <b>cs7 variant</b>        | Specifies which of the SS7 variations the router is running.               |
| <b>encapsulation mtp2</b> | Specifies MTP2 encapsulation.                                              |
| <b>mtp2-timer</b>         | Configures MTP2 encapsulation timers.                                      |
| <b>show cs7 mtp2</b>      | Displays ITP MTP2 status.                                                  |

# cs7 network-indicator

To configure the network indicator, use the **cs7 network-indicator** command in global configuration mode. To return to the default, use the **no** form of this command.

**cs7** [*instance instance-number*] **network-indicator** { **international** | **national** | **reserved** | **spare** }

**no cs7** [*instance instance-number*] **network-indicator**

## Syntax Description

|                        |                                                            |
|------------------------|------------------------------------------------------------|
| <b>instance</b>        | (Optional) Configure the network indicator on an instance. |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.     |
| <b>international</b>   | International network                                      |
| <b>national</b>        | National network                                           |
| <b>reserved</b>        | Reserved for national use                                  |
| <b>spare</b>           | For international use only                                 |

## Defaults

National network.

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Examples

The following example configures the network indicator to international:

```
cs7 network-indicator international
```

The following example configures the network indicator to international on instance 3:

```
cs7 instance 3 network-indicator international
```

## Related Commands

| Command                   | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
| <b>cs7 variant</b>        | Specifies which of the SS7 variations (ANSI or ITU) the router is running. |
| <b>encapsulation mtp2</b> | Specifies MTP2 encapsulation.                                              |
| <b>mtp2-timer</b>         | Configures MTP2 encapsulation timers.                                      |
| <b>show cs7 mtp2</b>      | Displays ITP MTP2 status.                                                  |



## cs7 network-name

To specify a network name for a signaling point, use the **cs7 instance network-name** command in global configuration mode. To remove, use the **no** form of the command.

**cs7** [**instance** *instance-number*] **network-name** *network-name*

**no cs7** [**instance** *instance-number*] **network-name** *network-name*

| Syntax Description | <b>instance</b>        | (Optional) Specifies a network name for a signaling point on an instance.         |
|--------------------|------------------------|-----------------------------------------------------------------------------------|
|                    | <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.                            |
|                    | <i>network-name</i>    | Specifies the network name. Valid names are text string up to 19 characters long. |
|                    |                        |                                                                                   |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or value. |
|-----------------|-------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

|                         |                                                                                                                                                                                                                                                              |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The network-name is used to allow network management to group signalling points by network. Network-name is not required for instance zero. For all other instances it must be specified after the variant and prior to all other commands for the instance, |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                              |
|-----------------|--------------------------------------------------------------|
| <b>Examples</b> | The following example specifies the network name <b>hr</b> : |
|-----------------|--------------------------------------------------------------|

```
cs7 network-name hr
```

The following example specifies the network name **hr** for instance 2:

```
cs7 instance 2 network-name hr
```

| Related Commands | Command                   | Description                                                                |
|------------------|---------------------------|----------------------------------------------------------------------------|
|                  | <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |

# cs7 nso

To enable ITP Non-Stop Operation (NSO), use the **cs7 nso** command in global configuration mode. To disable ITP NSO, use the **no** form of this command.

**cs7 nso**

**no cs7 nso**

---

## Syntax Description

This command has no arguments or keywords.

---

## Defaults

No default behavior or values

---

## Command Modes

Global configuration

---

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(23)SW | This command was introduced. |

---

## Usage Guidelines

Issuing the **no cs7 nso** command results in a reload of the standby RSP, if it is present. This occurs because the ITP protocols on the standby RSP must revert back to the state required for RPR+ operation, which is the default for ITP if the redundancy mode is SSO and NSO is not configured.

---

## Examples

The following example enables NSO:

```
cs7 nso
```

---

## Related Commands

| Command      | Description               |
|--------------|---------------------------|
| show cs7 nso | Displays NSO information. |

# cs7 offload mtp3

To enable MTP3 offload (VIP to VIP forwarding of MSUs), use the **cs7 offload mtp3** command in global configuration mode. To remove the configuration, use the **no** form of this command.

**cs7 offload mtp3**

**no cs7 offload mtp3**

**Note**

This command is supported on the Cisco 7500 platform only.

**Syntax Description**

This command has no arguments or keywords.

**Defaults**

MTP3 offload is disabled.

**Command Modes**

Global configuration

**Command History**

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB12 | This command was introduced. |

**Usage Guidelines**

The **cs7 offload mtp3** command activates MTP3 offload on all VIPs.

MTP3 offload cannot be enabled if the Instance Translation feature has been configured.

The Instance Translation feature cannot be enabled if MTP3 offload has been configured.

The **cs7 offload mtp3** command will take effect when the ITP is reloaded.

**Examples**

The following example enables the ITP to forward MSUs between VIPs without involving the RSP:

```
cs7 offload mtp3
```

**Related Commands**

| Command                      | Description                                                                    |
|------------------------------|--------------------------------------------------------------------------------|
| <b>show cs7 offload mtp3</b> | Displays the current status of MTP3 offload on each VIP                        |
| <b>show cs7</b>              | Displays the ITP basic configuration and indicates if MTP3 offload is enabled. |

# cs7 offload mtp3 restart

To enable the ITP software to reload IOS microcode on a VIP on which MTP3 offload has been permanently disabled by the MTP3 offload feature (due to excessive errors) use the **cs7 offload mtp3 restart** Privileged EXEC command.

**cs7 offload mtp3 slot restart**

|                           |                              |
|---------------------------|------------------------------|
| <b>Syntax Description</b> | <i>slot</i> VIP slot number. |
|---------------------------|------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |           |
|----------------------|-----------|
| <b>Command Modes</b> | User EXEC |
|----------------------|-----------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB12    | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | This command causes the ITP to perform an immediate microcode reload on the specified VIP by simulating an online insertion and removal (OIR) of the VIP.                                                                                                                                                                                                                                                             |
|                         | This command should be used only when a particular VIP has been permanently disabled by the MTP3 offload feature, due to excessive errors. In most error situations, the MTP3 offload feature will automatically perform error recovery. However, if successive recovery attempts do not eliminate the error conditions, all links on the VIP will be deactivated, and the MTP3 offload feature disabled on that VIP. |

|                 |                                                                                                                                                                 |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | Assuming the VIP in slot 0 is marked as permanently disabled, the following example shows the command to cause IOS microcode to be loaded on the VIP in slot 0: |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
cs7 offload mtp3 0 restart
```

| <b>Related Commands</b> | <b>Command</b>               | <b>Description</b>                                       |
|-------------------------|------------------------------|----------------------------------------------------------|
|                         | <b>show cs7 offload mtp3</b> | Displays the current status of MTP3 offload on each VIP. |

# cs7 paklog

To configure the ITP Packet Logging facility parameter, use the **cs7 paklog** command in global configuration mode. To remove the configuration, use the **no** form of this command.

**cs7 paklog** *dest-ip* **dest-port** *dest-port* [**severity** *severity*] [**facility** *facility*] [**src-port** *src-port*] [**hostname** *hostname*]

**no cs7 paklog** *dest-ip* **dest-port** *dest-port* [**severity** *severity*] [**facility** *facility*] [**src-port** *src-port*] [**hostname** *hostname*]

| Syntax Description                |                                                                                                                                                                                                            |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>dest-ip</i>                    | Destination IP address of the syslog receiving host.                                                                                                                                                       |
| <b>dest-port</b> <i>dest-port</i> | Keyword and value indicating the Destination IP port of the remote syslog receiving port. Valid range is port number 1 to 65535.                                                                           |
| <b>severity</b> <i>severity</i>   | (Optional) Keyword and value specifying the severity of the message. Valid range is 0 to 7. If no severity is specified, the default is severity level 7, debug level severity.                            |
| <b>facility</b> <i>facility</i>   | (Optional) Keyword and value specifying the facility for the message. Valid range is 0 to 23. If no facility is specified, the default facility is 16, "local use 0."                                      |
| <b>src-port</b> <i>src-port</i>   | (Optional) Keyword and value specifying the source IP port of the UDP syslog message. Valid range is port number 1 to 65535. If no source IP port is specified, the default source port 10000 is assigned. |
| <b>hostname</b> <i>hostname</i>   | (Optional) Keyword and value specifying a hostname to be sent in the syslog message. If no hostname is specified the local ITP host name is assigned.                                                      |

## Defaults

If no severity is specified, the default is severity level 7, debug level severity.

If no facility is specified, the default facility is 16, "local use 0."

If no source IP port is specified, the default source port 10000 is assigned.

If no hostname is specified the local ITP host name is assigned.

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

The ITP Packet Logging facility uses the BSD Syslog protocol (RFC 3164) to send selected MSUs to a user-selected monitoring tool via the UDP connectionless protocol (RFC 768). Cisco Systems, Inc. does not provide monitoring tools specifically for receiving and decoding messages sent by the facility. The user must obtain a suitable tool for receiving syslog messages.

Under normal conditions, use of the ITP Packet Logging facility will not impact system performance. However, if packet logging is configured incorrectly, system performance can be diminished during periods of high traffic.

---

**Examples**

The following example specifies a CS7 access list to permit packets that are to be logged, specifies the destination IP address and port number of the host that will receive the packets, and specifies the source IP port of the UDP syslog message:

```
cs7 paklog 10.4.0.90 dest-port 5514 src-port 10000
!  
access-list 2700 instance 0 permit all
```

---

**Related Commands**

| Command                      | Description                                                                     |
|------------------------------|---------------------------------------------------------------------------------|
| <b>access-list</b>           | Defines a Cisco ITP access list.                                                |
| <b>debug cs7 mtp3 paklog</b> | Sends selected message signaling units (MSU) to an appropriate monitoring tool. |

## cs7 point-code

Each ITP must have a unique local point code that is used to send management messages to adjacent signaling points. To assign a local point code, use the **cs7 point-code** command in global configuration mode. To remove the point code from the instance configuration, use the **no** form of this command.

**cs7** [*instance instance-number*] **point-code** *point-code*

**no cs7** [*instance instance-number*] **point-code** *point-code*

### Syntax Description

|                        |                                                                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Assign a local point code to an instance.                                                                                                  |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.                                                                                                |
| <i>point-code</i>      | The local point code for this router.<br>The ANSI point code range is 0.0.0 through 255.255.255.<br>The ITU point code range is 0.0.0 through 7.255.7 |

### Defaults

No default behavior or values.

### Command Modes

Global configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

You must specify the SS7 variant before you can specify the local point code.

You must remove all M3UA, SUA, and linkset configuration before you can remove the local point code.

### Examples

The following example sets the local point to 10.44.254:

```
cs7 point-code 10.44.254
```

The following example sets the local point code for instance 1 to 10.44.254:

```
cs7 instance 1 point-code 10.44.254
```

### Related Commands

| Command                         | Description                                                                |
|---------------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>       | Enables multiple instances of a variant and network indicator combination. |
| <b>cs7 point-code delimiter</b> | Specifies the point code delimiter.                                        |
| <b>cs7 point-code format</b>    | Modifies the standard point code format.                                   |

# cs7 point-code delimiter

The delimiter that separates the network, cluster, and member components of a point code can be either a dot (.) or a dash (-). To specify the point code delimiter, use the **cs7 point-code delimiter** command in global configuration mode. To return to the default delimiter (dot), use the **default** keyword.

**cs7** [*instance instance-number*] **point-code delimiter** {**dash** | **default** | **dot**}

**no cs7** [*instance instance-number*] **point-code delimiter** {**dash** | **default** | **dot**}

## Syntax Description

|                        |                                                                |
|------------------------|----------------------------------------------------------------|
| <b>instance</b>        | (Optional) Specifies the point code delimiter for an instance. |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.         |
| <b>dash</b>            | Specifies a dash (-) as the point code delimiter.              |
| <b>default</b>         | Returns the delimiter to the default of dot (.).               |
| <b>dot</b>             | Specifies a dot (.) as the point code delimiter.               |

## Defaults

The default point code delimiter is a dot (.).

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

You can modify the default point code bit format and the default delimiter at any time during configuration, without prior removal of links and linksets.

## Examples

The following example sets the local point code delimiter to dash:

```
cs7 point-code delimiter dash
```

The following example sets the local point code delimiter to dash for instance 2:

```
cs7 instance 2 point-code delimiter dash
```

## Related Commands

| Command                   | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
| <b>cs7 point-code</b>     | Assigns a local point code to the router.                                  |



## cs7 point-code format

The format of point codes can be represented according to the ANSI or ITU standard. To modify either standard on an instance, use the **cs7 instance point-code format** command in global configuration mode. To return to either standard's default, use the **default** keyword.

**cs7** [*instance instance-number*] **point-code format** { *1-24* [*1-23* [*1-22*]] } [**description** *string*] [**default**]

**no cs7** [*instance instance-number*] **point-code format** { *1-24* [*1-23* [*1-22*]] } [**description** *string*] **default**

### Syntax Description

|                        |                                                                 |
|------------------------|-----------------------------------------------------------------|
| <b>instance</b>        | (Optional) Modify the point code format on an instance.         |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.          |
| <i>1-24</i>            | Number of bits used for the first component of the point code.  |
| <i>1-23</i>            | Number of bits used for the second component of the point code. |
| <i>1-22</i>            | Number of bits used for the third component of the point code.  |
| <b>description</b>     | Text description follows.                                       |
| <i>string</i>          | Text description.                                               |
| <b>default</b>         | Use the default format.                                         |

### Defaults

The ANSI standard for point code representation is 24 bits partitioned into 3 segments for network, cluster, and member, with a default representation of 8.8.8.

The ITU standard for point code representation is 14 bits partitioned into 3 segments for network, cluster, and member, with a default representation of 3.8.3.

### Command Modes

Global configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

Before modifying the point code format, you must first specify which standard SS7 variant the ITP is running. To do so, use the **cs7 variant** global configuration command.

You can modify the default point code bit format and the default delimiter at any time during configuration, without prior removal of links and linksets.

### Examples

The following example sets the format for the ITU standard to 2.6.6:

```
cs7 point-code format 2 6 6 description network cluster member
```

The following example sets the format for the ITU standard to 2.6.6 on instance 1:

```
cs7 instance 1 point-code format 2 6 6 description network cluster member
```

---

**Related Commands**

| Command                   | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
| <b>cs7 variant</b>        | Indicates which of the SS7 variations (ANSI or ITU) the router is running. |

# cs7 profile

To define a profile that you can apply to all links in a linkset, use the **cs7 profile** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7 profile** *name*

**no cs7 profile** *name*

## Syntax Description

|             |               |
|-------------|---------------|
| <i>name</i> | Profile name. |
|-------------|---------------|

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

This command is not instance related and cannot be specified with the **instance** keyword.

## Examples

The following example defines a profile named timers, configures the profile to support MTP2, configures the t1 and t2 settings in the timers profile, then applies the timers profile to all the links in linkset ITPa:

```
cs7 profile timers
 mtp2
  timer t1 15000
  timer t2 9000
.
.
.
cs7 linkset itpa
 profile timers
```

The following example defines a profile named SAAL, configures the profile to support HSL, specifies the packet bundling interval and SSCF NNI timers, then applies the profile to all the links in linkset to\_nyc:

```
cs7 profile SAAL
 hsl
  bundling 10
  sscf-nni t1 10
  sscf-nni t2 150
  sscf-nni t3 100
.
.
.
cs7 linkset to_nyc
 profile SAAL
```

**Related Commands**

| Command              | Description                                                       |
|----------------------|-------------------------------------------------------------------|
| <b>show cs7 mtp2</b> | Displays ITP MTP2 status.                                         |
| <b>hsl</b>           | Configures CS7 link profile parameters for HSL                    |
| <b>mtp2-timer</b>    | Configures CS7 link profile parameters for MTP2.                  |
| <b>variant</b>       | Specifies which of the SS7 variations the CS7 profile is running. |

# cs7 prompt enhanced

To configure the command line interface (CLI) prompt to display the current linkset (and where applicable, link) when you are in linkset configuration mode, use the **cs7 prompt enhanced** command in global configuration mode. To return to the default prompt, use the **no** form of this command.

**cs7 prompt enhanced**

**no cs7 prompt enhanced**

## Syntax Description

This command has no arguments or keywords.

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(25)1SW | This command was introduced. |

## Usage Guidelines

The **cs7 prompt enhanced** command is an optional global configuration command that changes the prompt in linkset configuration mode to display the linkset (and where applicable, the link) that is currently being configured. This command is intended to help avoid the possibility of inadvertently shutting down the wrong linkset/link.

## Examples

The following example configures the CLI prompt to display the current linkset:

```
cs7 prompt enhanced
```

## Related Commands

| Command                | Description                       |
|------------------------|-----------------------------------|
| show cs7 linkset       | Displays ITP linkset information. |
| shutdown (CS7 link)    | Shuts down a link.                |
| shutdown (CS7 linkset) | Shuts down a linkset              |

# cs7 qos class

To configure CS7 Quality of Service class, use the **cs7 qos class** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7** [*instance instance-number*] **qos class** *class*

**no cs7** [*instance instance-number*] **qos class** *class*

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Specifies QoS class for an instance.                                             |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.                                      |
| <i>class</i>           | Quality of Service class identification number. Valid numbers are in the range 0 through 7. |
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

A QoS class must be defined prior to being used by peer links and by the QoS packet classification methods input linkset, service indicator and access list.

## Examples

The following example configures a QoS class of 4:

```
cs7 qos class 4
```

The following example configures a QoS class of 4 to instance 2:

```
cs7 instance 2 qos class 4
```

## Related Commands

| Command                        | Description                                                                |
|--------------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>      | Enables multiple instances of a variant and network indicator combination. |
| <b>gta qos-class</b>           | Sets the QoS class for the Global Title Address.                           |
| <b>match access-group</b>      | Enables access list packet classification.                                 |
| <b>match any (CS7 Linkset)</b> | Enables input linkset packet classification.                               |
| <b>match si (cs7 linkset)</b>  | Enables service indicator packet classification.                           |

## cs7 remote-congestion-msgs

To allow remote congestion status console messages, use the **cs7 remote-congestion-msgs** command in global configuration mode. To suppress the messages, use the no form of the command.

**cs7** [*instance instance-number*] **remote-congestion-msgs**

**no cs7** [*instance instance-number*] **remote-congestion-msgs**

|                           |                                                                                                                                    |                                                                            |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>instance</b>                                                                                                                    | (Optional) Specifies QoS class for an instance.                            |
|                           | <i>instance-number</i>                                                                                                             | Instance number. An integer value in the range 0 to 7.                     |
| <b>Defaults</b>           | Allow remote congestion status messages.                                                                                           |                                                                            |
| <b>Command Modes</b>      | Global configuration                                                                                                               |                                                                            |
| <b>Command History</b>    | <b>Release</b>                                                                                                                     | <b>Modification</b>                                                        |
|                           | 12.2(4)MB                                                                                                                          | This command was introduced.                                               |
| <b>Examples</b>           | The following example enables remote congestion status console messages:<br><br>cs7 remote-congestion-msgs                         |                                                                            |
|                           | The following example enables remote congestion status console messages on instance 1:<br><br>cs7 instance 1remote-congestion-msgs |                                                                            |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                     | <b>Description</b>                                                         |
|                           | cs7 multi-instance                                                                                                                 | Enables multiple instances of a variant and network indicator combination. |

## cs7 route-mgmt-sls

To change the way route management signaling link selector (SLS) values are assigned on an instance, use the **cs7 instance route-mgmt-sls** command in global configuration mode. To return to the default selection method (round-robin), use the **no** form of the command.

**cs7** [*instance instance-number*] **route-mgmt-sls** {**destination** | **round-robin** | **value num**}

**no cs7** [*instance instance-number*] **route-mgmt-sls**

| Syntax Description     |                                                                                                                                                             |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Change the way route management signaling link selector (SLS) values are assigned on an instance                                                 |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.                                                                                                      |
| <b>destination</b>     | Assigns route management SLS values based upon the concerned point code destination.                                                                        |
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0.                                                                 |
| <b>round-robin</b>     | Assigns route management SLS values using round-robin method. Route management messages will be distributed evenly over the available links in the linkset. |
| <b>value</b>           | Assigns route management SLS values to a static value. Route management messages will be distributed over the same link within a linkset.                   |
| <i>num</i>             | Value in the range 0 - 255 (ANSI) and 1-15 (ITU).                                                                                                           |

**Defaults** The default is to assign route management SLS values using round-robin.

**Command Modes** Global configuration

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Usage Guidelines** When the ITP originates route management messages, it assigns an SLS value that is used by route management to distribute messages over multiple links in a link set. When the SLS is assigned using the round-robin method, the route management messages are distributed over the available links in the linkset. This results in the most efficient use of the available links.

There are some SS7 nodes that require all route management messages to have an SLS value of zero. If the ITP is connected to an adjacent node with this requirement use the **cs7 instance route-mgmt-sls value num** form of the command. Configuring the **cs7 instance route-mgmt-sls** command to use a specific value will cause route management messages to use the same link within a linkset. This is not necessarily the most efficient use of the available links in a linkset but it will ensure that route management messages arrive at the adjacent node in the order they were sent.



Alternatively, the ITP has the ability to distribute route management message SLS values based upon the concerned point code destination address in the route management message. This allows the ITP to make more efficient use of the available links in the linkset while preserving the order of route management messages to an adjacent node.

### Examples

The following command will cause route management messages to have an SLS value of zero:

```
cs7 route-mgmt-sls value 0
```

The following command will cause route management messages that originate at instance 2 to have an SLS value of zero:

```
cs7 instance 2 route-mgmt-sls value 0
```

### Related Commands

| Command                   | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
| <b>cs7 sls-shift</b>      | Shifts which SLS bits are used for link and linkset selection.             |

# cs7 route-table

To specify the ITP route table, use the **cs7 instance route-table** command in global configuration mode. To remove the route table, use the **no** form of this command.

**cs7** [**instance** *instance-number*] **route-table** *rt-name*

**no cs7** [**instance** *instance-number*] **route-table** *rt-name*

## Syntax Description

|                        |                                                           |
|------------------------|-----------------------------------------------------------|
| <b>instance</b>        | (Optional) Specifies the ITP route table for an instance. |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.    |
| <i>rt-name</i>         | Route table name.                                         |

## Defaults

A route table named **system** is configured by default.

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

A route table for an instance is identified by its route table name. A route table name system is configured by default and used to keep routes to all adjacent signaling points. Additional routes can be added to the system route table.

Issuing the **cs7 route-table** command enables CS7 route table configuration mode. From this mode you can update the route table.



### Note

You must specify **system** as the route table name (*rt-name*).

## Examples

The following example creates a route table:

```
cs7 route-table system
```

The following example creates a route table for instance 1:

```
cs7 instance 1 route-table system
```

## Related Commands

| Command                           | Description                                                                |
|-----------------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>         | Enables multiple instances of a variant and network indicator combination. |
| <b>update route (route-table)</b> | Updates a route.                                                           |

# cs7 save address-table

To save an address table to a specified location and file, use the **cs7 save address-table** command in global configuration mode. To remove the line from the configuration, use the **no** form of this command.

**cs7 save address-table** {mlr | sms} *tablename* *URL*

**no cs7 save address-table** {mlr | sms} *tablename* *URL*

## Syntax Description

|                  |                                                                                                                      |
|------------------|----------------------------------------------------------------------------------------------------------------------|
| <b>mlr</b>       | Specifies the type of table is <b>mlr</b> .                                                                          |
| <b>sms</b>       | Specifies the type of table is <b>sms</b> .                                                                          |
| <i>tablename</i> | Identifies the existing address table that is to be replaced.                                                        |
| <i>URL</i>       | The user-assigned local or remote location representing the file name and path from which the file will be replaced. |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

SMS address tables can be stored in either NVRAM on the IOS platform or in a file that typically would be stored in flash. NVRAM limitations on some platforms might restrict the number of address entries that can be stored there. In this case, the file storage option is recommended.

## Examples

The following command saves an SMS address table named addrtbl1 to disk0:smsaddrtbl:

```
cs7 save address-table sms addrtbl1 disk0:smsaddrtbl
```

## Related Commands

| Command                             | Description                                                                             |
|-------------------------------------|-----------------------------------------------------------------------------------------|
| <b>addr</b> (cs7 sms address-table) | Configures one or more addresses that can be used for blocking or routing SMS messages. |
| <b>cs7 sms address-table</b>        | Specifies an address table and enables CS7 SMS address-table configuration mode.        |
| <b>load</b> (CS7 SMS address-table) | Specifies the file to load upon startup.                                                |

# cs7 save gtt-table

To save the CS7 GTT table to a file, use the **cs7 save gtt-table** privileged EXEC command.

**cs7 save gtt-table** *url*

|                           |                                                                                                                                          |                                                                                                      |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>url</i>                                                                                                                               | Location where file is to be saved.                                                                  |
| <b>Defaults</b>           | No default behavior or values                                                                                                            |                                                                                                      |
| <b>Command Modes</b>      | Privileged EXEC                                                                                                                          |                                                                                                      |
| <b>Command History</b>    | <b>Release</b>                                                                                                                           | <b>Modification</b>                                                                                  |
|                           | 12.2(4)MB                                                                                                                                | This command was introduced.                                                                         |
| <b>Usage Guidelines</b>   | GTT data is not saved with the <b>write memory</b> command. You must use the <b>cs7 save gtt-table</b> command.                          |                                                                                                      |
| <b>Examples</b>           | <p>The following example saves a the GTT table to a file named gttdata.txt in flash:</p> <pre>cs7 save gtt-table flash:gttdata.txt</pre> |                                                                                                      |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                           | <b>Description</b>                                                                                   |
|                           | <b>cs7 gtt load</b>                                                                                                                      | Specifies the location from which the GTT database will be reloaded when the ITP router is rebooted. |

# cs7 save log

To save a log to a file, use the **cs7 save log** command in privileged EXEC mode.

**cs7 save log** *type destination*

|                           |                    |                                                   |
|---------------------------|--------------------|---------------------------------------------------|
| <b>Syntax Description</b> | <i>type</i>        | Specifies the type of log.                        |
|                           | <i>destination</i> | Path and filename of the log archive destination. |

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                                                                                                                                        |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>Saved logs are written in readable text format.</p> <p>New log entries that occur while the save is in progress are written to a new log file and are not lost.</p> |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                                                                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | <p>The following example detaches the current log from the active log process and saves it to tftp://10.1.1.3/logs/gttlog1.txt:</p> <pre>cs7 save log gtt tftp://10.1.1.3/logs/gttlog1.txt</pre> |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                         |                           |                                                                                                                             |
|-------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>            | <b>Description</b>                                                                                                          |
|                         | <b>cs7 log</b>            | Enables the ITP to log events, errors, and traces                                                                           |
|                         | <b>cs7 log checkpoint</b> | Enables automatic archiving of a log to a remote or local destination at a specified interval of every <i>secs</i> seconds. |
|                         | <b>show cs7 log</b>       | Displays the current log.                                                                                                   |

# cs7 save route-table

To save the CS7 route table to a file, use the **cs7 save route-table** privileged EXEC command.

**cs7 save route-table** *rtname url*

|                           |               |                                     |
|---------------------------|---------------|-------------------------------------|
| <b>Syntax Description</b> | <i>rtname</i> | Route table name.                   |
|                           | <i>url</i>    | Location where file is to be saved. |

**Defaults** No default behavior or values

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

**Usage Guidelines** Use this privileged EXEC command to save an active route table into a file. The newly-created file can be used with the **load** route-table sub-command to populate the route table upon ITP startup. Note that all **update route** or **remove route** route-table commands are removed from the system configuration after the save is completed. This is done because those commands have been applied to the actual route-table **before** the save and therefore are included in the saved file.

It is recommended that you save the router configuration to non-volatile memory after generating a new route-table file because the configuration has changed (update/remove route commands may have been removed from the configuration).

**Examples** The following example saves a route table named testtable to flash:

```
cs7 save route-table testtable flash:testtable
```

|                         |                                   |                                        |
|-------------------------|-----------------------------------|----------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                    | <b>Description</b>                     |
|                         | <b>load (cs7 route table)</b>     | Loads route table contents from a URL. |
|                         | <b>remove route (route table)</b> | Removes the active MTP3 route table.   |
|                         | <b>update route (route-table)</b> | Updates a route.                       |

# cs7 sccp gti-conversion

To configure an SCCP GTI conversion table, use the **cs7 sccp gti-conversion** command in global configuration mode. To remove the definition, use the **no** form of this command.

**cs7 sccp gti-conversion** *tablename*

**no cs7 sccp gti-conversion** *tablename*

| Syntax Description | <i>tablename</i> | SCCP GTI Conversion table name. The table name may be 1-12 characters in length. |
|--------------------|------------------|----------------------------------------------------------------------------------|
|--------------------|------------------|----------------------------------------------------------------------------------|

| Defaults | No default behavior or values |
|----------|-------------------------------|
|----------|-------------------------------|

| Command Modes | Global configuration |
|---------------|----------------------|
|---------------|----------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(20)SW | This command was introduced. |

| Usage Guidelines | Issuing the <b>cs7 sccp gti-conversion</b> command enables the CS7 SCCP GTI Conversion submodule. |
|------------------|---------------------------------------------------------------------------------------------------|
|------------------|---------------------------------------------------------------------------------------------------|

| Examples | The following command specifies an SCCP GTI conversion table named gti-conv1:<br><br><code>cs7 sccp gti-conversion conv1</code> |
|----------|---------------------------------------------------------------------------------------------------------------------------------|
|----------|---------------------------------------------------------------------------------------------------------------------------------|

| Related Commands | Command                                 | Description                                            |
|------------------|-----------------------------------------|--------------------------------------------------------|
|                  | <b>show cs7 sccp gti-conversion</b>     | Displays CS7 GTI conversion table.                     |
|                  | <b>update (CS7 SCCP GTI Conversion)</b> | Creates or updates an SCCP GTI conversion table entry. |

# cs7 sccp instance-conversion

To configure or update an SCCP instance conversion entry, use the **cs7 sccp instance-conversion** command in global configuration mode. To remove the definition, use the **no** form of this command.

**cs7 sccp instance-conversion in-instance** *instance* **out-instance** *instance*

**no cs7 sccp instance-conversion in-instance** *instance* **out-instance** *instance*

## Syntax Description

|                     |                                                                |
|---------------------|----------------------------------------------------------------|
| <b>in-instance</b>  | Specifies the input instance for which conversion is desired.  |
| <i>instance</i>     | Input instance number.                                         |
| <b>out-instance</b> | Specifies the output-instance for which conversion is desired. |
| <i>instance</i>     | Output instance number.                                        |

## Defaults

If no conversion methods are assigned, the GTT in the MSUs will not be changed.

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(20)SW | This command was introduced. |

## Usage Guidelines

When you configure an SCCP instance conversion entry you can assign gti-conversion, subsystem mapping, and address-conversion tables from one instance to another. All three conversion methods can be used, or just one or two. If no conversion methods are assigned, the GTT in the MSUs will not be changed.

You can also set message-handling options and specify a national indicator.

## Examples

The following example configures an SCCP instance conversion entry and sets gti-conversion, subsystem mapping, and address-conversion tables from instance0 to instance1:

```
cs7 sccp instance-conversion in-instance 0 out-instance 1
  set gti-conversion gtitable
  set ssr-conversion ssntable
  set address-conversion gtaddresstable
```

## Related Commands

| Command                       | Description                                                                             |
|-------------------------------|-----------------------------------------------------------------------------------------|
| <b>set address-conversion</b> | Specifies the GTT address conversion table to be assigned from one instance to another. |
| <b>set gti-conversion</b>     | Specifies the GTI conversion table to be assigned from one instance to another.         |



| Command                                  | Description                                                                     |
|------------------------------------------|---------------------------------------------------------------------------------|
| <b>set ssn-conversion</b>                | Specifies the SSN conversion table to be assigned from one instance to another. |
| <b>set message-handling</b>              | Specifies the message handling options.                                         |
| <b>set national-indicator</b>            | Specifies the SCCP national indicator to be used.                               |
| <b>show cs7 sccp gti-conversion</b>      | Displays the SCCP GTI conversion table.                                         |
| <b>show cs7 sccp instance-conversion</b> | Displays the SCCP instance conversion table                                     |
| <b>show cs7 sccp ssn-conversion</b>      | Displays the SCCP SSN conversion table.                                         |

## cs7 sccp ssn-conversion

To create a subsystem mapping table, use the **cs7 sccp ssn-conversion** command in global configuration mode. To delete the table, use the **no** form of this command.

**cs7 sccp ssn-conversion** *tablename* **in-ssn** *in-ssn* **out-ssn** *out-ssn*

**no cs7 sccp ssn-conversion** *tablename* **in-ssn** *in-ssn* **out-ssn** *out-ssn*

|                           |                  |                                                                        |
|---------------------------|------------------|------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>tablename</i> | Subsystem table name. The table name may be 1-12 characters in length. |
|                           | <b>in-ssn</b>    | Input SSN.                                                             |
|                           | <i>in-ssn</i>    | Valid range 0 to 255.                                                  |
|                           | <b>out-ssn</b>   | Output SSN                                                             |
|                           | <i>out-ssn</i>   | Valid range 0 to 255.                                                  |

**Defaults** No default behavior or values

**Command Modes** Global configuration

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(20)SW     | This command was introduced. |

**Usage Guidelines** If no match is found in the SSN conversion table, the SSN in the MSU is unchanged. If both GTI Conversion and Subsystem Mapping are used, and a GTI conversion specifies a new subsystem for the MSU, the subsystem specified by the GTI conversion is used, not the subsystem from the SSN conversion table.

**Examples** The following command creates a subsystem mapping table named ss-conv0:

```
cs7 sccp ssn-conversion ss-conv0 in-ssn 11 out-ssn 13
cs7 sccp ssn-conversion ss-conv0 in-ssn 200 out-ssn 6
```

|                         |                                     |                                                                                       |
|-------------------------|-------------------------------------|---------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                      | <b>Description</b>                                                                    |
|                         | <b>set address-conversion</b>       | Specifies the address conversion table to be assigned from one instance to another.   |
|                         | <b>set gti-conversion</b>           | Specifies the GTI conversion table to be assigned from one instance to another.       |
|                         | <b>set ssn-conversion</b>           | Specifies the subsystem conversion table to be assigned from one instance to another. |
|                         | <b>show cs7 sccp ssn-conversion</b> | Displays the SSN conversion table.                                                    |

## cs7 secondary-pc

To configure the secondary point code, use the **cs7 secondary-pc** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7** [**instance** *instance-number* ]**secondary-pc** *zone.region.sp*

**no** [**instance** *instance-number* ]**secondary-pc** *zone.region.sp*

| Syntax Description | <b>instance</b>        | (Optional) Configure the secondary point code on an instance. |
|--------------------|------------------------|---------------------------------------------------------------|
|                    | <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.        |
|                    | <i>zone.region.sp</i>  | Secondary point code.                                         |
|                    |                        |                                                               |

| Defaults | No default behavior or values |
|----------|-------------------------------|
|----------|-------------------------------|

| Command Modes | Global configuration |
|---------------|----------------------|
|---------------|----------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

| Usage Guidelines | This command is used to configure multiple linksets between the ITP and an adjacent node. To the adjacent node, the ITP appears to be two different nodes - one with the primary point code configured using the <b>cs7 point-code</b> command and one with the point code configured using this command. |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | The following example configures a primary, secondary and capability point code. |
|----------|----------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------|

```
cs7 point-code 1.1.1
cs7 secondary-pc 1.1.2
cs7 capability-pc 1.1.3
```

| Related Commands | Command                   | Description                                                                |
|------------------|---------------------------|----------------------------------------------------------------------------|
|                  | <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
|                  | <b>cs7 linkset</b>        | Specifies a linkset.                                                       |

# cs7 sg-event-history

To set the maximum number of events to save in history, use the **cs7 sg-event-history** command in global configuration mode.

**cs7 sg-event-history** *number*

**no sg-event-history** *number*

| Syntax Description | <i>number</i> | Maximum number of events to save in AS, ASP and point code history. The valid range is 1 to 256 events. The default is 16 events |
|--------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------|
|--------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------|

| Defaults | 16 events |
|----------|-----------|
|----------|-----------|

| Command Modes | Global configuration |
|---------------|----------------------|
|---------------|----------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Examples | The following example specifies that 64 events will be saved in history:<br><br><code>cs7 sg-event-history 64</code> |
|----------|----------------------------------------------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------------------------------------------|

| Related Commands | Command | Description |
|------------------|---------|-------------|
|                  |         |             |
|                  |         |             |
|                  |         |             |
|                  |         |             |

## cs7 sgmp

Two SGs can function as a mated pair and exchange necessary state information using the Signaling Gateway Mate Protocol (SGMP). SGMP is used to establish an association to the mated signaling gateway (with equivalent SG configuration). To specify the local port number for SGMP and enter CS7 SGMP submode, use the **cs7 sgmp** command in global configuration mode. To delete the SGMP configuration (if there is no mated SG configured) use the **no** form of this command.

**cs7 sgmp** *local\_port*

**no cs7 sgmp** *local\_port*

### Syntax Description

|                   |                                                                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>local_port</i> | The local port number. The local port number is a number in the range 1024 to 65535. Only one SGMP local port may be specified. The local port number may not be the same as the configured local port numbers for M2PA, M3UA, or SUA. |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

No default behavior or values

### Command Modes

Global configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

Issuing the **cs7 sgmp** command enables CS7 SGMP submode.

The mated-pair SGs are used to loadshare and/or back up each other in failover scenarios. The mated SG can be used as a backup point code for cases when there is a failure of an association between this SG and the ASP.

Mated-pair SGs must have equivalent SG configuration, including the same AS and AS Route routing-key definitions. However, the local point code of each SG must be unique and must not match the local point code, the capability point code, the secondary point code, any AS point code (dpc), or any AS Route point code configured on its mate.

When the SG mate association is active, the SG is informed of AS state changes on the mate in real time. When an AS becomes inactive, subsequent messages are rerouted to the mate if the corresponding AS on the mate is active.

When the AS on the original SG returns to active state, new messages are temporarily queued to allow in-transit messages from the mated SG to arrive at the ASP. Queued messages are released to the ASP upon expiration of an AS recovery timer.

This command is not instance related and cannot be specified with the **instance** keyword.

---

**Examples**

The following example specifies the local port number 5000 for SGMP:

```
cs7 sgmp 5000
```

---

**Related Commands**

| Command                    | Description                                                          |
|----------------------------|----------------------------------------------------------------------|
| <b>cs7 mated-sg</b>        | Specifies the mated SG.                                              |
| <b>local-ip (CS7 SGMP)</b> | Configures up to 4 local IP addresses that will receive SGMP packets |
| <b>show cs7 sgmp</b>       | Displays SGMP information.                                           |

## cs7 sls-shift

When the variant is ITU, to shift which signaling link selection (SLS) bits are used for link and linkset selection, use the **sls-shift** command in global configuration mode. To disable the specification, use the **no** form of this command.

**cs7** [*instance instance-number*] **sls-shift** {**0-3**}

**no cs7** [*instance instance-number*] **sls-shift**

### Syntax Description

|                        |                                                                                                                                                                     |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | Shift SLS bits on an instance.                                                                                                                                      |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.                                                                                                              |
| <b>0-3</b>             | This argument indicates a range, from least significant bit (0) to most significant bit (3) of the SLS, to be used for linkset selection within a combined linkset. |

### Defaults

The default is 0, the equivalent of the **no sls-shift** command.

### Command Modes

Global configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

This command is for MTP3 users (SUA/M3UA) that do not have an inbound linkset. The command works the same as the linkset specific **sls-shift** command.

This command is valid only when the variant is ITU. It affects MSUs received on the linkset, and changes which bit in the SLS is used for linkset selection.

It is necessary to be able to change which bit to use for linkset selection because ITU, unlike ANSI, does not perform SLS rotation. If all nodes in the network use the same bit for linkset selection, traffic won't balance evenly.

### Examples

The following example specifies that the most significant bit (3) is to be used for linkset selection:

```
cs7 sls-shift 3
```

### Related Commands

| Command                   | Description                                                                |
|---------------------------|----------------------------------------------------------------------------|
| <b>cs7 linkset</b>        | Specifies a linkset.                                                       |
| <b>cs7 multi-instance</b> | Enables multiple instances of a variant and network indicator combination. |
| <b>cs7 route-mgmt-sls</b> | Changes the way route management SLS values are assigned.                  |

# cs7 sms address-table

To create and name a table of addresses that can be used for blocking or routing SMS messages, use the **cs7 sms address-table** command in global configuration mode. To remove the table, use the **no** form of this command.

**cs7 sms address-table** *tablename*

**no cs7 sms address-table** *tablename*

## Syntax Description

|                  |                                                                                                                |
|------------------|----------------------------------------------------------------------------------------------------------------|
| <i>tablename</i> | Identifies the address table. This name is used to identify the address table from within SMS ruleset commands |
|------------------|----------------------------------------------------------------------------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

SMS address tables can be stored in either NVRAM on the IOS platform or in a file that typically would be stored in flash. NVRAM limitations on some platforms might restrict the number off address entries that can be stored there. In this case, the file storage option is recommended.

The **cs7 sms address-table** command enables CS7 SMS address-table configuration mode.

## Examples

The first command in the following example creates an SMS address table named BLACKLIST:

```
cs7 sms address-table BLACKLIST
  addr 19195556661 exact
  addr 19195557772 exact
  addr 19195558883 exact
```

## Related Commands

| Command                             | Description                                                                             |
|-------------------------------------|-----------------------------------------------------------------------------------------|
| <b>addr (cs7 sms address-table)</b> | Configures one or more addresses that can be used for blocking or routing SMS messages. |
| <b>load (CS7 SMS address-table)</b> | Specifies the file to load upon startup.                                                |



## cs7 sms msc-table

To enable CS7 SMS MSC table configuration mode, in which you configure an SMS MSC table, use the **cs7 sms msc-table** command in global configuration mode. To remove the configuration, use the **no** form of this command.

**cs7 sms msc-table**

**no cs7 sms msc-table**

### Syntax Description

This command has no arguments or keywords.

### Defaults

By default, if an MSC table is not configured, all messages to mobile destinations are delivered with delivery times indicating the local time of the ITP, regardless of the time zone of the message destination.

### Command Modes

Global configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(25)SW1 | This command was introduced. |

### Usage Guidelines

The SMS MSC table stores information pertaining to MSCs with which the ITP communicates. The table stores information that indicates the time zone information for each MSC relative to the ITP. By default, if an MSC table is not configured, all messages to mobile destinations are delivered with delivery times that indicate the local time of the ITP, regardless of whether the destination is in the same or different time zone as the ITP. If you configure an MSC table, short messages will be delivered with delivery times indicated in the MSC's local time, which is typically also the local time of the receiver of the message.

### Examples

The first line of the following example enables CS7 SMS MSC table configuration mode:

```
cs7 sms msc-table
digits 19199332252 time-offset subtract 01:00
digits 1505 time-offset subtract 01:00
```

### Related Commands

| Command       | Description               |
|---------------|---------------------------|
| <b>digits</b> | Specifies an MSC address. |

# cs7 sms result-group

To configure an SMS result group, a group of resources capable of receiving a short message, use the **cs7 sms result-group** command in global configuration mode. To remove the configuration, use the **no** form of this command.

**cs7 sms result-group** *name* { **esme** | **smsc** }

**no cs7 sms result-group** *name* { **esme** | **smsc** }

## Syntax Description

|             |                                                                                                                                                                                                                                   |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>name</i> | Specifies the SMS result group table name.                                                                                                                                                                                        |
| <b>esme</b> | Result group type is an external short message entity (ESME) and represents a large account. Used to configure ESME specific parameters and enable the SMS routing subsystem to properly characterize the routing of the message. |
| <b>smsc</b> | Result group type represents a set of short message service centers (SMSC). Used to enter SMSC specific parameters and enable the SMS routing subsystem to properly characterize the routing of the message.                      |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

The **cs7 sms result-group** command enables CS7 SMS result-group configuration mode.

## Examples

The following example specifies a result group of type ESME, named offisland:

```
cs7 sms result-group offisland esme
```

The following example specifies a result group of type SMSC, named offisland:

```
cs7 sms result-group offisland smsc
```

## Related Commands

| Command                                        | Description                                                                                         |
|------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>esme cdr consolidation</b> (cs7 sms result) | Specifies ESME (large-account) consolidation field of the CDR. (ESME)                               |
| <b>esme id</b> (cs7 sms result)                | Specifies an ESME ID. (ESME)                                                                        |
| <b>match-ip</b>                                | Matches an inbound session to a result group by partner IP address and optional port number. (ESME) |

| Command                               | Description                                                                                                                                                               |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>match smpp id (cs7 sms result)</b> | Matches an inbound session to a result group based on system ID and optional system type and password. (ESME)                                                             |
| <b>match ucp id (cs7 sms result)</b>  | Matches an inbound session to the result group based on UCP address and optional password. (ESME)                                                                         |
| <b>queue-limit</b>                    | Specifies the maximum number of queued operations in the outbound group send queue. (ESME)                                                                                |
| <b>queue-timer</b>                    | Specifies the maximum time a request can remain on the outbound group send queue before the request is timed out and allowed to continue to the next routing rule. (ESME) |
| <b>pc (cs7 sms result)</b>            | Specifies that message will be routed using point code. (SMSC)                                                                                                            |
| <b>smpp (cs7 sms result)</b>          | Specifies that message will be routed on an SMPP session. (ESME)                                                                                                          |
| <b>ucp (cs7 SMS result)</b>           | Specifies that message will be routed on a UCP session. (ESME)                                                                                                            |

# cs7 sms route-table

To configure an SMS route table, use the **cs7 sms route-table** command in global configuration mode. To remove the route table, use the **no** form of this command.

**cs7 sms route-table**

**no cs7 sms route-table**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The <b>cs7 sms route-table</b> command enable CS7 SMS route table configuration mode. |
|-------------------------|---------------------------------------------------------------------------------------|

|                 |                                                      |
|-----------------|------------------------------------------------------|
| <b>Examples</b> | The following example configures an SMS route table: |
|-----------------|------------------------------------------------------|

```
cs7 sms route-table
```

|                         |                                        |                                                                        |
|-------------------------|----------------------------------------|------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                         | <b>Description</b>                                                     |
|                         | <b>cdr-service</b>                     | Specifies a CDR service to be used by the SMS routing subsystem.       |
|                         | <b>gsm-map (cs7 sms route table)</b>   | Specifies the GSM MAP operation to be routed under this configuration. |
|                         | <b>map-source-addr (cs7 sms smsmo)</b> | Specifies the local source address of an application.                  |
|                         | <b>show cs7 sms route-table</b>        | Displays attributes of the SMS route table.                            |

## cs7 sms ruleset

To configure an SMS ruleset, use the **cs7 sms ruleset** command in global configuration mode. To disable the ruleset, use the **no** form of this command.

**cs7 sms ruleset** *name* [**protocol** **[gsm-map]**]

**no cs7 sms ruleset** *name*

### Syntax Description

|                 |                                                                           |
|-----------------|---------------------------------------------------------------------------|
| <i>name</i>     | SMS ruleset name.                                                         |
| <b>protocol</b> | (Optional) Specifies an application layer protocol for this ruleset.      |
| <b>gsm-map</b>  | (Optional) Use GSM-MAP as application layer protocol within this ruleset. |

### Defaults

No default behavior or values

### Command Modes

Global configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

The **cs7 sms ruleset** command enables CS7 SMS set rule configuration mode.

### Examples

The following example specifies a ruleset named SMS-RULES:

```
cs7 sms ruleset SMS-RULES
```

### Related Commands

| Command                   | Description                        |
|---------------------------|------------------------------------|
| <b>rule (cs7 sms set)</b> | Specifies a rule for this ruleset. |

# cs7 sms smpp

To configure SMS SMPP connections, use the **cs7 sms smpp** command in global configuration mode. To to remove the configuration, use the **no** form of this command.

**cs7 sms smpp** *local-port* **local-ip** *local-ip-addr* [**dynamic**]

**nocs7 sms smpp** *local-port* **local-ip** *local-ip-addr* [**dynamic**]

|                           |                      |                                                                                                                                                                                                                                                                                                                        |
|---------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>local-port</i>    | Local port for SMPP. Valid range is 1024-65535.                                                                                                                                                                                                                                                                        |
|                           | <b>local-ip</b>      | Specifies a local IP address.                                                                                                                                                                                                                                                                                          |
|                           | <i>local-ip-addr</i> | Local IP address for connection.                                                                                                                                                                                                                                                                                       |
|                           | <b>dynamic</b>       | (Optional) Allow dynamic destinations. Indicates that the SMPP session partners connecting on this port need not specifically be listed as a destination under this SMPP port. The use of the <b>dynamic</b> keyword allows SMPP sessions to start with no TCP/IP connection validation on the remote IP address/port. |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

## Usage Guidelines

**Examples** The following example configures an SMS SMPP listening at port 5000. The local IP address is 10.10.10.200 and the configuration allows dynamic destinations:

```
cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic
```

|                         |                                   |                                               |
|-------------------------|-----------------------------------|-----------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                    | <b>Description</b>                            |
|                         | <b>destination (cs7 sms smpp)</b> | Configures SMPP destination.                  |
|                         | <b>show cs7 sms smpp</b>          | Displays information about SMS SMPP sessions. |

# cs7 sms smpp profile

To configure an SMPP profile, use the **cs7 sms smpp profile** command in global configuration mode. To remove the profile, use the **no** form of this command.

**cs7 sms smpp profile** *name*

**no cs7 sms smpp profile** *name*

## Syntax Description

|             |                                                      |
|-------------|------------------------------------------------------|
| <i>name</i> | Profile name. The default profile name is “default.” |
|-------------|------------------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

Configuring a profile named **default** will allow the settings in that profile to be used for all sessions that do not have a profile specifically coded.

The **cs7 sms smpp profile** command is used to name a file of configurable SMPP session parameters. The profile can be used by a number of different SMPP sessions or applied to dynamic inbound sessions.

The **cs7 sms smpp profile** command enables the CS7 SMS profile parameters configuration mode, in which you can configure SMS SMPP/UCP connection parameters.

## Examples

The following example creates an SMPP profile named mmprofile:

```
cs7 sms profile mmprofile
```

## Related Commands

| Command                                                       | Description                             |
|---------------------------------------------------------------|-----------------------------------------|
| <b>bind-type</b> ( <b>cs7 sms profile parameters</b> )        | Specifies the SMPP bind type.           |
| <b>inactivity-timer</b> ( <b>cs7 sms profile parameters</b> ) | Specifies the session inactivity timer. |
| <b>keepalive-timer</b> ( <b>CS7 SMS profile parameters</b> )  | Specifies a session keepalive timer.    |
| <b>response-timer</b> ( <b>cs7 sms profile parms</b> )        | Specifies a session response timer.     |

| Command                                              | Description                           |
|------------------------------------------------------|---------------------------------------|
| <b>send-window (cs7 sms profile<br/>parms)</b>       | Specifies send window size.           |
| <b>session-init-timer(cs7 sms profile<br/>parms)</b> | Specifies a session initiation timer. |



## cs7 sms ucp

To configure SMS UCP connections, use the **cs7 sms smpp** command in global configuration mode. To remove the configuration, use the **no** form of this command.

```
cs7 sms ucp local-port local-ip local-ip-addr [dynamic]
```

```
nocs7 sms ucp local-port local-ip local-ip-addr [dynamic]
```

|                           |                      |                                                                                                                                                                                                                                                                                                                      |
|---------------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>local-port</i>    | Local port for SMPP. Valid range is 1024-65535.                                                                                                                                                                                                                                                                      |
|                           | <b>local-ip</b>      | Specifies a local IP address.                                                                                                                                                                                                                                                                                        |
|                           | <i>local-ip-addr</i> | Local IP address for connection.                                                                                                                                                                                                                                                                                     |
|                           | <b>dynamic</b>       | (Optional) Allow dynamic destinations. Indicates that the UCP session partners connecting on this port need not specifically be listed as a destination under this UCP port. The use of the <b>dynamic</b> keyword allows SMPP sessions to start with no TCP/IP connection validation on the remote IP address/port. |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

### Usage Guidelines

|                 |                                                                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example configures an SMS UCP listening at port 5000. The local IP address is 10.10.10.200 and the configuration allows dynamic destinations: |
|                 | <pre>cs7 sms ucp 5000 local-ip 10.10.10.200 dynamic</pre>                                                                                                   |

|                         |                                  |                             |
|-------------------------|----------------------------------|-----------------------------|
| <b>Related Commands</b> | <b>Command</b>                   | <b>Description</b>          |
|                         | <b>destination (cs7 sms ucp)</b> | Configures UCP destination. |

# cs7 sms ucp profile

To configure a UCP profile, use the **cs7 sms ucp profile** command in global configuration mode. To remove the profile, use the **no** form of this command.

**cs7 sms ucp profile** *name*

**no cs7 sms ucp profile** *name*

## Syntax Description

|             |                                                      |
|-------------|------------------------------------------------------|
| <i>name</i> | Profile name. The default profile name is “default.” |
|-------------|------------------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

Configuring a profile named **default** will allow the settings in that profile to be used for all sessions that do not have a profile specifically coded.

The **cs7 sms ucp profile** command is used to name a file of configurable UCP session parameters. The profile can be used by a number of different SMPP sessions or applied to dynamic inbound sessions.

The **cs7 sms ucp profile** command enables the CS7 SMS profile parameters configuration mode, in which you can configure SMS UCP connection parameters.

## Examples

The following example creates an SMPP profile named mmprofile:

```
cs7 sms profile mmprofile
```

## Related Commands

| Command                                                       | Description                             |
|---------------------------------------------------------------|-----------------------------------------|
| <b>bind-type</b> ( <b>cs7 sms profile parameters</b> )        | Specifies the SMPP bind type.           |
| <b>inactivity-timer</b> ( <b>cs7 sms profile parameters</b> ) | Specifies the session inactivity timer. |
| <b>keepalive-timer</b> ( <b>CS7 SMS profile parameters</b> )  | Specifies a session keepalive timer.    |
| <b>response-timer</b> ( <b>cs7 sms profile parms</b> )        | Specifies a session response timer.     |

| Command                                              | Description                           |
|------------------------------------------------------|---------------------------------------|
| <b>send-window (cs7 sms profile<br/>parms)</b>       | Specifies send window size.           |
| <b>session-init-timer(cs7 sms profile<br/>parms)</b> | Specifies a session initiation timer. |

# cs7 snmp dest-max-window

To specify the maximum number of destination state changes allowed per window, use the **cs7 snmp dest-max-window** command in global configuration mode. To return to the default value, use the **no** form of this command.

**cs7 snmp dest-max-window** *changes*

**cs7 snmp dest-max-window** *changes*

|                           |                |                                                                                                               |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>changes</i> | Maximum number of destination state changes allowed per window. Valid range is 10 to 9000. The default is 60. |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------|

|                 |    |
|-----------------|----|
| <b>Defaults</b> | 60 |
|-----------------|----|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(21)SW | This command was introduced. |

## Usage Guidelines

**Examples** In the following example, the maximum number of destination state changes allowed per window is set to 500:

```
cs7 snmp dest-max-window 500
```

| <b>Related Commands</b> | Command | Description |
|-------------------------|---------|-------------|
|                         |         |             |

## cs7 snmp mgmt-max-window

To specify the maximum number of route management state changes allowed per window, use the **cs7 snmp mgmt-max-window** command in global configuration mode. To return to the default value, use the **no** form of this command.

**cs7 snmp mgmt-max-window** *changes*

**no cs7 snmp mgmt-max-window** *changes*

| Syntax Description | <i>changes</i> | Maximum number of route management state changes allowed per window. Valid range is 10 to 9000. The default is 60. |
|--------------------|----------------|--------------------------------------------------------------------------------------------------------------------|
|--------------------|----------------|--------------------------------------------------------------------------------------------------------------------|

| Defaults | 60 |
|----------|----|
|----------|----|

| Command Modes | Global configuration |
|---------------|----------------------|
|---------------|----------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(21)SW | This command was introduced. |

### Usage Guidelines

| Examples | In the following example, the maximum number of route management state changes allowed per window is set to 500:<br><br><pre>cs7 snmp mgmt-max-window 500</pre> |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Related Commands | Command | Description |
|------------------|---------|-------------|
|                  |         |             |

# cs7 sua

To specify the local port number for SUA and enter CS7 SUA submode, use the **cs7 sua** command in global configuration mode. To delete the SUA configuration (if there are no SUA ASs or ASPs) use the **no** form of this command.

**cs7 sua** *local-port* [**offload** *slot-number*]

**no cs7 sua** *local-port*

## Syntax Description

|                    |                                                                                                                                                                                                             |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>local-port</i>  | This value indicates the local port number in the range 1024 to 65535. This port number may not be the same as the configured local port numbers for M2PA, M3UA, or SGMP. The SUA well-known port is 14001. |
| <b>offload</b>     | (Optional for the Cisco 7500 Router) Enables the ITP to perform SUA SCTP message processing on the VIP.                                                                                                     |
| <i>slot-number</i> | VIP slot number.                                                                                                                                                                                            |

## Defaults

No default behavior or values. The SUA well-known port number is 14001.

## Command Modes

Global configuration

## Command History

| Release     | Modification                                                                 |
|-------------|------------------------------------------------------------------------------|
| 12.2(4)MB5  | This command was introduced.                                                 |
| 12.2(4)MB13 | The <b>offload</b> keyword was added, enabling the xUA SCTP Offload feature. |

## Usage Guidelines

SUA uses SCTP to communicate with Application Server Processes (ASPs). The **offload** keyword enables the ITP to offload SUA SCTP message processing to the VIP. This feature, available on the Cisco 7500 Router only, increases forwarding performance.

If offloaded, a specific SUA instance can run on only one VIP. But different offloaded SUA instances can run on the same VIP or on different VIPS.

If you offload M3UA or SUA to a VIP, that VIP cannot also be used for M2PA offload.

If you are configuring SUA SCTP offload, the **local-ip** *ip-address* must be an IP address that was already configured on the VIP to which you are offloading this SUA instance.

Issuing the **cs7 sua** command enables CS7 SUA submode.

The **cs7 sua** command cannot be specified with the **instance** keyword.

The SUA configuration must be removed before the variant or local point code can be removed.

## Examples

The following example specifies a local port number of 5000 for SUA:

```
cs7 sua 5000
 local-ip 10.10.10.4
```

The following example offloads two different instances of SUA SCTP message processing to the VIP in slot 5 and another instance to the VIP in slot 6:

```
cs7 sua 6000 offload 5
 local-ip 10.10.10.5
!
cs7 sua 6500 offload 5
 local-ip 10.10.10.5
!
cs7 sua 7000 offload 6
 local-ip 10.10.10.6
```

**Related Commands**

| Command                   | Description                                                          |
|---------------------------|----------------------------------------------------------------------|
| <b>local-ip (CS7 SUA)</b> | Configures up to 4 local IP addresses that will receive SUA packets. |
| <b>show cs7 asp</b>       | Displays ASP information.                                            |
| <b>show cs7 sua</b>       | Displays SUA node information.                                       |

## cs7 sua-allow-xudt-request

To allow the SUA ASP additional control in determining whether an SCCP UDT or XUDT message will be generated, use the **cs7 sua-allow-xudt-request** command in global configuration mode. To remove the configuration, use the **no** form of this command.

**cs7** [*instance instance-number*] **sua-allow-xudt-request**

**no cs7** [*instance instance-number*] **sua-allow-xudt-request**

### Syntax Description

|                        |                                                        |
|------------------------|--------------------------------------------------------|
| <b>instance</b>        | (Optional) Specifies an instance.                      |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7. |

### Defaults

If this command is **not** used, XUDT SCCP messages are generated only when segmentation of an SCCP message is performed by the ASP.

### Command Modes

Global configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(23)SW1 | This command was introduced. |

### Usage Guidelines

The **cs7 sua-allow-xudt-request** command allows the SUA ASP additional control in determining whether an SCCP UDT or XUDT will be generated upon receiving a CLDT message. When the command is specified, SUA will request the SCCP layer to generate an XUDT message if the ASP has provided either the IMPORTANCE or HOP\_COUNTER parameters within the CLDT message.

### Examples

The following command enables the SUA to request the SCCP layer to generate an XUDT message if the ASP has provided either the IMPORTANCE or HOP\_COUNTER parameters within the CLDT message:

```
cs7 instance 2 sua-allow-xudt-request
```



## cs7 summary-routing-exception

To turn off the use of summary/cluster routes (for the purpose of routing MSU) for a configured full point code member, use the **cs7 summary-routing-exception** command in global configuration mode. To restore the default (allow the use of summary routes), use the **no** form of this command.

**cs7** [*instance instance-summary*] **summary-routing-exception**

**no cs7** [*instance instance-summary*] **summary-routing-exception**

### Syntax Description

|                        |                                                                       |
|------------------------|-----------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Turn off the use of summary/cluster routes on an instance. |
| <i>instance-number</i> | Instance number. An integer value in the range 0 to 7.                |

### Defaults

The summary routing exception feature is disabled.

### Command Modes

Global configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

The **cs7 summary-routing-exception** command lets you control whether or not to use the summary route or ANSI cluster route when the full point code route is not available. If the command is enabled, then the summary route will **not** be used. The MSU will be dropped and a TFP sent.

This feature is useful for customers who want most destinations that are covered by a summary route to be routed on a certain group of linksets, but want one or a few destinations within that summary to be routed on different linksets completely independently of the summary routes.

The feature only affects routing of MSU for a destination for which there is a configured set of full point code routes.

### Examples

The following example turns off the use of summary routes:

```
cs7 summary-routing-exception
```

### Related Commands

| Command                           | Description                                                                |
|-----------------------------------|----------------------------------------------------------------------------|
| <b>cs7 multi-instance</b>         | Enables multiple instances of a variant and network indicator combination. |
| <b>update route (route-table)</b> | Adds a summary route and updates the routing table.                        |

# cs7 tcap tid-timer

To set the minimum expiration time for TCAP transactions, use the **cs7 tcap tid-timer** command in global configuration mode. To re-establish the default timer value of 60 minutes, use the **no** form of this command.

**cs7 tcap tid-timer** *minutes*

**no cs7 cs7 tcap tid-timer**

## Syntax Description

|                |                                                                                                              |
|----------------|--------------------------------------------------------------------------------------------------------------|
| <i>minutes</i> | Time in minutes before TCAP may cancel transaction. Valid range is 0 to 1440 minutes. Default is 60 minutes. |
|----------------|--------------------------------------------------------------------------------------------------------------|

## Defaults

The minimum expiration time for TCAP transactions is 60 minutes.

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following example sets the minimum expiration time for TCAP transactions to 120 minutes:

```
cs7 tcap tid-timer 120
```

## Related Commands

| Command              | Description                    |
|----------------------|--------------------------------|
| <b>show cs7 tcap</b> | Displays CS7 TCAP information. |

## cs7 tfc-pacing-ratio

To adjust the transfer control (TFC) pacing ratio to comply with the ANSI specification of 1 TFC for every dropped message signal unit (MSU), use the **cs7 tfc-pacing-ratio** command in global configuration mode. To re-establish the ITP default TFC pacing ratio (8 MSUs dropped for outbound link congestion for each TFC generated), use the **no** form of this command.

**cs7** [*instance instance-number*] **tfc-pacing-ratio** *count*

**no cs7** [*instance instance-number*] **tfc-pacing-ratio**

|                           |                                                                                                                                                                                                                                                                                                                                 |                                                                            |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>instance</b>                                                                                                                                                                                                                                                                                                                 | (Optional) Adjust the transfer control (TFC) pacing ratio on an instance.  |
|                           | <i>instance-number</i>                                                                                                                                                                                                                                                                                                          | Instance number. An integer value in the range 0 to 7.                     |
|                           | <i>count</i>                                                                                                                                                                                                                                                                                                                    | Valid range is 1 to 16. The default is 8.                                  |
|                           |                                                                                                                                                                                                                                                                                                                                 |                                                                            |
| <b>Defaults</b>           | The default TFC pacing ratio is 8 MSUs dropped for outbound link congestion for each TFC generated.                                                                                                                                                                                                                             |                                                                            |
| <b>Command Modes</b>      | Global configuration                                                                                                                                                                                                                                                                                                            |                                                                            |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                                                                                                                                                                  | <b>Modification</b>                                                        |
|                           | 12.2(4)MB                                                                                                                                                                                                                                                                                                                       | This command was introduced.                                               |
| <b>Usage Guidelines</b>   | The <b>cs7 tfc-pacing-ratio</b> command controls the ratio of TFC MSUs that are sent in response to received MSUs that are dropped due to outbound link congestion. The ANSI standard is a 1 to 1 ratio. The ITP default configuration sets a ratio of 1 TFC per 8 dropped MSUs to prevent congestion in the reverse direction. |                                                                            |
| <b>Examples</b>           | The following example sends TFCs in a 1 to 1 ratios (TFC MSUs sent in response to MSUs dropped due to outbound congestion):                                                                                                                                                                                                     |                                                                            |
|                           | <pre>cs7 tfc-pacing-ratio 1</pre>                                                                                                                                                                                                                                                                                               |                                                                            |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                                                                                                                                                                  | <b>Description</b>                                                         |
|                           | <b>cs7 multi-instance</b>                                                                                                                                                                                                                                                                                                       | Enables multiple instances of a variant and network indicator combination. |

# cs7 uninhibit

To prevent the risk of losing connectivity by shutting down the last link in a linkset, use the **cs7 inhibit** user EXEC command with the linkset name and the link number. To reverse the inhibit, use the **cs7 uninhibit** command.

**cs7 uninhibit** *linkset link*

## Syntax Description

|                |               |
|----------------|---------------|
| <i>linkset</i> | Linkset name. |
| <i>link</i>    | Link.         |

## Command Modes

User EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Usage Guidelines

The **cs7 inhibit** command prevents you from taking the last link in a linkset out of service. If you were to use the **shutdown** command to shutdown the last link in a linkset, you could lose connectivity. The **cs7 inhibit** command first verifies whether a link is the last link in the linkset. The commands allows you to add linksets or to reduce your bandwidth in the linksets by taking links out of service.

## Examples

The following command uninhibits link 0 on the linkset named tony:

```
cs7 uninhibit tony 0
```

## Related Commands

| Command                    | Description                 |
|----------------------------|-----------------------------|
| <b>shutdown (CS7 link)</b> | Disables a link or linkset. |
| <b>cs7 inhibit</b>         | Inhibits a link.            |

# cs7 util-abate

To set the integer range utilization threshold, use the **cs7 util-abate** command global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7 util-abate** *percent*

**no util-abate** *percent*

|                           |                |                                                                                                 |
|---------------------------|----------------|-------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percent</i> | Integer range utilization threshold in percent. The range is 0 to 40 percent. The default is 0. |
|---------------------------|----------------|-------------------------------------------------------------------------------------------------|

|                 |                   |
|-----------------|-------------------|
| <b>Defaults</b> | The default is 0. |
|-----------------|-------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB4     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>The abate delta is an integer used to reduce the number of cItpSpLinkRcvdUtilChange and cItpSpLinkSentUtilChange notifications generated when a link's utilization fluctuates around the specified threshold. The abate delta is used to lower the falling threshold so that a significant difference exists between the rising and falling thresholds. For example, if the threshold is set to 45 percent (using <b>cs7 util-threshold 45</b>) and the abate delta is set to 10 percent, then the rising notifications will be generate at 45 percent and the falling notification will be generated at 35 percent.</p> |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

This command is not instance related and cannot be specified with the **instance** keyword.

|                 |                                                                     |
|-----------------|---------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the utilization threshold to 30 percent: |
|-----------------|---------------------------------------------------------------------|

```
cs7 util-abate 30
```

|                         |                           |                                                      |
|-------------------------|---------------------------|------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>            | <b>Description</b>                                   |
|                         | <b>cs7 util-threshold</b> | Specifies the global threshold for link utilization. |
|                         | <b>plan-capacity-rcvd</b> | Specifies link receive planning capacity.            |
|                         | <b>plan-capacity-send</b> | Specifies link send planning capacity.               |
|                         | <b>threshold-receive</b>  | Specifies the receive threshold for a link.          |
|                         | <b>threshold-send</b>     | Specifies the send threshold for a link.             |

# cs7 util-plan-capacity

To define a default for the **plan-capacity-rcvd** and **plan-capacity-send** configuration commands specified at the link level, use the **cs7 util-plan-capacity** command in global configuration mode. To remove the configuration, use the **no** form of the command

**cs7 util-plan-capacity** *bps*

**no cs7 util-plan-capacity** *bps*

## Syntax Description

|            |                                                                            |
|------------|----------------------------------------------------------------------------|
| <i>bps</i> | The default planned capacity in bps. The range is 56000 to 2147483647 bps. |
|------------|----------------------------------------------------------------------------|

## Defaults

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB4 | This command was introduced. |

## Usage Guidelines

The default planned capacity value that is configured will be used as a default for an SCTP-based link in place of the interface speed.

This command is not instance related and cannot be specified with the **instance** keyword.

## Examples

The following example sets the default planned capacity to 100000 bps:

```
cs7 util--plan capacity 100000
```

## Related Commands

| Command                   | Description                                          |
|---------------------------|------------------------------------------------------|
| <b>cs7 util-abate</b>     | Specifies the integer range utilization threshold.   |
| <b>cs7 util-threshold</b> | Specifies the global threshold for link utilization. |
| <b>plan-capacity-rcvd</b> | Specifies the link receive planning capacity.        |
| <b>plan-capacity-send</b> | Specifies the link send planning capacity.           |
| <b>threshold-receive</b>  | Specifies the receive threshold for a link.          |
| <b>threshold-send</b>     | Specifies the send threshold for a link.             |

# cs7 util-sample-interval

To set the sample interval for link utilization, use the **cs7 util-sample-interval** command in global configuration mode. To remove the configuration, use the **no** form of the command

**cs7 util-sample-interval** *seconds*

**no cs7 util-sample-interval** *seconds*

| Syntax Description | <i>seconds</i> | Integer range utilization threshold, in seconds. The range is 60 to 3600 seconds. The default is 300 seconds. |
|--------------------|----------------|---------------------------------------------------------------------------------------------------------------|
|--------------------|----------------|---------------------------------------------------------------------------------------------------------------|

| Defaults | 300 seconds |
|----------|-------------|
|----------|-------------|

| Command Modes | Global configuration |
|---------------|----------------------|
|---------------|----------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB4 | This command was introduced. |

| Usage Guidelines | The <b>cs7 util-sample-interval</b> command specifies the duration of the sample interval in seconds. Shorter intervals allow the network management systems to quickly see increases in traffic. However, shorter intervals might produce notifications that do not represent sustained link utilization problems. Longer intervals are less likely to produce false link utilization notifications. However, longer interval requires more time to detect link utilization problems. |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

This command is not instance related and cannot be specified with the **instance** keyword.

| Examples | The following example sets the sample interval for link utilization to 60 seconds: |
|----------|------------------------------------------------------------------------------------|
|----------|------------------------------------------------------------------------------------|

```
cs7 util-sample-interval 60
```

| Related Commands | Command                   | Description                                          |
|------------------|---------------------------|------------------------------------------------------|
|                  | <b>cs7 util-abate</b>     | Specifies the integer range utilization threshold.   |
|                  | <b>cs7 util-threshold</b> | Specifies the global threshold for link utilization. |
|                  | <b>plan-capacity-rcvd</b> | Specifies the link receive planning capacity.        |
|                  | <b>plan-capacity-send</b> | Specifies the link send planning capacity.           |
|                  | <b>threshold-receive</b>  | Specifies the receive threshold for a link.          |
|                  | <b>threshold-send</b>     | Specifies the send threshold for a link.             |

# cs7 util-threshold

To set the global threshold for link utilization, use the **cs7 util-threshold** command in global configuration mode. To remove the configuration, use the **no** form of the command.

**cs7 util-threshold** *percent*

**no cs7 util-threshold** *percent*

|                           |                |                                                                                              |
|---------------------------|----------------|----------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percent</i> | Utilization threshold in percent. The range is 25 to 100 percent. The default is 40 percent. |
|---------------------------|----------------|----------------------------------------------------------------------------------------------|

|                 |            |
|-----------------|------------|
| <b>Defaults</b> | 40 percent |
|-----------------|------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB4     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The <b>cs7 util-threshold</b> command specifies the rate at which a link is considered to be carrying traffic that exceeds the planned value. This value is specified as a percent of the utilization. The cItpSpLinkRcvdUtilChange and cItpSpLinkSentUtilChange are generated as a link's utilization rises and falls around the specified threshold. |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The **cs7 util-threshold** command is global and applies to all SS7 links in this router. Thresholds on individual links can be specified using the **threshold-receive** and **threshold-send** CS7 link submode commands.

This command is not instance related and cannot be specified with the **instance** keyword.

|                 |                                                                               |
|-----------------|-------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the threshold for link utilization to 100 percent: |
|-----------------|-------------------------------------------------------------------------------|

```
cs7 util-threshold 100
```

| <b>Related Commands</b> | <b>Command</b>                  | <b>Description</b>                                  |
|-------------------------|---------------------------------|-----------------------------------------------------|
|                         | <b>cs7 util-sample-interval</b> | Specifies the sample interval for link utilization. |



# cs7 variant

To indicate which of the SS7 variations the ITP is running, use the **cs7 variant** command in global configuration mode. To remove the specification from the configuration use the **no** form of the command.

**cs7** [*instance instance-number*] **variant** {**ansi** | **china** | **itu** | **ttc**}

**no cs7** [*instance instance-number*] **variant** {**ansi** | **china** | **itu** | **ttc**}

## Syntax Description

|                 |                                                                                        |
|-----------------|----------------------------------------------------------------------------------------|
| <b>instance</b> | (Optional) Indicate which of the SS7 variations the ITP is running on an instance.     |
| <b>ansi</b>     | American National Standards Institute (ANSI) SS7 protocol variant.                     |
| <b>china</b>    | CHINA SS7 protocol variant.                                                            |
| <b>itu</b>      | International Telecommunications Union (ITU) SS7 protocol variant.                     |
| <b>ttc</b>      | Japan Telecommunication Technology Committee (TTC) SS7 protocol variant, based on ITU. |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release    | Modification                              |
|------------|-------------------------------------------|
| 12.2(1)MB  | This command was introduced.              |
| 12.2(4)MB5 | The CHINA SS7 protocol variant was added. |
| 12.2(20)SW | The TTC SS7 protocol variant was added.   |

## Usage Guidelines

In the current release of Cisco ITP, the ANSI, CHINA, ITU, and TTC SS7 protocol variants are supported.

Cisco ITP supports the following Japan TTC standards added to the CCITT recommendations:

- Priority Indicator (PRI) field, used to transmit SUs with priority in the network.
- Generic transmission timing of SUs, including 4 new timers:
  - TA timer for sending SIE (default=20ms)
  - TF timer for sending FISU (default=20ms)
  - TO timer for sending SIO (default=20ms)
  - TS timer for sending SIOS (default=20ms)
- Outstanding number of MSUs transmittable without confirmation: MTP2/TTC uses TTC default 40.
- FIB and BIB comparison. If FIB or receive SU differs from BIB of last transmitted SU, the received SU is discarded.

- Negative Acknowledgement: Negative acknowledgement is transmitted by receiving a repeated MSU.
- Monitoring Timing: TTC defines SU error detection on Te timer. ITP implements the timer in the disabled state.

When you change a variant, you must remove all configuration that is ITP-specific. Remove the following ITP configuration statements in the following order:

- links
- linksets
- route-table
- access list
- encapsulation on serial links. (This removes all MTP2 timers.)
- AS route
- AS
- ASPs
- M3UA and SUA
- point code
- variant

### Examples

The following example indicates that the ANSI variant of SS7 is being used:

```
cs7 variant ansi
```

### Related Commands

| Command                      | Description                          |
|------------------------------|--------------------------------------|
| <b>cs7 national-options</b>  | Configures the national options.     |
| <b>mtp2-timer ttc enable</b> | Enables the use of the TTC TE timer. |
| <b>mtp2-timer ttc te</b>     | Configures the TTC TE timer.         |
| <b>show cs7</b>              | Displays ITP configuration status.   |

# cs7 xua-as-based-congestion

To base M3UA/SUA congestion on AS congestion level, use the **cs7 xua-as-based-congestion** command in global configuration mode. To remove the statement from the configuration, use the **no** form of the command.

**cs7 xua-as-based-congestion**

**no cs7 xua-as-based-congestion**

## Syntax Description

This command has no arguments or keywords.

## Defaults

No default behaviors or values.

## Command Modes

Global configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example specifies that M3UA/SUA congestion will be based on AS congestion level:

```
cs7 xua-as-based-congestion
```

## Related Commands

| Command | Description |
|---------|-------------|
|         |             |
|         |             |
|         |             |

# cs7 xua-ssnm-filtering

To enable M3UA/SUA SSNM filtering, use the **cs7 xua-ssnm-filtering** command in global configuration mode. To remove the statement from the configuration, use the **no** form of this command.

**cs7 xua-ssnm-filtering**

**no cs7 xua-ssnm-filtering**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                                 |
|-----------------|---------------------------------|
| <b>Defaults</b> | No default behaviors or values. |
|-----------------|---------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

|                 |                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------|
| <b>Examples</b> | <p>The following example enables M3UA/SUA SSNM filtering:</p> <pre>cs7 xua-ssnm-filtering</pre> |
|-----------------|-------------------------------------------------------------------------------------------------|

|                         |                |                    |
|-------------------------|----------------|--------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b> |
|                         |                |                    |
|                         |                |                    |
|                         |                |                    |

# cs7 xua-tfc-allowed

To allow TFCs and SCONs for M3UA/SUA congestion, use the **cs7 xua-tfc-allowed** command in global configuration mode. To remove the statement from the configuration, use the **no** form of this command.

**cs7 xua-tfc-allowed**

**no cs7 xua-tfc-allowed**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                                 |
|-----------------|---------------------------------|
| <b>Defaults</b> | No default behaviors or values. |
|-----------------|---------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

|                 |                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example allows TFCs and SCONs for M3UA/SUA congestion:<br><br>cs7 xua-tfc-allowed |
|-----------------|-------------------------------------------------------------------------------------------------|

|                         |                |                    |
|-------------------------|----------------|--------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b> |
|                         |                |                    |
|                         |                |                    |
|                         |                |                    |

## cumulative-sack (CS7 ASP)

To configure the cumulative selective acknowledgment time-out value for the association, use the **cumulative-sack** command in **cs7 asp** configuration mode. To disable the configuration, use the **no** form of this command.

**cumulative-sack** *msec*

**no cumulative-sack** *msec*

### Syntax Description

|             |                                                                                                                                                                               |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Cumulative selective acknowledgment time-out value, in milliseconds. Range is 100 through 500 milliseconds. The default is the value specified under the local port instance. |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default acknowledgment time-out value is the value specified under the local port instance.

### Command Modes

CS7 asp configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Examples

The following example sets the cumulative selective acknowledgment time-out value to 300:

```
cs7 asp ASP1 14001 15000 sua
  remote-ip 1.1.1.1
  cumulative-sack 300
```

### Related Commands

| Command                    | Description                                                          |
|----------------------------|----------------------------------------------------------------------|
| <b>cs7 asp</b>             | Specifies an Application Server Process and enables CS7 ASP submode. |
| <b>show cs7 asp detail</b> | Displays ASP detail information.                                     |

## cumulative-sack (CS7 Link)

To configure the cumulative selective acknowledgment time-out value for the link, use the **cumulative-sack** command in cs7 link configuration mode. To disable the configuration, use the **no** form of this command.

**cumulative-sack** *msec*

**no cumulative-sack** *msec*

|                           |             |                                                                                                                                              |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Cumulative selective acknowledgment time-out value, in milliseconds. Range is 100 through 500 milliseconds. The default is 200 milliseconds. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                   |
|-----------------|-------------------|
| <b>Defaults</b> | 200 milliseconds. |
|-----------------|-------------------|

|                      |                        |
|----------------------|------------------------|
| <b>Command Modes</b> | CS7 link configuration |
|----------------------|------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(1)MB      | This command was introduced. |

|                 |                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the cumulative selective acknowledgment time-out value to 300: |
|-----------------|-------------------------------------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
cumulative-sack 300
```

|                         |                      |                                                     |
|-------------------------|----------------------|-----------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>       | <b>Description</b>                                  |
|                         | <b>cs7 linkset</b>   | Specifies a linkset and enters CS7 linkset submode. |
|                         | <b>show cs7 m2pa</b> | Displays ITP M2PA statistics.                       |

## cumulative-sack (cs7 mated-sg)

To configure the cumulative selective acknowledgment time-out value for the association, use the **cumulative-sack** command in cs7 mated-sg configuration mode. To disable the configuration, use the **no** form of this command.

**cumulative-sack** *msec*

**no cumulative-sack** *msec*

### Syntax Description

*msec*

Cumulative selective acknowledgment time-out value, in milliseconds. Range is 100 through 500 milliseconds. The default is the value specified under the local SGMP port instance.

### Defaults

The default selective acknowledgment time-out value is the value specified under the local SGMP port instance.

### Command Modes

CS7 mated-sg configuration

### Command History

#### Release

12.2(4)MB5

#### Modification

This command was introduced.

### Examples

The following example sets the cumulative selective acknowledgment time-out value to 300:

```
cs7 mated-sg mate2 5000 passive
 cumulative-sack 300
```

### Related Commands

#### Command

#### Description

**cs7 mated-sg**

Configures a connection to a mated SG.

**show cs7 mated-sg detail**

Displays mated SG detail information.



# cumulative-sack (CS7 M3UA)

To configure the cumulative selective acknowledgment time-out value used when a new SCTP association is started with the local port, use the **cumulative-sack** command in **cs7 m3ua** configuration mode. To disable the configuration, use the **no** form of this command.

**cumulative-sack** *msec*

**no cumulative-sack** *msec*

|                           |             |                                                                                                                                              |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Cumulative selective acknowledgment time-out value, in milliseconds. Range is 100 through 500 milliseconds. The default is 200 milliseconds. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                   |
|-----------------|-------------------|
| <b>Defaults</b> | 200 milliseconds. |
|-----------------|-------------------|

|                      |                        |
|----------------------|------------------------|
| <b>Command Modes</b> | CS7 m3ua configuration |
|----------------------|------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

**Examples** The following example sets the cumulative selective acknowledgment time-out value to 300:

```
cs7 m3ua 2905
 local-IP 4.4.4.4
 cumulative-sack 300
```

| Related Commands | Command              | Description                                                           |
|------------------|----------------------|-----------------------------------------------------------------------|
|                  | <b>cs7 m3ua</b>      | Specifies the local port number for M3UA and enters CS7 M3UA submode. |
|                  | <b>show cs7 m3ua</b> | Displays M3UA information.                                            |

## cumulative-sack (CS7 SGMP)

To configure the cumulative selective acknowledgment time-out value used when a new SCTP association is started with the local port, use the **cumulative-sack** command in `cs7 sgmp` configuration mode. To disable the configuration, use the **no** form of this command.

**cumulative-sack** *msec*

**no cumulative-sack** *msec*

### Syntax Description

|             |                                                                                                                                                 |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Cumulative selective acknowledgment time-out value, in milliseconds.<br>Range is 100 through 500 milliseconds. The default is 200 milliseconds. |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

200 milliseconds.

### Command Modes

CS7 sgmp configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Examples

The following example sets the cumulative selective acknowledgment time-out value to 300:

```
cs7 sgmp 5000
 cumulative-sack 300
```

### Related Commands

| Command              | Description                                                           |
|----------------------|-----------------------------------------------------------------------|
| <b>cs7 sgmp</b>      | Specifies the local port number for SGMP and enters CS7 SGMP submode. |
| <b>show cs7 sgmp</b> | Displays SGMP information.                                            |

# cumulative-sack (cs7 sua)

To configure the cumulative selective acknowledgment time-out value used when a new SCTP association is started with the local port, use the **cumulative-sack** command in cs7 sua configuration mode. To disable the configuration, use the **no** form of this command.

**cumulative-sack** *msec*

**no cumulative-sack** *msec*

|                           |             |                                                                                                                                              |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Cumulative selective acknowledgment time-out value, in milliseconds. Range is 100 through 500 milliseconds. The default is 200 milliseconds. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                   |
|-----------------|-------------------|
| <b>Defaults</b> | 200 milliseconds. |
|-----------------|-------------------|

|                      |                       |
|----------------------|-----------------------|
| <b>Command Modes</b> | CS7 sua configuration |
|----------------------|-----------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB5 | This command was introduced. |

**Examples** The following example sets the cumulative selective acknowledgment time-out value to 300:

```
cs7 sua 15000
local-IP 4.4.4.4
cumulative-sack 300
```

| <b>Related Commands</b> | Command             | Description                                                         |
|-------------------------|---------------------|---------------------------------------------------------------------|
|                         | <b>cs7 sua</b>      | Specifies the local port number for SUA and enters CS7 SUA submode. |
|                         | <b>show cs7 sua</b> | Displays SUA information.                                           |

## cumulative-sack (group peer)

To configure the cumulative selective acknowledgment time-out value for the link, use the **cumulative-sack** group submode command. To disable the configuration, use the **no** form of this command.

**cumulative-sack** *msec*

**no cumulative-sack** *msec*

| Syntax Description | <i>msec</i><br>Cumulative selective acknowledgment time-out value, in milliseconds.<br>Range is 100 through 500 milliseconds. The default is 200 milliseconds.                                         |  |         |              |              |                                                                                                     |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------------|--------------|-----------------------------------------------------------------------------------------------------|
| Defaults           | 200 milliseconds.                                                                                                                                                                                      |  |         |              |              |                                                                                                     |
| Command Modes      | Group peer                                                                                                                                                                                             |  |         |              |              |                                                                                                     |
| Command History    | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(25)SW</td><td>This command was introduced.</td></tr></table>                                                                         |  | Release | Modification | 12.2(25)SW   | This command was introduced.                                                                        |
| Release            | Modification                                                                                                                                                                                           |  |         |              |              |                                                                                                     |
| 12.2(25)SW         | This command was introduced.                                                                                                                                                                           |  |         |              |              |                                                                                                     |
| Examples           | <p>The following example set the cumulative selective acknowledgment time-out value to 100:</p> <pre>cs7 group ITP1 3333  local-ip 1.1.1.1  peer 4444   remote-ip 1.1.1.2   cumulative-sack 100</pre>  |  |         |              |              |                                                                                                     |
| Related Commands   | <table><tr><th>Command</th><th>Description</th></tr><tr><td>peer (group)</td><td>Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode.</td></tr></table> |  | Command | Description  | peer (group) | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode. |
| Command            | Description                                                                                                                                                                                            |  |         |              |              |                                                                                                     |
| peer (group)       | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode.                                                                                                    |  |         |              |              |                                                                                                     |

# default

To create a default secondary trigger use the **default** command in cs7 mlr trigger configuration mode within a primary address trigger. To disable the specific routing trigger, use the **no** form of this command.

**default** {**block** | **continue** | **ruleset** *ruleset-name*}

**no default** {**block** | **continue** | **ruleset** *ruleset-name*}

|                           |                     |                                                                                                                                                                                                                                                                                    |
|---------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>block</b>        | This trigger-action specifies that messages matching this trigger should be dropped. The <b>block</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode.                                                                                    |
|                           | <b>continue</b>     | This trigger-action specifies that messages matching this trigger should be routed as received. This is the same behavior as if no primary trigger had been matched. The <b>continue</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode. |
|                           | <b>ruleset</b>      | Specifies the MLR ruleset table that should be used if this trigger is matched, and not overruled by a secondary trigger ruleset.                                                                                                                                                  |
|                           | <i>ruleset-name</i> | Name of an already defined CS7 MLR ruleset table. The name is specified as a character string with a maximum of 12 characters.                                                                                                                                                     |

**Defaults** No default behavior or value.

**Command Modes** CS7 mlr trigger configuration

|                        |                |                                        |
|------------------------|----------------|----------------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                    |
|                        | 12.2(4)MB      | This command was introduced.           |
|                        | 12.2(21)SW     | The <b>continue</b> keyword was added. |

**Usage Guidelines**

A combination trigger uses more than one network layer address for identifying a trigger match. Within a combination trigger, one address is defined as the primary trigger and the other the secondary trigger. If you configure a secondary address in the trigger submode, then BOTH addresses must match for the packet to be routed using the specified ruleset.

With the definition of the secondary triggers configured as an AND function with the primary trigger, a default secondary trigger is used to handle routing of packets on primary trigger only when one or more other secondary triggers are defined.

The default command is used only if all other subtriggers are unmatched. If default is not specified, then packets not matching a combination trigger will be routed according to standard SCCP or MTP3 procedures.

## Examples

In the following example, there are 3 secondary triggers defined based on the origin of the SMS message. All messages **not** originating from one of the secondary triggers are routed based on the default secondary trigger.

```
cs7 mlr table sms_table
trigger cdpa gt 9193334444 ruleset default_rules
  cgpa gt 1111111 ruleset msc1_rules
  cgpa gt 2222222 ruleset msc2_rules
  cgpa gt 3333333 ruleset msc3_rules
!
default ruleset default_rules
```

## Related Commands

| Command                   | Description                                                                                                            |
|---------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 mlr ruleset</b>    | Specifies sets of rules that will be used to process traffic matching triggers defined in a multi-layer routing table. |
| <b>show cs7 mlr table</b> | Displays multi-layer SMS routing information.                                                                          |
| <b>trigger cgpa</b>       | Specifies a routing trigger that is located in the SCCP calling party address field of the incoming MSU.               |

## description (cs7 link)

To specify a description of the link, use the **description** command in cs7 link configuration mode. To remove the text string, use the **no** form of this command.

**cs7 description** *line*

**no cs7 description** *line*

### Syntax Description

|             |                                                                                                            |
|-------------|------------------------------------------------------------------------------------------------------------|
| <i>line</i> | Text string description of the link. Length of <i>line</i> can be from one to 254 alphanumeric characters. |
|-------------|------------------------------------------------------------------------------------------------------------|

### Defaults

No default behavior or values

### Command Modes

CS7 link configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Examples

The following example provides a description of link 0:

```
cs7 linkset to_doc
link 0
description Link used to connect to point code 5.100.2
```

### Related Commands

| Command                    | Description                                                        |
|----------------------------|--------------------------------------------------------------------|
| <b>cs7 linkset</b>         | Specifies a linkset and enters CS7 linkset submode.                |
| <b>link (CS7 linkset)</b>  | Specifies a link and enters CS7 link submode.                      |
| <b>show cs7 linkset</b>    | Displays ITP linkset information.                                  |
| <b>show running config</b> | Displays the contents of the currently running configuration file. |

# description (cs7 linkset)

To specify a description of the linkset to be used by the administrator or the network management stations, use the **cs7 description** command in cs7 linkset configuration mode. To remove the text string, use the **no** form of this command.

**cs7 description** *line*

**no cs7 description** *line*

|                           |             |                                                                                                               |
|---------------------------|-------------|---------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>line</i> | Text string description of the linkset. Length of <i>line</i> can be from one to 254 alphanumeric characters. |
|---------------------------|-------------|---------------------------------------------------------------------------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                           |
|----------------------|---------------------------|
| <b>Command Modes</b> | CS7 linkset configuration |
|----------------------|---------------------------|

| <b>Command History</b> | Release   | Modification                 |
|------------------------|-----------|------------------------------|
|                        | 12.2(4)MB | This command was introduced. |

|                 |                                                               |
|-----------------|---------------------------------------------------------------|
| <b>Examples</b> | The following example provides a description for the linkset: |
|-----------------|---------------------------------------------------------------|

```
cs7 linkset to-Chicago-primary
description to-Chicago-primary
```

| <b>Related Commands</b> | Command                 | Description                                         |
|-------------------------|-------------------------|-----------------------------------------------------|
|                         | <b>cs7 linkset</b>      | Specifies a linkset and enters CS7 linkset submode. |
|                         | <b>show cs7 linkset</b> | Displays linkset information.                       |



## dest-port (cs7 mlr ruleset rule)

To specify an application destination port number, use the **dest-port** command in cs7 mlr ruleset-rule configuration mode. To remove the specification, use the **no** form of this command.

**dest-port** *dest-port-number*

**no dest-port** *dest-port-number*

### Syntax Description

|                         |                                                     |
|-------------------------|-----------------------------------------------------|
| <i>dest-port-number</i> | Destination port number. Valid range is 0 to 65535. |
|-------------------------|-----------------------------------------------------|

### Defaults

No default behavior or value

### Command Modes

CS7 mlr ruleset-rule configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(21)SW | This command was introduced. |

### Examples

The following example specifies an address of the destination port number of 1234:

```
cs7 mlr ruleset ruleset1
 rule 10 sms-mt
  dest-port 1
```

### Related Commands

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

# dest-port (cs7 sms set rule)

To specify an application destination port number, use the **dest-port** command in cs7 sms set rule configuration mode. To remove the port number, use the **no** form of this command.

**dest-port** *dest-port-num*

**no dest-port**

## Syntax Description

|                      |                                                     |
|----------------------|-----------------------------------------------------|
| <i>dest-port-num</i> | Destination port number. Valid range is 0 to 65535. |
|----------------------|-----------------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

CS7 sms set rule configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

## Examples

The following example configures a CS7 SMS ruleset named SMS-RULES, specifies a rule search index of 10 and specifies a destination port of 20 and a result of pc 1.1.1:

```
cs7 sms ruleset SMS-RULES
 rule 10
  dest-port 20
  result pc 1.1.1
```

## Related Commands

| Command                                   | Description                                                                     |
|-------------------------------------------|---------------------------------------------------------------------------------|
| <b>cs7 sms ruleset</b>                    | Specifies a ruleset.                                                            |
| <b>cdr-service-queue</b>                  | Tests the availability of CDR service queue as the input condition of the rule. |
| <b>dest-sme (cs7 sms set rule)</b>        | Specifies a destination short message entity.                                   |
| <b>dest-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of destination SME addresses.                            |
| <b>dest-smsc (cs7 sms set rule)</b>       | Specifies a destination SMSC.                                                   |
| <b>orig-imsi (cs7 sms set rule)</b>       | Specifies an origin IMSI.                                                       |
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table).                |
| <b>orig-sme (cs7 sms set rule)</b>        | Specifies an origin short message entity.                                       |

| Command                                  | Description                                                     |
|------------------------------------------|-----------------------------------------------------------------|
| <b>orig-sme-table (cs7 sms set rule)</b> | Specifies an SMS table of origin SME addresses (address-table). |
| <b>pid (cs7 sms set rule)</b>            | Specifies a protocol identifier (TP-PID)                        |
| <b>result (cs7 sms set rule)</b>         | Specifies a result.                                             |
| <b>rule (cs7 sms set)</b>                | Specifies a rule within a ruleset.                              |

## dest-sme (cs7 mlr ruleset rule)

To specify the address of the destination Short Message Entity (SME) within an SMS operation, use the **dest-sme** command in cs7 mlr ruleset-rule configuration mode. To remove the specification, use the **no** form of this command.

**dest-sme** { \* | *dest-addr* } [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*dest-sme-addr-type*]

**no dest-sme** { \* | *dest-addr* } [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*dest-sme-addr-type*]

| Syntax Description        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| *                         | Match all address values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <i>dest-addr</i>          | <p>When the rule operation is <b>sms-mo</b>, the <i>dest-addr</i> is an address string of 1 to 20 hexadecimal characters.</p> <p>When the rule operation is <b>sri-sm</b>, <i>dest-addr</i> is an address string of 1 to 16 hexadecimal characters.</p> <p>The string is not input in BCD-String format, but in normal form. The string always carries an implicit '*' at the end of the string, allowing only the prefix of a range of addresses to be specified.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>dest-sme-addr-type</i> | <p>(Optional) Parameters that identify attributes of the SME address being used to match a rule for the <b>sms-mo</b> and <b>sri-sm</b> operation types. If not specified, the address defaults to an E.164/telephony address with international scope. The address is composed of the following keywords:</p> <ul style="list-style-type: none"> <li>The <b>noa</b> keyword specifies the nature-of-address value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>The <i>noa</i> argument is an integer value in the range 0 to 7.</li> <li>The <b>np</b> keyword specifies the numbering-plan identification value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified. <b>np</b> is not valid when defining the <b>dest-sme</b> in an <b>sms-notify</b> operation.</li> <li>The <i>np</i> argument is an integer value in the range 0 to 15.</li> <li><b>min</b> Specifies that the address is a Mobile Identification Number (MIN). This keyword can be specified for the sme-addr-type of ANSI-41 operations.</li> <li><b>imsi</b> Specifies that the address is an International Mobile Subscriber Identification (IMSI) address. This keyword can be specified for the sme-addr-type of ANSI-41 operations.</li> </ul> |
| <b>exact</b>              | Indicates that the previously specified <i>dest-addr</i> should only be matched if the number of digits AND the digit values exactly match as specified in <i>dest-addr</i> . If <b>exact</b> is not specified, then the <i>dest-addr</i> carries an implicit '*' at the end of the string, allowing a match on the string as a prefix (range of addresses).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>min-digits</b>         | (Optional) Specifies the minimum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>min</i>                | Minimum number of digits in the address string. The default is 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

|                   |                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------|
| <b>max-digits</b> | (Optional) Specifies the maximum number of digits in the address string.                         |
| <i>max</i>        | Maximum number of digits in the address string. The default is the length of the address string. |

**Defaults**

If not specified, the *dest-sme-addr-type* address defaults to an E.164/telephony address with international scope.

**Command Modes**

CS7 mlr ruleset-rule configuration

**Command History**

| Release    | Modification                                                    |
|------------|-----------------------------------------------------------------|
| 12.2(4)MB  | This command was introduced.                                    |
| 12.2(21)SW | The <b>imsi</b> and <b>min</b> keywords were added.             |
| 12.2(25)SW | The <b>min-digits</b> and <b>max-digits</b> options were added. |

**Usage Guidelines**

The **dest-sme** allows you to specify the address of the destination SME within an SMS operation. This parameter is part of the rule used to match this route.

For the **sms-mo** operation, **dest-sme** identifies the SM-TP-DA field within the SMS user information field.

For the **sms-mt** operation, **dest-sme** identifies the IMSI contained in the SM-RP-DA field within the GSM MAP layer.

For the **sri-sm** operation, **dest-sme** identifies the destination MSISDN address within the GSM MAP layer.

Table 22 shows the uses of the **dest-sme** command based on the rule operation.

**Table 22** *Dest-SME by Operation*

|                | length in hex | no <i>dest-sme-addr-type</i>                 | <i>dest-sme-addr-type</i> specified |
|----------------|---------------|----------------------------------------------|-------------------------------------|
| <b>sms-mo</b>  | 1 - 20        | <b>noa/np</b> defaults to International/E.64 | specific np/noa                     |
| <b>sms-mt</b>  | 1 - 20        | <b>noa/np</b> defaults to International/E.64 | specific np/noa                     |
| <b>sri-sm</b>  | 1 - 16        | <b>noa/np</b> defaults to International/E.64 | specific np/noa                     |
| <b>alertsc</b> | 1 - 16        | <b>noa/np</b> defaults to International/E.64 | specific np/noa                     |

**Table 22**      **Dest-SME by Operation**

|               | length in hex | no <i>dest-sme-addr-type</i>                                                                                                                                      | <i>dest-sme-addr-type</i> specified                                                                                                                                                |
|---------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>smdpp</b>  | 1 - 20        | Priority digit string matching based on the following order:<br>SMS_OriginalDestinationAddress<br>SMS_DestinationAddress<br>MIN<br>IMSI<br>SCCP CdPA (RI=GT only) | min = MIN parameter only<br>imsi = IMSI parameter only<br>np/noa = full address matching based on the parameter order:<br>SMS_OriginalDestinationAddress<br>SMS_DestinationAddress |
| <b>smsreq</b> | 1 - 20        | Priority digit string matching based on the following order:<br>MobileDirectoryNumber<br>MIN<br>IMSI<br>SCCP CdPA (RI=GT only)                                    | min = MIN parameter only<br>imsi = IMSI parameter only<br>np/noa = MobileDirectoryNumber parameter only                                                                            |
| <b>smsnot</b> | 1 - 20        | Priority digit string matching based on the following order:<br>MobileDirectoryNumber<br>MIN<br>IMSI                                                              | min = MIN parameter only<br>imsi = IMSI parameter only<br>np/noa = MobileDirectoryNumber parameter only                                                                            |

**Examples**

The following example specifies an address of the destination SME:

```
cs7 mlr ruleset ruleset1
 rule 10 sms-mo
  dest-sme 1234
```

**Related Commands**

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## dest-sme (cs7 sms set rule)

To specify a destination short message entity, use the **dest-sme** command in cs7 sms set rule configuration mode. To remove the configuration, use the **no** form of this command.

**dest-sme** [\* | *dest-address*] [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*dest-sme-addr-type*]

**no dest-sme** [\* | *dest-address*] [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*dest-sme-addr-type*]

### Syntax Description

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>*</b>                  | Match all address values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>dest-address</i>       | Address of 1 to 20 hexadecimal digits.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>dest-sme-addr-type</i> | (Optional) Parameters that identify attributes of the SME address being used to match a rule for the <b>sms-mo</b> and <b>sri-sm</b> operation types. If not specified, the address defaults to an E.164/telephony address with international scope. The address is composed of the following keywords: <ul style="list-style-type: none"> <li>The <b>noa</b> keyword specifies the nature-of-address value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>The <b>noa</b> argument is an integer value in the range 0 to 7.</li> <li>The <b>np</b> keyword specifies the numbering-plan identification value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified. <b>np</b> is not valid when defining the <b>dest-sme</b> in an <b>sms-notify</b> operation.</li> <li>The <b>np</b> argument is an integer value in the range 0 to 15.</li> </ul> |
| <b>exact</b>              | (Optional) Configured address must match dest-sme exactly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>min-digits</b>         | (Optional) Specifies the minimum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>min</i>                | Minimum number of digits in the address string. The default is 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>max-digits</b>         | (Optional) Specifies the maximum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>max</i>                | Maximum number of digits in the address string. The default is the length of the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

### Defaults

No default behavior or values

### Command Modes

CS7 sms set rule configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Examples

The following example specifies an SMS ruleset named SMS-RULES, specifies a rule index of 20, and specifies a destination SME matching all addresses:

```
cs7 sms ruleset SMS-RULES
```

■ **dest-sme (cs7 sms set rule)**

```
rule 20 sms-mo
  dest-sme *
  result next-rule
```

**Related Commands**

| Command                                   | Description                                                      |
|-------------------------------------------|------------------------------------------------------------------|
| <b>cs7 sms ruleset</b>                    | Specifies a ruleset.                                             |
| <b>dest-port (cs7 sms set rule)</b>       | Specifies an application destination port number.                |
| <b>dest-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of destination SME addresses.             |
| <b>dest-smsc (cs7 sms set rule)</b>       | Specifies a destination SMSC.                                    |
| <b>orig-imsi (cs7 sms set rule)</b>       | Specifies an origin IMSI.                                        |
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table). |
| <b>orig-sme (cs7 sms set rule)</b>        | Specifies an origin short message entity.                        |
| <b>orig-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of origin SME addresses (address-table).  |
| <b>pid (cs7 sms set rule)</b>             | Specifies a protocol identifier (TP-PID)                         |
| <b>result (cs7 sms set rule)</b>          | Specifies a result.                                              |
| <b>rule (cs7 sms set)</b>                 | Specifies a rule within a ruleset.                               |



## dest-sme-table (cs7 mlr ruleset rule)

To configure an MLR table of destination SME addresses, use the **dest-sme-table** cs7 mlr ruleset-rule configuration command. To remove the specification, use the **no** form of this command.

**dest-sme-table** *tablename* [*dest-sme-addr-type*]

**no dest-sme-table**

| Syntax Description        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>tablename</i>          | IMSI address table name. Valid range is up to 16 hexadecimal digits.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>dest-sme-addr-type</i> | <p>(Optional) Parameters that identify attributes of the SME address being used to match a rule for the <b>sms-mo</b> and <b>sri-sm</b> operation types. If not specified, the address defaults to an E.164/telephony address with international scope. The address is composed of the following keywords:</p> <ul style="list-style-type: none"> <li>The <b>noa</b> keyword specifies the nature-of-address value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>The <b>noa</b> argument is an integer value in the range 0 to 7.</li> <li>The <b>np</b> keyword specifies the numbering-plan identification value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified. <b>np</b> is not valid when defining the <b>dest-sme</b> in an <b>sms-notify</b> operation.</li> <li>The <b>np</b> argument is an integer value in the range 0 to 15.</li> <li><b>min</b> Specifies that the address is a Mobile Identification Number (MIN). This keyword can be specified for the sme-addr-type of ANSI-41 operations.</li> <li><b>imsi</b> Specifies that the address is an International Mobile Subscriber Identification (IMSI) address. This keyword can be specified for the sme-addr-type of ANSI-41 operations.</li> </ul> |

**Defaults** No default behavior or value

**Command Modes** CS7 mlr ruleset-rule configuration

| Command History | Release    | Modification                                                                     |
|-----------------|------------|----------------------------------------------------------------------------------|
|                 | 12.2(21)SW | This command was introduced.                                                     |
|                 | 12.2(25)SW | The <b>noa</b> , <b>np</b> , <b>min</b> , and <b>imsi</b> parameters were added. |

**Examples** The following example specifies an address of the destination SME:

```
cs7 mlr ruleset ruleset1
rule 10 sms-mt
dest-sme-table 2
```

■ dest-sme-table (cs7 mlr ruleset rule)

| Related Commands | Command                       | Description                                                                                                                       |
|------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|                  | <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## dest-sme-table (cs7 sms set rule)

To specify an SMS table of destination SME addresses (address-table), use the **dest-sme-table** command in cs7 sms set rule configuration mode. To remove the configuration, use the **no** form of this command.

**dest-sme-table** *tablename* [*dest-sme-addr-type*]

**no dest-sme-table**

| Syntax Description | <i>tablename</i>          | Address table name.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <i>dest-sme-addr-type</i> | (Optional) Parameters that identify attributes of the SME address being used to match a rule for the <b>sms-mo</b> and <b>sri-sm</b> operation types. If not specified, the address defaults to an E.164/telephony address with international scope. The address is composed of the following keywords: <ul style="list-style-type: none"> <li>The <b>noa</b> keyword specifies the nature-of-address value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>The <i>noa</i> argument is an integer value in the range 0 to 7.</li> <li>The <b>np</b> keyword specifies the numbering-plan identification value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified. <b>np</b> is not valid when defining the <b>dest-sme</b> in an <b>sms-notify</b> operation.</li> <li>The <i>np</i> argument is an integer value in the range 0 to 15.</li> </ul> |

**Defaults** No default behavior or values

**Command Modes** CS7 sms set rule configuration

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Usage Guidelines** The **dest-sme-table**, **orig-imsi-table**, and **orig-sme-table** rule parameters accept either an SMS address-table name OR an MLR address-table name. This ability is primarily for customers that want the SMS-MO Proxy functionality. The address-table names are unique between FDA and MLR. You may enter an MLR address-table name for an SMS rule parameter. However, MLR cannot reference SMS address-tables.

If an incoming message matches an SMS rule that references an MLR address-table, then any MLR address-table result is mapped to an SMS result:

- BLOCK, PC, and PCSSN results map easily from MLR to SMS.
  - For result groups, the MLR result group name is mapped to an SMS result group name.
  - If the SMS result group is not configured, then the result specified on the rule is used.

- AS and CONTINUE results are not valid in SMS. For these cases, the result specified on the rule is used. If no result is specified, the result on the rule is used (same as MLR).

If multiple rule parameters are configured for a rule, then the rule result will be used (rather than a result specified in the address table).

If the result type specified within the table is valid, it is used. Otherwise, the result in the rule is used.

For all tables, the **noa** and **np** must match before the table is accessed.

## Examples

The following example specifies an SMS ruleset named SMS-RULES, specifies a rule index of 20, and specifies an SMS table of destination SME addresses named SHORTLIST:

```
cs7 sms ruleset SMS-RULES
rule 20 sms-mo
  dest-sme-table SHORTLIST
  result block
```

## Related Commands

| Command                                   | Description                                                                     |
|-------------------------------------------|---------------------------------------------------------------------------------|
| <b>cdr-service-queue</b>                  | Tests the availability of CDR service queue as the input condition of the rule. |
| <b>cs7 sms ruleset</b>                    | Specifies a ruleset.                                                            |
| <b>dest-port (cs7 sms set rule)</b>       | Specifies an application destination port number.                               |
| <b>dest-sme (cs7 sms set rule)</b>        | Specifies a destination short message entity.                                   |
| <b>dest-smsc (cs7 sms set rule)</b>       | Specifies a destination SMSC.                                                   |
| <b>orig-imsi (cs7 sms set rule)</b>       | Specifies an origin IMSI.                                                       |
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table).                |
| <b>orig-sme (cs7 sms set rule)</b>        | Specifies an origin short message entity.                                       |
| <b>orig-sme (cs7 sms set rule)</b>        | Specifies an SMS table of origin SME addresses (address-table).                 |
| <b>pid (cs7 sms set rule)</b>             | Specifies a protocol identifier (TP-PID)                                        |
| <b>result (cs7 sms set rule)</b>          | Specifies a result                                                              |
| <b>rule (cs7 sms set)</b>                 | Specifies a rule within a ruleset.                                              |

## dest-smsc (cs7 mlr ruleset rule)

To specify the destination service center address, use the **dest-smsc** command in cs7 mlr ruleset-rule configuration mode. To remove the specification, use the **no** form of this command.

**dest-smsc** [\* | *address*] [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*addr-type*]

**no dest-smsc**

### Syntax Description

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>*</b>          | Match all addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>address</i>    | Address of 1 to 20 hexadecimal digits.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>addr-type</i>  | (Optional) Parameters that identify attributes of the SMSC address being used to match a rule. If not specified, the address defaults to an SMSC address string specifying an E.164/telephony address with international scope. The <i>addr-type</i> is composed of the following keywords: <ul style="list-style-type: none"> <li>The <b>noa</b> keyword specifies the nature-of-address value associated with the SMSC address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>The <i>noa</i> argument is an integer value in the range 0 to 7.</li> <li>The <b>np</b> keyword specifies the numbering-plan identification value associated with the SMSC address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified.</li> <li>The <i>np</i> argument is an integer value in the range 0 to 15.</li> </ul> |
| <b>exact</b>      | (Optional) Configured address must match dest-smc exactly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>min-digits</b> | (Optional) Specifies the minimum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>min</i>        | Minimum number of digits in the address string. The default is 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>max-digits</b> | (Optional) Specifies the maximum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>max</i>        | Maximum number of digits in the address string. The default is the length of the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### Defaults

If not specified, the *addr-type* address defaults to an E.164/telephony address with international scope.

### Command Modes

CS7 mlr ruleset-rule configuration

### Command History

| Release    | Modification                        |
|------------|-------------------------------------|
| 12.2(4)MB  | This command was introduced.        |
| 12.2(21)SW | The <b>exact</b> keyword was added. |

### Usage Guidelines

If intermediate GTT is used toward the ITP SMS Routers, then the CdPA routing trigger will already contain the destination SMSC address, and need not be specified on the rule.

---

**Examples**

The following example specifies the destination service center address:

```
cs7 mlr ruleset ruleset1
rule 20 sms-mo
  dest-smsc 1234
```

---

**Related Commands**

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## dest-smsc (cs7 sms set rule)

To specify a destination short message entity, use the **dest-sme** command in cs7 sms set rule configuration mode. To remove the configuration, use the **no** form of this command.

**dest-smsc** [\* | *address*] [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*addr-type*]

**no dest-smsc**

### Syntax Description

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>*</b>          | Match all addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>address</i>    | Address of 1 to 20 hexadecimal digits.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>addr-type</i>  | (Optional) Parameters that identify attributes of the SMSC address being used to match a rule. If not specified, the address defaults to an SMSC address string specifying an E.164/telephony address with international scope. The <i>addr-type</i> is composed of the following keywords: <ul style="list-style-type: none"> <li>The <b>noa</b> keyword specifies the nature-of-address value associated with the SMSC address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>The <i>noa</i> argument is an integer value in the range 0 to 7.</li> <li>The <b>np</b> keyword specifies the numbering-plan identification value associated with the SMSC address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified.</li> <li>The <i>np</i> argument is an integer value in the range 0 to 15.</li> </ul> |
| <b>exact</b>      | (Optional) Configured address must match dest-sme exactly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>min-digits</b> | (Optional) Specifies the minimum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>min</i>        | Minimum number of digits in the address string. The default is 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>max-digits</b> | (Optional) Specifies the maximum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>max</i>        | Maximum number of digits in the address string. The default is the length of the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### Defaults

No default behavior or values

### Command Modes

CS7 sms set rule configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Examples

The following example specifies an SMS ruleset named SMS-RULES, specifies a rule index of 20, and specifies a destination SMSC matching all addresses:

```
cs7 sms ruleset SMS-RULES
rule 20 sms-mo
```

■ **dest-smsc (cs7 sms set rule)**

```
dest-smsc *
result block
```

**Related Commands**

| <b>Command</b>                            | <b>Description</b>                                               |
|-------------------------------------------|------------------------------------------------------------------|
| <b>cs7 sms ruleset</b>                    | Specifies a ruleset.                                             |
| <b>dest-port (cs7 sms set rule)</b>       | Specifies an application destination port number.                |
| <b>dest-sme (cs7 sms set rule)</b>        | Specifies a destination short message entity.                    |
| <b>dest-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of destination SME addresses.             |
| <b>orig-imsi (cs7 sms set rule)</b>       | Specifies an origin IMSI.                                        |
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table). |
| <b>orig-sme (cs7 sms set rule)</b>        | Specifies an origin short message entity.                        |
| <b>orig-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of origin SME addresses (address-table).  |
| <b>pid (cs7 sms set rule)</b>             | Specifies a protocol identifier (TP-PID)                         |
| <b>result (cs7 sms set rule)</b>          | Specifies a result.                                              |
| <b>rule (cs7 sms set)</b>                 | Specifies a rule within a ruleset.                               |



## destination (cs7 cdr service)

To add, remove, or update CDR destinations within a CS7 CDR service, use the **destination** command in cs7 cdr service configuration mode. To disable the destination, use the **no** form of this command.

**destination** *name share-value*

**no destination** *name share-value*

| Syntax Description | <i>name</i>        | Name of CDR destination.             |
|--------------------|--------------------|--------------------------------------|
|                    | <i>share-value</i> | Valid share-value range is 1 to 100. |

| Defaults | No default behavior or values |
|----------|-------------------------------|
|----------|-------------------------------|

| Command Modes | cs7 cdr service configuration |
|---------------|-------------------------------|
|---------------|-------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Usage Guidelines | To delete a destination statement from a CDR service, you must first <b>shutdown</b> the destination from CS7 CDR destination configuration mode as follows: |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
ITP(config)#cs7 cdr destination CDR1
ITP(config-cs7-cdr-dest)#shutdown
ITP(config-cs7-cdr-dest)#exit
ITP(config)#cs7 cdr service CDR1
ITP(config-cs7-cdr-ser)#no destination CDR1
```

| Examples | The following example specifies a CDR service named FDASMSC and 2 destinations, psd1 and psd2: |
|----------|------------------------------------------------------------------------------------------------|
|----------|------------------------------------------------------------------------------------------------|

```
cs7 cdr service FDASMSC
destination psd1 10
destination psd2 20
```

| Related Commands | Command                    | Description                  |
|------------------|----------------------------|------------------------------|
|                  | <b>cs7 cdr destination</b> | Specifies a CDR destination. |
|                  | <b>cs7 cdr service</b>     | Specifies a CDR service.     |

## destination (cs7 sms smpp)

To configure an SMS SMPP destination, use the **destination** command in cs7 sms smpp configuration mode. To remove the destination, use the **no** form of this command.

**destination** *dest-name remote-ip-addr remote-port [profile profile-name]*

**no destination** *dest-name remote-ip-addr remote-port [profile profile-name]*

### Syntax Description

|                       |                                                                                                                                                         |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>dest-name</i>      | Name of the SMPP destination. This name is used when you add the <i>session-name</i> to an SMS result group with the <b>smpp</b> or <b>ucp</b> command. |
| <i>remote-ip-addr</i> | Remote IP address. Identifies the destination IP address for this SMPP session partner.                                                                 |
| <i>remote-port</i>    | Remote port. Identifies the destination IP port for this SMPP session partner. Valid range is 1024 to 65535.                                            |
| <b>profile</b>        | (Optional) Indicates that this SMPP session will use a profile to define SMPP parameters.                                                               |
| <i>profile-name</i>   | Name of the profile this session will use. This name must match the name configured in the <b>cs7 sms smpp profile</b> command.                         |

### Defaults

No default behavior or values

### Command Modes

CS7 sms smpp configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

The destination command enables CS7 SMS session parameter configuration mode. In that mode you can configure SMS SMPP or UCP connection parameters.

### Examples

The second line of the following example configures an SMS SMPP destination:

```
cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic
destination offisland 10.10.20.2 6000
```

### Related Commands

| Command                     | Description                      |
|-----------------------------|----------------------------------|
| <b>cs7 sms smpp</b>         | Configures SMS SMPP connections. |
| <b>cs7 sms smpp profile</b> | Configures an SMPP profile.      |

## destination (cs7 sms ucp)

To configure an SMS UCP destination, use the **destination** command in **cs7 sms ucp** configuration mode. To remove the destination, use the **no** form of this command.

**destination** *dest-name remote-ip-addr remote-port* [**profile** *profile-name*]

**no destination** *dest-name remote-ip-addr remote-port* [**profile** *profile-name*]

|                           |                       |                                                                                                                                |
|---------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>dest-name</i>      | Name of the UCP destination.                                                                                                   |
|                           | <i>remote-ip-addr</i> | Remote IP address. Identifies the destination IP address for this UCP session partner.                                         |
|                           | <i>remote-port</i>    | Remote port. Identifies the destination IP port for this UCP session partner. Valid range is 1024 to 65535.                    |
|                           | <b>profile</b>        | Indicates that this UCP session will use a profile to define UCP parameters.                                                   |
|                           | <i>profile-name</i>   | Name of the profile this session will use. This name must match the name configured in the <b>cs7 sms ucp profile</b> command. |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                           |
|----------------------|---------------------------|
| <b>Command Modes</b> | CS7 sms ucp configuration |
|----------------------|---------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                                                                                                                                              |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The <i>dest-name</i> argument is the <i>session-name</i> that you add to an SMS result group when you configure the <b>ucp</b> command in CS7 SMS result configuration mode. |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                             |
|-----------------|-----------------------------------------------------------------------------|
| <b>Examples</b> | The second line of the following example configures an SMS UCP destination: |
|-----------------|-----------------------------------------------------------------------------|

```
cs7 sms UCP 5000 local-ip 10.10.10.200 dynamic
destination main 10.10.30.2 7000
```

|                         |                             |                                                          |
|-------------------------|-----------------------------|----------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>              | <b>Description</b>                                       |
|                         | <b>cs7 sms ucp</b>          | Configure SMS UCP connections.                           |
|                         | <b>cs7 sms ucp profile</b>  | Configures a UCP profile.                                |
|                         | <b>ucp (cs7 SMS result)</b> | Specifies that messages will be routed on a UCP session. |

# digits

To configure an MSC address in an SMS MSC table that indicates time zone information for an MSC relative to the ITP, use the **digits** command in CS7 SMS table configuration mode. To remove the specification, use the **no** form of this command.

**digits** *address* **time-offset** {**add** | **subtract**} *time-difference*

**no digits** *address* **time-offset** {**add** | **subtract**} *time-difference*

## Syntax Description

|                        |                                                                                                                                                                                  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>address</i>         | Full or partial prefix MSC E.164 address. All MSCs with E.164 addresses that include the coded prefix assume the traits configured for this MSC table entry.                     |
| <b>time-offset</b>     | Specifies that the MSC is in a different time-zone from the ITP.                                                                                                                 |
| <b>add</b>             | Specifies that time is added to the ITP local time to match the MSC local time.                                                                                                  |
| <b>subtract</b>        | Specifies that time is subtracted from the ITP local time to match the MSC local time.                                                                                           |
| <i>time-difference</i> | Time offset to be applied to ITP local time to match MSC local time. Valid format is <i>hh:mm</i> where <i>hh</i> is the number of hours and <i>mm</i> is the number of minutes. |

## Defaults

By default, if an MSC table is not configured, all messages to mobile destinations are delivered with delivery times indicating the local time of the ITP, regardless of the the time zone of the message destination.

## Command Modes

CS7 SMS MSC table configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(25)SW1 | This command was introduced. |

## Usage Guidelines

The SMS MSC table stores information pertaining to MSCs with which the ITP communicates. The table stores information that indicates the time zone information for each MSC relative to the ITP. By default, if an MSC table is not configured, all messages to mobile destinations are delivered with delivery times indicating the local time of the ITP, regardless of whether the destination is in the same or different time zone as the ITP. If you configure an MSC table, short messages will be delivered with delivery times indicated in the MSC's local time, which is typically also the local time of the receiver of the message.

## Examples

The second and third lines of the following example specify SMS MSC addresses in an SMS MSC table:

```
cs7 sms msc-table
digits 19199332252 time-offset subtract 01:00
digits 1505 time-offset subtract 01:00
```

| Related Commands | Command           | Description                                                                               |
|------------------|-------------------|-------------------------------------------------------------------------------------------|
|                  | cs7 sms msc-table | Enables CS7 SMS MSC table configuration mode in which you can configure an SMS MSC table. |

# display-name (cs7 link)

To define a text string to be included on traps related to the link, use the **display-name** command in cs7 link configuration mode. To remove the text string, use the **no** form of this command.

**display-name** *line*

**no display-name** *line*

## Syntax Description

|             |                                                                                |
|-------------|--------------------------------------------------------------------------------|
| <i>line</i> | Text string description for the link. Length of <i>line</i> can 30 characters. |
|-------------|--------------------------------------------------------------------------------|

## Defaults

The default value of *line* is a formatted string containing the linkset name and the ITP point code.

## Command Modes

CS7 link configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Examples

The following example configures the display-name for the link:

```
cs7 linkset to_doc
link 0
display-name link0
```

## Related Commands

| Command                   | Description                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------|
| <b>cs7 linkset</b>        | Specifies a linkset and enters CS7 linkset submode.                                       |
| <b>link (CS7 linkset)</b> | Specifies a link and enters CS7 link submode.                                             |
| <b>show cs7</b>           | Displays the ITP basic configuration, including the point code and capability point code. |

# display-name (cs7 linkset)

To define a text string to be included on traps related to the linkset, use the **display-name** command in cs7 linkset configuration mode. To remove the text string, use the **no** form of this .

**display-name** *line*

**no display-name** *line*

## Syntax Description

|             |                                                                                   |
|-------------|-----------------------------------------------------------------------------------|
| <i>line</i> | Text string description for the linkset. Length of <i>line</i> can 30 characters. |
|-------------|-----------------------------------------------------------------------------------|

## Defaults

The default value of *line* is a formatted string containing the linkset name.

## Command Modes

CS7 linkset configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Examples

The following example configures the display-name for the linkset:

```
cs7 linkset to_doc
display-name to_doc
```

## Related Commands

| Command            | Description                                                                               |
|--------------------|-------------------------------------------------------------------------------------------|
| <b>cs7 linkset</b> | Specifies a linkset and enters CS7 linkset submode.                                       |
| <b>show cs7</b>    | Displays the ITP basic configuration, including the point code and capability point code. |

■ display-name (cs7 linkset)





## ITP Command Set: E - R

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This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 Command Reference publications.

- **encapsulation cs7monitor**, page 659
- **encapsulation mtp2**, page 660
- **esme cdr consolidation (cs7 sms result)**, page 661
- **esme id (cs7 sms result)**, page 662
- **false-congestion**, page 663
- **fast-cwnd-rate (cs7 asp)**, page 664
- **fast-cwnd-rate (cs7 link)**, page 665
- **fast-cwnd-rate (cs7 m3ua)**, page 666
- **fast-cwnd-rate (cs7 mated-sg)**, page 667
- **fast-cwnd-rate (cs7 sgmp)**, page 668
- **fast-cwnd-rate (cs7 sua)**, page 669
- **fast-start**, page 670
- **get-imsi**, page 671
- **get-msrn**, page 673
- **gprs-delivery prefer-sgsn**, page 675
- **gsm-authent-vlr**, page 677
- **gsm-map (cs7 sms route table)**, page 678
- **gta app-grp**, page 680
- **gta asname**, page 681
- **gta pcssn**, page 683
- **gta qos-class**, page 685
- **gtt-accounting**, page 687
- **hsl**, page 688
- **idle-cwnd-rate (cs7 asp)**, page 689
- **idle-cwnd-rate (cs7 link)**, page 690
- **idle-cwnd-rate (cs7 mated-sg)**, page 691

- **idle-cwnd-rate (cs7 m3ua)**, page 692
- **idle-cwnd-rate (cs7 sgmp)**, page 693
- **idle-cwnd-rate (cs7 sua)**, page 694
- **inactivity-timer (cs7 sms profile parameters)**, page 695
- **inactivity-timer (cs7 sms session parameters)**, page 697
- **init-cwnd-size (cs7 asp)**, page 699
- **init-cwnd-size (cs7 link)**, page 700
- **init-cwnd-size (cs7 m3ua)**, page 701
- **init-cwnd-size (cs7 mated-sg)**, page 702
- **init-cwnd-size (cs7 sgmp)**, page 703
- **init-cwnd-size (cs7 sua)**, page 704
- **init-ip-dscp**, page 705
- **init-ip-precedence**, page 706
- **init-retransmit (cs7 link)**, page 707
- **init-retransmit (cs7 m3ua)**, page 708
- **init-retransmit (cs7 sgmp)**, page 709
- **init-retransmit (CS7 SUA)**, page 710
- **init-retransmit (group)**, page 711
- **init-timeout (CS7 Link)**, page 712
- **init-timeout (CS7 M3UA)**, page 713
- **init-timeout (CS7 SGMP)**, page 714
- **init-timeout (CS7 SUA)**, page 715
- **init-timeout (group)**, page 716
- **invoke-timer (cs7 authent-vlr)**, page 717
- **invoke-timer (cs7 sms gsm smsmo)**, page 718
- **ip**, page 719
- **ip-dscp**, page 720
- **ip-precedence**, page 721
- **ipc zone default**, page 722
- **keepalive (CS7 ASP)**, page 723
- **keepalive (CS7 Link)**, page 724
- **keepalive (CS7 Mated-SG)**, page 725
- **keepalive (CS7 M3UA)**, page 726
- **keepalive (CS7 Monitor)**, page 727
- **keepalive (CS7 SGMP)**, page 728
- **keepalive (CS7 SUA)**, page 729
- **keepalive (group peer)**, page 730
- **keepalive-timer (CS7 SMS profile parameters)**, page 731

- **keepalive-timers (CS7 SMS session parameters), page 732**
- **link (CS7 linkset), page 734**
- **link (CS7 monitor), page 736**
- **link-test, page 737**
- **link-timer, page 738**
- **load (cs7 route table), page 741**
- **load (CS7 SMS address-table), page 743**
- **local-ip (CS7 local peer), page 745**
- **local-ip (CS7 M3UA), page 746**
- **local-ip (CS7 MAPUA), page 747**
- **local-ip (CS7 SGMP), page 748**
- **local-ip (CS7 SUA), page 749**
- **local-ip (group), page 750**
- **local-ip (local IPC SCTP), page 751**
- **local-port, page 752**
- **map-dest-addr, page 753**
- **map-source-addr (cs7 mapua), page 755**
- **map-source-addr (cs7 sms smsmo), page 757**
- **match access-group, page 759**
- **match any (CS7 ASP), page 760**
- **match any (CS7 Linkset), page 761**
- **match ip (cs7 sms result), page 762**
- **match si (cs7 asp)), page 763**
- **match si (cs7 linkset), page 764**
- **match smpp id (cs7 sms result), page 765**
- **match ucp id (cs7 sms result), page 766**
- **max-inbound-streams (CS7 M3UA), page 767**
- **max-inbound-streams (CS7 SGMP), page 768**
- **max-inbound-streams (CS7 SUA), page 769**
- **max-messages (CS7 SMS SMSMO MSC PROXY), page 770**
- **maxQdepth, page 771**
- **max-return, page 772**
- **max-streams (group), page 773**
- **mnp, page 774**
- **modify-prefix, page 775**
- **msc-proxy-addr (cs7 sms smsmo), page 777**
- **mtp2, page 779**
- **mtp2-timer, page 780**

- **mtp2-timer ttc enable**, page 782
- **multi-message-dialogue**, page 783
- **multiplicity**, page 784
- **nai**, page 785
- **network-appearance**, page 786
- **new-name**, page 787
- **np**, page 788
- **orig-imsi (cs7 mlr ruleset rule)**, page 789
- **orig-imsi (cs7 sms set rule)**, page 790
- **orig-imsi-table (cs7 mlr ruleset rule)**, page 792
- **orig-imsi-table (cs7 sms set rule)**, page 794
- **orig-sme (cs7 mlr ruleset rule)**, page 796
- **orig-sme (cs7 sms set rule)**, page 798
- **orig-sme-table (cs7 mlr ruleset rule)**, page 800
- **orig-sme-table (cs7 sms set rule)**, page 802
- **orig-smsc**, page 804
- **path-retransmit (CS7 ASP)**, page 806
- **path-retransmit (CS7 Link)**, page 807
- **path-retransmit (CS7 Mated-SG)**, page 808
- **path-retransmit (CS7 M3UA)**, page 809
- **path-retransmit (CS7 SGMP)**, page 810
- **path-retransmit (CS7 SUA)**, page 811
- **path-retransmit (group peer)**, page 812
- **pc (cs7 gtt application group)**, page 813
- **pc (cs7 mlr result)**, page 814
- **pc (cs7 sms result)**, page 816
- **peer (group)**, page 817
- **peer-timer**, page 818
- **pid (cs7 mlr ruleset rule)**, page 819
- **pid (cs7 sms set rule)**, page 820
- **ping cs7**, page 822
- **plan-capacity-rcvd**, page 824
- **plan-capacity-send**, page 825
- **port**, page 826
- **post-gtt-address-conversion**, page 827
- **pre-gtt-address-conversion**, page 828
- **preventive-txp**, page 829
- **protocol sctp**, page 830

- **proxy-error-use (cs7 sms smsmo)**, page 831
- **qos-access-group**, page 832
- **qos-class (CS7 AS)**, page 833
- **qos-class (CS7 ASP)**, page 834
- **qos-class (CS7 gtt selector)**, page 835
- **qos-class (CS7 link)**, page 836
- **qos-class (CS7 Mated-SG)**, page 837
- **qos-ip-dscp**, page 838
- **qos-ip-precedence**, page 839
- **queue-depth (cs7 cdr service)**, page 840
- **queue-limit**, page 841
- **queue-timer**, page 842
- **receive-window (CS7 local peer)**, page 843
- **receive-window (CS7 M3UA)**, page 845
- **receive-window (CS7 SGMP)**, page 846
- **receive-window (CS7 SUA)**, page 847
- **receive-window (group)**, page 848
- **recovery-timeout**, page 850
- **redundancy**, page 851
- **remote-ip (CS7 ASP)**, page 852
- **remote-ip (CS7 Mated-SG)**, page 853
- **remote-ip (group peer)**, page 854
- **remote-ip (remote IPC SCTP)**, page 855
- **remote port (local IPC SCTP)**, page 856
- **remove route (CS7 AS route)**, page 857
- **remove route (route table)**, page 858
- **response-timer (cs7 sms profile parms)**, page 859
- **response-timer (cs7 sms session parms)**, page 861
- **result (cs7 mlr ruleset rule)**, page 863
- **result (cs7 sms set rule)**, page 865
- **retransmit-cwnd-rate (CS7 ASP)**, page 867
- **retransmit-cwnd-rate (CS7 Link)**, page 869
- **retransmit-cwnd-rate (CS7 Mated-SG)**, page 871
- **retransmit-cwnd-rate (CS7 M3UA)**, page 873
- **retransmit-cwnd-rate (CS7 SGMP)**, page 875
- **retransmit-cwnd-rate (CS7 SUA)**, page 877
- **retransmit-timeout (CS7 ASP)**, page 879
- **retransmit-timeout (CS7 Link)**, page 881

- **retransmit-timeout (CS7 Mated-SG)**, page 883
- **retransmit-timeout (CS7 M3UA)**, page 885
- **retransmit-timeout (CS7 SGMP)**, page 887
- **retransmit-timeout (CS7 SUA)**, page 889
- **retransmit-timeout (group peer)**, page 891
- **reuse-count**, page 893
- **rotate-sls**, page 894
- **routing-key (CS7 AS)**, page 895
- **routing-key (CS7 AS Route)**, page 899
- **rule (cs7 mlr ruleset)**, page 900
- **rule (cs7 sms set)**, page 903
- **ruleset (cs7 sms smsmo)**, page 905

# encapsulation cs7monitor

To set the encapsulation type on an interface to CS7 monitor, use the **encapsulation cs7monitor** command in interface configuration mode. To disable the encapsulation, use the **no** form of this command

**encapsulation cs7monitor**

**no encapsulation cs7monitor**

## Syntax Description

This command has no arguments or keywords.

## Defaults

No default behavior or values.

## Command Modes

Interface configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB12 | This command was introduced. |

## Usage Guidelines

The **encapsulation cs7monitor** command allows the interface to recognize SS7/MTP2 packets on the interface but does NOT implement the MTP2 protocol on that interface. The interface is merely listening to the MTP2 protocol and passing the important data MSUs to a third-party monitor.

The following example causes serial interface 4/7:0 to listen for the MTP2 protocol and pass the MSUs to a monitor:

```
interface serial4/7:0
 encapsulation cs7 monitor
```

## Related Commands

| Command     | Description                                                                                                  |
|-------------|--------------------------------------------------------------------------------------------------------------|
| cs7 monitor | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

# encapsulation mtp2

To specify MTP2 encapsulation, use the **encapsulation mtp2** command in interface configuration mode. To turn off MTP2 encapsulation for the interface and return to the default HDLC encapsulation, use the **no** form of the command.

**encapsulation mtp2**

**no encapsulation mtp2**

## Syntax Description

This command has no arguments or keywords.

## Defaults

The default encapsulation is HDLC.

## Command Modes

Interface configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Usage Guidelines

The **encapsulation mtp2** command allows the interface to recognize SS7/MTP2 protocol packets and implements the MTP2 protocol on that interface. Traditional SS7 links use serial interfaces. You must configure ITP router interfaces to use MTP2 encapsulation.

## Examples

The following example configures serial interface 0 to use MTP2 encapsulation:

```
interface serial0/0
no ip address
encapsulation mtp2
```

## Related Commands

| Command           | Description                      |
|-------------------|----------------------------------|
| <b>mtp2-timer</b> | Tunes MTP2 encapsulation timers. |



## esme cdr consolidation (cs7 sms result)

To configure ESME (large-account) CDR consolidation string to place in the CDR when a message is routed to this result group, use the **esme cdr consolidation** command in cs7 sms result configuration mode. To remove the configuration, use the **no** form of this command.

**esme cdr consolidation** *consolidation-string*

**no esme cdr consolidation** *consolidation-string*

|                           |                                                                                       |
|---------------------------|---------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>consolidation-string</i> CDR consolidation string. Valid value is 1 - 5 characters |
|---------------------------|---------------------------------------------------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                              |
|----------------------|------------------------------|
| <b>Command Modes</b> | CS7 sms result configuration |
|----------------------|------------------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(25)SW | This command was introduced. |

### Usage Guidelines

|                 |                                                                                                                         |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example configures a result group named OFFISLAND with result type ESME, and specifies CDR consolidation: |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|

```
cs7 sms result-group OFFISLAND esme
esme cdr consolidation 1
```

| <b>Related Commands</b> | Command                     | Description                |
|-------------------------|-----------------------------|----------------------------|
|                         | <b>cs7 sms result-group</b> | Configures a result group. |

## esme id (cs7 sms result)

To configure an ESME (large-account) identifier, use the **esme id** command in `cs7 sms result` configuration mode. To remove the configuration, use the **no** form of this command.

**esme id** *id*

**no esme id** *id*

|                           |                                                                                                                             |                              |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Syntax Description</b> | <i>id</i> ESME identifier, in the range 100 to 99999.                                                                       |                              |
| <b>Defaults</b>           | No default behavior or values                                                                                               |                              |
| <b>Command Modes</b>      | CS7 sms result configuration                                                                                                |                              |
| <b>Command History</b>    | <b>Release</b>                                                                                                              | <b>Modification</b>          |
|                           | 12.2(25)SW                                                                                                                  | This command was introduced. |
| <b>Usage Guidelines</b>   |                                                                                                                             |                              |
| <b>Examples</b>           | The following example configures a result group named OFFISLAND with result type ESME, and specifies an account identifier: |                              |
|                           | <pre>cs7 sms result-group OFFISLAND esme   esme id 100</pre>                                                                |                              |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                              | <b>Description</b>           |
|                           | <b>cs7 sms result-group</b>                                                                                                 | Configures a result group.   |

# false-congestion

To configure the false congestion detection level for linkset, use the **false-detection** command in cs7 linkset configuration mode. To remove the setting, use the **no** form of this command.

**false-congestion** *level*

**no false-congestion** *level*

|                           |              |                                                                           |
|---------------------------|--------------|---------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>level</i> | Level at which false congestion is detected. Valid values are 1, 2, or 3. |
|---------------------------|--------------|---------------------------------------------------------------------------|

## Defaults

|                      |                           |
|----------------------|---------------------------|
| <b>Command Modes</b> | CS7 linkset configuration |
|----------------------|---------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB7     | This command was introduced. |

## Examples

The following example sets false congestion level 2 for the linkset named to\_doc:

```
cs7 linkset to_doc
 false-congestion 2
```

|                         |                    |                                                                                           |
|-------------------------|--------------------|-------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>     | <b>Description</b>                                                                        |
|                         | <b>cs7 linkset</b> | Specifies a linkset and enters CS7 linkset submenu.                                       |
|                         | <b>show cs7</b>    | Displays the ITP basic configuration, including the point code and capability point code. |

## fast-cwnd-rate (cs7 asp)

To configure the rate at which the SCTP congestion window size is reduced due to a fast retransmission, use the **fast-cwnd-rate** command in cs7 asp configuration mode. To disable the configuration, use the **no** form of this command.

**fast-cwnd-rate** *percent*

**no fast-cwnd-rate** *percent*

### Syntax Description

|                |                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default is 50 percent.

### Command Modes

CS7 asp configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The fast-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to a fast retransmission on the SCTP association.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following examples set the fast congestion window rate to 60 percent:

```
cs7 asp ASP1 2905 2905 m3ua
  remote-ip 1.1.1
  fast-cwnd-rate 60
```

### Related Commands

| Command                        | Description                                                                                                     |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------|
| retransmit-cwnd-rate (CS7 ASP) | Configures the rate at which the SCTP congestion window size is reduced due to retransmission timer expirations |

## fast-cwnd-rate (cs7 link)

To configure the rate at which the SCTP congestion window size is reduced due to a fast retransmission, use the **fast-cwnd-rate** command in cs7 link configuration mode. To disable the configuration, use the **no** form of this command.

**fast-cwnd-rate** *percent*

**no fast-cwnd-rate** *percent*

|                           |                |                                                                                                                                                         |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                            |
|-----------------|----------------------------|
| <b>Defaults</b> | The default is 50 percent. |
|-----------------|----------------------------|

|                      |                        |
|----------------------|------------------------|
| <b>Command Modes</b> | CS7 link configuration |
|----------------------|------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(19)SW     | This command was introduced. |

|                         |                                                                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The fast-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to a fast retransmission on the SCTP association. |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

|                 |                                                                          |
|-----------------|--------------------------------------------------------------------------|
| <b>Examples</b> | The following example set the fast congestion window rate to 60 percent. |
|-----------------|--------------------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000

fast-cwnd-rate 60
```

| <b>Related Commands</b> | <b>Command</b>                  | <b>Description</b>                                                                                                                                      |
|-------------------------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | retransmit-cwnd-rate (CS7 Link) | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |

## fast-cwnd-rate (cs7 m3ua)

To configure the rate at which the SCTP congestion window size is reduced due to a fast retransmission, use the **fast-cwnd-rate** command in cs7 m3ua configuration mode. To disable the configuration, use the **no** form of this command.

**fast-cwnd-rate** *percent*

**no fast-cwnd-rate** *percent*

### Syntax Description

|                |                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default is 50 percent.

### Command Modes

CS7 m3ua configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The fast-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to a fast retransmission on the SCTP association.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example set the fast congestion window rate to 60 percent.

```
cs7 m3ua 2905
 local-ip 4.4.4.4
 fast-cwnd-rate 60
```

### Related Commands

| Command                         | Description                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| retransmit-cwnd-rate (CS7 M3UA) | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |

## fast-cwnd-rate (cs7 mated-sg)

To configure the rate at which the SCTP congestion window size is reduced due to a fast retransmission, use the **fast-cwnd-rate** command in cs7 mated-sg configuration mode. To disable the configuration, use the **no** form of this command.

**fast-cwnd-rate** *percent*

**no fast-cwnd-rate** *percent*

|                           |                |                                                                                                                                                         |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                            |
|-----------------|----------------------------|
| <b>Defaults</b> | The default is 50 percent. |
|-----------------|----------------------------|

|                      |                            |
|----------------------|----------------------------|
| <b>Command Modes</b> | CS7 mated-sg configuration |
|----------------------|----------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(19)SW     | This command was introduced. |

|                         |                                                                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The fast-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to a fast retransmission on the SCTP association. |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Note**

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

|                 |                                                                          |
|-----------------|--------------------------------------------------------------------------|
| <b>Examples</b> | The following example set the fast congestion window rate to 60 percent. |
|-----------------|--------------------------------------------------------------------------|

```
cs7 mated-sg BLUE 5000
remote-ip 5.5.5.5
fast-cwnd-rate 60
```

|                         |                                     |                                                                                                                                                         |
|-------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                      | <b>Description</b>                                                                                                                                      |
|                         | retransmit-cwnd-rate (CS7 Mated-SG) | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |

## fast-cwnd-rate (cs7 sgmp)

To configure the rate at which the SCTP congestion window size is reduced due to a fast retransmission, use the **fast-cwnd-rate** command in cs7 sgmp configuration mode. To disable the configuration, use the **no** form of this command.

**fast-cwnd-rate** *percent*

**no fast-cwnd-rate** *percent*

### Syntax Description

|                |                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default is 50 percent.

### Command Modes

CS7 sgmp configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The fast-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to a fast retransmission on the SCTP association.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example set the fast congestion window rate to 60 percent.

```
cs7 sgmp 5000
 local-ip 4.4.4.4
 fast-cwnd-rate 60
```

### Related Commands

| Command                         | Description                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| retransmit-cwnd-rate (CS7 SGMP) | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |



## fast-cwnd-rate (cs7 sua)

To configure the rate at which the SCTP congestion window size is reduced due to a fast retransmission, use the **fast-cwnd-rate** command in cs7 sua configuration mode. To disable the configuration, use the **no** form of this command.

**fast-cwnd-rate** *percent*

**no fast-cwnd-rate** *percent*

|                           |                |                                                                                                                                                         |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |
|---------------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                            |
|-----------------|----------------------------|
| <b>Defaults</b> | The default is 50 percent. |
|-----------------|----------------------------|

|                      |                       |
|----------------------|-----------------------|
| <b>Command Modes</b> | CS7 sua configuration |
|----------------------|-----------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(19)SW     | This command was introduced. |

|                         |                                                                                                                                                                                       |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The fast-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to a fast retransmission on the SCTP association. |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

|                 |                                                                          |
|-----------------|--------------------------------------------------------------------------|
| <b>Examples</b> | The following example set the fast congestion window rate to 60 percent. |
|-----------------|--------------------------------------------------------------------------|

```
cs7 sua 15000
 local-ip 4.4.4.4
 fast-cwnd-rate 60
```

| <b>Related Commands</b> | <b>Command</b>                 | <b>Description</b>                                                                                                                                      |
|-------------------------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         | retransmit-cwnd-rate (CS7 SUA) | Rate at which the size of the SCTP congestion window will be decreased due a fast retransmission. Range is 0 to 100 percent. The default is 50 percent. |

# fast-start

To configure the fast-start option for establishing TCP connectivity, use the **fast-start** command in `cs7` monitor configuration mode. To disable the fast-start, use the **no** form of this command.

**fast-start**

**no fast-start**

---

**Syntax Description** This command has no arguments or keywords.

---

**Defaults** Fast-start is disabled.

---

**Command Modes** CS7 monitor configuration

---

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB12 | This command was introduced. |

---



---

**Usage Guidelines** After the TCP session with the remote server is established, the ITP will not send MSUs from the monitored links to the server until the server responds to the first keepalive. This mechanism prevents the ITP from over-running the server until the TCP session (and receive window) are fully established. Configuration of fast-start overrides this mechanism and allows the ITP to start sending MSUs to the server immediately after the TCP session is established.



**Caution**

---

MSUs might be lost until the TCP session (and receive window) are fully established.

---



---

**Examples** The following example allows the ITP to start sending MSUs to the server immediately after the TCP session is established:

```
cs7 monitor 9000
 fast-start
```

---

| Command                  | Description                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------|
| <code>cs7 monitor</code> | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

---

# get-imsi

To specify the GetIMSI procedure for an SMPP MAPUA, use the **get-imsi** command in cs7 mapua configuration mode. To remove the line from the configuration, use the **no** form of this command.

**get-imsi** [**include-msc**]

**no get-imsi**

| Syntax Description | <b>include-msc</b> (Optional) Include the MSC number in the GetIMSI response. |
|--------------------|-------------------------------------------------------------------------------|
|--------------------|-------------------------------------------------------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | CS7 mapua configuration |
|---------------|-------------------------|
|---------------|-------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Usage Guidelines | <p>For a given SMPP MAPUA, either <b>get-imsi</b> or <b>get-msrn</b> must be specified. If neither procedure is specified, the SMPP requests will not be accepted from the MMSC.</p> <p>More than SMPP MAPUA can be defined, as shown in the example.</p> |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | <p>The following example shows configuration of 2 SMPP MAPUAs. The first specifies <b>get-imsi</b>. The second specifies <b>get-msrn</b>:</p> |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------|

```
cs7 mapua GetIMSI smpp 9000
  local-ip 4.4.4.4
  client 1.1.1.1
  client 2.2.2.2
  client dynamic
  map-source-addr digits 1234567890 type 9
  get-imsi include-msc
  smpp response-timer 6000
  smpp session-init-timer 3000
!
cs7 mapua GetMSRN smpp 9001
  local-ip 4.4.4.4
  client 1.1.1.1
  client 2.2.2.2
  map-source-addr digits 1234567890 type 9
  invoke-timer 15
  get-msrn map-version 2
  smpp response-timer 2000
```

**Related Commands**

| Command   | Description                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------|
| cs7 mapua | Specifies the name, protocol, and local port number for the MAP Proxy feature and enables the CS7 MAPUA submode |

# get-msrn

To specify the GetMSRN procedure for an SMPP MAPUA, use the **get-msrn** command in cs7 mapua configuration mode. To remove the line from the configuration, use the **no** form of this command.

**get-msrn** [**map-version** *version*]

**no get-msrn**

| Syntax Description | map-version | (Optional) Indicates the default GSM MAP version to be used for the GetMSRN procedure. |
|--------------------|-------------|----------------------------------------------------------------------------------------|
|                    | version     | Version number. Valid range is 1 to 3. The default is 2.                               |

| Defaults | Version 2. |
|----------|------------|
|----------|------------|

| Command Modes | CS7 mapua configuration |
|---------------|-------------------------|
|---------------|-------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Usage Guidelines | <p>For a given SMPP MAPUA, either <b>get-imsi</b> or <b>get-msrn</b> must be specified. If neither procedure is specified, the SMPP requests will not be accepted from the MMSC.</p> <p>More than SMPP MAPUA can be defined, as shown in the example.</p> |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | <p>The following example shows configuration of 2 SMPP MAPUAs. The first specifies <b>get-imsi</b>. The second specifies <b>get-msrn</b>:</p> |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------|
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------|

```
cs7 mapua GetIMSI smpp 9000
  local-ip 4.4.4.4
  client 1.1.1.1
  client 2.2.2.2
  client dynamic
  map-source-addr digits 1234567890 type 9
  get-imsi include-msc
  smpp response-timer 6000
  smpp session-init-timer 3000
!
cs7 mapua GetMSRN smpp 9001
  local-ip 4.4.4.4
  client 1.1.1.1
  client 2.2.2.2
  map-source-addr digits 1234567890 type 9
  invoke-timer 15
  get-msrn map-version 2
  smpp response-timer 2000
```

**Related Commands**

| Command   | Description                                                                                                     |
|-----------|-----------------------------------------------------------------------------------------------------------------|
| cs7 mapua | Specifies the name, protocol, and local port number for the MAP Proxy feature and enables the CS7 MAPUA submode |

# gprs-delivery prefer-sgsn

To specify that DSMR will first attempt SMS MT delivery to the SGSN address when the HLR provides both MSC and SGSN addresses in an SRI-SM confirmation, use the **gprs-delivery prefer-sgsn** command in CS7 SMS GSM-SMSMO configuration mode. To remove the configuration, use the **no** form of this command.

**gprs-delivery prefer-sgsn**

**no gprs-delivery prefer-sgsn**

## Syntax Description

This command has no arguments or keywords.

## Defaults

If not specified, DSMR will first attempt to deliver the message to the MSC when both MSC and SGSN addresses are returned by the HLR.

## Command Modes

CS7 SMS GSM SMSMO configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(25)SW1 | This command was introduced. |

## Usage Guidelines

The **gprs-delivery prefer-sgsn** command enables some customization of MT deliveries involving GPRS destinations. This command only has effect if the **sm-sc-map-version** command is configured to 3 or greater.

When the **prefer-sgsn** option is specified, DSMR will first attempt SMS MT delivery to the SGSN address when the HLR provides both MSC and SGSN addresses in an SRI-SM confirmation.

If not configured, DSMR will first attempt to deliver the message to the MSC when both MSC and SGSN addresses are returned by the HLR.

## Examples

The last line in the following example specifies that DSMR will first attempt SMS MT delivery to the SGSN address when the HLR provides both MSC and SGSN addresses in an SRI-SM confirmation:

```
cs7 sms route-table
cdr-service CDR1
gsm-map sms-mo ssn 8
gprs-delivery prefer-sgsn
```

| Related Commands | Command                           | Description                                                    |
|------------------|-----------------------------------|----------------------------------------------------------------|
|                  | gsm-map (cs7 sms route table)     | Specifies the inbound/received GSM MAP operations to be routed |
|                  | sm-sc-map-version (cs7 sms smsmo) | Specifies a locally supported MAP version.                     |



# gsm-authent-vlr

To enable `authent-vlr` submode for provisioning parameters specific to the `Process_Obtain_Authentication_Sets_VLR` service, use the **gsm-authent-vlr** command in `cs7 mapua` configuration mode. To remove the line from the configuration, use the **no** form of this command.

**gsm-authent-vlr**

**no gsm-authent-vlr**

## Syntax Description

This command has no arguments or keywords.

## Defaults

If not specified, the default behavior described under each parameter is applied.

## Command Modes

CS7 mapua configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

## Examples

The following example enables `authent-vlr` submode, then specifies **cache-size** and **max-return**:

```
gsm-authent-vlr
  cache-size 100
  max-return 2
```

## Related Commands

| Command                                     | Description                                                                                                           |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <code>authorize</code>                      | Specifies that authorization of the IMSI must be performed by accessing the subscriber's profile stored in the HLR.   |
| <code>cache-size</code>                     | Specifies the total number of IMSIs for which authentication triplets will be cached.                                 |
| <code>cs7 mapua</code>                      | Specifies the name, protocol, and local port number for the MAP Proxy feature and enables the CS7 MAPUA submode       |
| <code>invoke-timer (cs7 authent-vlr)</code> | Specifies the amount of time, in seconds, that the MAP Proxy will wait for a response to a sent TCAP Invoke component |
| <code>max-return</code>                     | Specifies the maximum number of authentication triplets that may be returned to a MAPUA client for a single request.  |
| <code>reuse-count</code>                    | Specifies the total number of times a previously returned (stale) authentication triplet can be reused.               |

## gsm-map (cs7 sms route table)

To specify the inbound/received GSM MAP operations to be routed, use the **gsm-map** command in cs7 sms route table configuration mode. To remove the specification, use the **no** form of this command.

**gsm-map sms-mo ssn** *ssn*

**no gsm-map sms-mo ssn** *ssn*

|                           |               |                                                                                                                         |
|---------------------------|---------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>sms-mo</b> | The GSM-MAP operation. In the current release, the only valid entry is <b>sms-mo</b> , which configures SMS MO routing. |
|                           | <b>ssn</b>    | The subsystem number to register for this configuration.                                                                |
|                           | <i>ssn</i>    | Subsystem number. Valid numbers are in the range 2 to 255.                                                              |

**Defaults** No default behavior or values.

**Command Modes** CS7 sms route table configuration

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

**Usage Guidelines** The **gsm-map** command enables CS7 SMS GSM SMSMO configuration mode.

Unconfiguring gsm-map will abnormally terminate all outstanding dialogues associated with the transport.

The following example identifies the GSM MAP operation SMS MO:

```
cs7 sms route-table
gsm-map sms-mo ssn 8
```

|                         |                                               |                                                                                                         |
|-------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                                | <b>Description</b>                                                                                      |
|                         | <b>cs7 sms route-table</b>                    | Configures an SMS route table.                                                                          |
|                         | <b>gprs-delivery prefer-sgsn</b>              | Enables customization of MT deliveries involving GPRS destinations.                                     |
|                         | <b>invoke-timer (cs7 sms gsm smsmo)</b>       | Specifies a timer to supervise initiated dialogues.                                                     |
|                         | <b>map-source-addr (cs7 sms smsmo)</b>        | Configures a local source address of application.                                                       |
|                         | <b>max-messages (CS7 SMS SMSMO MSC PROXY)</b> | Specifies the maximum number of open MO SMS messages allowed before a congestion response is generated. |
|                         | <b>mnp</b>                                    | Allows configuration of SMR options specific to mobile number portability.                              |

| Command                                    | Description                                                 |
|--------------------------------------------|-------------------------------------------------------------|
| <b>msc-proxy-addr</b> (cs7<br>sms smsmo)   | Configures a MAP MSC Proxy address.                         |
| <b>proxy-error-use</b> (cs7<br>sms smsmo)  | Return the error received from the last MO Proxy procedure. |
| <b>ruleset</b> (cs7 sms<br>smsmo)          | Applies an SMS routing ruleset.                             |
| <b>smsc-map-version</b> (cs7<br>sms smsmo) | Configures a locally supported MAP version.                 |

## gta app-grp

To create or modify a GTA entry that translates a GTA to a GTT application group, use the **gta app-grp** command in cs7 gtt selector configuration mode. To delete a GTA entry, use the **no** form of the command.

**gta** *gta app-grp app-grp*

**no** *gta gta*

### Syntax Description

|                |                                                                                                |
|----------------|------------------------------------------------------------------------------------------------|
| <i>gta</i>     | Global Title Address. Valid values are hexadecimal numbers in the range of 1 to 15 characters. |
| <b>app-grp</b> | Result type specifying that GTA translates to a GTT Application Group.                         |
| <i>app-grp</i> | Name of application group.                                                                     |

### Defaults

No default behavior or values

### Command Modes

CS7 gtt selector configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

If load sharing is required for the intermediate GTT, then the result of the GTT must use a GTT application group.

### Examples

The following example translates gta 919363 to the application group named group1:

```
gta 919363 app-grp group1
```

### Related Commands

| Command                       | Description                                 |
|-------------------------------|---------------------------------------------|
| <b>cs7 gtt concern-pclist</b> | Configures a GTT concerned point code list. |
| <b>cs7 gtt selector</b>       | Specifies a GTT selector.                   |
| <b>show cs7 gtt gta</b>       | Displays CS7 GTT GTA entries.               |
| <b>show cs7 gtt map</b>       | Displays CS7 GTT MAP entries.               |

## gta asname

To create or modify a GTA entry that translates to an M3UA or SUA application server name, use the **gta asname** command in cs7 gtt selector configuration mode. To delete a GTA entry, use the **no** form of the command.

```
gta gta asname asname {gt | pcssn} {ntt ntt | ssn ssn}
```

```
no gta gta
```

### Syntax Description

|               |                                                                                                |
|---------------|------------------------------------------------------------------------------------------------|
| <i>gta</i>    | Global Title Address. Valid values are hexadecimal numbers in the range of 1 to 15 characters. |
| <b>asname</b> | Result type specifying that GTA translates to an M3UA or SUA application server name.          |
| <i>asname</i> | Name of M3UA or SUA Application Server.                                                        |
| <b>gt</b>     | Set routing indicator (RI) to Route on Global Title                                            |
| <b>pcssn</b>  | Set RI to Route on Point Code and Subsystem Number.                                            |
| <b>ntt</b>    | Specifies a new translation type                                                               |
| <i>ntt</i>    | New translation type, in the range 0 through 255,                                              |
| <b>ssn</b>    | Specifies a subsystem number.                                                                  |
| <i>ssn</i>    | Subsystem number, in the range 2 through 255.                                                  |

### Defaults

No default behavior or values

### Command Modes

CS7 gtt selector configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

The **gta asname** command allows you to assign a global title translation to an M3UA or SUA AS, instead of a point code and SSN. By specifying the asname here, backup systems solely reside underneath the specified AS via the **cs7 as** command.

### Examples

The following example configures a GTA entry that translates to an SUA AS named GREENASP3:

```
cs7 as GREENASP3 sua
  routing-key 3 gtt
  asp ASP3
.
.
.
cs7 gtt selector E164SEL 14
  gta 1123456789001 asname GREENASP3 pcssn
```

**Related Commands**

| Command                 | Description                                                          |
|-------------------------|----------------------------------------------------------------------|
| <b>cs7 as</b>           | Specifies an Application Server and enables the CS7 AS submode.      |
| <b>cs7 gtt selector</b> | Specifies a GTT selector.                                            |
| <b>cs7 m3ua</b>         | Specifies the local port number for SUA and enters CS7 M3UA submode. |
| <b>cs7 sua</b>          | Specifies the local port number for SUA and enters CS7 SUA submode   |
| <b>show cs7 gtt gta</b> | Displays CS7 GTT GTA entries.                                        |

## gta pcssn

To create or modify a GTA entry that translates a GTA to a point code and optional subsystem number, use the **gta pcssn** command in cs7 gtt selector configuration mode. To delete a GTA entry, use the **no** form of the command.

```
gta gta pcssn pc {gt | pcssn} {ntt ntt | ssn ssn} }
```

```
no gta gta
```

### Syntax Description

|              |                                                                                                |
|--------------|------------------------------------------------------------------------------------------------|
| <i>gta</i>   | Global Title Address. Valid values are hexadecimal numbers in the range of 1 to 15 characters. |
| <b>pcssn</b> | Result type specifying that GTA translates to a point code and optional subsystem number.      |
| <i>pc</i>    | Point code, in the form zone.region.sp.                                                        |
| <b>gt</b>    | Set routing indicator (RI) to Route on Global Title                                            |
| <b>pcssn</b> | Set RI to Route on Point Code and Subsystem Number.                                            |
| <b>ntt</b>   | Specifies a new translation type                                                               |
| <i>ntt</i>   | New translation type, in the range 0 through 255,                                              |
| <b>ssn</b>   | Specifies a subsystem number.                                                                  |
| <i>ssn</i>   | Subsystem number, in the range 2 through 255.                                                  |

### Defaults

No default behavior or values

### Command Modes

CS7 gtt selector configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

You must configure at least one subsystem for the point code, or else the command will fail.

### Examples

The following example adds GTA entry 1111 translating to point code 1.2.3 and sets the routing indicator to route on global title.

```
gta 1111 pcssn 1.2.3 gt
```

The following example modifies GTA entry 1111 translating to point code 1.2.3 and sets the routing indicator to route on point code and subsystem number.

```
gta 1111 pcssn 1.2.3 pcssn
```

The following example deletes GTA entry 1111.

```
no gta 1111
```

**Related Commands**

| Command                       | Description                                 |
|-------------------------------|---------------------------------------------|
| <b>cs7 gtt concern-pclist</b> | Configures a GTT concerned point code list. |
| <b>cs7 gtt selector</b>       | Specifies a GTT selector.                   |
| <b>show cs7 gtt gta</b>       | Displays CS7 GTT GTA entries.               |
| <b>show cs7 gtt map</b>       | Displays CS7 GTT MAP entries.               |



# gta qos-class

To set the QoS class for a global title address, use the **gta qos-class** command in **cs7 gtt selector** configuration mode. To remove the configuration, use the **no** form of the command.

```
gta gta qos-class class {[app-grp app-grp] | [pcssn pc {gt ntt ntt} | {pcssn {ntt ntt} | {ssn ssn}}]}
```

```
no gta gta qos-class
```

| Syntax Description |                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------|
| <i>gta</i>         | Global Title Address. Valid values are hexadecimal numbers in the range of 1 to 15 characters. |
| <i>qos-class</i>   | QoS class. Valid range is 0 through 7.                                                         |
| <b>app-grp</b>     | GTA translated to a GTT application group.                                                     |
| <i>app-grp</i>     | Name of application group.                                                                     |
| <b>pcssn</b>       | GTA translated to a point code and optional subsystem number.                                  |
| <i>pc</i>          | Point code in the form zone.region.sp.                                                         |
| <b>gt</b>          | Set the routing indicator to “route on global title.”                                          |
| <b>ntt</b>         | Specifies a new translation type.                                                              |
| <i>ntt</i>         | New translation type. Valid range is 0 through 255.                                            |
| <b>pcssn</b>       | Set the routing indicator to “route on point code and subsystem number.”                       |
| <b>ssn</b>         | Specifies a subsystem number.                                                                  |
| <i>ssn</i>         | Subsystem number. Valid range is 2 through 255.                                                |

**Defaults** No default behavior or values

**Command Modes** CS7 gtt selector configuration

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Usage Guidelines** If the QoS class entered for a GTA is not defined, SCCP packets for the GTA are routed over the default class peer link members.

**Examples** The following example configures a QoS class 3 for the GTA 1324:

```
cs7 gtt selector c7gsp 3 2
gta 1324 qos-class 3 2 pcssn 2.2.2 gt ssn 2
```

| Related Commands | Command       | Description                     |
|------------------|---------------|---------------------------------|
|                  | cs7 qos class | Defines a QoS class.            |
|                  | show cs7 qos  | Displays QoS class information. |
|                  |               |                                 |

# gtt-accounting

To enable GTT accounting on this linkset, use the **gtt-accounting** command in cs7 linkset configuration mode. To disable GTT accounting on this linkset, use the **no** form of this command.

**gtt-accounting**

**no gtt-accounting**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |          |
|-----------------|----------|
| <b>Defaults</b> | Disabled |
|-----------------|----------|

|                      |                           |
|----------------------|---------------------------|
| <b>Command Modes</b> | CS7 linkset configuration |
|----------------------|---------------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

|                 |                                                                           |
|-----------------|---------------------------------------------------------------------------|
| <b>Examples</b> | The following example enables GTT accounting on the linkset named to_doc: |
|-----------------|---------------------------------------------------------------------------|

```
cs7 linkset to_doc
gtt-accounting
```

| Related Commands | Command             | Description                                         |
|------------------|---------------------|-----------------------------------------------------|
|                  | cs7 linkset         | Specifies a linkset and enters CS7 linkset submode. |
|                  | show cs7 accounting | Displays ITP accounting details.                    |

# hsl

To configure CS7 link profile parameters for HSL, use the **hsl** command in cs7 profile configuration mode. To disable the settings, use the **no** form of this command.

**hsl**

**no hsl**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |          |
|-----------------|----------|
| <b>Defaults</b> | Disabled |
|-----------------|----------|

|                      |                           |
|----------------------|---------------------------|
| <b>Command Modes</b> | CS7 profile configuration |
|----------------------|---------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

|                 |                                                                                                                                                                                                                            |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | <p>The following example defines a profile named SAAL, configures the profile to support HSL, specifies the packet bundling interval and SSCF NNI timers, then applies the profile to all the links in linkset to_nyc:</p> |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
cs7 profile SAAL
 hsl
  bundling 10
  sscf-nni t1 10
  sscf-nni t2 150
  sscf-nni t3 100
.
.
cs7 linkset to_nyc
 profile SAAL
```

|                         |                    |                                                                   |
|-------------------------|--------------------|-------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>     | <b>Description</b>                                                |
|                         | <b>cs7 profile</b> | Defines a profile that you can apply to all links in a linkset.   |
|                         | <b>variant</b>     | Specifies which of the SS7 variations the CS7 profile is running. |

## idle-cwnd-rate (cs7 asp)

To configure the rate at which the SCTP congestion window size is reduced due to idle time, use the **idle-cwnd-rate** command in cs7 asp configuration mode. To disable the configuration, use the **no** form of this command.

**idle-cwnd-rate** *percent*

**no idle-cwnd-rate** *percent*

### Syntax Description

|                |                                                                                                                                                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due to the association being idle. Range is 0 to 100 percent. The default is 50 percent. |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default is 50 percent.

### Command Modes

CS7 asp configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The idle-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to the SCTP association being idle. The SCTP congestion window will not decrease below the initial congestion window size regardless of the rate and the length of idle time.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example set the idle congestion window rate to 60 percent.

```
cs7 asp ASP1 2905 2905 m3ua
remote-ip 1.1.1
idle-cwnd-rate 60
```

### Related Commands

| Command                  | Description                                        |
|--------------------------|----------------------------------------------------|
| init-cwnd-size (cs7 asp) | Configure the SCTP initial congestion window size. |

# idle-cwnd-rate (cs7 link)

To configure the rate at which the SCTP congestion window size is reduced due to idle time, use the **idle-cwnd-rate** command in cs7 link configuration mode. To disable the configuration, use the **no** form of this command.

**idle-cwnd-rate** *percent*

**no idle-cwnd-rate** *percent*

## Syntax Description

|                |                                                                                                                                                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due to the association being idle. Range is 0 to 100 percent. The default is 50 percent. |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

The default is 50 percent.

## Command Modes

CS7 link configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

## Usage Guidelines

The idle-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to the SCTP association being idle. The SCTP congestion window will not decrease below the initial congestion window size regardless of the rate and the length of idle time.



### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

## Examples

The following example set the idle congestion window rate to 60 percent.

```
cs7 linkset michael 10.1.1
 link 0 sctp 172.18.44.147 7000 7000

 idle-cwnd-rate 60
```

## Related Commands

| Command                   | Description                                        |
|---------------------------|----------------------------------------------------|
| init-cwnd-size (cs7 link) | Configure the SCTP initial congestion window size. |

## idle-cwnd-rate (cs7 mated-sg)

To configure the rate at which the SCTP congestion window size is reduced due to idle time, use the **idle-cwnd-rate** command in cs7 mated-sg configuration mode. To disable the configuration, use the **no** form of this command.

**idle-cwnd-rate** *percent*

**no idle-cwnd-rate** *percent*

### Syntax Description

|                |                                                                                                                                                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due to the association being idle. Range is 0 to 100 percent. The default is 50 percent. |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default is 50 percent.

### Command Modes

CS7 mated-sg configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The idle-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to the SCTP association being idle. The SCTP congestion window will not decrease below the initial congestion window size regardless of the rate and the length of idle time.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example set the idle congestion window rate to 60 percent.

```
cs7 mated-sg BLUE 5000
remote-ip 5.5.5.5
idle-cwnd-rate 60
```

### Related Commands

| Command                       | Description                                        |
|-------------------------------|----------------------------------------------------|
| init-cwnd-size (cs7 mated-sg) | Configure the SCTP initial congestion window size. |

# idle-cwnd-rate (cs7 m3ua)

To configure the rate at which the SCTP congestion window size is reduced due to idle time, use the **idle-cwnd-rate** command in cs7 m3ua configuration mode. To disable the configuration, use the **no** form of this command.

**idle-cwnd-rate** *percent*

**no idle-cwnd-rate** *percent*

## Syntax Description

|                |                                                                                                                                                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due to the association being idle. Range is 0 to 100 percent. The default is 50 percent. |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

The default is 50 percent.

## Command Modes

CS7 m3ua configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

## Usage Guidelines

The idle-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to the SCTP association being idle. The SCTP congestion window will not decrease below the initial congestion window size regardless of the rate and the length of idle time.



### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

## Examples

The following example set the idle congestion window rate to 60 percent.

```
cs7 m3ua 2905
 local-ip 4.4.4.4
 idle-cwnd-rate 60
```

## Related Commands

| Command                   | Description                                        |
|---------------------------|----------------------------------------------------|
| init-cwnd-size (cs7 m3ua) | Configure the SCTP initial congestion window size. |



# idle-cwnd-rate (cs7 sgmp)

To configure the rate at which the SCTP congestion window size is reduced due to idle time, use the **idle-cwnd-rate** command in cs7 sgmp configuration mode. To disable the configuration, use the **no** form of this command.

**idle-cwnd-rate** *percent*

**no idle-cwnd-rate** *percent*

|                           |                |                                                                                                                                                                 |
|---------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due to the association being idle. Range is 0 to 100 percent. The default is 50 percent. |
|---------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                            |
|-----------------|----------------------------|
| <b>Defaults</b> | The default is 50 percent. |
|-----------------|----------------------------|

|                      |                        |
|----------------------|------------------------|
| <b>Command Modes</b> | CS7 sgmp configuration |
|----------------------|------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(19)SW     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                   |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The idle-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to the SCTP association being idle. The SCTP congestion window will not decrease below the initial congestion window size regardless of the rate and the length of idle time. |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



## Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

|                 |                                                                          |
|-----------------|--------------------------------------------------------------------------|
| <b>Examples</b> | The following example set the idle congestion window rate to 60 percent. |
|-----------------|--------------------------------------------------------------------------|

```
cs7 sgmp 5000
 local-ip 4.4.4.4
 idle-cwnd-rate 60
```

| <b>Related Commands</b> | <b>Command</b>            | <b>Description</b>                                 |
|-------------------------|---------------------------|----------------------------------------------------|
|                         | init-cwnd-size (cs7 sgmp) | Configure the SCTP initial congestion window size. |

## idle-cwnd-rate (cs7 sua)

To configure the rate at which the SCTP congestion window size is reduced due to idle time, use the **idle-cwnd-rate** command in **cs7 sua** configuration mode. To disable the configuration, use the **no** form of this command.

**idle-cwnd-rate** *percent*

**no idle-cwnd-rate** *percent*

### Syntax Description

|                |                                                                                                                                                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i> | Rate at which the size of the SCTP congestion window will be decreased due to the association being idle. Range is 0 to 100 percent. The default is 50 percent. |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default is 50 percent.

### Command Modes

CS7 sua configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The idle-cwnd-rate parameter allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to the SCTP association being idle. The SCTP congestion window will not decrease below the initial congestion window size regardless of the rate and the length of idle time.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example set the idle congestion window rate to 60 percent.

```
cs7 sua 15000
 local-ip 4.4.4.4
 idle-cwnd-rate 60
```

### Related Commands

| Command                  | Description                                        |
|--------------------------|----------------------------------------------------|
| init-cwnd-size (cs7 sua) | Configure the SCTP initial congestion window size. |

# inactivity-timer (cs7 sms profile parameters)

To set the session inactivity timer, use the **inactivity-timer** command in cs7 sms profile parameters configuration mode. To remove the configuration, use the **no** form of this command.

**inactivity-timer** { **off** | *msec* }

**no inactivity-timer** { **off** | *msec* }

## Syntax Description

|             |                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------|
| <b>off</b>  | The UCP default is <b>off</b> .                                                                               |
| <i>msec</i> | Session inactivity timer value, in milliseconds. Valid range is 1000 to 9000000 ms. The default is 300000 ms. |

## Defaults

The UCP default is off.

The SMPP default is 300000 ms.

## Command Modes

CS7 sms profile parameters configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

## Examples

The following example creates an SMPP profile named mmprofile and configures several parameters:

```
cs7 sms smpp profile mmprofile
 bind-type any
 inactivity-timer 5000
 keepalive-timer 1000
 response-timer 2000
 send-window 50
 session-init-timer 5000
```

## Related Commands

| Command                                             | Description                        |
|-----------------------------------------------------|------------------------------------|
| <b>bind-type</b> (cs7 sms profile parameters)       | Specifies SMPP bind type.          |
| <b>keepalive-timer</b> (CS7 SMS profile parameters) | Specifies session keepalive timer. |
| <b>response-timer</b> (cs7 sms profile parms)       | Specifies session response timer.  |

**inactivity-timer (cs7 sms profile parameters)**

| Command                                          | Description                        |
|--------------------------------------------------|------------------------------------|
| <b>send-window (cs7 sms profile parms)</b>       | Specifies send window size.        |
| <b>session-init-timer(cs7 sms profile parms)</b> | Specifies session initiation time. |

# inactivity-timer (cs7 sms session parameters)

To set the session inactivity timer, use the **inactivity-timer** command in cs7 sms session parameters configuration mode. To remove the configuration, use the **no** form of this command.

**inactivity-timer** { **off** | *msec* }

**no inactivity-timer** { **off** | *msec* }

| Syntax Description | <b>off</b>  | The UCP default is <b>off</b> .                                                                               |
|--------------------|-------------|---------------------------------------------------------------------------------------------------------------|
|                    | <i>msec</i> | Session inactivity timer value, in milliseconds. Valid range is 1000 to 9000000 ms. The default is 300000 ms. |

|                 |              |
|-----------------|--------------|
| <b>Defaults</b> | 300000 msec. |
|-----------------|--------------|

|                      |                                          |
|----------------------|------------------------------------------|
| <b>Command Modes</b> | CS7 sms session parameters configuration |
|----------------------|------------------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

## Usage Guidelines

|                 |                                                                                                               |
|-----------------|---------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example creates an SMPP connection, configures a destination and configures several parameters: |
|-----------------|---------------------------------------------------------------------------------------------------------------|

```
cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic
destination offisland 10.10.20.2 6000
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

| Related Commands | Command                                              | Description                        |
|------------------|------------------------------------------------------|------------------------------------|
|                  | <b>bind-type</b> (CS7 sms session parameters)        | Specifies SMPP bind type.          |
|                  | <b>keepalive-timers</b> (CS7 SMS session parameters) | Specifies session keepalive timer. |
|                  | <b>response-timer</b> (cs7 sms session parms)        | Specifies session response timer.  |

## ■ inactivity-timer (cs7 sms session parameters)

| Command                                    | Description                        |
|--------------------------------------------|------------------------------------|
| send-window (cs7 sms session parms)        | Specifies send window size.        |
| session-init-timer (cs7 sms session parms) | Specifies session initiation time. |

# init-cwnd-size (cs7 asp)

To configure the SCTP initial congestion window size, use the **init-cwnd-size** command in cs7 asp configuration mode. To disable the configuration, use the **no** form of this command.

**init-cwnd-size** *window-size*

**no init-cwnd-size** *window-size*

## Syntax Description

|                    |                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>window-size</i> | Size in bytes of the SCTP initial congestion window size. Range is 3000 to 20971520 bytes. The default is 2 times the smallest MTU of the SCTP interfaces (in bytes). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

The default *window-size* is 2 times the smallest MTU of the SCTP interfaces (in bytes).

## Command Modes

CS7 asp configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

## Usage Guidelines

The **init-cwnd-size** command allows the administrator to configure an initial congestion window size for an SCTP association.

If this parameter is provisioned, the window-size specified must match the receive-window size of the remote end of the SCTP association. Failure to match the init-cwnd-size to the remote receive-window will cause non-deterministic congestion control behavior



### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

## Examples

The following example set the initial congestion window size to 5000 bytes.

```
cs7 asp ASP1 2905 2905 m3ua
  remote-ip 1.1.1
  init-cwnd-size 5000
```

## Related Commands

| Command                         | Description                              |
|---------------------------------|------------------------------------------|
| receive-window (CS7 local peer) | Configure the local receive window size. |

## init-cwnd-size (cs7 link)

To configure the SCTP initial congestion window size, use the **init-cwnd-size** command in cs7 link configuration mode. To disable the configuration, use the **no** form of this command.

**init-cwnd-size** *window-size*

**no init-cwnd-size** *window-size*

### Syntax Description

|                    |                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>window-size</i> | Size in bytes of the SCTP initial congestion window size. Range is 3000 to 20971520 bytes. The default is 2 times the smallest MTU of the SCTP interfaces (in bytes). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default *window-size* is 2 times the smallest MTU of the SCTP interfaces (in bytes).

### Command Modes

CS7 link configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The **init-cwnd-size** command allows the administrator to configure an initial congestion window size for an SCTP association.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example set the initial congestion window size to 5000 bytes.

```
cs7 linkset michael 10.1.1
 link 0 sctp 172.18.44.147 7000 7000
  init-cwnd-size 5000
```

### Related Commands

| Command                         | Description                              |
|---------------------------------|------------------------------------------|
| receive-window (CS7 local peer) | Configure the local receive window size. |



# init-cwnd-size (cs7 m3ua)

To configure the SCTP initial congestion window size, use the **init-cwnd-size** command in cs7 m3ua configuration mode. To disable the configuration, use the **no** form of this command.

**init-cwnd-size** *window-size*

**no init-cwnd-size** *window-size*

## Syntax Description

|                    |                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>window-size</i> | Size in bytes of the SCTP initial congestion window size. Range is 3000 to 20971520 bytes. The default is 2 times the smallest MTU of the SCTP interfaces (in bytes). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

The default *window-size* is 2 times the smallest MTU of the SCTP interfaces (in bytes).

## Command Modes

CS7 m3ua configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

## Usage Guidelines

The **init-cwnd-size** command allows the administrator to configure an initial congestion window size for an SCTP association.



### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

## Examples

The following example set the initial congestion window size to 5000 bytes.

```
cs7 m3ua 2905
 local-ip 4.4.4.4
  init-cwnd-size 5000
```

## Related Commands

| Command                   | Description                              |
|---------------------------|------------------------------------------|
| receive-window (CS7 M3UA) | Configure the local receive window size. |

## init-cwnd-size (cs7 mated-sg)

To configure the SCTP initial congestion window size, use the **init-cwnd-size** command in cs7 mated-sg configuration mode. To disable the configuration, use the **no** form of this command.

**init-cwnd-size** *window-size*

**no init-cwnd-size** *window-size*

### Syntax Description

|                    |                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>window-size</i> | Size in bytes of the SCTP initial congestion window size. Range is 3000 to 20971520 bytes. The default is 2 times the smallest MTU of the SCTP interfaces (in bytes). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default *window-size* is 2 times the smallest MTU of the SCTP interfaces (in bytes).

### Command Modes

CS7 mated-sg configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The **init-cwnd-size** command allows the administrator to configure an initial congestion window size for an SCTP association.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example set the initial congestion window size to 5000 bytes.

```
cs7 mated-sg BLUE 5000
remote-ip 5.5.5.5
init-cwnd-size 5000
```

### Related Commands

| Command                         | Description                              |
|---------------------------------|------------------------------------------|
| receive-window (CS7 local peer) | Configure the local receive window size. |

# init-cwnd-size (cs7 sgmp)

To configure the SCTP initial congestion window size, use the `init-cwnd-size` command in `cs7 sgmp` configuration mode . To disable the configuration, use the **no** form of this command.

**init-cwnd-size** *window-size*

**no init-cwnd-size** *window-size*

## Syntax Description

|                    |                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>window-size</i> | Size in bytes of the SCTP initial congestion window size. Range is 3000 to 20971520 bytes. The default is 2 times the smallest MTU of the SCTP interfaces (in bytes). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

The default *window-size* is 2 times the smallest MTU of the SCTP interfaces (in bytes).

## Command Modes

CS7 sgmp configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

## Usage Guidelines

The **init-cwnd-size** command allows the administrator to configure an initial congestion window size for an SCTP association.



### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

## Examples

The following example set the initial congestion window size to 5000 bytes.

```
cs7 sgmp 5000
local-ip 4.4.4.4
init-cwnd-size 5000
```

## Related Commands

| Command                   | Description                              |
|---------------------------|------------------------------------------|
| receive-window (CS7 SGMP) | Configure the local receive window size. |

# init-cwnd-size (cs7 sua)

To configure the SCTP initial congestion window size, use the `init-cwnd-size` command in `cs7 sua` configuration mode. To disable the configuration, use the **no** form of this command.

**init-cwnd-size** *window-size*

**no init-cwnd-size** *window-size*

## Syntax Description

|                    |                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>window-size</i> | Size in bytes of the SCTP initial congestion window size. Range is 3000 to 20971520 bytes. The default is 2 times the smallest MTU of the SCTP interfaces (in bytes). |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

The default *window-size* is 2 times the smallest MTU of the SCTP interfaces (in bytes).

## Command Modes

CS7 sua configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

## Usage Guidelines

The **init-cwnd-size** command allows the administrator to configure an initial congestion window size for an SCTP association.



### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

## Examples

The following example set the initial congestion window size to 5000 bytes.

```
cs7 sua 15000
 local-ip 4.4.4.4
  init-cwnd-size 5000
```

## Related Commands

| Command                  | Description                              |
|--------------------------|------------------------------------------|
| receive-window (CS7 SUA) | Configure the local receive window size. |

# init-ip-dscp

To set the Differential Services Code Point (DSCP) bits in the IP header TOS byte for the peer link initialization packets, use the **init-ip-dscp** command in cs7 local-peer configuration mode. To set the DSCP setting to the default, use the **no** form of this command.

**init-ip-dscp** *dscp*

**no init-ip-dscp** *dscp*

|                           |             |                                                                                                                                                                                                                              |
|---------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>dscp</i> | IP DSCP setting, in decimal notation. Valid range is 0 through 63 or you can use one of the following keywords: ef, af11, af12, af13, af21, af22, af23, af31, af32, af33, af41, af42, af43, cs1, cs2, cs3, cs4, cs5, or cs7. |
|---------------------------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |   |
|-----------------|---|
| <b>Defaults</b> | 0 |
|-----------------|---|

|                      |                              |
|----------------------|------------------------------|
| <b>Command Modes</b> | CS7 local-peer configuration |
|----------------------|------------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB4     | This command was introduced. |

|                 |                                                                                                                                                      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the IP type of service to DSCP 56 for the peer link initialization packets:<br><br>cs7 local-peer 4096<br>init-ip-dscp 56 |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------|

|                         |                    |                                                                                                                        |
|-------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>     | <b>Description</b>                                                                                                     |
|                         | cs7 local-peer     | Specifies the local peer.                                                                                              |
|                         | init-ip-precedence | Specifies the IP precedence bits in the IP header type of service (TOS) byte for the peer link initialization packets. |

# init-ip-precedence

To set the IP precedence bits in the IP header type of service (TOS) byte for the peer link initialization packets, use the **init-ip-precedence** command in **cs7 local-peer** configuration mode. To disable the configuration, use the **no** form of this command.

**init-ip-precedence** *ip-tos*

**no init-ip-precedence** *ip-tos*

## Syntax Description

| keyword       |                                                                                     |
|---------------|-------------------------------------------------------------------------------------|
| <i>ip-tos</i> | IP precedence setting, in decimal notation. Range is 0 through 7. The default is 0. |

## Defaults

The IP TOS default is 0.

## Command Modes

CS7 local-peer configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB4 | This command was introduced. |

## Examples

The following example sets the IP type of service to 5 for peer link initialization packets:

```
cs7 local-peer 4096
  init-ip-precedence 5
```

## Related Commands

| Command               | Description                                                                                                                   |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 local-peer</b> | Specifies the local peer.                                                                                                     |
| <b>init-ip-dscp</b>   | Specifies the Differential Services Code Point (DSCP) bits in the IP header TOS byte for the peer link initialization packets |

# init-retransmit (cs7 link)

To configure the number of retransmissions for peer initialization messages, use the **init-retransmit** command in cs7 link configuration mode. To disable the configuration, use the **no** form of this command.

**init-retransmit** *max-retries*

**no init-retransmit** *max-retries*

|                           |                                                                                                                                                                                                      |                                                                                             |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retries</i>                                                                                                                                                                                   | Maximum initialization packet retries. The range is 2 through 20. The default is 8 retries. |
| <b>Defaults</b>           | 8 retries.                                                                                                                                                                                           |                                                                                             |
| <b>Command Modes</b>      | CS7 link configuration                                                                                                                                                                               |                                                                                             |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                                       | <b>Modification</b>                                                                         |
|                           | 12.2(1)MB                                                                                                                                                                                            | This command was introduced.                                                                |
| <b>Examples</b>           | <p>The following example sets the number of retransmissions for peer initialization messages to 10:</p> <pre>cs7 linkset michael 10.1.1 link 0 sctp 172.18.44.147 7000 7000 init-retransmit 10</pre> |                                                                                             |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                                       | <b>Description</b>                                                                          |
|                           | <b>cs7 linkset</b>                                                                                                                                                                                   | Specifies a linkset and enters CS7 linkset submode.                                         |
|                           | <b>link (CS7 linkset)</b>                                                                                                                                                                            | Specifies a link and enters CS7 link submode.                                               |
|                           | <b>show cs7 m2pa</b>                                                                                                                                                                                 | Displays M2PA statistics.                                                                   |

## init-retransmit (cs7 m3ua)

To configure the number of retransmissions for peer initialization packets for this local port, use the **init-retransmit** command in cs7 m3ua configuration mode. To disable the configuration, use the **no** form of this command.

**init-retransmit** *max-retries*

**no init-retransmit** *max-retries*

|                    |                                                                                                                                                                 |                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| Syntax Description | <i>max-retries</i> Maximum initialization packet retries. The range is 2 through 20. The default is 8 retries.                                                  |                                                                       |
| Defaults           | 8 retries.                                                                                                                                                      |                                                                       |
| Command Modes      | CS7 m3ua configuration                                                                                                                                          |                                                                       |
| Command History    | Release                                                                                                                                                         | Modification                                                          |
|                    | 12.2(4)MB5                                                                                                                                                      | This command was introduced.                                          |
| Examples           | The following example sets the number of retransmissions for peer initialization messages to 10:<br><br>cs7 m3ua 2905<br>local-IP 4.4.4.4<br>init-retransmit 10 |                                                                       |
| Related Commands   | Command                                                                                                                                                         | Description                                                           |
|                    | cs7 m3ua                                                                                                                                                        | Specifies the local port number for M3UA and enters CS7 M3UA submode. |
|                    | show cs7 m3ua                                                                                                                                                   | Displays M3UA statistics.                                             |



## init-retransmit (cs7 sgmp)

To configure the number of retransmissions for peer initialization packets for this local port, use the **init-retransmit** command in CS7 SGMP configuration mode. To disable the configuration, use the **no** form of this command.

**init-retransmit** *max-retries*

**no init-retransmit** *max-retries*

|                           |                    |                                                                                             |
|---------------------------|--------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retries</i> | Maximum initialization packet retries. The range is 2 through 20. The default is 8 retries. |
|---------------------------|--------------------|---------------------------------------------------------------------------------------------|

|                 |            |
|-----------------|------------|
| <b>Defaults</b> | 8 retries. |
|-----------------|------------|

|                      |                        |
|----------------------|------------------------|
| <b>Command Modes</b> | CS7 sgmp configuration |
|----------------------|------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

|                 |                                                                                                  |
|-----------------|--------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the number of retransmissions for peer initialization messages to 10: |
|                 | <pre>cs7 sgmp 5000 init-retransmit 10</pre>                                                      |

|                         |                      |                                                                       |
|-------------------------|----------------------|-----------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>       | <b>Description</b>                                                    |
|                         | <b>cs7 sgmp</b>      | Specifies the local port number for SGMP and enters CS7 SGMP submode. |
|                         | <b>show cs7 sgmp</b> | Displays SGMP statistics.                                             |

## init-retransmit (CS7 SUA)

To configure the number of retransmissions for peer initialization packets for this local port, use the **init-retransmit** CS7 SUA submode command. To disable the configuration, use the **no** form of this command.

**init-retransmit** *max-retries*

**no init-retransmit** *max-retries*

|                    |                                                                                                                                                                 |                                                                     |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Syntax Description | <i>max-retries</i> Maximum initialization packet retries. The range is 2 through 20. The default is 8 retries.                                                  |                                                                     |
| Defaults           | 8 retries.                                                                                                                                                      |                                                                     |
| Command Modes      | CS7 SUA submode                                                                                                                                                 |                                                                     |
| Command History    | Release                                                                                                                                                         | Modification                                                        |
|                    | 12.2(4)MB5                                                                                                                                                      | This command was introduced.                                        |
| Examples           | The following example sets the number of retransmissions for peer initialization messages to 10:<br><br>cs7 sua 15000<br>local-IP 4.4.4.4<br>init-retransmit 10 |                                                                     |
| Related Commands   | Command                                                                                                                                                         | Description                                                         |
|                    | cs7 sua                                                                                                                                                         | Specifies the local port number for SUA and enters CS7 SUA submode. |
|                    | show cs7 sua                                                                                                                                                    | Displays SUA statistics.                                            |

# init-retransmit (group)

To configure the number of retransmissions for peer initialization messages, use the **init-retransmit** group submode command. To disable the configuration, use the **no** form of this command.

**init-retransmit** *max-retries*

**no init-retransmit** *max-retries*

| Syntax Description | <i>max-retries</i> Maximum initialization packet retries. The range is 2 through 20. The default is 8 retries.                                                             |  |         |              |            |                                                       |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------------|------------|-------------------------------------------------------|
| Defaults           | 8 retries.                                                                                                                                                                 |  |         |              |            |                                                       |
| Command Modes      | Group submode                                                                                                                                                              |  |         |              |            |                                                       |
| Command History    | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(25)SW</td><td>This command was introduced.</td></tr></table>                                             |  | Release | Modification | 12.2(25)SW | This command was introduced.                          |
| Release            | Modification                                                                                                                                                               |  |         |              |            |                                                       |
| 12.2(25)SW         | This command was introduced.                                                                                                                                               |  |         |              |            |                                                       |
| Examples           | <p>The following example sets the number of retransmissions for peer initialization messages to 10:</p> <pre>cs7 group ITP1 3333 local-ip 1.1.1.1 init-retransmit 10</pre> |  |         |              |            |                                                       |
| Related Commands   | <table><tr><th>Command</th><th>Description</th></tr><tr><td>cs7 group</td><td>Specifies an ITP group and enables the group submode.</td></tr></table>                      |  | Command | Description  | cs7 group  | Specifies an ITP group and enables the group submode. |
| Command            | Description                                                                                                                                                                |  |         |              |            |                                                       |
| cs7 group          | Specifies an ITP group and enables the group submode.                                                                                                                      |  |         |              |            |                                                       |

## init-timeout (CS7 Link)

To configure the time-out value for retransmission of association setup messages, use the **init-timeout** CS7 link submode command. To disable the configuration, use the **no** form of this command.

**init-timeout** *msec*

**no init-timeout** *msec*

| Syntax Description | <i>msec</i> | Timeout value in milliseconds. Range is 1000 to 60000 milliseconds. The default is 1000 milliseconds. |
|--------------------|-------------|-------------------------------------------------------------------------------------------------------|
|--------------------|-------------|-------------------------------------------------------------------------------------------------------|

| Defaults | 1000 milliseconds. |
|----------|--------------------|
|----------|--------------------|

| Command Modes | CS7 link submode |
|---------------|------------------|
|---------------|------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

| Examples | The following example sets the timeout value for retransmission of association setup messages to 2000 milliseconds: |
|----------|---------------------------------------------------------------------------------------------------------------------|
|----------|---------------------------------------------------------------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
init- timeout 2000
```

| Related Commands | Command                   | Description                                         |
|------------------|---------------------------|-----------------------------------------------------|
|                  | <b>cs7 linkset</b>        | Specifies a linkset and enters CS7 linkset submode. |
|                  | <b>link (CS7 linkset)</b> | Specifies a link and enters CS7 link submode.       |
|                  | <b>show cs7 m2pa</b>      | Displays M2PA statistics.                           |

## init-timeout (CS7 M3UA)

To configure the maximum interval for the init packet retransmission time-out value, use the **init-timeout** CS7 M3UA submode command. To disable the configuration, use the **no** form of this command.

**init-timeout** *msec*

**no init-timeout** *msec*

|                           |                                                                                                                                                                                         |                                                                                                       |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i>                                                                                                                                                                             | Timeout value in milliseconds. Range is 1000 to 60000 milliseconds. The default is 1000 milliseconds. |
| <b>Defaults</b>           | 1000 milliseconds.                                                                                                                                                                      |                                                                                                       |
| <b>Command Modes</b>      | CS7 M3UA submode                                                                                                                                                                        |                                                                                                       |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                          | <b>Modification</b>                                                                                   |
|                           | 12.2(4)MB5                                                                                                                                                                              | This command was introduced.                                                                          |
| <b>Examples</b>           | <p>The following example sets the timeout value for retransmission of association setup messages to 2000 milliseconds:</p> <pre>cs7 m3ua 2905 local-IP 4.4.4.4 init- timeout 2000</pre> |                                                                                                       |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                          | <b>Description</b>                                                                                    |
|                           | <b>cs7 m3ua</b>                                                                                                                                                                         | Specifies the local port number for M3UA and enter M3UA submode.                                      |
|                           | <b>show cs7 m3ua</b>                                                                                                                                                                    | Displays M2PA statistics.                                                                             |

## init-timeout (CS7 SGMP)

To configure the maximum interval for the init packet retransmission time-out value, use the **init-timeout** CS7 SGMP submode command. To disable the configuration, use the **no** form of this command.

**init-timeout** *msec*

**no init-timeout** *msec*

### Syntax Description

|             |                                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Timeout value in milliseconds. Range is 1000 to 60000 milliseconds. The default is 1000 milliseconds. |
|-------------|-------------------------------------------------------------------------------------------------------|

### Defaults

1000 milliseconds.

### Command Modes

CS7 SGMP submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Examples

The following example sets the timeout value for retransmission of association setup messages to 2000 milliseconds:

```
cs7 sgmp 5000
  init- timeout 2000
```

### Related Commands

| Command              | Description                                                          |
|----------------------|----------------------------------------------------------------------|
| <b>cs7 sgmp</b>      | Specifies the local port number for SGMP and enter CS7 SGMP submode. |
| <b>show cs7 sgmp</b> | Displays SGMP statistics.                                            |

# init-timeout (CS7 SUA)

To configure the maximum interval for the init packet retransmission time-out value, use the **init-timeout** CS7 SUA submode command. To disable the configuration, use the **no** form of this command.

**init-timeout** *msec*

**no init-timeout** *msec*

| <b>Syntax Description</b> | <i>msec</i><br>Timeout value in milliseconds. Range is 1000 to 60000 milliseconds. The default is 1000 milliseconds.                                                                                                            |         |              |            |                                                                    |              |                          |  |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------|------------|--------------------------------------------------------------------|--------------|--------------------------|--|
| <b>Defaults</b>           | 1000 milliseconds.                                                                                                                                                                                                              |         |              |            |                                                                    |              |                          |  |
| <b>Command Modes</b>      | CS7 SUA submode                                                                                                                                                                                                                 |         |              |            |                                                                    |              |                          |  |
| <b>Command History</b>    | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(4)MB5</td><td>This command was introduced.</td></tr></table>                                                                                                  | Release | Modification | 12.2(4)MB5 | This command was introduced.                                       |              |                          |  |
| Release                   | Modification                                                                                                                                                                                                                    |         |              |            |                                                                    |              |                          |  |
| 12.2(4)MB5                | This command was introduced.                                                                                                                                                                                                    |         |              |            |                                                                    |              |                          |  |
| <b>Examples</b>           | <p>The following example sets the timeout value for retransmission of association setup messages to 2000 milliseconds:</p> <pre>cs7 sua 15000   local-IP 4.4.4.4   init- timeout 2000</pre>                                     |         |              |            |                                                                    |              |                          |  |
| <b>Related Commands</b>   | <table><tr><th>Command</th><th>Description</th></tr><tr><td>cs7 sua</td><td>Specifies the local port number for SUA and enter CS7 SUA submode.</td></tr><tr><td>show cs7 sua</td><td>Displays SUA statistics.</td></tr></table> | Command | Description  | cs7 sua    | Specifies the local port number for SUA and enter CS7 SUA submode. | show cs7 sua | Displays SUA statistics. |  |
| Command                   | Description                                                                                                                                                                                                                     |         |              |            |                                                                    |              |                          |  |
| cs7 sua                   | Specifies the local port number for SUA and enter CS7 SUA submode.                                                                                                                                                              |         |              |            |                                                                    |              |                          |  |
| show cs7 sua              | Displays SUA statistics.                                                                                                                                                                                                        |         |              |            |                                                                    |              |                          |  |

# init-timeout (group)

To configure the maximum interval for the init packet retransmission time-out value, use the **init-timeout** group submode command. To disable the configuration, use the **no** form of this command.

**init-timeout** *msec*

**no init-timeout** *msec*

| Syntax Description | <i>msec</i> | Timeout value in milliseconds. Range is 1000 to 60000 milliseconds. The default is 1000 milliseconds. |
|--------------------|-------------|-------------------------------------------------------------------------------------------------------|
|--------------------|-------------|-------------------------------------------------------------------------------------------------------|

| Defaults | 1000 milliseconds. |
|----------|--------------------|
|----------|--------------------|

| Command Modes | group submode |
|---------------|---------------|
|---------------|---------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Examples | The following example specifies a maximum init packet retransmission time-out value of 5000 milliseconds: |
|----------|-----------------------------------------------------------------------------------------------------------|
|----------|-----------------------------------------------------------------------------------------------------------|

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 init-timeout 5000
```

| Related Commands | Command          | Description                                           |
|------------------|------------------|-------------------------------------------------------|
|                  | <b>cs7 group</b> | Specifies an ITP group and enables the group submode. |



## invoke-timer (cs7 authentic-vlr)

To specify the amount of time, in seconds, that the MAP Proxy will wait for a response to a sent TCAP Invoke component, use the **invoke-timer** command in authentic-vlr submode. To disable the timer, use the **no** form of this command.

**invoke-timer** *seconds*

**no command invoke-timer** *seconds*

| Syntax Description | <i>seconds</i> | The number of seconds that the MAP Proxy will wait for a response to a sent TCAP Invoke component. Valid values are 1 through 30 seconds. |
|--------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|--------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------|

| Defaults | 10 seconds |
|----------|------------|
|----------|------------|

| Command Modes | CS7 authentic-vlr |
|---------------|-------------------|
|---------------|-------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB7 | This command was introduced. |

| Usage Guidelines | The <b>invoke-timer</b> command is specific to the TCAP INVOKE for the GSM authentication service. |
|------------------|----------------------------------------------------------------------------------------------------|
|------------------|----------------------------------------------------------------------------------------------------|

| Examples | The following example sets the invoke-timer to 20 seconds: |
|----------|------------------------------------------------------------|
|----------|------------------------------------------------------------|

```
gsm-authent-vlr
 invoke-timer 20
```

| Related Commands | Command         | Description                                                                                                                   |
|------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------|
|                  | gsm-authent-vlr | Enables the authentic-vlr submode for provisioning parameters specific to the Process_Obtain_Authentication_Sets_VLR service. |

# invoke-timer (cs7 sms gsm smsmo)

To specify a timer to supervise initiated dialogues, use the **invoke-timer** command in CS7 SMS SMSMO configuration mode. To disable the timer, use the **no** form of this command.

**invoke-timer** *seconds*

**no invoke-timer**

| Syntax Description | <i>seconds</i> | Time in seconds. Valid range is 1 to 30 seconds. The default is 10 seconds. |
|--------------------|----------------|-----------------------------------------------------------------------------|
|--------------------|----------------|-----------------------------------------------------------------------------|

| Defaults | 10 seconds |
|----------|------------|
|----------|------------|

| Command Modes | CS7 SMS SMSMO configuration |
|---------------|-----------------------------|
|---------------|-----------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

## Usage Guidelines

**Examples** The following example configures GSM-MAP routing and sets a 20 second timer to supervise initiated dialogues:

```
cs7 sms route-table
gsm-map sms-mo ssn 2
invoke-timer 20
```

| Related Commands | Command                              | Description                                    |
|------------------|--------------------------------------|------------------------------------------------|
|                  | <b>gsm-map (cs7 sms route table)</b> | Specifies the GSM MAP operations to be routed. |

# ip

To configure the ITP to accept incoming TCP connections from a specific remote IP address, use the **ip** command in CS7 monitor configuration mode. To disable the **ip** command after it has been configured, use the **no** form of this command.

**ip** *ip-address*

**no ip**

## Syntax Description

|                   |                    |
|-------------------|--------------------|
| <i>ip-address</i> | Remote IP address. |
|-------------------|--------------------|

## Defaults

The default configuration is **no ip** (accept all incoming TCP connection requests).

## Command Modes

CS7 monitor configuration

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB12 | This command was introduced. |

## Usage Guidelines

Incoming TCP connection requests from any IP address other than the configured address will be rejected. If no IP address is configured, the ITP will accept incoming TCP connection requests from any IP address.

## Examples

The following example configures the ITP to accept incoming TCP connections from the specific remote address 192.168.0.1:

```
cs7 monitor 9000
ip 192.168.0.1
```

## Related Commands

| Command     | Description                                                                                                  |
|-------------|--------------------------------------------------------------------------------------------------------------|
| cs7 monitor | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

# ip-dscp

To set the Differential Services Code Point (DSCP) bits in the IP header TOS byte, use the **ip-dscp** CS7 link submode command. To set the DSCP setting to the default, use the **no** form of this command.

**ip-dscp** *ip-tos*

**no ip-dscp** *ip-tos*

|                    |                                                                                                                                                         |                              |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Syntax Description | <i>ip-tos</i> IP DSCP setting, in decimal notation. Range is 5000 through 63. The default 0.                                                            |                              |
| Defaults           | The IP TOS default is 0.                                                                                                                                |                              |
| Command Modes      | CS7 link submode                                                                                                                                        |                              |
| Command History    | Release                                                                                                                                                 | Modification                 |
|                    | 12.2(4)MB                                                                                                                                               | This command was introduced. |
| Usage Guidelines   | The IP DSCP configured on the peer link overrides any IP TOS setting assigned to the peer link using a QoS class.                                       |                              |
| Examples           | The following example sets the IP type of service to DSCP 56:<br><pre>cs7 linkset michael 10.1.1  link 2 sctp 172.18.44.147 7000 7000  ip-dscp 56</pre> |                              |
| Related Commands   | Command                                                                                                                                                 | Description                  |
|                    | cs7 linkset                                                                                                                                             | Specifies a linkset.         |
|                    | link (CS7 linkset)                                                                                                                                      | Configures a link.           |

# ip-precedence

To set the IP precedence bits in the IP header type of service (TOS) byte, use the **ip-precedence** CS7 link submode command. To disable the configuration, use the **no** form of this command.

**ip-precedence** *ip-tos*

**no ip-precedence** *ip-tos*

|                           |                                                                                                                                                |                                               |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <b>Syntax Description</b> | <i>ip-tos</i> IP precedence setting, in decimal notation. Range is 0 through 7. The default is zero.                                           |                                               |
| <b>Defaults</b>           | Zero.                                                                                                                                          |                                               |
| <b>Command Modes</b>      | CS7 link submode                                                                                                                               |                                               |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                 | <b>Modification</b>                           |
|                           | 12.2(1)MB                                                                                                                                      | This command was introduced.                  |
| <b>Usage Guidelines</b>   | The IP precedence configured on the peer link overrides any TOS setting assigned to the peer link using a QoS class.                           |                                               |
| <b>Examples</b>           | The following example sets the IP type of service to 5:<br><pre>cs7 linkset michael 10.1.1 link 0 sctp 172.18.44.147 7000 7000 ip-prec 5</pre> |                                               |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                 | <b>Description</b>                            |
|                           | <b>cs7 linkset</b>                                                                                                                             | Specifies a linkset.                          |
|                           | <b>ip-dscp, page 720</b>                                                                                                                       | Specifies a Differential Services Code Point. |
|                           | <b>link (CS7 linkset)</b>                                                                                                                      | Configures a link.                            |

# ipc zone default

To configure the Inter-device Peer Communication (IPC) protocol, use the **ipc zone default** command in global configuration mode. To remove the configuration, use the **no** form of this command.

**ipc zone default**

**no ipc zone default**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |        |
|----------------------|--------|
| <b>Command Modes</b> | Global |
|----------------------|--------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                                                                                         |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | Both active and standby are part of the default IPC zone.<br>The <b>ipc zone default</b> command enables IPC zone mode. |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                               |
|-----------------|-------------------------------------------------------------------------------|
| <b>Examples</b> | The following example configures the IPC zone:<br><pre>ipc zone default</pre> |
|-----------------|-------------------------------------------------------------------------------|

|                         |                      |                                                                 |
|-------------------------|----------------------|-----------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>       | <b>Description</b>                                              |
|                         | <b>association</b>   | Configures an association between the two devices.              |
|                         | <b>protocol sctp</b> | Specifies the SCTP protocol and enables IPC SCTP protocol mode. |

# keepalive (CS7 ASP)

To specify if a keepalive timer is supported, and to specify the keepalive interval for the association, use the **keepalive** CS7 ASP submode command. To disable the keepalive, use the **no** form of this command.

**keepalive** *msec*

**no keepalive** *msec*

## Syntax Description

|             |                                                                                                                                                |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Keepalive interval, in milliseconds. The range is 300 through 30000 milliseconds. The default is the value specified under the local instance. |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

Keepalive is enabled.

The keepalive interval defaults to the value specified under the local instance.

## Command Modes

CS7 ASP submode

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example sets the keepalive value to 1000 milliseconds:

```
cs7 asp ASP1 2904 2905 m3ua
  remote-ip 1.1.1.1
  keepalive 1000
```

## Related Commands

| Command             | Description                                                          |
|---------------------|----------------------------------------------------------------------|
| <b>cs7 asp</b>      | Specifies an Application Server Process and enables CS7 ASP submode. |
| <b>show cs7 asp</b> | Displays ASP statistics.                                             |

# keepalive (CS7 Link)

To enable a peer link keepalive interval, use the **keepalive** CS7 link submode command. To disable the keepalive, use the **no** form of this command.

**keepalive** *msec*

**no keepalive** *msec*

## Syntax Description

|             |                                                                                                                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Keepalive interval, in milliseconds. The range is 300 through 30000 milliseconds. The default keepalive interval is 30000 milliseconds. |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

Keepalive is enabled.

The default keepalive interval is 30000 milliseconds.

## Command Modes

CS7 link submode

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Examples

The following example sets the keepalive value to 1000 milliseconds:

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
  keepalive 1000
```

## Related Commands

| Command                   | Description                                         |
|---------------------------|-----------------------------------------------------|
| <b>cs7 linkset</b>        | Specifies a linkset and enters CS7 linkset submode. |
| <b>link (CS7 linkset)</b> | Specifies a link and enters CS7 link submode.       |
| <b>show cs7 m2pa</b>      | Displays M2PA statistics.                           |



# keepalive (CS7 Mated-SG)

To enable a keepalive interval for the association, use the **keepalive** CS7 Mated-SG submode command. To disable the keepalive, use the **no** form of this command.

**keepalive** *msec*

**no keepalive** *msec*

## Syntax Description

|             |                                                                                                                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Keepalive interval, in milliseconds. The range is 300 through 30000 milliseconds. The default keepalive interval is 30000 milliseconds. |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

Keepalive is enabled.

The keepalive interval defaults to the interval specified under the local port instance.

## Command Modes

CS7 Mated-SG submode

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example sets the keepalive value to 1000 milliseconds:

```
cs7 mated-sg BLUE 2905
 remote-ip 5.5.5.5
 keepalive 1000
```

## Related Commands

| Command                  | Description                                                            |
|--------------------------|------------------------------------------------------------------------|
| <b>cs7 mated-sg</b>      | Configures a connection to a mated SG and enters CS7 Mated-SG submode. |
| <b>show cs7 mated-sg</b> | Displays Mated SG statistics.                                          |

# keepalive (CS7 M3UA)

To specify a keepalive interval to be used when a new SCTP association is started with the local port, use the **keepalive** CS7 M3UA submode command. To disable the keepalive, use the **no** form of this command.

**keepalive** *msec*

**no keepalive** *msec*

## Syntax Description

|             |                                                                                                                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Keepalive interval, in milliseconds. The range is 300 through 30000 milliseconds. The default keepalive interval is 30000 milliseconds. |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

Keepalive is enabled.

The default keepalive interval is 30000 milliseconds.

## Command Modes

CS7 M3UA submode

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example sets the keepalive value to 1000 milliseconds:

```
cs7 m3ua 2905
 local-ip 4.4.4.4
 keepalive 1000
```

## Related Commands

| Command              | Description                                                           |
|----------------------|-----------------------------------------------------------------------|
| <b>cs7 m3ua</b>      | Specifies the local port number for M3UA and enters CS7 M3UA submode. |
| <b>show cs7 m3ua</b> | Displays M3UA statistics.                                             |

# keepalive (CS7 Monitor)

To specify the keepalive time in milliseconds, use the **keepalive** command in CS7 monitor configuration mode. To disable the keepalive, use the **no** form of this command.

**keepalive** *keepalive-time*

**no keepalive**

| Syntax Description | <i>keepalive-time</i> | The keepalive value, in milliseconds. Valid range is 0 to 60000ms. |
|--------------------|-----------------------|--------------------------------------------------------------------|
|--------------------|-----------------------|--------------------------------------------------------------------|

| Defaults | Default configuration of keepalive is 5000ms. |
|----------|-----------------------------------------------|
|----------|-----------------------------------------------|

| Command Modes | CS7 monitor configuration |
|---------------|---------------------------|
|---------------|---------------------------|

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | 12.2(4)MB12 | This command was introduced. |

| Usage Guidelines | <p>Keepalive packets are sent between the ITP and the remote server as a mechanism to ensure the TCP session is active and detect session failure in a timely manner.</p> <p>During periods of idle monitor traffic, the ITP will send a keepalive packet to the remote server every <i>keepalive-time</i> milliseconds.</p> <p>The ITP monitor also expects to receive a keepalive packet from the remote server every <i>keepalive-time</i> milliseconds.</p> <p>If the ITP does not receive a keepalive packet from the remote server within an interval of the <i>keepalive-time</i> milliseconds, the ITP will close the TCP session.</p> <p>When keepalive is disabled, the ITP will not send keepalive packets nor will it expect to receive keepalive packets (i.e. the TCP session will not be disconnected by missed keepalives). When keepalive is disabled, the <b>fast-start</b> command might be needed to start the flow of monitored packets to the server.</p> |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | The following example sets the keepalive timer to the maximum value, 60000ms: |
|----------|-------------------------------------------------------------------------------|
|----------|-------------------------------------------------------------------------------|

```
cs7 monitor 9000
keepalive 60000
```

| Related Commands | Command     | Description                                                                                                  |
|------------------|-------------|--------------------------------------------------------------------------------------------------------------|
|                  | cs7 monitor | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

# keepalive (CS7 SGMP)

To specify a keepalive interval to be used when a new SCTP association is started with the local port, use the **keepalive** CS7 link submode command. To disable the keepalive, use the **no** form of this command.

**keepalive** *msec*

**no keepalive** *msec*

## Syntax Description

|             |                                                                                                                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Keepalive interval, in milliseconds. The range is 300 through 30000 milliseconds. The default keepalive interval is 30000 milliseconds. |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

Keepalive is enabled.

The default keepalive interval is 30000 milliseconds.

## Command Modes

CS7 SGMP submode

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example sets the keepalive value to 1000 milliseconds:

```
cs7 sgmp 5000
 local-ip 4.4.4.4
 keepalive 1000
```

## Related Commands

| Command              | Description                                                           |
|----------------------|-----------------------------------------------------------------------|
| <b>cs7 sgmp</b>      | Specifies the local port number for SGMP and enters CS7 SGMP submode. |
| <b>show cs7 sgmp</b> | Displays SGMP statistics.                                             |

# keepalive (CS7 SUA)

To specify a keepalive interval to be used when a new SCTP association is started with the local port, use the **keepalive** CS7 link submode command. To disable the keepalive, use the **no** form of this command.

**keepalive** *msec*

**no keepalive** *msec*

## Syntax Description

|             |                                                                                                                                         |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <i>msec</i> | Keepalive interval, in milliseconds. The range is 300 through 30000 milliseconds. The default keepalive interval is 30000 milliseconds. |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

Keepalive is enabled.

The default keepalive interval is 30000 milliseconds.

## Command Modes

CS7 SUA submode

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example sets the keepalive value to 1000 milliseconds:

```
cs7 sua 15000
 local-IP 4.4.4.4
 keepalive 1000
```

## Related Commands

| Command             | Description                                                         |
|---------------------|---------------------------------------------------------------------|
| <b>cs7 sua</b>      | Specifies the local port number for SUA and enters CS7 SUA submode. |
| <b>show cs7 sua</b> | Displays SUA statistics.                                            |

# keepalive (group peer)

To enable a peer link keepalive interval, use the **keepalive** group peer submode command. To disable the keepalive, use the **no** form of this command.

**keepalive** *msec*

**no keepalive** *msec*

| Syntax Description | <i>msec</i> | Keepalive interval, in milliseconds. The range is 300 through 30000 milliseconds. The default keepalive interval is 30000 milliseconds. |
|--------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|
|--------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------|

| Defaults | Keepalive is enabled.<br>The default keepalive interval is 30000 milliseconds. |
|----------|--------------------------------------------------------------------------------|
|----------|--------------------------------------------------------------------------------|

| Command Modes | Group peer submode |
|---------------|--------------------|
|---------------|--------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Examples | The following example sets the keepalive value to 1000 milliseconds: |
|----------|----------------------------------------------------------------------|
|----------|----------------------------------------------------------------------|

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 peer 4444
  remote-ip 1.1.1.2
  keepalive 1000
```

| Related Commands | Command             | Description                                                                                         |
|------------------|---------------------|-----------------------------------------------------------------------------------------------------|
|                  | <b>peer (group)</b> | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode. |

# keepalive-timer (CS7 SMS profile parameters)

To specify a session keepalive timer, use the **keepalive-timer** command in CS7 SMS profile parameters configuration mode. To remove the configuration, use the **no** form of this command.

**keepalive-timer** *msec*

**no keepalive-timer** *msec*

| Syntax Description | <i>msec</i> | Session keepalive timer value in milliseconds. Valid range is 500 to 120000 ms. The default is 30000 ms. |
|--------------------|-------------|----------------------------------------------------------------------------------------------------------|
|--------------------|-------------|----------------------------------------------------------------------------------------------------------|

| Defaults | 30000 ms. |
|----------|-----------|
|----------|-----------|

| Command Modes | CS7 SMS profile parameters configuration |
|---------------|------------------------------------------|
|---------------|------------------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

## Usage Guidelines

**Examples** The following example creates an SMPP profile named mmprofile and configures several parameters:

```
cs7 sms smpp profile mmprofile
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

| Related Commands | Command                                              | Description                         |
|------------------|------------------------------------------------------|-------------------------------------|
|                  | <b>bind-type (cs7 sms profile parameters)</b>        | Specifies SMPP bind type.           |
|                  | <b>inactivity-timer (cs7 sms profile parameters)</b> | Specifies session inactivity timer. |
|                  | <b>response-timer (cs7 sms profile parms)</b>        | Specifies session response timer.   |
|                  | <b>send-window (cs7 sms profile parms)</b>           | Specifies send window size.         |
|                  | <b>session-init-timer(cs7 sms profile parms)</b>     | Specifies session initiation time.  |

# keepalive-timers (CS7 SMS session parameters)

To specify a session keepalive timer, use the **keepalive-timer** command in CS7 SMS session parameters configuration mode. To remove the configuration, use the **no** form of this command.

**keepalive-timer** *msec*

**no keepalive-timer** *msec*

|                           |             |                                                                                                          |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Session keepalive timer value in milliseconds. Valid range is 500 to 120000 ms. The default is 30000 ms. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------|

|                 |           |
|-----------------|-----------|
| <b>Defaults</b> | 30000 ms. |
|-----------------|-----------|

|                      |                                          |
|----------------------|------------------------------------------|
| <b>Command Modes</b> | CS7 SMS session parameters configuration |
|----------------------|------------------------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(25)SW     | This command was introduced. |

## Usage Guidelines

**Examples** The following example creates an SMPP connection, configures a destination and configures several parameters:

```
cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic
destination offisland 10.10.20.2 6000
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

| <b>Related Commands</b> | <b>Command</b>                                       | <b>Description</b>                  |
|-------------------------|------------------------------------------------------|-------------------------------------|
|                         | <b>bind-type (CS7 sms session parameters)</b>        | Specifies SMPP bind type.           |
|                         | <b>inactivity-timer (cs7 sms session parameters)</b> | Specifies session inactivity timer. |
|                         | <b>response-timer (cs7 sms session parms)</b>        | Specifies session response timer.   |



| Command                                           | Description                        |
|---------------------------------------------------|------------------------------------|
| <b>send-window (cs7 sms session parms)</b>        | Specifies send window size.        |
| <b>session-init-timer (cs7 sms session parms)</b> | Specifies session initiation time. |

## link (CS7 linkset)

To configure an SS7 link to a legacy SS7 device, make sure that the interface encapsulation is MTP2 and use the **link** CS7 linkset submode command. To remove the link from the linkset, use the **no** form of this command.

To configure a link to an ITP SS7 device, use the **link** CS7 linkset submode command. To remove the link from the linkset, use the **no** version of this command.

### Legacy SS7 Device

**link** *slc* [*name*] **serial** *number*

**no link** *slc* [*name*] **serial** *number*

### ITP SS7 Device

**link** *slc* [*name*] **sctp** *remote-ip-addr* [*remote-ip-addr* ...] *remote-port-num* *local-port-num* [**passive**]

**no link** *slc* [*name*] **sctp** *remote-ip-addr* [*remote-ip-addr* ...] *remote-port-num* *local-port-num* [**passive**]

### Syntax Description

|                        |                                                                                                                                                                                 |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>slc</i>             | Signal Link Code. Valid range is 0-15.                                                                                                                                          |
| <i>name</i>            | Name of group peer on which the link physically resides. The <i>name</i> parameter is only valid (and required) if the ITP Group feature has been configured.                   |
| <b>serial</b>          | Serial interface                                                                                                                                                                |
| <i>number</i>          | Serial interface number.                                                                                                                                                        |
| <b>sctp</b>            | Stream Control Transmission Protocol                                                                                                                                            |
| <i>remote-ip-addr</i>  | Remote IP address. This is one of the four IP address configured as a local IP addresses on the remote peer. At least one, and up to four remote IP addresses can be specified. |
| <i>remote-port-num</i> | The remote port number. This is the local port number that was configured on the remote ITP.                                                                                    |
| <i>local-port-num</i>  | The local port number.                                                                                                                                                          |
| <b>passive</b>         | Indicates that the remote ITP must establish the peer connection.                                                                                                               |

### Defaults

No default behavior or values

### Command Modes

CS7 linkset submode

### Command History

| Release    | Modification                         |
|------------|--------------------------------------|
| 12.2(1)MB  | This command was introduced.         |
| 12.2(23)SW | The <i>name</i> parameter was added. |

## Usage Guidelines

SLC must be the same at both ends of the signaling link to align.

When you issue the **link** command you enter CS7 link submode. In CS7 link submode you have access to commands that allow you to further configure links.

## Examples

The following example configures links 0 and 1 to a legacy SS7 device. The names smith and jones are the group peers on which each link resides (indicating that the ITP Group feature has been enabled):

```
cs7 linkset black 5.100.1
  link 0 smith serial1/0/0:0
  link 1 jones serial2/0/0:0
```

The following example assigns link 0 to the ITP linkset named white and assigns the SCTP peers (remote instance at IP address 172.18.44.147 port 7000 and local instance at port 7000):

```
cs7 linkset white 10.1.1
  link 0 sctp 172.18.44.147 7000 7000
```

## Related Commands

| Command                   | Description                   |
|---------------------------|-------------------------------|
| <b>cs7 linkset</b>        | Specifies a linkset.          |
| <b>encapsulation mtp2</b> | Specifies MTP2 encapsulation. |

## link (CS7 monitor)

To configure a link to be monitored by the ITP, use the **link** command in CS7 monitor configuration mode. To remove the configuration, use the **no** form of this command.

**link** { **atm** | **serial** } *slot[/bay]/port*

**no link** { **atm** | **serial** } *slot[/bay]/port*

### Syntax Description

|               |                                 |
|---------------|---------------------------------|
| <b>serial</b> | Specifies the serial interface. |
|---------------|---------------------------------|

### Defaults

No default behavior or values.

### Command Modes

CS7 monitor configuration

### Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB12 | This command was introduced. |

### Usage Guidelines

Serial links must be configured with the **encapsulation cs7monitor** command.

ATM links must be configured with the **atm cs7 monitor** command.

All MSUs received on the link are sent to the remote server via TCP.

### Examples

The following example configures the serial4/7:1 link to be monitored by the ITP:

```
cs7 monitor 9000
link serial4/7:1
```

The following example configures the ATM5/0/0 link to be monitored by the ITP:

```
cs7 monitor 9000
link atm5/0/0
```

### Related Commands

| Command                  | Description                                                       |
|--------------------------|-------------------------------------------------------------------|
| atm cs7monitor           | Sets the encapsulation type on an ATM link to CS7 monitor.        |
| encapsulation cs7monitor | Sets the encapsulation type on a serial interface to CS7 monitor. |

# link-test

Link test is performed by sending an SLTM message and verifying the acknowledgement (SLTA) from the adjacent node. Link test is performed on serial and peer links. To enable link-test, use the **link-test** CS7 link submode command. To disable link test, use the **no** form of this command.

**link-test**

**no link-test**

## Syntax Description

This command has no arguments or keywords.

## Defaults

Link-test is enabled by default and tests the links every 30 seconds.

A link test is automatically run when the link first comes into service.

## Command Modes

CS7 link submode command

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Usage Guidelines

By default, a link test is run when the link first comes into service, and periodically while the link is in service. If the link test fails, the link is taken out of service.

The slt-t2 timer determines the interval for sending signaling link test messages.

The slt-t1 timer determines the interval to wait for the signaling link test acknowledgement.

If an SLTA is not received in the specified interval, a second SLTM will be sent. If an SLTA is not received for the second SLTM, then the link restoration and activation procedure is initiated.

The command **no link-test** disables the link test. The command **link-test** re-enables link test.

## Examples

The following example disables link test:

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
no link-test
```

## Related Commands

| Command                   | Description             |
|---------------------------|-------------------------|
| <b>cs7 mtp3 timer</b>     | Configures MTP3 timers. |
| <b>link (CS7 linkset)</b> | Specifies a link.       |

# link-timer

To configure the ITP MTP3 management timers that control the link, use the **link-timer** CS7 link submode command. To reset a timer to its default value, use the **no** form of this command.

**link-timer** {**retry** *msec* | **slt-t1** *msec* | **slt-t2** *msec* | **t01** *msec* | **t02** *msec* | **t03** *msec* | **t04** *msec* | **t05** *msec* | **t12** *msec* | **t13** *msec* | **t14** *msec* | **t17** *msec* | **t19** *msec* | **t20** *msec* | **t21** *msec* | **t22** *msec* | **t23** *msec* | **t24** *msec* | **t32** *msec*}

**no link-timer** {**retry** | **slt-t1** | **slt-t2** | **t01** | **t02** | **t03** | **t04** | **t05** | **t12** | **t13** | **t14** | **t17** | **t19** | **t20** | **t21** | **t22** | **t23** | **t24** | **t32**}



## Note

Ranges are ANSI or ITU defined.

## Syntax Description

|                           |                                                                                                                                                                                    |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>retry</b> <i>msec</i>  | (ANSI, ITU) Link activation retry timer.<br>(ANSI, ITU) Range of <i>msec</i> is 60000 through 90000 milliseconds.<br>Default is 60000 milliseconds.                                |
| <b>slt-t1</b> <i>msec</i> | (ANSI, ITU) Link test acknowledgment timer.<br>(ANSI, ITU) ITU Range of <i>msec</i> is 4000 through 12000 milliseconds.<br>Default is 8000 milliseconds.                           |
| <b>slt-t2</b> <i>msec</i> | (ANSI, ITU) Interval timer for sending test messages.<br>(ANSI, ITU) Range of <i>msec</i> is 30000 through 90000 milliseconds.<br>(ANSI, ITU) Default is 60000 milliseconds.       |
| <b>t01</b> <i>msec</i>    | (ANSI, ITU) Delay to avoid message mis-sequencing.<br>(ANSI, ITU) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds.               |
| <b>t02</b> <i>msec</i>    | (ANSI, ITU) Wait for changeover acknowledgment.<br>(ANSI, ITU) Range of <i>msec</i> is 700 through 2000 milliseconds.<br>(ANSI, ITU) Default is 1400 milliseconds.                 |
| <b>t03</b> <i>msec</i>    | (ANSI, ITU) Delay to avoid mis-sequencing in changeback.<br>(ANSI, ITU) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds.         |
| <b>t04</b> <i>msec</i>    | (ANSI, ITU) Wait for changeback acknowledgment (first attempt).<br>(ANSI, ITU) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds.  |
| <b>t05</b> <i>msec</i>    | (ANSI, ITU) Wait for changeback acknowledgment (second attempt).<br>(ANSI, ITU) Range of <i>msec</i> is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds. |
| <b>t12</b> <i>msec</i>    | (ANSI, ITU) Wait for uninhibited acknowledgment.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                |
| <b>t13</b> <i>msec</i>    | (ANSI, ITU) Wait for force uninhibited.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                         |
| <b>t14</b> <i>msec</i>    | (ANSI, ITU) Wait for inhibition acknowledgment.<br>(ANSI, ITU) Range of <i>msec</i> is 2000 through 3000 milliseconds.<br>(ANSI, ITU) Default is 2500 milliseconds.                |

|                 |                                                                                                                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t17 msec</b> | (ANSI, ITU) Delay to avoid oscillation of alignment failure and link restart.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.        |
| <b>t19 msec</b> | (ANSI) Failed link craft referral timer.<br>(ANSI) Range of <i>msec</i> is 480000 through 600000 milliseconds.<br>(ANSI) Default is 540000.                                                             |
| <b>t20 msec</b> | (ANSI) Waiting to repeat local inhibit test.<br>(ANSI) Range of <i>msec</i> is 90000 through 120000 milliseconds.<br>(ANSI) Default is 105000 milliseconds.                                             |
| <b>t21 msec</b> | (ANSI) Waiting to repeat remote inhibit test.<br>(ANSI) Range of <i>msec</i> is 90000 through 120000 milliseconds.<br>(ANSI) Default is 105000 milliseconds.                                            |
| <b>t22 msec</b> | (ITU) Local inhibit test timer.<br>(ITU) Range of <i>msec</i> is 180000 through 360000 milliseconds.<br>(ITU) Default is 300000 milliseconds.                                                           |
| <b>t23 msec</b> | (ITU) Remote inhibit test timer.<br>(ITU) Range of <i>msec</i> is 180000 through 360000 milliseconds.<br>(ITU) Default is 300000 milliseconds.                                                          |
| <b>t24 msec</b> | (ITU) Stabilizing timer after removal of local processor outage, used in LPO latching to RPO.<br>(ITU) Range of <i>msec</i> is 400 through 600 milliseconds.<br>(ITU) Default is 500 milliseconds.      |
| <b>t25 msec</b> | (ANSI) Timer at SP adjacent to restarting SP, waiting for traffic restart allowed message.<br>(ANSI) Range of <i>msec</i> is 30000 through 35000 milliseconds.<br>(ANSI) Default is 30000 milliseconds. |
| <b>t32 msec</b> | (ANSI) Link oscillation timer - Procedure A.<br>Range of <i>msec</i> is 60000 through 120000 milliseconds.<br>Default is 60000 milliseconds.                                                            |

**Defaults**

See defaults listed in Syntax Description.

**Command Modes**

CS7 link submode

**Command History**

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

**Usage Guidelines**

MTP3 timers can be defined at 3 levels, global, linkset, and link.

All global, linkset, and link specific timers can be defined at the global level. These values serve as defaults and are propagated down to the lower levels.

All linkset and link specific timers can be defined at the linkset level. These values serve as defaults for the linkset and all links defined within that linkset. Any values defined here will override any global values.

All timers defined at the link level will apply to the link and will override any values for that timer defined at either the linkset, or global level.

### Examples

The following example sets the ITP MTP3 T1 timer to 1000 milliseconds for link 0 of linkset1:

```
cs7 linkset linkset1
  link 0
    link-timer t01 1000
```

### Related Commands

| Command                     | Description                                                                                                                                                            |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 linkset</b>          | Specifies a linkset and enters CS7 linkset submenu.                                                                                                                    |
| <b>link (CS7 linkset)</b>   | Specifies a link and enters CS7 link submenu.                                                                                                                          |
| <b>cs7 mtp3 timer</b>       | Configures all global, linkset, and link specific timers.                                                                                                              |
| <b>show cs7 linkset</b>     | Used with the <b>timer</b> keyword, displays all timers for a linkset and indicates at which level the timers were defined. Displays all links timers for the linkset. |
| <b>show cs7 mtp3 timers</b> | Displays all global timers, and all linkset and link timers that have been defined at the global level.                                                                |
| <b>timer (CS7 Linkset)</b>  | Configures timers for a linkset (and, optionally, timers for links on the linkset.)                                                                                    |



# load (cs7 route table)

Route table contents can be loaded from a URL that locates a binary version of the route table. To load route table contents from flash, use the **load** command in route table configuration mode. To remove the **load** command from the configuration, use the **no** version of this command.

**load {flash | ftp | rcp | tftp} URL**

**no load {flash | ftp | rcp | tftp} URL**

## Syntax Description

|                                 |                                                |
|---------------------------------|------------------------------------------------|
| <b>flash   ftp   rcp   tftp</b> | Device where the route table is stored.        |
| <i>URL</i>                      | Path and filename of the route table contents. |

## Defaults

No default behavior or values.

## Command Modes

Route table configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |
| 12.2(4)MB | Command revised.             |

## Usage Guidelines

The **load** command will enter the (new) routing table immediately. When reloading the router, the **load** command will be executed before any update route.

Removing the **load** command from the configuration will not empty the routing table, but no table will be loaded when the next router reload occurs.

Use this command to load an MTP3 route-table upon ITP startup. At startup the ITP will load the route-table specified by <url> from a local flash file system or from a remote file system using tftp/ftp/rcp. After the route-table is loaded, all **update route** or **remove route** commands are applied to the previously loaded route-table.

If you use the **load** command while the ITP is operational the current (actual/active) route table is replaced with the one specified by <url> and the configured update/remove route commands are re-applied.

## Examples

The following example loads a file named route.txt from a tftp server:

```
load tftp://64.102.16.25/route.txt
```

## Related Commands

| Command                     | Description                              |
|-----------------------------|------------------------------------------|
| <b>cs7 route-table</b>      | Specifies the ITP route table            |
| <b>cs7 save route-table</b> | Saves an active route-table into a file. |

| Command                       | Description                     |
|-------------------------------|---------------------------------|
| show cs7 route                | Displays the ITP routing table. |
| update route<br>(route-table) | Updates a route.                |

# load (CS7 SMS address-table)

To specify an SMS address-table file to load upon startup, use the **load** command in CS7 SMS address-table configuration mode. To remove the specification, use the **no** form of this command.

**load** *URL*

**no load**

| Syntax Description | URL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                    | <ul style="list-style-type: none"> <li>bootflash: URL to load</li> <li>cs7: URL to load</li> <li>disk0: URL to load</li> <li>disk1: URL to load</li> <li>flash: URL to load</li> <li>ftp: URL to load</li> <li>null: URL to load</li> <li>nvrn: URL to load</li> <li>rcp: URL to load</li> <li>slavebootflash: URL to load</li> <li>slaveddfs: URL to load</li> <li>slavedisk0: URL to load</li> <li>slavedisk1: URL to load</li> <li>slavenvram: URL to load</li> <li>slavercsf: URL to load</li> <li>slaveslot0: URL to load</li> <li>slaveslot1: URL to load</li> <li>slot0: URL to load</li> <li>slot1: URL to load</li> <li>system: URL to load</li> <li>tftp: URL to load</li> </ul> |  |

**Defaults** No default behavior or values

**Command Modes** CS7 sms-address-table configuration

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

---

**Usage Guidelines**

SMS address tables can be stored in either NVRAM on the IOS platform or in a file that typically would be stored in flash. NVRAM limitations on some platforms might restrict the number of address entries that can be stored there. In this case, the file storage option is recommended.

You can configure address table entries that you plan to save to an external file. You then specify a location from which you will load the file of address table entries upon reboot.

---

**Examples**

The following example identifies an address table and specifies where the file is stored and loaded from at startup.

```
cs7 sms address-table imsi-screen
load disk0:imsi-screen
!
```

---

**Related Commands**

| Command                      | Description                     |
|------------------------------|---------------------------------|
| <b>cs7 sms address-table</b> | Specifies an SMS address table. |

## local-ip (CS7 local peer)

To configure a local IP address for an instance, use the **local-ip** CS7 local-peer submode command. To remove the configuration, use the **no** form of this command.

**local-ip** *addr*

**no local-ip** *addr*

| Syntax Description | <i>addr</i> | IP address. |
|--------------------|-------------|-------------|
|--------------------|-------------|-------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | CS7 local peer |
|---------------|----------------|
|---------------|----------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

| Usage Guidelines | You must configure one (and may configure up to four) local IP address for each local-peer. Cisco ITP will use one of the four local IP addresses for a primary local end-point instance and use the other three IP addresses as backups. |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | The following example assigns IP address 172.18.44.254 to the local peer at port 7000: |
|----------|----------------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------------|

```
cs7 local-peer 7000
 local-ip 172.18.44.254
```

| Related Commands | Command               | Description                                                 |
|------------------|-----------------------|-------------------------------------------------------------|
|                  | <b>cs7 local-peer</b> | Specifies the local peer and enters CS7 local peer submode. |

# local-ip (CS7 M3UA)

To configure a local IP address for an instance, use the **local-ip** CS7 M3UA submode command. To remove the configuration, use the **no** form of this command.

**local-ip** *addr*

**no local-ip** *addr*

| Syntax Description | <i>addr</i> | IP address. |
|--------------------|-------------|-------------|
|--------------------|-------------|-------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | CS7 M3UA |
|---------------|----------|
|---------------|----------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Usage Guidelines | You must configure one (and may configure up to four) local IP addresses that will receive packets for the configured local port. You can configure multiple IP addresses for SCTP multi-homing by specifying additional <b>local-ip</b> commands. The local port will receive packets from only an IP address that was configured. |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The local-ip associated with an instance can only be added on the first visit to the instance submode, or when the instance submode is shutdown. The local-ip associated with an instance can only be removed when the instance is shutdown.

| Examples | The following example assigns IP address 4.4.4.4 to the local peer at port 2905: |
|----------|----------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------|

```
cs7 m3ua 2905
 local-ip 4.4.4.4
```

| Related Commands | Command         | Description                                                      |
|------------------|-----------------|------------------------------------------------------------------|
|                  | <b>cs7 m3ua</b> | Specifies the local port number for M3UA and enter M3UA submode. |

# local-ip (CS7 MAPUA)

To configure up to four local IP addresses that will receive MAPUA packets, use the **local-ip** command in CS7 MAPUA submode. To remove the configuration, use the **no** form of this command.

**local-ip** *local-ip*

**no local-ip** *local-ip*

| Syntax Description | <i>local-ip</i> | Local IP address. |
|--------------------|-----------------|-------------------|
|--------------------|-----------------|-------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | CS7 MAPUA |
|---------------|-----------|
|---------------|-----------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB7 | This command was introduced. |

| Usage Guidelines | You must configure one (and may configure up to four) local IP addresses that will receive MAPUA packets. |
|------------------|-----------------------------------------------------------------------------------------------------------|
|------------------|-----------------------------------------------------------------------------------------------------------|

| Examples | The following example specifies that local IP 4.4.4.4 can receive MAPUA packets: |
|----------|----------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------|

```
cs7 mapua rad2000 radius 2000
local-ip 4.4.4.4
```

| Related Commands | Command          | Description                                                                   |
|------------------|------------------|-------------------------------------------------------------------------------|
|                  | <b>cs7 mapua</b> | Specifies the name, protocol, and local port number for the MAP Proxy feature |

# local-ip (CS7 SGMP)

To configure a local IP address for an instance, use the **local-ip** CS7 SGMP submode command. To remove the configuration, use the **no** form of this command.

**local-ip** *addr*

**no local-ip** *addr*

| Syntax Description | <i>addr</i> | IP address. |
|--------------------|-------------|-------------|
|--------------------|-------------|-------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | CS7 SGMP |
|---------------|----------|
|---------------|----------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Usage Guidelines | You must configure one (and may configure up to four) local IP addresses that will receive packets for the configured local port. You can configure multiple IP addresses for SCTP multi-homing by specifying additional <b>local-ip</b> commands. The local port will receive packets from only an IP address that was configured. |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The local-ip associated with an instance can only be added on the first visit to the instance submode, or when the instance submode is shutdown. The local-ip associated with an instance can only be removed when the instance is shutdown.

| Examples | The following example assigns IP address 4.4.4.4 to the local peer at port 5000: |
|----------|----------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------|

```
cs7 sgmp 5000
 local-ip 4.4.4.4
```

| Related Commands | Command         | Description               |
|------------------|-----------------|---------------------------|
|                  | <b>cs7 sgmp</b> | Specifies the local peer. |



## local-ip (CS7 SUA)

To configure a local IP address for an instance, use the **local-ip** CS7 SUA submode command. To remove the configuration, use the **no** form of this command.

**local-ip** *addr*

**no local-ip** *addr*

| Syntax Description | <i>addr</i> | Local IP address. |
|--------------------|-------------|-------------------|
|--------------------|-------------|-------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | CS7 SUA |
|---------------|---------|
|---------------|---------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Usage Guidelines | You must configure one (and may configure up to four) local IP addresses that will receive packets for the configured local port. You can configure multiple IP addresses for SCTP multi-homing by specifying additional <b>local-ip</b> commands. The local port will receive packets from only an IP address that was configured. |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The local-ip associated with an instance can only be added on the first visit to the instance submode, or when the instance submode is shutdown. The local-ip associated with an instance can only be removed when the instance is shutdown.

| Examples | The following example assigns IP address 4.4.4.4 to the local peer at port 15000: |
|----------|-----------------------------------------------------------------------------------|
|----------|-----------------------------------------------------------------------------------|

```
cs7 sua 15000
  local-ip 4.4.4.4
```

| Related Commands | Command        | Description                                                         |
|------------------|----------------|---------------------------------------------------------------------|
|                  | <b>cs7 sua</b> | Specifies the local port number for SUA and enters CS7 SUA submode. |

# local-ip (group)

To configure a local IP address for an association, use the **local-ip** group submode command. To remove the configuration, use the **no** form of this command.

**local-ip** *ip-address*

**no local-ip** *ip-address*

| Syntax Description | <i>ip-address</i> | Local IP address. |
|--------------------|-------------------|-------------------|
|--------------------|-------------------|-------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | Group |
|---------------|-------|
|---------------|-------|

| Command History | Release    | Modification                                  |
|-----------------|------------|-----------------------------------------------|
|                 | 12.2(25)SW | This command was introduced in Group submode. |

| Usage Guidelines | The local association IP address must be an IP address configured on the router. You may configure up to four local IP address for the association. |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | The second line in the following example assigns local association IP address 1.1.1.1 |
|----------|---------------------------------------------------------------------------------------|
|----------|---------------------------------------------------------------------------------------|

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 peer 4444
 remote-ip 1.1.1.2
```

| Related Commands | Command          | Description                                       |
|------------------|------------------|---------------------------------------------------|
|                  | <b>cs7 group</b> | Specifies an ITP Group and enables group submode. |

# local-ip (local IPC Sctp)

To configure a local IP address for an Sctp association, use the **local-ip** command in local IPC Sctp configuration mode. To remove the specified address from the configuration, use the **no** form of this command.

**local-ip** *ip-address*

**no local-ip** *ip-address*

| Syntax Description | <i>ip-address</i> | Local IP address. |
|--------------------|-------------------|-------------------|
|--------------------|-------------------|-------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | local IPC Sctp |
|---------------|----------------|
|---------------|----------------|

| Command History | Release    | Modification                                             |
|-----------------|------------|----------------------------------------------------------|
|                 | 12.2(25)SW | This command was introduced in local IPC Sctp submodule. |

| Usage Guidelines | The local IPC Sctp IP address must be an IP address configured on the router. You can specify up to two local IP addresses for the association. |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | The third line in the following example configures local IP address 1.1.1.1 |
|----------|-----------------------------------------------------------------------------|
|----------|-----------------------------------------------------------------------------|

```
protocol sctp
 local-port 11111
 local-ip 1.1.1.1
```

| Related Commands | Command                             | Description                   |
|------------------|-------------------------------------|-------------------------------|
|                  | <b>remote port (local IPC Sctp)</b> | Defines the remote Sctp port. |

# local-port

To specify the local IPC Sctp association port, use the **local-port** command in IPC Sctp protocol configuration mode. To remove the configuration, use the **no** form of this command.

**local-port** *port-number*

**no local-port** *port-number*

|                           |                    |                                                                                                        |
|---------------------------|--------------------|--------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>port-number</i> | Local IPC Sctp association port number. Valid port numbers range from 1 to 65535. There is no default. |
|---------------------------|--------------------|--------------------------------------------------------------------------------------------------------|

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

|                      |                   |
|----------------------|-------------------|
| <b>Command Modes</b> | IPC Sctp protocol |
|----------------------|-------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The <b>local-port</b> command enables local IPC Sctp mode, in which you configure the local IP addresses for the association. |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|

The port number for the local IPC Sctp association can not be the same as the port number for the CS7 group association. When you define a local IPC Sctp port number (for example port number 1024) the next available port number (in this example port number 1025) is automatically created for the IPC Sctp association used for checkpointing. Neither of these port numbers (in this example, neither 1024 nor 1025) may be used for the CS7 group port number.

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| <b>Examples</b> | The second line in the following example configures local port 11111 |
|-----------------|----------------------------------------------------------------------|

```
protocol sctp
 local-port 11111
 local-ip 1.1.1.1
```

| <b>Related Commands</b> | <b>Command</b>                   | <b>Description</b>                                                                                    |
|-------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------|
|                         | <b>local-ip (local IPC Sctp)</b> | Defines the local IP address that will be used in the Sctp association.                               |
|                         | <b>protocol sctp</b>             | Specifies that the Sctp protocol will be used as the transport protocol for the IPC zone association. |

# map-dest-addr

To provision a global title address, such as an E.212/E.214 address, to be used in the SCCP called party address, use the **map-dest-addr** command in CS7 MAPUA submode. To remove the provision, use the **no** form of this command.

**map-dest-addr** [**use** {**national** | **international**}] [**tt** *tt*] [**gti** *gti*] [**np** *np*] [**nai** *nai*]

**no map-dest-addr** [**use** {**national** | **international**}] [**tt** *tt*] [**gti** *gti*] [**np** *np*] [**nai** *nai*]

## Syntax Description

|                      |                                                                                                                                                                                                                                                                                                  |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>use</b>           | (Optional) Indicates setting for national use bit in the address indicator.                                                                                                                                                                                                                      |
| <b>international</b> | Indicates that address has international scope (default for ITU/CHINA).                                                                                                                                                                                                                          |
| <b>national</b>      | Indicates that address has national scope (default for ANSI).                                                                                                                                                                                                                                    |
| <b>tt</b>            | (Optional for ANSI, ITU, and China variants.) Specifies the translation type.                                                                                                                                                                                                                    |
| <i>tt</i>            | The translation-type used in the global title representing the MAP Proxy. Valid values are in the range 0-255.<br><br>Typical values are 9 (for IMSI), 14 (for MSISDN) or 10 (for Network Element without number portability).<br><br>For ANSI, defaults to 9. For ITU and China, defaults to 0. |
| <b>gti</b>           | (Optional for ITU, and China variants.) Specifies the global title indicator.                                                                                                                                                                                                                    |
| <i>gti</i>           | Global Title Indicator. Valid numbers are:<br>2 Global Title includes translation type.<br>4 Global Title includes translation type, numbering plan, nature of address.<br><br>Default is 4.                                                                                                     |
| <b>np</b>            | (Optional for ITU, and China variants.) Specifies the numbering plan.                                                                                                                                                                                                                            |
| <i>np</i>            | Numbering plan values. Valid values are in the range 0-15.<br><br>Default is 6.                                                                                                                                                                                                                  |
| <b>nai</b>           | (Optional for ITU, and China variants.) Nature of address indicator.                                                                                                                                                                                                                             |
| <i>nai</i>           | Nature of address indicator value. Valid values are in the range 0-127<br><br>Default is 4.                                                                                                                                                                                                      |

## Defaults

ANSI defaults:  
TT = 9.

ITU/CHINA defaults:  
TT = 0.  
GTI = 4.  
NP = 6.  
NAI = 4

## Command Modes

CS7 MAPUA submode

**Command History**

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

**Examples**

The following example provisions the destination address translation type as 10:

```
map-dest-addr tt 10
```

**Related Commands**

| Command   | Description                                                                                                      |
|-----------|------------------------------------------------------------------------------------------------------------------|
| cs7 mapua | Specifies the name, protocol, and local port number for the MAP Proxy feature and enables the CS7 MAPUA submode. |

## map-source-addr (cs7 mapua)

To provision a global title address, such as an E.164 address, to be used as the calling party address for all MAP-generated messages, use the **map-source-addr** command in CS7 MAPUA configuration mode. To remove the provision, use the **no** form of this command.

```
map-source-addr [use {national | international}] digits digit-string [tt tt] [gti gti] [np np] [nai nai]
```

```
no map-source-addr
```

| Syntax Description   |                                                                                                                                                                                                                                                                                                   |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>use</b>           | (Optional) Indicates setting for national use bit in the address indicator.                                                                                                                                                                                                                       |
| <b>international</b> | Indicates that address has international scope (default for ITU/CHINA).                                                                                                                                                                                                                           |
| <b>national</b>      | Indicates that address has national scope (default for ANSI).                                                                                                                                                                                                                                     |
| <b>digits</b>        | Provisions a digit string representing the MAP Proxy.                                                                                                                                                                                                                                             |
| <i>digit-string</i>  | The 1-15 digit string (in hexadecimal) representing the MAP Proxy. The digit string will typically represent an E.164 type, but may be further qualified as any address type.                                                                                                                     |
| <b>tt</b>            | (Optional for ANSI, ITU, and China variants.) Specifies the translation type of the address specified in the digits parameter.                                                                                                                                                                    |
| <i>tt</i>            | The translation-type used in the global title representing the MAP Proxy. Valid values are in the range 0-255.<br><br>Typical values are 9 (for IMSI), 14 (for MSISDN) or 10 (for Network Element without number portability).<br><br>For ANSI, defaults to 10. For ITU and China, defaults to 0. |
| <b>gti</b>           | (Optional for ITU and China variants.) Specifies the global title indicator.                                                                                                                                                                                                                      |
| <i>gti</i>           | Global Title Indicator. Valid numbers are:<br>2 Global Title includes translation type.<br>4 Global Title includes translation type, numbering plan, nature of address.                                                                                                                           |
| <b>np</b>            | (Optional for ITU and China variants.) Specifies the numbering plan.                                                                                                                                                                                                                              |
| <i>np</i>            | Numbering plan values. Valid values are in the range 0-15.<br><br>Default is 1.                                                                                                                                                                                                                   |
| <b>nai</b>           | (Optional for ITU and China variants.) Nature of address indicator.                                                                                                                                                                                                                               |
| <i>nai</i>           | Nature of address indicator value. Valid values are in the range 0-127<br><br>Default is 4.                                                                                                                                                                                                       |

### Defaults

ANSI defaults:

TT = 10.

ITU/CHINA defaults:

TT = 0.

GTI = 4.

NP = 1.

NAI = 4

---

**Command Modes** CS7 MAPUA submode

---

**Command History**

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

---

---

**Examples**

The following example provisions a global title address 1234567890 with translation type 9:

```
cs7 mapua rad2000 radius 2000
client 1.1.1.1 secret 0 client1111
map-source-addr digits 1234567890 tt 9
```

---

**Related Commands**

| Command   | Description                                                                                                      |
|-----------|------------------------------------------------------------------------------------------------------------------|
| cs7 mapua | Specifies the name, protocol, and local port number for the MAP Proxy feature and enables the CS7 MAPUA submode. |

---



## map-source-addr (cs7 sms smsmo)

To specify the local source address of the SMS application, use the **map-source-address** command in cs7 sms smsmo configuration mode. To remove the configuration, use the **no** form of this command.

```
map-source-addr {digits | use {international | national} digits} addr-digits [tt tt gti gti [np np nai nai]]
```

```
no map-source-addr
```

| Syntax Description   |  |                                                                                                                                     |
|----------------------|--|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>digits</b>        |  | Indicates address digits.                                                                                                           |
| <b>use</b>           |  | Indicates setting for national use bit in the address indicator.                                                                    |
| <b>international</b> |  | Indicates that address has international scope (default for ITU/CHINA).                                                             |
| <b>national</b>      |  | Indicates that address has national scope (default for ANSI).                                                                       |
| <i>addr-digits</i>   |  | Address digits, in the range of 1 to 15 digits.                                                                                     |
| <b>tt</b>            |  | (Optional) Indicates translation type.                                                                                              |
| <i>tt</i>            |  | Translation type, in the range 0 to 255.                                                                                            |
| <b>gti</b>           |  | Specifies a global title indicator.                                                                                                 |
| <i>gti</i>           |  | Global title indicator. Valid numbers are 2(primarily used in the ANSI domain) or 4 (used in the ITU domain).                       |
| <b>np</b>            |  | In ITU domain, specifies a numbering plan.                                                                                          |
| <i>np</i>            |  | Numbering plan. Valid range is 0 through 15.                                                                                        |
| <b>nai</b>           |  | In ITU domain, specifies a nature of address indicator. Required for a <i>gti</i> value of 4. Optional for a <i>gti</i> value of 2. |
| <i>nai</i>           |  | Nature of address indicator. Valid range is 0 through 127.                                                                          |

**Defaults** No default behavior or values

**Command Modes** CS7 SMS SMS-MO

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Usage Guidelines** Specifies local source address of application. The map source address is used in reply to sms-mo dialogues and in proxied dialogs if an msc proxy address is not specified.

A ruleset must be configured for the gsm-map sms-mo configuration to take effect. If no ruleset is configured the configuration will be incomplete and will be ignored.

---

**Examples**

The following example configures an SMS route table, specifies a CDR service, specifies GSM MAP routing and a local source address of application.

```
cs7 sms route-table
cdr-service cdrserv1
gsm-map sms-mo ssn 8
ruleset sms-rules
map-source-addr digits 18881212122
```

---

**Related Commands**

| Command                              | Description                      |
|--------------------------------------|----------------------------------|
| <b>cs7 sms route-table</b>           | Specifies an SMS route table.    |
| <b>gsm-map (cs7 sms route table)</b> | Specifies the GSM MAP operation. |

---

# match access-group

To enable access list packet classification on a linkset, use the **match access-group** CS7 linkset submode command. To remove the configuration, use the **no** form of the command.

**match access-group**

**no match access-group**

**Syntax Description** This command has no arguments or keywords.

**Command Modes** CS7 linkset submode

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Usage Guidelines** This command should be used on input linksets with legacy SS7 links. The **match access-group** command enables the mapping of CS7 access list match criteria to the access list applied to the QoS classes.

**Examples** The following example enables access lists packet classification. Incoming packets with service indicator 3 (SCCP) will be assigned QoS class 5.

```
access list 2701 permit si 3

cs7 qos class 5
  qos-ip-precedence 3
  qos-access-group 2701

cs7 linkset to-washington 3.3.3
  match access-group
```

| Related Commands | Command              | Description             |
|------------------|----------------------|-------------------------|
|                  | <b>access-list</b>   | Defines an access list. |
|                  | <b>cs7 qos class</b> | Specifies a QoS class.  |

## match any (CS7 ASP)

To assign a QoS class number to all inbound traffic, use the **match any** CS7 ASP submode command. To remove the configuration, use the **no** form of the command.

**match any qos-class** *class* [*instance-number*]

**no match any qos-class** *class* [*instance-number*]

|                    |                        |                                                                                                                   |
|--------------------|------------------------|-------------------------------------------------------------------------------------------------------------------|
| Syntax Description | <b>qos-class</b>       | Specifies a QoS class.                                                                                            |
|                    | <i>class</i>           | QoS class ID. Valid range is 1 through 7.                                                                         |
|                    | <i>instance-number</i> | Required if multiple instances is configured. The valid range is 0 through 7. The default instance is instance 0. |

|               |                 |
|---------------|-----------------|
| Command Modes | CS7 ASP submode |
|---------------|-----------------|

|                 |                |                              |
|-----------------|----------------|------------------------------|
| Command History | <b>Release</b> | <b>Modification</b>          |
|                 | 12.2(4)MB5     | This command was introduced. |

### Usage Guidelines

**Examples** The following example assigns QoS class 4 to all incoming packets from ASP1:

```
cs7 asp ASP1
 match any qos-class 4
```

|                  |                      |                                                                      |
|------------------|----------------------|----------------------------------------------------------------------|
| Related Commands | <b>Command</b>       | <b>Description</b>                                                   |
|                  | <b>cs7 asp</b>       | Specifies an Application Server Process and enables CS7 ASP submode. |
|                  | <b>cs7 qos class</b> | Specifies a QoS class.                                               |

## match any (CS7 Linkset)

To enable input packet classification on a linkset, use the **match any** CS7 linkset submode command. To remove the configuration, use the **no** form of the command.

**match any qos-class** *class*

**no match any qos-class** *class*

|                           |                                                                                                                                                                                       |                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>Syntax Description</b> | <b>qos-class</b>                                                                                                                                                                      | Specifies a QoS class.                    |
|                           | <i>class</i>                                                                                                                                                                          | QoS class ID. Valid range is 1 through 7. |
| <b>Command Modes</b>      | CS7 linkset submode                                                                                                                                                                   |                                           |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                        | <b>Modification</b>                       |
|                           | 12.2(4)MB                                                                                                                                                                             | This command was introduced.              |
| <b>Usage Guidelines</b>   | This command should be used on input linksets with legacy SS7 links.                                                                                                                  |                                           |
| <b>Examples</b>           | The following example configures input linkset packet classification and assigns QoS class 4 to the incoming packets:<br><br>cs7 linkset to-washington 3.3.3<br>match any qos-class 4 |                                           |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                        | <b>Description</b>                        |
|                           | cs7 qos class                                                                                                                                                                         | Specifies a QoS class.                    |

## match ip (cs7 sms result)

To match inbound sessions to the proper result group based on partner IP address and optional port number, use the **match ip** command in CS7 SMS result configuration mode. To remove the configuration, use the **no** form of this command.

**match ip** *ip-address* {*port* | **any**} [**profile** *profile-name*] [**weight** *weight*]

**no match ip** *ip-address* {*port* | **any**} [**profile** *profile-name*] [**weight** *weight*]

|                           |                     |                                                                           |
|---------------------------|---------------------|---------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>ip-address</i>   | IP address.                                                               |
|                           | <i>port</i>         | (Optional) Remote port for connection. Valid range is 1024-65535.         |
|                           | <b>any</b>          | (Optional) Match any.                                                     |
|                           | <b>profile</b>      | (Optional) Configures a profile.                                          |
|                           | <i>profile-name</i> | Profile name.                                                             |
|                           | <b>weight</b>       | (Optional) Specifies the weight applied to the WRR distribution algorithm |
|                           | <i>weight</i>       | Weight value applied to WRR algorithm. Valid range is 0 - 10.             |

**Defaults** No default behavior or values

**Command Modes** CS7 SMS result configuration

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

**Usage Guidelines** Configuring this operand allows dynamic sessions that match this parameter to be associated with the result group by partner IP address.

**Examples** The following example configures a result group named OFFISLAND with result type ESME, and specifies a match by partner IP address 10.10.10.200:

```
cs7 sms result-group OFFISLAND esme
match ip 10.10.10.200 any
```

|                         |                             |                            |
|-------------------------|-----------------------------|----------------------------|
| <b>Related Commands</b> | <b>Command</b>              | <b>Description</b>         |
|                         | <b>cs7 sms result-group</b> | Configures a result group. |

## match si (cs7 asp))

To assign a QoS class number to any inbound packet that has a specific service indicator, use the **match si** command in cs7 asp configuration mode . To remove the configuration, use the **no** form of the command.

**match si** *si* **qos-class** *class* [*instance-number*]

**no match si** *si* **qos-class** *class* [*instance-number*]

|                           |                        |                                                                                                                   |
|---------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>si</i>              | Service indicator. Valid range is 0 through 15.                                                                   |
|                           | <b>qos-class</b>       | Specifies a QoS class.                                                                                            |
|                           | <i>class</i>           | QoS class ID. Valid range is 1 through 7.                                                                         |
|                           | <i>instance-number</i> | Required if multiple instances is configured. The valid range is 0 through 7. The default instance is instance 0. |

|                      |                       |
|----------------------|-----------------------|
| <b>Command Modes</b> | CS7 ASP configuration |
|----------------------|-----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

**Examples** The following example assigns QoS class 3 to all ISUP (si=5) incoming packets from ASP1:

```
cs7 asp ASP1
match si 5 qos-class 3
```

|                         |                      |                                                                      |
|-------------------------|----------------------|----------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>       | <b>Description</b>                                                   |
|                         | <b>cs7 asp</b>       | Specifies an Application Server Process and enables CS7 ASP submode. |
|                         | <b>cs7 qos class</b> | Specifies a QoS class.                                               |

## match si (cs7 linkset)

To enable service indicator packet classification on a linkset, use the **match si** command in cs7 linkset configuration mode. To remove the configuration, use the **no** form of the command.

**match si** *si* qos-class *class*

**no match si** *si* qos-class *class*

### Syntax Description

|                  |                                                 |
|------------------|-------------------------------------------------|
| <i>si</i>        | Service indicator. Valid range is 0 through 15. |
| <b>qos-class</b> | Specifies a QoS class.                          |
| <i>class</i>     | QoS class ID. Valid range is 1 through 7.       |

### Command Modes

CS7 linkset configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

This command should be used on input linksets with legacy SS7 links.

### Examples

The following example configures service indicator packet classification. Service indicator 5 (ISUP) packets are assigned QoS class 3:

```
cs7 linkset to-washington 3.3.3
 match si 5 qos-class 3
```

### Related Commands

| Command              | Description            |
|----------------------|------------------------|
| <b>cs7 qos class</b> | Specifies a QoS class. |



## match smpp id (cs7 sms result)

To specify ESME (large-account) SMPP system identification and match inbound sessions to the proper result group, use the **match smpp id** command in CS7 SMS result configuration mode. To remove the configuration, use the **no** form of this command.

**match smpp id** *id* [**type** *type*] [**password** *password*]

**no match smpp id** *id* [**type** *type*] [**password** *password*]

### Syntax Description

|                 |                                              |
|-----------------|----------------------------------------------|
| <i>id</i>       | ESME SMPP system ID string.                  |
| <b>type</b>     | (Optional) Configures ESME SMPP system type. |
| <i>type</i>     | SMPP system type.                            |
| <b>password</b> | (Optional) Configures ESME SMPP password.    |
| <i>password</i> | SMPP password.                               |

### Defaults

No default behavior or values

### Command Modes

CS7 SMS result configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

Configuring this operand verifies SMPP session parameters for all SMPP sessions on the result group, and allows dynamic SMPP sessions that match these parameters to be associated with this result group.

### Examples

The following example configures a result group named OFFISLAND with result type ESME, and specifies ESME SMPP system ID, type, and password:

```
cs7 sms result-group OFFISLAND esme
match smpp id dogshow type esme password pooch
```

### Related Commands

| Command                     | Description                |
|-----------------------------|----------------------------|
| <b>cs7 sms result-group</b> | Configures a result group. |

## match ucp id (cs7 sms result)

To specify ESME (large-account) UCP address code and password and match inbound sessions to the proper result group, use the **match ucp id** command in CS7 SMS result configuration mode. To remove the configuration, use the **no** form of this command.

**match ucp id** *ucp-addr* **password** *password*

**no match ucp id** *ucp-addr* **password** *password*

### Syntax Description

|                 |                                             |
|-----------------|---------------------------------------------|
| <b>id</b>       | Configures ESME UCP address code.           |
| <i>id</i>       | UCP address.                                |
| <b>password</b> | (Optional) Configures an ESME UCP password. |
| <i>password</i> | UCP password.                               |

### Defaults

No default behavior or values

### Command Modes

CS7 SMS result configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

Configuring this operand verifies UCP session parameters for all SMPP sessions on the result group, and allows dynamic UCP sessions that match these parameters to be associated with this result group.

### Examples

The following example configures a result group named OFFISLAND with result type ESME, and specifies an ESME UCP address code and password:

```
cs7 sms result-group OFFISLAND esme
```

### Related Commands

| Command                     | Description                |
|-----------------------------|----------------------------|
| <b>cs7 sms result-group</b> | Configures a result group. |

## max-inbound-streams (CS7 M3UA)

To configure the maximum number of inbound streams allowed for the local port, use the **max-inbound-streams** CS7 M3UA submode command. To remove the configuration, use the **no** form of this command.

**max-inbound-streams** *max-streams*

**no max-inbound-streams** *max-streams*

| Syntax Description | <i>max-streams</i> | The maximum number of inbound streams allowed for the local the local port. The range is 2 to 25. The default is 17 streams. |
|--------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------|
|--------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------|

| Defaults | 17 streams |
|----------|------------|
|----------|------------|

| Command Modes | CS7 M3UA |
|---------------|----------|
|---------------|----------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

**Examples** The following command specifies that a maximum of 10 streams is allowed on the local port:

```
cs7 m3ua 2905
 local-ip 4.4.4.4
 max-inbound-streams 10
```

| Related Commands | Command              | Description                                                           |
|------------------|----------------------|-----------------------------------------------------------------------|
|                  | <b>cs7 m3ua</b>      | Specifies the local port number for M3UA and enters CS7 M3UA submode. |
|                  | <b>show cs7 m3ua</b> | Displays M3UA statistics.                                             |

## max-inbound-streams (CS7 SGMP)

To configure the maximum number of inbound streams allowed for the local port, use the **max-inbound-streams** CS7 SGMP submode command. To remove the configuration, use the **no** form of this command.

**max-inbound-streams** *max-streams*

**no max-inbound-streams** *max-streams*

### Syntax Description

|                    |                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------|
| <i>max-streams</i> | The maximum number of inbound streams allowed for the local the local port. The range is 2 to 25. The default is 17 streams. |
|--------------------|------------------------------------------------------------------------------------------------------------------------------|

### Defaults

17 streams

### Command Modes

CS7 SGMP

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Examples

The following command specifies that a maximum of 10 streams is allowed on the local port:

```
cs7 sgmp 5000
 local-ip 4.4.4.4
 max-inbound-streams 10
```

### Related Commands

| Command              | Description                                                           |
|----------------------|-----------------------------------------------------------------------|
| <b>cs7 sgmp</b>      | Specifies the local port number for SGMP and enters CS7 SGMP submode. |
| <b>show cs7 sgmp</b> | Displays SGMP statistics.                                             |

## max-inbound-streams (CS7 SUA)

To configure the maximum number of inbound streams allowed for the local port, use the **max-inbound-streams** CS7 SUA submode command. To remove the configuration, use the **no** form of this command.

**max-inbound-streams** *max-streams*

**no max-inbound-streams** *max-streams*

| Syntax Description | <i>max-streams</i> | The maximum number of inbound streams allowed for the local the local port. The range is 2 to 25. The default is 17 streams. |
|--------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------|
|--------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------|

| Defaults | 17 streams |
|----------|------------|
|----------|------------|

| Command Modes | CS7 SUA |
|---------------|---------|
|---------------|---------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

**Examples** The following command specifies that a maximum of 10 streams is allowed on the local port:

```
cs7 sua 15000
 local-IP 4.4.4.4
 max-inbound-streams 10
```

| Related Commands | Command             | Description                                                         |
|------------------|---------------------|---------------------------------------------------------------------|
|                  | <b>cs7 sua</b>      | Specifies the local port number for SUA and enters CS7 SUA submode. |
|                  | <b>show cs7 sua</b> | Displays SUA statistics.                                            |

## max-messages (CS7 SMS SMSMO MSC PROXY)

To specify the maximum number of open MO SMS messages allowed before a congestion response is generated, use the **max-messages** command in CS7 SMS route table configuration mode. To remove the configuration, use the **no** form of this command.

**max-messages** *number*

**no max-messages** *number*

### Syntax Description

|               |                                                                         |
|---------------|-------------------------------------------------------------------------|
| <i>number</i> | Maximum number of open MO SMS messages. Valid range is 1 to 2147483647. |
|---------------|-------------------------------------------------------------------------|

### Defaults

No default behavior or values

### Command Modes

CS7 SMS SMS-MO

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Examples

The following example configures an SMS route table, specifies a CDR service, specifies GSM MAP routing, a ruleset, and a local source address of application, and specifies the maximum number of open MO SMS messages.

```
cs7 sms route-table
cdr-service cdrserv1
gsm-map sms-mo ssn 8
ruleset sms-rules
map-source-addr digits 18881212122
msc-proxy-addr tt 10 gti 2
max-messages 1000000
```

### Related Commands

| Command                              | Description                      |
|--------------------------------------|----------------------------------|
| <b>cs7 sms route-table</b>           | Specifies an SMS route table.    |
| <b>gsm-map (cs7 sms route table)</b> | Specifies the GSM MAP operation. |

# maxQdepth

To configure the maximum TCP queue depth (the maximum number of packets that may be queued for retransmit), use the **maxQdepth** command in CS7 monitor configuration mode. To remove the configuration, use the **no** form of this command.

**maxQdepth** *max-depth*

**no maxQdepth**

|                           |                  |                                                                                                             |
|---------------------------|------------------|-------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-depth</i> | The maximum number of TCP packets that may be queued for retransmit. The valid range is 10 to 1000 packets. |
|---------------------------|------------------|-------------------------------------------------------------------------------------------------------------|

|                 |                                                    |
|-----------------|----------------------------------------------------|
| <b>Defaults</b> | Default configuration of maxQdepth is 100 packets. |
|-----------------|----------------------------------------------------|

|                      |                           |
|----------------------|---------------------------|
| <b>Command Modes</b> | CS7 monitor configuration |
|----------------------|---------------------------|

| <b>Command History</b> | Release     | Modification                 |
|------------------------|-------------|------------------------------|
|                        | 12.2(4)MB12 | This command was introduced. |

|                         |                                                                                                                                                                                                               |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | If the ITP monitor cannot send a TCP packet immediately, the packet will be queued for retransmit. Once the number of TCP packets on the queue reaches the maxQdepth, additional TCP packets will be dropped. |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                          |
|-----------------|----------------------------------------------------------|
| <b>Examples</b> | The following example sets the maxQdepth to 500 packets: |
|-----------------|----------------------------------------------------------|

```
cs7 monitor 9000
maxQdepth 500
```

| <b>Related Commands</b> | Command            | Description                                                                                                  |
|-------------------------|--------------------|--------------------------------------------------------------------------------------------------------------|
|                         | <b>cs7 monitor</b> | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

# max-return

To specify the maximum number of authentication triplets that may be returned to a MAPUA client for a single request, use the **max-return** command in `authent-vlr` submode. To return to the default return size value of 5, use the **no** form of this command.

**max-return** *return-size*

**no max-return** *return-size*

## Syntax Description

|                    |                                                                                                                                                                          |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>return-size</i> | The maximum number of authentication triplets that may be returned to a MAPUA client for a single request. Valid values are decimal numbers in the range of 1 through 5. |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

The return size default is 5

## Command Modes

Authent-vlr

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

## Usage Guidelines

The **max-return** command allows you to override the number of requested triplets specified by the client (e.g, AR) in order to optimize caching in the system. If not specified, the return size default is 5, but fewer triplets may be returned based on the number requested by the client and the number returned by the HLR (or stored in the cache from a previous query).

## Examples

The following example sets to 2 the maximum number of authentication triplets that may be returned to a MAPUA for a single request:

```
gsm-authent-vlr
 cache-size 100
 max-return 2
```

## Related Commands

| Command         | Description                                                                                                                                       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| cache-size      | Specifies the total number of IMSIs for which authentication triplets will be cached.                                                             |
| gsm-authent-vlr | Enables <code>authent-vlr</code> submode for provisioning parameters specific to the <code>Process_Obtain_Authentication_Sets_VLR</code> service. |



## max-streams (group)

To configure the maximum number of inbound and outbound streams allowed for the local port, use the **max-streams** group submode command. To reset the inbound and outbound stream values to their default values, use the **no** form of this command.

**max-streams** *inbound-streams* *outbound-streams*

**no max-streams** *inbound-streams* *outbound-streams*

|                           |                                                                                                                                                                                    |                                                                                                                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>inbound-streams</i>                                                                                                                                                             | The maximum number of inbound streams allowed for the local the local port. The range is 2 to 17. The default is 2 streams.  |
|                           | <i>outbound-streams</i>                                                                                                                                                            | The maximum number of outbound streams allowed for the local the local port. The range is 2 to 17. The default is 2 streams. |
| <b>Defaults</b>           | 2 streams                                                                                                                                                                          |                                                                                                                              |
| <b>Command Modes</b>      | Group                                                                                                                                                                              |                                                                                                                              |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                     | <b>Modification</b>                                                                                                          |
|                           | 12.2(25)SW                                                                                                                                                                         | This command was introduced.                                                                                                 |
| <b>Examples</b>           | <p>The following command specifies that a maximum of 10 inbound and 10 outbound streams on the local port:</p> <pre>cs7 group ITP1 3333  local-ip 1.1.1.1  max-streams 10 10</pre> |                                                                                                                              |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                     | <b>Description</b>                                                                                                           |
|                           | <b>cs7 group</b>                                                                                                                                                                   | Specifies an ITP Group and enables the group submode.                                                                        |

# mnp

To allow configuration of DSMR options specific to mobile number portability, use the **mnp** command in CS7 SMS GSM SMSMO configuration mode. To remove the configuration, use the **no** form of this command.

**mnp tt1 tt [tt2 tt]**

**no mnp tt1 tt [tt2 tt]**

|                           |                                                                                                                                                                                                                             |                                                                                                                                                               |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>tt1</b>                                                                                                                                                                                                                  | Specifies that all SRI-SM messages will be sent to the HLR using the specified translation type within the SCCP called party address.                         |
|                           | <b>tt2</b>                                                                                                                                                                                                                  | If the SRI SM response contains the error “Unknown Subscriber” and tt2 is configured, then a second SRI is sent using the translation type specified for tt2. |
|                           | <b>tt</b>                                                                                                                                                                                                                   | An integer value in the range 0 to 255.                                                                                                                       |
| <b>Defaults</b>           | If <b>tt1</b> is not specified, then the variant-specific default TT is used: TT=10 for ANSI, TT=0 for all other variants.                                                                                                  |                                                                                                                                                               |
| <b>Command Modes</b>      | CS7 SMS GSM SMSMO configuration                                                                                                                                                                                             |                                                                                                                                                               |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                                                              | <b>Modification</b>                                                                                                                                           |
|                           | 12.2(25)SW1                                                                                                                                                                                                                 | This command was introduced.                                                                                                                                  |
| <b>Examples</b>           | <p>The last line in the following example specifies that all SRI-SM messages will be sent to the HLR using the translation type 5:</p> <pre>cs7 sms route-table   cdr-service CDR1   gsm-map sms-mo ssn 8   mnp tt1 5</pre> |                                                                                                                                                               |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                                                              | <b>Description</b>                                                                                                                                            |
|                           | <b>gsm-map (cs7 sms route table)</b>                                                                                                                                                                                        | Specifies the inbound/received GSM MAP operations to be routed.                                                                                               |

# modify-prefix

To allow modification of the SMS destination that was received from an MSC and to enable conversion of local dialing prefixes into international equivalents, use the **modify-prefix** command in CS7 SMS GSM SMSMO configuration mode. To remove the configuration, use the **no** form of this command.

**modify-prefix dest-sme** { \* | *address* } [**noa** *noa np np*] [**min-digits** *min-digits*] [**max-digits** *max-digits*] [**remove** *num-digits-to-remove*] [**add** *add-prefix-digits*] [**rslt-noa** *noa rslt-np np*]

**no modify-prefix dest-sme** { \* | *address* } [**noa** *noa np np*] [**min-digits** *min-digits*] [**max-digits** *max-digits*] [**remove** *num-digits-to-remove*] [**add** *add-prefix-digits*] [**rslt-noa** *noa rslt-np np*]

| Syntax Description                        |  |                                                                                                                                                                    |
|-------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>dest-sme</b>                           |  | Specifies the type of address to modify. Currently, only the destination short message entity address can be modified, so <b>dest-sme</b> is the only valid entry. |
| <b>*</b>                                  |  | Specifies that all addresses will be modified.                                                                                                                     |
| <i>address</i>                            |  | Specifies that only addresses that begin with the digits specified will be modified.                                                                               |
| <b>noa</b> <i>noa np np</i>               |  | Specifies that only addresses received with nature of address that matches <i>noa</i> and a numbering plan that matches <i>np</i> will be modified.                |
| <b>min-digits</b> <i>min-digits</i>       |  | Specifies that only addresses received that are at least <i>min-digits</i> in length will be modified.                                                             |
| <b>max-digits</b> <i>max-digits</i>       |  | Specifies that only addresses received that are smaller or equal in length to <i>max-digits</i> will be modified.                                                  |
| <b>remove</b> <i>num-digits-to-remove</i> |  | Specifies the number of digits that should be stripped from the prefix of the received address when formulating the new modified address.                          |
| <b>add</b> <i>add-prefix-digits</i>       |  | Specifies the prefix digits that should be added to the received address when formulating the modified address.                                                    |
| <b>rslt-noa</b> <i>noa rslt-np np</i>     |  | Specifies the desired resulting nature of address and numbering plan used in the modified address.                                                                 |

**Defaults** No default behavior or values.

**Command Modes** CS7 SMS GSM SMSMO configuration

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | 12.2(25)SW1 | This command was introduced. |

**Examples** The last line in the following example specifies the conversion of the destination short message entity address:

```
cs7 sms route-table
  cdr-service CDR1
  gsm-map sms-mo ssn 8
  modify-prefix dest-sme 0 remove 1 add 31rslt-noa 1 rslt-np 1
```

| Related Commands | Command                              | Description                                                     |
|------------------|--------------------------------------|-----------------------------------------------------------------|
|                  | <b>gsm-map (cs7 sms route table)</b> | Specifies the inbound/received GSM MAP operations to be routed. |

## msc-proxy-addr (cs7 sms smsmo)

To enable the SMS MO Proxy feature and specify a MAP MSC Proxy address, use the **msc-proxy-addr** command in CS7 SMS SMSMO configuration mode. To remove the address, use the **no** form of this command.

```
msc-proxy-addr [use {international | national}] tt tt gti gti [np np nai nai]
```

```
no msc-proxy-addr
```

| Syntax Description   |  |                                                                                                                                     |
|----------------------|--|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>tt</b>            |  | Configure the translation type.                                                                                                     |
| <i>tt</i>            |  | Translation type, in the range 0 to 255.                                                                                            |
| <b>gti</b>           |  | Specifies a global title indicator.                                                                                                 |
| <i>gti</i>           |  | Global title indicator. Valid numbers are 2(primarily used in the ANSI domain) or 4 (used in the ITU domain).                       |
| <b>np</b>            |  | In ITU domain, specifies a numbering plan.                                                                                          |
| <i>np</i>            |  | Numbering plan. Valid range is 0 through 15.                                                                                        |
| <b>nai</b>           |  | In ITU domain, specifies a nature of address indicator. Required for a <i>gti</i> value of 4. Optional for a <i>gti</i> value of 2. |
| <i>nai</i>           |  | Nature of address indicator. Valid range is 0 through 127.                                                                          |
| <b>use</b>           |  | Indicates setting for national use bit in the address indicator.                                                                    |
| <b>international</b> |  | Address has international scope (default for ITU/CHINA).                                                                            |
| <b>national</b>      |  | Address has national scope (default for ANSI).                                                                                      |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |               |
|----------------------|---------------|
| <b>Command Modes</b> | CS7 SMS SMSMO |
|----------------------|---------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

The **msc-proxy-addr** command specifies how servicing MSC addresses are translated in the proxied dialogue toward the SMSC.

The **msc-proxy-addr** command specifies a MAP MSC Proxy address. It is used to form the SCCP CgPA for a proxied MO dialogue.

The **msc-proxy-addr** command enables CS7 SMS SMSMO MSC Proxy configuration mode.

---

**Examples**

The following example configures an SMS route table, specifies a CDR service, specifies GSM MAP routing and a MAP MSC Proxy address.

```
cs7 sms route-table
cdr-service
gsm-map sms-mo 5
msc-proxy-addr use international tt 4
```

---

**Related Commands**

| Command                              | Description                      |
|--------------------------------------|----------------------------------|
| <b>cs7 sms route-table</b>           | Specifies an SMS route table.    |
| <b>gsm-map (cs7 sms route table)</b> | Specifies the GSM MAP operation. |

# mtp2

To configure CS7 link profile parameters for MTP2, use the **mtp2** CS7 profile submode command. To disable the settings, use the **no** form of this command.

**mtp2**

**no mtp2**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |          |
|-----------------|----------|
| <b>Defaults</b> | Disabled |
|-----------------|----------|

|                      |                     |
|----------------------|---------------------|
| <b>Command Modes</b> | CS7 profile submode |
|----------------------|---------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

|                 |                                                                                                                                                                                                                          |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example defines a profile named timers, configures the profile to support MTP2, configures the t1 and t2 settings in the timers profile, then applies the timers profile to all the links in linkset ITPa: |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
cs7 profile timers
 mtp2
  timer t1 15000
  timer t2 9000
.
.
.
cs7 linkset itpa
 profile timers
```

| Related Commands | Command            | Description                                                     |
|------------------|--------------------|-----------------------------------------------------------------|
|                  | <b>cs7 profile</b> | Defines a profile that you can apply to all links in a linkset. |
|                  | <b>variant</b>     | Configures a CS7 link profile variant.                          |

# mtp2-timer

Traditional SS7 links use serial interfaces. ITP interfaces are configured to use encapsulation MTP2. You can tune several MTP2 timers. To tune MTP2 encapsulation timers, use the **mtp2-timer** CS7 link submode command with one of the timers. To reset the timers, use the **no** form of the command.

**mtp2-timer** {**t1** msec | **t2** msec | **t3** msec | **t4e** msec | **t4n** msec | **t5** msec | **t6** msec | **t7** msec | **ttc** timer msec }

**no mtp2-timer** {**t1** msec | **t2** msec | **t3** msec | **t4e** msec | **t4n** msec | **t5** msec | **t6** msec | **t7** msec | **ttc** timer msec }



## Note

Ranges are ANSI or ITU defined.

## Syntax Description

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| t1  | Alignment ready timer. ANSI default is 13000 milliseconds. ITU default is 40000 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| t2  | Not aligned timer. ANSI default is 11500 milliseconds. ITU default is 5000 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| t3  | Aligned timer. ANSI default is 11500 milliseconds. ITU default is 1500 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| t4e | Emergency proving period timer. ANSI default is 600 milliseconds. ITU default is 500 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| t4n | Normal proving period timer. ANSI default is 2300 milliseconds. ITU default is 8200 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| t5  | Sending SIB timer. ANSI default is 80 milliseconds. ITU default is 100 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| t6  | Remote congestion timer. ANSI default is 1000 milliseconds. ITU default is 3000 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| t7  | Excessive delay of acknowledgment timer. ANSI default is 1000 milliseconds. ITU default is 1000 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| ttc | <p><b>ttc ta timer</b>: TTC Timer for sending SIE. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> <p><b>ttc te timer</b>: TTC Timer for error monitoring. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> <p><b>ttc tf timer</b>: TTC Timer for sending FISU. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> <p><b>ttc to timer</b>: TTC Timer for sending SIO. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> <p><b>ttc ts timer</b>: TTC Timer for sending SIOS. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> |

## Defaults

t1: ANSI = 13000; ITU = 40000

t2: ANSI = 11500; ITU = 5000



t3: ANSI = 11500; ITU = 1500  
 t4E: ANSI = 600; ITU = 500  
 t4N: ANSI = 2300; ITU = 8200  
 t5: ANSI = 80; ITU = 100  
 t6: ANSI = 1000; ITU = 3000  
 t7: ANSI= 1000; ITU = 1000  
 ta: 20 ms  
 te: 20 ms  
 tf: 20 ms  
 to: 20 ms  
 ts: 20 ms

**Command Modes** CS7 link submode

| Command History | Release    | Modification                                                               |
|-----------------|------------|----------------------------------------------------------------------------|
|                 | 12.2(4)MB  | This command replaced the <b>cs7 mtp2</b> interface configuration command. |
|                 | 12.2(20)SW | TTC timers were added.                                                     |

**Usage Guidelines** MTP2 parameters can also be specified in a CS7 profile.

**Examples** The following example sets the T1 timer for 25000 milliseconds:

```

cs7 linkset ITP2 6.100.5
  link 0 serial0/0:0
→  mtp2-timer t1 25000

```

The following example sets the TTC te timer for 100 milliseconds:

```

cs7 linkset ITP2 6.100.5
  link 0 sctp 192.68.1.2 7000 7000
  mtp2-timer ttc te 100

```

| Related Commands | Command                          | Description                                                                       |
|------------------|----------------------------------|-----------------------------------------------------------------------------------|
|                  | <b>bundling (CS7 Link)</b>       | Enables and configures message bundling.                                          |
|                  | <b>cs7 profile</b>               | Define a profile of MTP2 parameters that you can apply to all links in a linkset. |
|                  | <b>mtp2-timer ttc enable</b>     | Enables the use of TTC timers.                                                    |
|                  | <b>show cs7 mtp2</b>             | Displays ITP MTP2 status.                                                         |
|                  | <b>tx-queue-depth (CS7 link)</b> | Configures the MTP2 transmit queue depth.                                         |

# mtp2-timer ttc enable

The MTP/TTC variant allows configuration of TTC Signal Unit (SU) transmission timer values. To enable the use of MTP2 TTC timers, use the **mtp2-timer ttc enable** CS7 link submode command with one of the timers. To disable the timers, use the **no** form of the command.

**mtp2-timer ttc enable**

**no mtp2-timer ttc enable**

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values.

**Command Modes** CS7 link submode

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(20)SW | This command was introduced. |

**Usage Guidelines** After enabling the use of MTP2 TTC timers, you can set the timer values.

**Examples** The following example enables the use of TTC timers:

```
cs7 linkset ITP2 6.100.5
link 0 serial0/0:0
→ mtp2-timer ttc enable
```

| Related Commands | Command              | Description                     |
|------------------|----------------------|---------------------------------|
|                  | <b>mtp2-timer</b>    | Tune MTP2 encapsulation timers. |
|                  | <b>show cs7 mtp2</b> | Displays ITP MTP2 status.       |

# multi-message-dialogue

To match segmented short messages and short messages that have the More-Messages-To-Send indicator set, use the **multi-message-dialogue** command in cs7 mlr ruleset-rule configuration mode. To remove the specification, use the **no** form of this command.

**multi-message-dialogue**

**no multi-message-dialogue**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                              |
|-----------------|------------------------------|
| <b>Defaults</b> | No default behavior or value |
|-----------------|------------------------------|

|                      |                                    |
|----------------------|------------------------------------|
| <b>Command Modes</b> | CS7 mlr ruleset-rule configuration |
|----------------------|------------------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                                                                                                                               |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | If the <b>multi-message-dialogue</b> command is configured, no other routing parameters may be configured within the CS7 mlr ruleset-rule configuration mode. |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|

The **multi-message-dialogue** command is allowed for sms-mo and sms-mt operations. If specified, the following messages will match this operation:

- Empty BEGIN messages
- CONTINUE messages
- BEGIN and CONTINUE messages containing an INVOKE component with the More-Messages-to-Send indicator (sms-mt only).
- Concatenated messages

|                 |                                                                     |
|-----------------|---------------------------------------------------------------------|
| <b>Examples</b> | The following example specifies the multi-message-dialogue command: |
|-----------------|---------------------------------------------------------------------|

```
cs7 mlr ruleset ruleset1
rule 10 sms-mt
multi-message-dialogue
```

|                         |                               |                                                                               |
|-------------------------|-------------------------------|-------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                | <b>Description</b>                                                            |
|                         | <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table. |

# multiplicity

To specify a method for selecting destination in the application group, use the **multiplicity** CS7 gtt application group submode command. To restore the default multiplicity (share) use the **no** form of this command.

**multiplicity** {[**cost** | **share** | **cgpa**]

**no multiplicity**

## Syntax Description

|              |                                                                                                                                                                                           |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>cost</b>  | Use the destination with the least cost if available.                                                                                                                                     |
| <b>share</b> | Share equally between all destinations.                                                                                                                                                   |
| <b>cgpa</b>  | Use the SCCP calling party address (CGPA) field, which results in a weighted factor selection number for choosing the next destination from the available items in the application group. |

## Defaults

The default multiplicity is share.

## Command Modes

CS7 GTT application group configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Examples

The following example configures an application group with 3 items using the multiplicity command with the cgpa keyword. The first item gets used approximately twice as many times as the other two. The remaining items handle equal amounts of traffic

```
cs7 gtt application-group group1
multiplicity cgpa
pc 1.1.1 ssn 8 50 pcssn
pc 1.1.2 ssn 8 25 pcssn
pc 1.1.3 ssn 8 25 pcssn
```

## Related Commands

| Command                          | Description                                              |
|----------------------------------|----------------------------------------------------------|
| <b>cs7 gtt application-group</b> | Specifies a GTT application group.                       |
| <b>cs7 gtt map</b>               | Configures a Global Title Mated Application (MAP) entry. |

# nai

To specify a new nature of address to be applied for the whole GTT address conversion table, use the **nai** CS7 GTT address conversion submode command. To disable the configuration, use the **no** form of this command.

**nai** *nai*

**no** **nai**

## Syntax Description

|            |                                                      |
|------------|------------------------------------------------------|
| <i>nai</i> | Nature of address value. The range is 0 through 127. |
|------------|------------------------------------------------------|

## Defaults

No default behavior or values.

## Command Modes

CS7 GTT address conversion submode

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB2 | This command was introduced. |

## Examples

The following example specifies that the *nai* value will be converted to 4 for all addresses that are converted:

```
cs7 gtt address-conversion e212e214
nai 4
```

## Related Commands

| Command                           | Description                                |
|-----------------------------------|--------------------------------------------|
| <b>cs7 gtt address-conversion</b> | Configures a GTT address conversion table. |

# network-appearance

To define the value used in the Network Appearance parameter in M3UA and SUA messages, use the `network-appearance` command in CS7 AS configuration mode. To remove the definition and use the actual instance number instead, use the **no** form of this command.

**network-appearance** *number*

**no network-appearance** *number*

## Syntax Description

|               |                                                                                                               |
|---------------|---------------------------------------------------------------------------------------------------------------|
| <i>number</i> | A value in the range 1 to 4294967295 to be used in the Network Appearance parameter in M3UA and SUA messages. |
|---------------|---------------------------------------------------------------------------------------------------------------|

## Defaults

No default behavior or values.

## Command Modes

CS7 AS

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

## Usage Guidelines

If `network-appearance` is not configured, the actual instance number is used instead. If `network-appearance` is already configured on another AS, it is valid only if the other AS has the same instance.

## Examples

The following example defines `network-appearance` parameter as 100:

```
network-appearance 100
```

## Related Commands

| Command                         | Description                                                                |
|---------------------------------|----------------------------------------------------------------------------|
| <code>cs7 multi-instance</code> | Enables multiple instances of a variant and network indicator combination. |

## new-name

To rename an existing GTT selector, use the new-name CS7 GTT Selector submode command. To disable the configuration, use the **no** form of this command.

**new-name** *newselector*

**no new-name**

|                           |                    |                                |
|---------------------------|--------------------|--------------------------------|
| <b>Syntax Description</b> | <i>newselector</i> | New name for the GTT Selector. |
|---------------------------|--------------------|--------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                          |
|----------------------|--------------------------|
| <b>Command Modes</b> | CS7 GTT Selector submode |
|----------------------|--------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

|                 |                                                                                         |
|-----------------|-----------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example renames the existing GTT selector to test1:<br><br>new-name test1 |
|-----------------|-----------------------------------------------------------------------------------------|

|                         |                  |                                                                                                 |
|-------------------------|------------------|-------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>   | <b>Description</b>                                                                              |
|                         | cs7 gtt selector | Configures a new GTT selector or enters the submode for modifying the attributes of a selector. |

# np

To specify a new numbering plan to be applied for the whole table, use the **np** CS7 GTT address conversion submode command. To disable the configuration, use the **no** form of this command.

**np** *np*

**no np**

| Syntax Description | <i>np</i> | Numbering Plan value. The range is 0 through 15. |
|--------------------|-----------|--------------------------------------------------|
|--------------------|-----------|--------------------------------------------------|

| Defaults | No default behavior or values |
|----------|-------------------------------|
|----------|-------------------------------|

| Command Modes | CS7 GTT address conversion submode |
|---------------|------------------------------------|
|---------------|------------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB2 | This command was introduced. |

| Examples | The following example specifies that the np value will be converted to 6 for all addresses that are converted: |
|----------|----------------------------------------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------------------------------------|

```
cs7 gtt prefix-conversion e212e214
np 6
```

| Related Commands | Command                           | Description                                |
|------------------|-----------------------------------|--------------------------------------------|
|                  | <b>cs7 gtt address-conversion</b> | Configures a GTT address conversion table. |



## orig-imsi (cs7 mlr ruleset rule)

To specify an origin IMSI, use the **orig-imsi** command in cs7 mlr ruleset rule configuration mode. To remove the configuration, use the **no** form of this command.

**orig-imsi** { \* | *imsi-addr* | **unknown** } [**exact**] [**min-digits** *min*] [**max-digits** *max*]

**no orig-imsi**

| Syntax Description |  |                                                                                                  |
|--------------------|--|--------------------------------------------------------------------------------------------------|
| <i>imsi-addr</i>   |  | IMSI address up to 16 hexadecimal digits.                                                        |
| <b>exact</b>       |  | Configured address must match orig-imsi exactly.                                                 |
| <b>min-digits</b>  |  | (Optional) Specifies the minimum number of digits in the address string.                         |
| <i>min</i>         |  | Minimum number of digits in the address string. The default is 1.                                |
| <b>max-digits</b>  |  | (Optional) Specifies the maximum number of digits in the address string.                         |
| <i>max</i>         |  | Maximum number of digits in the address string. The default is the length of the address string. |
| <b>unknown</b>     |  | Unknown origin IMSI.                                                                             |

**Defaults** No default behavior or values

**Command Modes** CS7 mlr ruleset rule configuration

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Examples** The following example specifies a ruleset named ruleset1, specifies a rule index of 20, and specifies an origin IMSI address 1111:

```
cs7 sms ruleset SMS-RULES
rule 20 sms-mo
  orig-imsi 1111
  result group grp1
```

| Related Commands | Command                       | Description                                                                                                                       |
|------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
|                  | <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## orig-imsi (cs7 sms set rule)

To specify an origin IMSI, use the **orig-imsi** command in CS7 SMS set rule configuration mode. To remove the configuration, use the **no** form of this command.

**orig-imsi** { \* | *imsi-addr* | **unknown** } [**exact**] [**min-digits** *min*] [**max-digits** *max*]

**no orig-imsi**

|                           |                   |                                                                                                  |
|---------------------------|-------------------|--------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>imsi-addr</i>  | IMSI address up to 16 hexadecimal digits.                                                        |
|                           | <b>exact</b>      | Configured address must match orig-imsi exactly.                                                 |
|                           | <b>min-digits</b> | (Optional) Specifies the minimum number of digits in the address string.                         |
|                           | <i>min</i>        | Minimum number of digits in the address string. The default is 1.                                |
|                           | <b>max-digits</b> | (Optional) Specifies the maximum number of digits in the address string.                         |
|                           | <i>max</i>        | Maximum number of digits in the address string. The default is the length of the address string. |
|                           | <b>unknown</b>    | Unknown origin IMSI.                                                                             |

**Defaults** No default behavior or values

**Command Modes** CS7 SMS set rule configuration

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

### Usage Guidelines

**Examples** The following example specifies an SMS ruleset named SMS-RULES, specifies a rule index of 20, and specifies an origin IMSI address 1111:

```
cs7 sms ruleset SMS-RULES
 rule 20 sms-mo
   orig-imsi 1111
 result group smscgrp
```

|                         |                                     |                                                                                 |
|-------------------------|-------------------------------------|---------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                      | <b>Description</b>                                                              |
|                         | <b>cdr-service-queue</b>            | Tests the availability of CDR service queue as the input condition of the rule. |
|                         | <b>cs7 sms ruleset</b>              | Specifies a ruleset.                                                            |
|                         | <b>dest-port (cs7 sms set rule)</b> | Specifies an application destination port number.                               |

| Command                                   | Description                                                      |
|-------------------------------------------|------------------------------------------------------------------|
| <b>dest-sme (cs7 sms set rule)</b>        | Specifies a destination short message entity.                    |
| <b>dest-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of destination SME addresses.             |
| <b>dest-smsc (cs7 sms set rule)</b>       | Specifies a destination SMSC.                                    |
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table). |
| <b>orig-sme (cs7 sms set rule)</b>        | Specifies an origin short message entity.                        |
| <b>orig-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of origin SME addresses (address-table).  |
| <b>pid (cs7 sms set rule)</b>             | Specifies a protocol identifier (TP-PID)                         |
| <b>result (cs7 sms set rule)</b>          | Specifies a result.                                              |
| <b>rule (cs7 sms set)</b>                 | Specifies a rule within a ruleset.                               |

## orig-imsi-table (cs7 mlr ruleset rule)

To specify an SMS table of origin IMSI addresses, use the **orig-imsi-table** command in cs7 mlr ruleset rule configuration mode. To remove the configuration, use the **no** form of this command.

**orig-imsi-table** *tablename* [**noa** *noa-value* **np** *np-value*]

**no orig-imsi-table** *tablename*

### Syntax Description

|                  |                                                  |
|------------------|--------------------------------------------------|
| <i>tablename</i> | Address table name.                              |
| <b>noa</b>       | Specifies a nature of address.                   |
| <i>noa-value</i> | Valid range is 0 to 7.                           |
| <b>np</b>        | Specifies a numbering plan identification value. |
| <i>np-value</i>  | Valid range is 0 to 15.                          |

### Defaults

No default behavior or values

### Command Modes

CS7 mlr ruleset rule configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

The **dest-sme-table**, **orig-imsi-table**, and **orig-sme-table** rule parameters accept either an SMS address-table name OR an MLR address-table name. This ability is primarily for customers that want the SMS-MO Proxy functionality. The address-table names are unique between FDA and MLR. You may enter an MLR address-table name for an SMS rule parameter. However, MLR cannot reference SMS address-tables.

If an incoming message matches an SMS rule that references an MLR address-table, then any MLR address-table result is mapped to an SMS result:

- BLOCK, PC, and PCSSN results map easily from MLR to SMS.
  - For result groups, the MLR result group name is mapped to an SMS result group name.
  - If the SMS result group is not configured, then the result specified on the rule is used.
- AS and CONTINUE results are not valid in SMS. For these cases, the result specified on the rule is used. If no result is specified, the result on the rule is used (same as MLR).

If multiple rule parameters are configured for a rule, then the rule result will be used (rather than a result specified in the address table).

If the result type specified within the table is valid, it is used. Otherwise, the result in the rule is used.

For all tables, the **noa** and **np** must match before the table is accessed.

## Examples

The following example specifies an MLR ruleset named ruleset1, specifies a rule index of 20, and specifies an SMS table of origin IMSI addresses named SHORTLIST:

```
cs7 mlr ruleset ruleset1
rule 20 sms-mo
  orig-imsi-table SHORTLIST
  result block
```

## Related Commands

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## orig-imsi-table (cs7 sms set rule)

To specify an SMS table of origin IMSI addresses, use the **orig-imsi-table** command in CS7 SMS set rule configuration mode. To remove the configuration, use the **no** form of this command.

**orig-imsi-table** *tablename* [**noa** *noa-value* **np** *np-value*]

**no orig-imsi-table** *tablename*

### Syntax Description

|                  |                                                  |
|------------------|--------------------------------------------------|
| <i>tablename</i> | Address table name.                              |
| <b>noa</b>       | Specifies a nature of address.                   |
| <i>noa-value</i> | Valid range is 0 to 7.                           |
| <b>np</b>        | Specifies a numbering plan identification value. |
| <i>np-value</i>  | Valid range is 0 to 15.                          |

### Defaults

No default behavior or values

### Command Modes

CS7 SMS set rule configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

The **dest-sme-table**, **orig-imsi-table**, and **orig-sme-table** rule parameters accept either an SMS address-table name OR an MLR address-table name. This ability is primarily for customers that want the SMS-MO Proxy functionality. The address-table names are unique between FDA and MLR. You may enter an MLR address-table name for an SMS rule parameter. However, MLR cannot reference SMS address-tables.

If an incoming message matches an SMS rule that references an MLR address-table, then any MLR address-table result is mapped to an SMS result:

- BLOCK, PC, and PCSSN results map easily from MLR to SMS.
  - For result groups, the MLR result group name is mapped to an SMS result group name.
  - If the SMS result group is not configured, then the result specified on the rule is used.
- AS and CONTINUE results are not valid in SMS. For these cases, the result specified on the rule is used. If no result is specified, the result on the rule is used (same as MLR).

If multiple rule parameters are configured for a rule, then the rule result will be used (rather than a result specified in the address table).

If the result type specified within the table is valid, it is used. Otherwise, the result in the rule is used.

For all tables, the **noa** and **np** must match before the table is accessed.

**Examples**

The following example specifies an SMS ruleset named SMS-RULES, specifies a rule index of 20, and specifies an SMS table of origin IMSI addresses named SHORTLIST:

```
cs7 sms ruleset SMS-RULES
rule 20 sms-mo
  orig-imsi-table SHORTLIST
  result block
```

**Related Commands**

| Command                                  | Description                                                                     |
|------------------------------------------|---------------------------------------------------------------------------------|
| <b>cdr-service-queue</b>                 | Tests the availability of CDR service queue as the input condition of the rule. |
| <b>cs7 sms ruleset</b>                   | Specifies a ruleset.                                                            |
| <b>dest-port (cs7 sms set rule)</b>      | Specifies an application destination port number.                               |
| <b>dest-sme (cs7 sms set rule)</b>       | Specifies a destination short message entity.                                   |
| <b>dest-sme-table (cs7 sms set rule)</b> | Specifies an SMS table of destination SME addresses.                            |
| <b>dest-smsc (cs7 sms set rule)</b>      | Specifies a destination SMSC.                                                   |
| <b>orig-imsi (cs7 sms set rule)</b>      | Specifies an origin IMSI.                                                       |
| <b>orig-sme (cs7 sms set rule)</b>       | Specifies an origin short message entity.                                       |
| <b>orig-sme-table (cs7 sms set rule)</b> | Specifies an SMS table of origin SME addresses (address-table).                 |
| <b>pid (cs7 sms set rule)</b>            | Specifies a protocol identifier (TP-PID)                                        |
| <b>result (cs7 sms set rule)</b>         | Specifies a result.                                                             |
| <b>rule (cs7 sms set)</b>                | Specifies a rule within a ruleset.                                              |

## orig-sme (cs7 mlr ruleset rule)

To specify the address of the origin Short Message Entity (SME) within an SMS operation, use the **orig-sme** command in cs7 mlr ruleset-rule configuration mode. To remove the specification, use the **no** form of this command.

**orig-sme** { \* | *address* } [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*orig-sme-addr-type*]

**no orig-sme**

### Syntax Description

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>*</b>                  | Match all addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>address</i>            | <p>When the rule operation is <b>sms-mo</b>, the <i>address</i> is an address string of 1 to 20 hexadecimal characters.</p> <p>When the rule operation is <b>sms-mt</b>, the <i>address</i> is an address string of 1 to 16 hexadecimal characters.</p> <p>The string is not input in BCD-String format, but in normal form. The string always carries an implicit '*' at the end of the string, allowing only the prefix of a range of addresses to be specified.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>exact</b>              | (Optional) The previously specified <i>orig-addr</i> should only be matched if the number of digits and the digit values exactly match. If <b>exact</b> is not specified, the <i>orig-addr</i> carries an implicit "*" at the end of the string, allowing a match on the string as a prefix (range of addresses).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>min-digits</b>         | (Optional) Specifies the minimum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>min</i>                | Minimum number of digits in the address string. The default is 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>max-digits</b>         | (Optional) Specifies the maximum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>max</i>                | Maximum number of digits in the address string. The default is the length of the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>orig-sme-addr-type</i> | <p>(Optional) Parameters that identify attributes of the SME address being used to match a rule. If not specified, the address defaults to an MS-ISDN address string specifying an E.164/telephony address with international scope. The <i>orig-sme-addr-type</i> is composed of the following keywords:</p> <ul style="list-style-type: none"> <li>• The <b>noa</b> keyword specifies the nature-of-address value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>• The <i>noa</i> argument is an integer value in the range 0 to 7.</li> <li>• The <b>np</b> keyword specifies the numbering-plan identification value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified.</li> <li>• The <i>np</i> argument is an integer value in the range 0 to 15.</li> </ul> |

### Defaults

If not specified, the *orig-sme-addr-type* address defaults to an E.164/telephony address with international scope.

### Command Modes

CS7 mlr ruleset rule configuration



**Command History**

| Release    | Modification                        |
|------------|-------------------------------------|
| 12.2(4)MB  | This command was introduced.        |
| 12.2(21)SW | The <b>exact</b> keyword was added. |

**Usage Guidelines**

For the **sms-mo** operation, **orig-sme** identifies from the the SM-RP-OA field within the GSM MAP layer.

For the **sms-mt** operation, **orig-sme** identifies the SM-TP-OA field within the SMS user information field.

**Table 23** *Dest-SME by Operation*

|               | length in hex digits | no <i>dest-sme-addr-type</i>                                                                                                                                      | <i>dest-sme-addr-type</i> specified                                                                                                                                                |
|---------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>sms-mo</b> | 1 - 20               | <b>noa/np</b> defaults to International/E.64                                                                                                                      | specific np/noa                                                                                                                                                                    |
| <b>sms-mt</b> | 1 - 20               | <b>noa/np</b> defaults to International/E.64                                                                                                                      | specific np/noa                                                                                                                                                                    |
| <b>smdpp</b>  | 1 - 20               | Priority digit string matching based on the following order:<br>SMS_OriginalOriginationAddress<br>SMS_OriginationAddress<br>MIN<br>IMSI<br>SCCP CgPA (RI=GT only) | min = MIN parameter only<br>imsi = IMSI parameter only<br>np/noa = full address matching based on the parameter order:<br>SMS_OriginalOriginationAddress<br>SMS_OriginationAddress |

**Examples**

The following example specifies the address of the origin SME:

```
cs7 mlr ruleset ruleset1
rule 10 sms-mo
  dest-sme 1234
  orig sme 60920025
  result gt 9991117777
```

**Related Commands**

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## orig-sme (cs7 sms set rule)

To specify an origin short message entity, use the **orig-sme** command in CS7 SMS set rule configuration mode. To remove the configuration, use the **no** form of this command.

**orig-sme** { \* | *address* } [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*orig-sme-addr-type*]

**no orig-sme**

| Syntax Description        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>*</b>                  | Match all addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <i>address</i>            | SMSC Address or MSISDN, 1 to 16 hexadecimal digits.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>exact</b>              | Configured address must match orig-imsi exactly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>min-digits</b>         | (Optional) Specifies the minimum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>min</i>                | Minimum number of digits in the address string. The default is 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>max-digits</b>         | (Optional) Specifies the maximum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <i>max</i>                | Maximum number of digits in the address string. The default is the length of the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>orig-sme-addr-type</i> | (Optional) Parameters that identify attributes of the SME address being used to match a rule. If not specified, the address defaults to an MS-ISDN address string specifying an E.164/telephony address with international scope. The <i>orig-sme-addr-type</i> is composed of the following keywords: <ul style="list-style-type: none"> <li>• The <b>noa</b> keyword specifies the nature-of-address value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>• The <i>noa</i> argument is an integer value in the range 0 to 7.</li> <li>• The <b>np</b> keyword specifies the numbering-plan identification value associated with the SME address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified.</li> <li>• The <i>np</i> argument is an integer value in the range 0 to 15.</li> </ul> |

**Defaults** No default behavior or values

**Command Modes** CS7 sms set rule configuration

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Examples** The following example specifies an SMS ruleset named SMS-RULES, specifies a rule index of 20, and specifies an origin SME matching all addresses:

```
cs7 sms ruleset SMS-RULES
rule 20 sms-mo
```

```
orig-sme *
result block
```

## Related Commands

| Command                                   | Description                                                                     |
|-------------------------------------------|---------------------------------------------------------------------------------|
| <b>cdr-service-queue</b>                  | Tests the availability of CDR service queue as the input condition of the rule. |
| <b>cs7 sms ruleset</b>                    | Specifies a ruleset.                                                            |
| <b>dest-port (cs7 sms set rule)</b>       | Specifies an application destination port number.                               |
| <b>dest-sme (cs7 sms set rule)</b>        | Specifies a destination short message entity.                                   |
| <b>dest-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of destination SME addresses.                            |
| <b>dest-smsc (cs7 sms set rule)</b>       | Specifies a destination SMSC.                                                   |
| <b>orig-imsi (cs7 sms set rule)</b>       | Specifies an origin IMSI.                                                       |
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table).                |
| <b>orig-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of origin SME addresses (address-table).                 |
| <b>pid (cs7 sms set rule)</b>             | Specifies a protocol identifier (TP-PID)                                        |
| <b>result (cs7 sms set rule)</b>          | Specifies a result.                                                             |
| <b>rule (cs7 sms set)</b>                 | Specifies a rule within a ruleset.                                              |

## orig-sme-table (cs7 mlr ruleset rule)

To specify a table of origin SME addresses that will be used to find the desired routing destination, use the **orig-sme-table** command in cs7 mlr ruleset rule configuration mode. To remove the configuration, use the **no** form of this command.

**orig-sme-table** *tablename* [**noa** *noa-value* **np** *np-value*]

**no orig-sme-table** *tablename* [**noa** *noa-value* **np** *np-value*]

### Syntax Description

|                  |                                                                                                                                                                                                                         |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>tablename</i> | Identifies the name of a previously defined MLR address table that is to be used when searching with the orig-sme-table routing parameter. The name is specified as a character string with a maximum of 12 characters. |
| <b>noa</b>       | Specifies a nature of address.                                                                                                                                                                                          |
| <i>noa-value</i> | Valid range is 0 to 7.                                                                                                                                                                                                  |
| <b>np</b>        | Specifies a numbering plan identification value.                                                                                                                                                                        |
| <i>np-value</i>  | Valid range is 0 to 15.                                                                                                                                                                                                 |

### Defaults

No default behavior or values

### Command Modes

CS7 mlr ruleset rule configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

The **orig-sme-table** command is valid for smdpp, sms-mo, and sms-mt rule operations. If the address-table lookup finds a match and returns a result, it may only be used if no other routing parameters are defined on this rule. If more than one parameter is configured in a rule, then the result specified under the rule is used.

The **dest-sme-table**, **orig-imsi-table**, and **orig-sme-table** rule parameters accept either an SMS address-table name OR an MLR address-table name. This ability is primarily for customers that want the SMS-MO Proxy functionality. The address-table names are unique between FDA and MLR. You may enter an MLR address-table name for an SMS rule parameter. However, MLR cannot reference SMS address-tables.

If an incoming message matches an SMS rule that references an MLR address-table, then any MLR address-table result is mapped to an SMS result:

- BLOCK, PC, and PCSSN results map easily from MLR to SMS.
  - For result groups, the MLR result group name is mapped to an SMS result group name.
  - If the SMS result group is not configured, then the result specified on the rule is used.
- AS and CONTINUE results are not valid in SMS. For these cases, the result specified on the rule is used. If no result is specified, the result on the rule is used (same as MLR).

If multiple rule parameters are configured for a rule, then the rule result will be used (rather than a result specified in the address table).

If the result type specified within the table is valid, it is used. Otherwise, the result in the rule is used.

For all tables, the **noa** and **np** must match before the table is accessed.

### Examples

The following example specifies an SMS ruleset named ruleset1, specifies a rule index of 20, and specifies a table of origin SME addresses named tbl1:

```
cs7 mlr ruleset ruleset1
rule 20 sms-mo
  orig-sme-table tbl1
  result block
```

### Related Commands

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## orig-sme-table (cs7 sms set rule)

To specify an SMS table of origin SME addresses, use the **orig-sme-table** command in cs7 sms set rule configuration mode. To remove the configuration, use the **no** form of this command.

**orig-sme-table** *tablename* [**noa** *noa-value* **np** *np-value*]

**no orig-sme-table** *tablename* [**noa** *noa-value* **np** *np-value*]

### Syntax Description

|                  |                                                  |
|------------------|--------------------------------------------------|
| <i>tablename</i> | Address table name.                              |
| <b>noa</b>       | Specifies a nature of address.                   |
| <i>noa-value</i> | Valid range is 0 to 7.                           |
| <b>np</b>        | Specifies a numbering plan identification value. |
| <i>np-value</i>  | Valid range is 0 to 15.                          |

### Defaults

No default behavior or values

### Command Modes

CS7 SMS set rule configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

The **dest-sme-table**, **orig-imsi-table**, and **orig-sme-table** rule parameters accept either an SMS address-table name OR an MLR address-table name. This ability is primarily for customers that want the SMS-MO Proxy functionality. The address-table names are unique between FDA and MLR. You may enter an MLR address-table name for an SMS rule parameter. However, MLR cannot reference SMS address-tables.

If an incoming message matches an SMS rule that references an MLR address-table, then any MLR address-table result is mapped to an SMS result:

- BLOCK, PC, and PCSSN results map easily from MLR to SMS.
  - For result groups, the MLR result group name is mapped to an SMS result group name.
  - If the SMS result group is not configured, then the result specified on the rule is used.
- AS and CONTINUE results are not valid in SMS. For these cases, the result specified on the rule is used. If no result is specified, the result on the rule is used (same as MLR).

If multiple rule parameters are configured for a rule, then the rule result will be used (rather than a result specified in the address table).

If the result type specified within the table is valid, it is used. Otherwise, the result in the rule is used.

For all tables, the **noa** and **np** must match before the table is accessed.

**Examples**

The following example specifies an SMS ruleset named SMS-RULES, specifies a rule index of 20, and specifies an SMS table of origin SME addresses named BLACKLIST:

```
cs7 sms ruleset SMS-RULES
rule 20 sms-mo
  orig-sme-table BLACKLIST
  result block
```

**Related Commands**

| Command                                   | Description                                                                     |
|-------------------------------------------|---------------------------------------------------------------------------------|
| <b>cdr-service-queue</b>                  | Tests the availability of CDR service queue as the input condition of the rule. |
| <b>cs7 sms ruleset</b>                    | Specifies a ruleset.                                                            |
| <b>dest-port (cs7 sms set rule)</b>       | Specifies an application destination port number.                               |
| <b>dest-sme (cs7 sms set rule)</b>        | Specifies a destination short message entity.                                   |
| <b>dest-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of destination SME addresses.                            |
| <b>dest-smsc (cs7 sms set rule)</b>       | Specifies a destination SMSC.                                                   |
| <b>orig-imsi (cs7 sms set rule)</b>       | Specifies an origin IMSI.                                                       |
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table).                |
| <b>orig-sme (cs7 sms set rule)</b>        | Specifies an origin short message entity.                                       |
| <b>pid (cs7 sms set rule)</b>             | Specifies a protocol identifier (TP-PID)                                        |
| <b>result (cs7 sms set rule)</b>          | Specifies a result.                                                             |
| <b>rule (cs7 sms set)</b>                 | Specifies a rule within a ruleset.                                              |

# orig-smsc

To specify the originating service center address, use the **orig-smsc** command in cs7 mlr ruleset-rule configuration mode. To remove the specification, use the **no** form of this command.

**orig-smsc** { \* | *address* } [**exact**] [**min-digits** *min*] [**max-digits** *max*] [*addr-type*]

**no orig-smsc**

| Syntax Description |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| *                  | Match all addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>address</i>     | Address of 1 to 20 hexadecimal digits.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>addr-type</i>   | (Optional) Parameters that identify attributes of the SMSC address being used to match a rule. If not specified, the address defaults to an SMSC address string specifying an E.164/telephony address with international scope. The <i>addr-type</i> is composed of the following keywords: <ul style="list-style-type: none"> <li>The <b>noa</b> keyword specifies the nature-of-address value associated with the SMSC address. Messages received with an 'Unknown' (0) value will match any non-zero noa value specified.</li> <li>The <i>noa</i> argument is an integer value in the range 0 to 7.</li> <li>The <b>np</b> keyword specifies the numbering-plan identification value associated with the SMSC address. Messages received with an 'Unknown' (0) value will match any non-zero np value specified.</li> <li>The <i>np</i> argument is an integer value in the range 0 to 15.</li> </ul> |
| <b>exact</b>       | (Optional) Configured address must match dest-sme exactly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>min-digits</b>  | (Optional) Specifies the minimum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>min</i>         | Minimum number of digits in the address string. The default is 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>max-digits</b>  | (Optional) Specifies the maximum number of digits in the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>max</i>         | Maximum number of digits in the address string. The default is the length of the address string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**Defaults** If not specified, the *orig-sme-addr-type* address defaults to an E.164/telephony address with international scope.

**Command Modes** CS7 mlr ruleset rule

| Command History | Release    | Modification                        |
|-----------------|------------|-------------------------------------|
|                 | 12.2(19)SW | This command was introduced.        |
|                 | 12.2(21)SW | The <b>exact</b> keyword was added. |



---

**Usage Guidelines**

The **orig-smsc** command is used to specify the address of the originating service center (SM-RP-OA field within GSM) within an SMS-MT operation. This parameter is part of the rule used to match this route.

**Note**

---

The originating SMSC address might also be present in the SCCP CgPA. If so, the routing **trigger** might already contain the destination SMSC address, and it need not be specified on the **rule**.

---

For the **sri-sm** operation, **orig-smsc** matches the originating service center address found within the GSM MAP layer.

---

**Examples**

The following example specifies the originating service center address :

```
cs7 mlr ruleset ruleset1
rule 20 sms-mo
  orig-smsc 1111
  result block
```

---

**Related Commands**

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

---

## path-retransmit (CS7 ASP)

To configure the maximum number of path retransmissions on a remote address for the association, use the **path-retransmit** CS7 ASP submode command. To disable the configuration, use the **no** form of this command.

**path-retransmit** *max-retries*

**no path-retransmit** *max-retries*

### Syntax Description

|                    |                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>max-retries</i> | Maximum number of packet and keepalive retries before the corresponding destination address is marked inactive. The range is 2 through 10 retries. The default is the value specified under the local port instance. |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default maximum number of retries is the value specified under the local port instance.

### Command Modes

CS7 ASP submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Examples

The following example sets the number of path retransmit retries to 10:

```
cs7 asp ASP1
  path-retransmit 10
```

### Related Commands

| Command             | Description                                                          |
|---------------------|----------------------------------------------------------------------|
| <b>cs7 asp</b>      | Specifies an Application Server Process and enables CS7 ASP submode. |
| <b>show cs7 asp</b> | Displays ASP statistics.                                             |

## path-retransmit (CS7 Link)

To configure path retransmissions on a remote peer address, use the **path-retransmit** CS7 link submode command. To disable the configuration, use the **no** form of this command.

**path-retransmit** *max-retries*

**no path-retransmit** *max-retries*

|                           |                    |                                                                                                                                                                                 |
|---------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retries</i> | Maximum number of packet and keepalive retries before the corresponding destination address is marked inactive. The range is 2 through 10 retries. The default is four retries. |
|---------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |               |
|-----------------|---------------|
| <b>Defaults</b> | Four retries. |
|-----------------|---------------|

|                      |                  |
|----------------------|------------------|
| <b>Command Modes</b> | CS7 link submode |
|----------------------|------------------|

| <b>Command History</b> | Release   | Modification                 |
|------------------------|-----------|------------------------------|
|                        | 12.2(1)MB | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The path-retransmit parameter is the number of packet retries before the destination address is deemed unreachable. The number of path-retransmits multiplied by the retransmission timer ultimately controls how fast an alternate address becomes the primary path for multi-homed nodes. This relationship suggests the RTO parameters and path-retransmit parameter should be considered together. Configuring the default RTO values and default path retransmit value of 4 allows a multi-homed node to switch to an alternate destination address within 4 seconds. |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                         |
|-----------------|-------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the number of path retransmit retries to 10: |
|-----------------|-------------------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
 link 0 sctp 172.18.44.147 7000 7000
 path-retransmit 10
```

| <b>Related Commands</b> | Command              | Description               |
|-------------------------|----------------------|---------------------------|
|                         | <b>show cs7 m2pa</b> | Displays M2PA statistics. |

## path-retransmit (CS7 Mated-SG)

To configure the maximum number of path retransmissions on a remote address for the association, use the **path-retransmit** CS7 Mated-SG submode command. To disable the configuration, use the **no** form of this command.

**path-retransmit** *max-retries*

**no path-retransmit** *max-retries*

### Syntax Description

|                    |                                                                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>max-retries</i> | Maximum number of packet and keepalive retries before the corresponding destination address is marked inactive. The range is 2 through 10 retries. The default is the value specified under the local port instance. |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

The default maximum number of retries is the value specified under the local port instance.

### Command Modes

CS7 Mated-SG submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Examples

The following example sets the number of path retransmit retries to 10:

```
cs7 mated-sg BLUE 2905
  path-retransmit 10
```

### Related Commands

| Command                  | Description                                                             |
|--------------------------|-------------------------------------------------------------------------|
| <b>cs7 mated-sg</b>      | Configures a connection to a mated SG and enables CS7 Mated SG submode. |
| <b>show cs7 mated-sg</b> | Displays Mated SG statistics.                                           |

## path-retransmit (CS7 M3UA)

To configure the maximum number path retransmissions on a remote ASP/ Mated-SG address to be used when a new SCTP association is started with the local port, use the **path-retransmit** CS7 M3UA submode command. To disable the configuration, use the **no** form of this command.

**path-retransmit** *max-retries*

**no path-retransmit** *max-retries*

|                           |                    |                                                                                                 |
|---------------------------|--------------------|-------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retries</i> | Maximum number of path retries. The range is 2 through 10 retries. The default is four retries. |
|---------------------------|--------------------|-------------------------------------------------------------------------------------------------|

|                 |               |
|-----------------|---------------|
| <b>Defaults</b> | Four retries. |
|-----------------|---------------|

|                      |                  |
|----------------------|------------------|
| <b>Command Modes</b> | CS7 M3UA submode |
|----------------------|------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

|                 |                                                                         |
|-----------------|-------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the number of path retransmit retries to 10: |
|-----------------|-------------------------------------------------------------------------|

```
cs7 m3ua 2905
 local-ip 4.4.4.4
 path-retransmit 10
```

|                         |                 |                                                                        |
|-------------------------|-----------------|------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>  | <b>Description</b>                                                     |
|                         | <b>cs7 m3ua</b> | Specifies the local port number for M3UA and enables CS7 M3UA submode. |

## path-retransmit (CS7 SGMP)

To configure the maximum number path retransmissions on a remote ASP/Mated-SG address to be used when a new SCTP association is started with the local port, use the **path-retransmit** CS7 SGMP submode command. To disable the configuration, use the **no** form of this command.

**path-retransmit** *max-retries*

**no path-retransmit** *max-retries*

### Syntax Description

|                    |                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------|
| <i>max-retries</i> | Maximum number of path retries. The range is 2 through 10 retries. The default is four retries. |
|--------------------|-------------------------------------------------------------------------------------------------|

### Defaults

Four retries.

### Command Modes

CS7 SGMP submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Examples

The following example sets the number of path retransmit retries to 10:

```
cs7 sgmp 5000
 local-ip 4.4.4.4
 path-retransmit 10
```

### Related Commands

| Command         | Description                                                            |
|-----------------|------------------------------------------------------------------------|
| <b>cs7 sgmp</b> | Specifies the local port number for SGMP and enables CS7 SGMP submode. |

## path-retransmit (CS7 SUA)

To configure the maximum number path retransmissions on a remote ASP/ Mated-SG address to be used when a new SCTP association is started with the local port, use the **path-retransmit** CS7 SUA submode command. To disable the configuration, use the **no** form of this command.

**path-retransmit** *max-retries*

**no path-retransmit** *max-retries*

|                           |                    |                                                                                                 |
|---------------------------|--------------------|-------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retries</i> | Maximum number of path retries. The range is 2 through 10 retries. The default is four retries. |
|---------------------------|--------------------|-------------------------------------------------------------------------------------------------|

|                 |               |
|-----------------|---------------|
| <b>Defaults</b> | Four retries. |
|-----------------|---------------|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | CS7 SUA submode |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

|                 |                                                                         |
|-----------------|-------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the number of path retransmit retries to 10: |
|-----------------|-------------------------------------------------------------------------|

```
cs7 sua 15000
 local-IP 4.4.4.4
 path-retransmit 10
```

|                         |                |                                                                      |
|-------------------------|----------------|----------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b>                                                   |
|                         | cs7 sua        | Specifies the local port number for SUA and enables CS7 SUA submode. |

## path-retransmit (group peer)

To configure path retransmissions on a remote peer address, use the **path-retransmit** group peer submode command. To disable the configuration, use the **no** form of this command.

**path-retransmit** *max-retries*

**no path-retransmit** *max-retries*

|                           |                    |                                                                                                                                                                                 |
|---------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>max-retries</i> | Maximum number of packet and keepalive retries before the corresponding destination address is marked inactive. The range is 2 through 10 retries. The default is four retries. |
|---------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |               |
|-----------------|---------------|
| <b>Defaults</b> | Four retries. |
|-----------------|---------------|

|                      |            |
|----------------------|------------|
| <b>Command Modes</b> | Group peer |
|----------------------|------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(25)SW | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The path-retransmit parameter is the number of packet retries before the destination address is deemed unreachable. The number of path-retransmits multiplied by the retransmission timer ultimately controls how fast an alternate address becomes the primary path for multi-homed nodes. This relationship suggests the RTO parameters and path-retransmit parameter should be considered together. Configuring the default RTO values and default path retransmit value of 4 allows a multi-homed node to switch to an alternate destination address within 4 seconds. |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                         |
|-----------------|-------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the number of path retransmit retries to 10: |
|-----------------|-------------------------------------------------------------------------|

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 peer 4444
  remote-ip 1.1.1.2
  path-retransmit 10
```

| <b>Related Commands</b> | Command             | Description                                                                                         |
|-------------------------|---------------------|-----------------------------------------------------------------------------------------------------|
|                         | <b>peer (group)</b> | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode. |



## pc (cs7 gtt application group)

To add or change a point code and optional subsystem number in the application group, use the **pc** command in cs7 gtt application group configuration mode. To remove the point code and optional subsystem number, use the **no** form of the command.

```
[instance instance-number] pc pc [ssn ssn] [cost | wf] {gt | pcssn}
```

```
no [instance instance-number] pc pc [ssn ssn] [cost | wf] {gt | pcssn}
```

### Syntax Description

|                        |                                                                                                                       |
|------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | Specifies an instance.                                                                                                |
| <i>instance-number</i> | Instance number.                                                                                                      |
| <i>pc</i>              | Point code, in the form zone.region.sp.                                                                               |
| <b>ssn</b>             | (Optional) Specifies a subsystem number.                                                                              |
| <i>ssn</i>             | Subsystem number. Valid range is 2 through 255.                                                                       |
| <i>cost</i>            | Cost. Valid range is 1 through 8.                                                                                     |
| <i>wf</i>              | Weighing factor. Any items added to the group require a cost if the <b>multiplicity</b> is specified as <b>cgpa</b> . |
| <b>gt</b>              | Set the Routing Indicator to “route on global title.”                                                                 |
| <b>pcssn</b>           | Set the Routing Indicator to route on point code and subsystem number.                                                |

### Defaults

No default behavior or values

### Command Modes

CS7 gtt application group configuration

### Command History

| Release    | Modification                           |
|------------|----------------------------------------|
| 12.2(4)MB  | This command was introduced.           |
| 12.2(20)SW | The <b>instance</b> keyword was added. |

### Examples

The following example specifies point code 2.2.2, subsystem number 3 with a cost of 4. The Routing indicator is set to route on the point code and subsystem number.

```
pc 1.2.3 ssn 3 4 pcssn
```

### Related Commands

| Command                          | Description                                                            |
|----------------------------------|------------------------------------------------------------------------|
| <b>cs7 gtt application-group</b> | Specifies a GTT application group.                                     |
| <b>multiplicity</b>              | Specifies a method for selecting destination in the application group. |

## pc (cs7 mlr result)

To specify the destination point code, use the **pc** command in CS7 MLR result configuration mode. To remove the specification, use the **no** form of this command.

**pc** *dest-pc* [**ssn** *ssn*] [**weight** *weight*]

**no pc** *dest-pc* [**weight** *weight*]

### Syntax Description

|                |                                                                                                                                                                                                                                                                                          |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>dest-pc</i> | A destination point code in variant-specific point-code format.                                                                                                                                                                                                                          |
| <b>ssn</b>     | (Optional) Specifies that a subsystem number will be used along with the point code.                                                                                                                                                                                                     |
| <i>ssn</i>     | Subsystem number. Valid range is 2 to 255.                                                                                                                                                                                                                                               |
| <b>weight</b>  | (Optional) Specifies the weight applied to the weighted round-robin (WRR) distribution algorithm used for MLR result groups.                                                                                                                                                             |
| <i>weight</i>  | An integer value in the range of 0 to 10. A value of 10 indicates the resource should be selected 10 times more than a resource assigned a weight of 1. A weight of 0 indicates that the resource should only be used in the event that all non-zero weighted resources are unavailable. |

### Defaults

If not specified, a default weight of 1 is used.

### Command Modes

CS7 mlr result configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

If multiple zero-weighted resources exist, then messages are equally distributed between them if all non-zero weighted resources fail. If not specified, a default weight of 1 is used.

### Examples

The following example specifies three resource in the result group SMS-WEIGHTED. The three resources are identified by point code and assigned weighted round-robin (WRR) values:

```
cs7 mlr result SMS-WEIGHTED
pc 3.3.2 weight 1
pc 3.3.1 weight 2
pc 3.3.3 weight 5
```

| Related Commands | Command        | Description                                                                                                                                                      |
|------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | cs7 mlr result | Specifies the name of the MLR results group. The result group contains the list of resources that process traffic to be routed based on multi-layer information. |

## pc (cs7 sms result)

To specify that a message will be routed to an SMSC according to point code, use the **pc** command in CS7 SMS result configuration mode. To remove the configuration, use the **no** form of this command.

**pc** *pc* [**ssn** *ssn*] [**weight** *weight*]

**no pc** *pc* [**ssn** *ssn*] [**weight** *weight*]

### Syntax Description

|               |                                                                                             |
|---------------|---------------------------------------------------------------------------------------------|
| <i>pc</i>     | Destination point code used to route message.                                               |
| <b>ssn</b>    | (Optional) Specifies a subsystem number.                                                    |
| <i>ssn</i>    | Subsystem number, in the range 2 to 255.                                                    |
| <b>weight</b> | (Optional) Specifies the weight applied to the weighted round robin distribution algorithm. |
| <i>weight</i> | Weight value, in the range 0 to 10.                                                         |

### Defaults

No default behavior or values

### Command Modes

CS7 SMS result configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

When a **pc/ssn** result is configured in an FDA system, a received GSM SMS-MO dialogue is proxied by the ITP toward the SMSC.

### Examples

:The following example configures a CS7 result group named SMSC of type SMSC and specifies that messages will be routed according to point code:

```
cs7 sms result-group SMSC smsc
pc 1.1.1 weight 2
pc2.2.2 weight 1
```

### Related Commands

| Command                     | Description                     |
|-----------------------------|---------------------------------|
| <b>cs7 sms result-group</b> | Configures an SMS result group. |

## peer (group)

To enable the ITP to initiate the SCTP association with its peer, use the **peer** command in group configuration mode. To remove the configuration, use the **no** form of this command.

**peer** *port-number*

**no peer** *port-number*

### Syntax Description

|                    |                                                                                |
|--------------------|--------------------------------------------------------------------------------|
| <i>port-number</i> | Port number. Valid port numbers range from 1024 to 49151. There is no default. |
|--------------------|--------------------------------------------------------------------------------|

### Defaults

No default behavior or values.

### Command Modes

Group

### Command History

| Release    | Modification                                   |
|------------|------------------------------------------------|
| 12.2(25)SW | This command was introduced in Global submode. |

### Usage Guidelines

The presence of the **peer** command causes the ITP to initiate the SCTP association with its peer. The absence of the peer command causes the ITP to open the specified local SCTP port and wait for an incoming association from the peer.

The peer command enables the group peer submode.

### Examples

The third line in the following example initiates the SCTP association with its peer.

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 peer 4444
 remote-ip 1.1.1.2
```

### Related Commands

| Command                       | Description                                       |
|-------------------------------|---------------------------------------------------|
| <b>cs7 group</b>              | Specifies an ITP Group and enables group submode. |
| <b>remote-ip (group peer)</b> | Specifies a remote IP address for an association. |

# peer-timer

To set the peer timer, use the **peer-timer** CS7 link submode command. To disable the timer, use the **no** form of this command.

**peer-timer t01** *milliseconds*

**no peer-timer**

| Syntax Description | <b>t01</b>          | Alignment ready timer.                                                           |
|--------------------|---------------------|----------------------------------------------------------------------------------|
|                    | <i>milliseconds</i> | The range is 5000 through 150000 milliseconds. The default is 5000 milliseconds. |

| Defaults | The default T1 timer is 5000 milliseconds. |
|----------|--------------------------------------------|
|----------|--------------------------------------------|

| Command Modes | CS7 link submode |
|---------------|------------------|
|---------------|------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

| Examples | The following example sets the t06 timer to 2000 milliseconds: |
|----------|----------------------------------------------------------------|
|----------|----------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
peer-timer t01 2000
```

| Related Commands | Command              | Description               |
|------------------|----------------------|---------------------------|
|                  | <b>show cs7 m2pa</b> | Displays M2PA statistics. |

## pid (cs7 mlr ruleset rule)

To specify a particular protocol identifier (PID) value for an SMS-MO or SMS-MT rule, use the **pid** command in CS7 MLR ruleset-rule configuration mode. To remove the specification, use the **no** form of the command.

**pid** *protocol-id*

**no pid** *protocol-id*

### Syntax Description

|                    |                                      |
|--------------------|--------------------------------------|
| <i>protocol-id</i> | An integer in the range of 0 to 255. |
|--------------------|--------------------------------------|

### Defaults

No default behavior or value.

### Command Modes

CS7 mlr ruleset-rule configuration

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

The value of the PID maps to the values specified for the TP-PID SMS parameter.  
For a complete set of PID values, refer to GSM 03.40

### Examples

The following example specifies a protocol identifier (PID) value:

```
cs7 mlr ruleset ruleset1
rule 10 sms-mo
pid 1
dest-sme 1234
orig sme 60920025
result gt 9991117777
```

### Related Commands

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## pid (cs7 sms set rule)

To specify a protocol identifier (TP-PID), use the **pid** command in CS7 SMS set rule configuration mode. To remove the configuration, use the **no** form of this command.

**pid** *pid-value*

**no pid**

### Syntax Description

|                  |                                                             |
|------------------|-------------------------------------------------------------|
| <i>pid-value</i> | Protocol identifier integer value. Valid range is 0 to 255. |
|------------------|-------------------------------------------------------------|

### Defaults

No default behavior or values

### Command Modes

CS7 SMS set rule configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

### Examples

The following example specifies an SMS ruleset named SMS-RULES, specifies a rule index of 20, and specifies an PID of 25:

```
cs7 sms ruleset SMS-RULES
 rule 20 sms-mo
  pid 25
  result block
```

### Related Commands

| Command                                   | Description                                                                     |
|-------------------------------------------|---------------------------------------------------------------------------------|
| <b>cdr-service-queue</b>                  | Tests the availability of CDR service queue as the input condition of the rule. |
| <b>cs7 sms ruleset</b>                    | Specifies a ruleset.                                                            |
| <b>dest-port (cs7 sms set rule)</b>       | Specifies an application destination port number.                               |
| <b>dest-sme (cs7 sms set rule)</b>        | Specifies a destination short message entity.                                   |
| <b>dest-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of destination SME addresses.                            |
| <b>dest-smsc (cs7 sms set rule)</b>       | Specifies a destination SMSC.                                                   |
| <b>orig-imsi (cs7 sms set rule)</b>       | Specifies an origin IMSI.                                                       |
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table).                |



| Command                                  | Description                                                     |
|------------------------------------------|-----------------------------------------------------------------|
| <b>orig-sme (cs7 sms set rule)</b>       | Specifies an origin short message entity.                       |
| <b>orig-sme-table (cs7 sms set rule)</b> | Specifies an SMS table of origin SME addresses (address-table). |
| <b>result (cs7 sms set rule)</b>         | Specifies a result.                                             |
| <b>rule (cs7 sms set)</b>                | Specifies a rule within a ruleset.                              |

# ping cs7

To verify that you can reach ITP nodes, use the **ping cs7** EXEC command. To stop the ping, use the **ping cs7** command with the **stop** keyword.

**ping cs7** [*instance-number*] [**-opc** *origination-point-code*] [**-duration** *seconds*] [**-ni** *network-indicator*] [**-rate** *MSU-per-second*] [**-size** *bytes*] [**-sls** *value* | **round-robin**] {*destination-point-code* | *host*}

**ping cs7** [*instance-number*] **stop** *destination-point-code*

## Syntax Description

|                               |                                                                                                                                                                              |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>instance</i>               | (Optional) ITP instance.                                                                                                                                                     |
| <b>-opc</b>                   | (Optional) Specifies the secondary pc or the capability pc as the originating pc of the ping. If <b>-opc</b> is not specified, the primary pc is the default originating pc. |
| <i>origination-point-code</i> | Originating point code. Can specify a secondary pc or a capability pc.                                                                                                       |
| <b>-duration</b>              | (Optional) Specifies a ping test duration, in seconds.                                                                                                                       |
| <i>seconds</i>                | Duration of the ping, in seconds. The default is 1 second.                                                                                                                   |
| <b>-ni</b>                    | (Optional) Specifies a network indicator.                                                                                                                                    |
| <i>network-indicator</i>      | The network indicator. Default is 2.                                                                                                                                         |
| <b>-rate</b>                  | (Optional) Specifies a ping message rate in MSU per second.                                                                                                                  |
| <i>MSU-per-second</i>         | MSU per second.                                                                                                                                                              |
| <b>-size</b>                  | (Optional) Specifies a test message size, in bytes.                                                                                                                          |
| <i>bytes</i>                  | Ping test message size. The default size is 40 bytes.                                                                                                                        |
| <b>-sls</b>                   | (Optional) Signaling link selector.                                                                                                                                          |
| <i>value</i>                  | Signaling link selector value. Valid numbers are 1 through 15. Default is 0.                                                                                                 |
| <b>stop</b>                   | Stop the ping.                                                                                                                                                               |
| <b>round-robin</b>            | Perform the ping in round-robin order.                                                                                                                                       |
| <i>point-code</i>             | The point code.                                                                                                                                                              |
| <i>host</i>                   | The hostname.                                                                                                                                                                |

## Defaults

The primary point code is the default originating point code.

## Command Modes

EXEC

## Command History

| Release    | Modification                    |
|------------|---------------------------------|
| 12.2(1)MB  | This command was introduced.    |
| 12.2(13)MB | The <b>-opc</b> flag was added. |

## Examples

The following example starts a 10-second ping to point code 10.44.156:

```
Router# ping cs7 -duration 10 10.44.156
%CS7PING-6-RTT:Q.755 Test 10.44.156:MTP Traffic test rtt 200/200/200
%CS7PING-6-TERM:Q.755 Test 10.44.156:MTP Traffic test terminated
```

The following command starts a ping from the secondary point code 10.10.10 to 10.44.156:

```
ping cs7 -opc 10.10.10 10.44.156
```

The following command stops a ping to point code 10.44.156:

```
ping cs7 stop 10.44.156
```

## Related Commands

| Command          | Description                       |
|------------------|-----------------------------------|
| cs7 host         |                                   |
| show cs7 linkset | Displays linkset information.     |
| show cs7 ping    | Displays output from a ping test. |

# plan-capacity-rcvd

To configure link receive planning capacity, use the **plan-capacity-rcvd** CS7 link submode command. To remove the configuration, use the **no** version of the command.

**plan-capacity-rcvd** *bps*

**no plan-capacity-rcvd** *bps*

|                           |            |                                                                        |
|---------------------------|------------|------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>bps</i> | Planned capacity in bits per second. The range is 56000 to 2147483647. |
|---------------------------|------------|------------------------------------------------------------------------|

|                 |                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------|
| <b>Defaults</b> | For links based on Serial or ATM (HSL) technologies the planned capacity is the physical speed of the link. |
|-----------------|-------------------------------------------------------------------------------------------------------------|

|                      |                  |
|----------------------|------------------|
| <b>Command Modes</b> | CS7 link submode |
|----------------------|------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB4     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | Planned capacity is the maximum amount of expected data to be transmitted on a link. This value is expressed in bits per second. For links based on Serial or ATM (HSL) technologies the planned capacity is the physical speed of the link. It is not necessary or recommended to specify a planned capacity for these types of links. When a planned capacity is not specified for these types of links the ifSpeed, from the IF-MIB, is used as the planned capacity. |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

In the case of SCTP/IP based links, there is not a direct way of determining the expected amount of traffic. The design of the IP cloud must consider the traffic from all SS7 links and allocate resources accordingly. In order to monitor link utilization on these types of links, a planned capacity must be specified.

|                 |                                                                                  |
|-----------------|----------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the receive planning capacity on link 0 to 56000 bps: |
|-----------------|----------------------------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
plan-capacity-rcvd 56000
```

| <b>Related Commands</b> | <b>Command</b>            | <b>Description</b>                                   |
|-------------------------|---------------------------|------------------------------------------------------|
|                         | <b>cs7 util-abate</b>     | Specifies the integer range utilization threshold.   |
|                         | <b>cs7 util-threshold</b> | Specifies the global threshold for link utilization. |
|                         | <b>plan-capacity-send</b> | Specifies the link send planning capacity.           |
|                         | <b>threshold-receive</b>  | Specifies the receive threshold for a link.          |
|                         | <b>threshold-send</b>     | Specifies the send threshold for a link.             |

# plan-capacity-send

To configure the link send planning capacity, use the **plan-capacity-send** CS7 link submode command. To remove the configuration use the **no** form of the command.

**plan-capacity-send** *bps*

**no plan-capacity-send** *bps*

|                           |            |                                                                        |
|---------------------------|------------|------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>bps</i> | Planned capacity in bits per second. The range is 56000 to 2147483647. |
|---------------------------|------------|------------------------------------------------------------------------|

|                 |                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------|
| <b>Defaults</b> | For links based on Serial or ATM (HSL) technologies the planned capacity is the physical speed of the link. |
|-----------------|-------------------------------------------------------------------------------------------------------------|

|                      |                  |
|----------------------|------------------|
| <b>Command Modes</b> | CS7 link submode |
|----------------------|------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB4     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | Planned capacity is the maximum amount of expected data to be transmitted on a link. This value is expressed in bits per second. For links based on Serial or ATM (HSL) technologies the planned capacity is the physical speed of the link. It is not necessary or recommended to specify a planned capacity for these types of links. When a planned capacity is not specified for these types of links the ifSpeed, from the IF-MIB, is used as the planned capacity. |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

In the case of SCTP/IP based links, there is not a direct way of determining the expected amount of traffic. The design of the IP cloud must consider the traffic from all SS7 links and allocate resources accordingly. In order to monitor link utilization on these types of links, a planned capacity must be specified.

|                 |                                                                               |
|-----------------|-------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the send planning capacity on link 0 to 56000 bps: |
|-----------------|-------------------------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
plan-capacity-send 56000
```

| <b>Related Commands</b> | <b>Command</b>            | <b>Description</b>                                   |
|-------------------------|---------------------------|------------------------------------------------------|
|                         | <b>cs7 util-abate</b>     | Specifies the integer range utilization threshold.   |
|                         | <b>cs7 util-threshold</b> | Specifies the global threshold for link utilization. |
|                         | <b>plan-capacity-rcvd</b> | Specifies the link receive planning capacity.        |
|                         | <b>threshold-receive</b>  | Specifies the receive threshold for a link.          |
|                         | <b>threshold-send</b>     | Specifies the send threshold for a link.             |

# port

To specify a particular application port number value for a GSM MAP sms-mo or sms-mt operation, use the **port** CS7 MLR ruleset-rule configuration mode command. To remove the statement, use the **no** form of this command.

**port** *port-number*

**no port** *port-number*

## Syntax Description

|                    |                                                     |
|--------------------|-----------------------------------------------------|
| <i>port-number</i> | Port number. An integer in the range of 0 to 65535. |
|--------------------|-----------------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

CS7 MLR ruleset-rule configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(21)SW | This command was introduced. |

## Usage Guidelines

The value of the port maps to the values specified in the User Data Header (UDH) of the SMS message.

## Examples

The following example specifies an application port number of 100:

```
port 100
```

## Related Commands

| Command                | Description                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------------------|
| <b>cs7 mlr ruleset</b> | Specifies the set of rules that will be used to process traffic matching triggers defined in an MLR table. |

# post-gtt-address-conversion

After you have defined a GTT address conversion table, you can apply the table on a GTT selector basis. To specify the global title address conversion table to apply after performing local global title translation, use the **post-gtt-address-conversion** CS7 GTT selector submode command. To remove the statement, use the **no** form of this command.

**post-gtt-address-conversion** *tablename*

**no post-gtt-address-conversion** *tablename*

|                           |                                                                       |
|---------------------------|-----------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>tablename</i> Name of an already-defined address conversion table. |
|---------------------------|-----------------------------------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                          |
|----------------------|--------------------------|
| <b>Command Modes</b> | CS7 GTT selector submode |
|----------------------|--------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB2     | This command was introduced. |

|                 |                                                                               |
|-----------------|-------------------------------------------------------------------------------|
| <b>Examples</b> | The following example specifies a conversion table named table1.              |
|                 | <pre>cs7 gtt selector name tt np nai post-gtt-address-conversion table1</pre> |

|                         |                                   |                                                                                                                  |
|-------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                    | <b>Description</b>                                                                                               |
|                         | <b>cs7 gtt selector</b>           | Creates a GTT selector.                                                                                          |
|                         | <b>pre-gtt-address-conversion</b> | Specifies the global title address conversion table to apply prior to performing local global title translation. |

# pre-gtt-address-conversion

To specify the global title address conversion table to apply prior to performing local global title translation, use the **pre-gtt-address-conversion** CS7 GTT selector submode command. To remove the statement, use the **no** form of this command.

**pre-gtt-address-conversion** *tablename*

**no pre-gtt-address-conversion** *tablename*

|                           |                  |                                                     |
|---------------------------|------------------|-----------------------------------------------------|
| <b>Syntax Description</b> | <i>tablename</i> | Name of an already-defined prefix-conversion table. |
|---------------------------|------------------|-----------------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                          |
|----------------------|--------------------------|
| <b>Command Modes</b> | CS7 GTT selector submode |
|----------------------|--------------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB2 | This command was introduced. |

|                 |                                                                              |
|-----------------|------------------------------------------------------------------------------|
| <b>Examples</b> | The following example specifies a conversion table named table2.             |
|                 | <pre>cs7 gtt selector name tt np nai pre-gtt-address-conversion table2</pre> |

| <b>Related Commands</b> | Command                            | Description                                                                                                   |
|-------------------------|------------------------------------|---------------------------------------------------------------------------------------------------------------|
|                         | <b>cs7 gtt selector</b>            | Creates a GTT selector.                                                                                       |
|                         | <b>post-gtt-address-conversion</b> | Specifies the global title address conversion table to apply after performing local global title translation. |



# preventive-txp

To enable preventive transfer prohibited route management messages, use the preventive-txp CS7 linkset submode command. To disable preventive transfer prohibited messages, use the **no** form of this command.

**preventive-txp**

**no preventive-txp**

## Syntax Description

Enabled

## Defaults

No default behavior or values

## Command Modes

CS7 linkset

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(4)MB12 | This command was introduced. |

## Usage Guidelines

A preventive transfer-prohibited message is normally sent to an adjacent node to indicate that the adjacent node will be used for signalling traffic to a concerned destination. The purpose of the message is to avoid a routing loop by preventing the adjacent node from sending signalling traffic to a node that will route the signalling traffic back to the adjacent node.

This command should only be used to disable preventive-transfer prohibited messages to adjacent nodes when the possibility for a routing loop does not exist. Extreme care should be taken when this command is used to disable preventive transfer-prohibited messages.

## Examples

The following example disables the broadcast of route management messages on linkset1:

```
cs7 linkset linkset1
no preventive-txp
```

## Related Commands

| Command                 | Description                                          |
|-------------------------|------------------------------------------------------|
| <b>cs7 linkset</b>      | Specifies a linkset and enables CS7 linkset submode. |
| <b>show cs7 linkset</b> | Displays linkset information and status.             |

# protocol sctp

To specify that the SCTP protocol will be used as the transport protocol for the IPC zone association, use the **protocol sctp** command in IPC association mode. To remove the protocol from the configuration, use the **no** form of this command.

**protocol sctp**

**no protocol sctp**

## Syntax Description

This command has no argument or keywords.

## Defaults

No default behavior or values

## Command Modes

IPC association

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Usage Guidelines

The **protocol sctp** command enables IPC SCTP protocol mode.

## Examples

The third line of the following example specifies that the SCTP protocol is used as the transport protocol for this association:

```
ipc zone default
association 1
protocol sctp
```

## Related Commands

| Command                   | Description                                                        |
|---------------------------|--------------------------------------------------------------------|
| local-ip (local IPC SCTP) | Specifies the local IP address to be used in the SCTP association. |
| local-port                | Specifies the local IPC SCTP association port.                     |

## proxy-error-use (cs7 sms smsmo)

To return the error received from the last MO Proxy procedure, use the **proxy-error-use** command in CS7 sms smsmo configuration mode. To remove the configuration, use the **no** form of this command.

**proxy-error-use**

**no proxy-error-use**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |               |
|----------------------|---------------|
| <b>Command Modes</b> | CS7 sms smsmo |
|----------------------|---------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

### Usage Guidelines

|                 |                                                                                                                                                                                                                                          |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example configures an SMS route table, specifies a CDR service, specifies GSM MAP routing, a ruleset, and a local source address of application, and specifies return the error received from the last MO Proxy procedure. |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
cs7 sms route-table
cdr-service cdrserv1
gsm-map sms-mo ssn 8
  ruleset sms-rules
  map-source-addr digits 18881212122
  msc-proxy-addr tt 10 gti 2
  proxy-error-use
```

|                         |                                      |                                  |
|-------------------------|--------------------------------------|----------------------------------|
| <b>Related Commands</b> | <b>Command</b>                       | <b>Description</b>               |
|                         | <b>cs7 sms route-table</b>           | Specifies an SMS route table.    |
|                         | <b>gsm-map (cs7 sms route table)</b> | Specifies the GSM MAP operation. |

# qos-access-group

To apply an access list to a QoS class, use the **qos-access-group** CS7 QoS submode command. To remove the access list from the QoS class, use the **no** form of this command.

**qos-access-group** *access-list-number*

**no qos-access-group** *access-list-number*

## Syntax Description

|                           |                                                                                          |
|---------------------------|------------------------------------------------------------------------------------------|
| <i>access-list-number</i> | Number of a Cisco SS7 access list. The range is a decimal number from 2700 through 2999. |
|---------------------------|------------------------------------------------------------------------------------------|

## Defaults

No default behavior or values

## Command Modes

CS7 QoS

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

The **qos-access-group** command allows you to assign an ITP access list to a QoS class definition.

## Examples

The following example assigns access list 2700 to QoS class 3. Packets that match access list 2700 are assigned QoS class 3:

```
access list 2700 permit dpc 1.100.0 0.0.255
```

```
cs7 qos class 3
  qos-access-group 2700
```

## Related Commands

| Command                      | Description                                          |
|------------------------------|------------------------------------------------------|
| <b>access-list</b>           | Defines an access list.                              |
| <b>cs7 qos class</b>         | Defines a QoS class.                                 |
| <b>show cs7 access-lists</b> | Displays information about defined ITP access lists. |

## qos-class (CS7 AS)

To configure a QoS class for the packets sent to the ASPs in this AS, use the **qos-class** CS7 AS submode command. To remove the configuration, use the **no** form of the command.

**qos-class** *class*

**no qos-class** *class*

|                           |                                                        |
|---------------------------|--------------------------------------------------------|
| <b>Syntax Description</b> | <i>class</i> QoS Class ID. Valid range is 1 through 7. |
|---------------------------|--------------------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                |
|----------------------|----------------|
| <b>Command Modes</b> | CS7 AS submode |
|----------------------|----------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB5 | This command was introduced. |

|                         |                                                                                                                                                      |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The QoS class must be defined before the class is assigned.                                                                                          |
|                         | Once configured, this QoS class is applied to all ASPs listed under this AS. The QoS class goes into effect for only the subsequent ASP connections. |
|                         | The QoS class defined under the ASP overrides the QoS class defined under the AS.                                                                    |

|                 |                                                         |
|-----------------|---------------------------------------------------------|
| <b>Examples</b> | The following example configures a QoS class 4 for AS1: |
|-----------------|---------------------------------------------------------|

```
cs7 as as1 m3ua
  qos-class 4
```

| <b>Related Commands</b> | Command | Description                    |
|-------------------------|---------|--------------------------------|
|                         | cs7 as  | Defines an Application Server. |

## qos-class (CS7 ASP)

To configure a QoS class for the packets sent to this ASP, use the **qos-class** CS7 ASP submode command. To remove the configuration, use the **no** form of the command.

**qos-class** *class* [*instance-number*]

**no qos-class** *class* [*instance-number*]

### Syntax Description

|                        |                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------|
| <i>class</i>           | QoS Class ID in the range 0 through 7.                                                                            |
| <i>instance-number</i> | Required if multiple instances is configured. The valid range is 0 through 7. The default instance is instance 0. |

### Defaults

No default behavior or values

### Command Modes

CS7 ASP submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

The QoS class must be defined before the class is assigned.

The QoS class goes into effect for only the subsequent ASP connections.

The QoS class defined under the ASP overrides the QoS class defined under the AS.

### Examples

The following example configures a QoS class 4 for ASP1:

```
cs7 asp ASP1 2904 2905 m3ua
  remote-ip 1.1.1.1
  qos-class 4
```

### Related Commands

| Command              | Description                                                          |
|----------------------|----------------------------------------------------------------------|
| <b>cs7 asp</b>       | Specifies an Application Server Process and enables CS7 ASP submode. |
| <b>cs7 qos class</b> | Defines a QoS class.                                                 |
| <b>show cs7 qos</b>  | Displays QoS class.                                                  |

## qos-class (CS7 gtt selector)

To configure a QoS class for a selector, use the **qos-class** CS7 GTT selector submode command. To remove the configuration, use the **no** form of the command.

**qos-class** *class*

**no qos-class** *class*

|                           |                                                                                                                                             |                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>Syntax Description</b> | <i>class</i>                                                                                                                                | QoS Class ID. Valid range is 0 through 7. |
| <b>Defaults</b>           | No default behavior or values                                                                                                               |                                           |
| <b>Command Modes</b>      | CS7 GTT selector submode                                                                                                                    |                                           |
| <b>Command History</b>    | <b>Release</b>                                                                                                                              | <b>Modification</b>                       |
|                           | 12.2(4)MB                                                                                                                                   | This command was introduced.              |
| <b>Usage Guidelines</b>   | If the QoS class entered for a selector is not defined, SCCP packets for the selector are routed using the default class peer link members. |                                           |
| <b>Examples</b>           | The following example configures a QoS class of 4 for the GTT selector named c7gsp:<br><pre>cs7 gtt selector c7gsp 3 2 qos-class 4</pre>    |                                           |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                              | <b>Description</b>                        |
|                           | <b>cs7 qos class</b>                                                                                                                        | Defines a QoS class.                      |
|                           | <b>show cs7 qos</b>                                                                                                                         | Displays QoS class.                       |

## qos-class (CS7 link)

To configure a QoS class for a peer link, use the **qos-class** CS7 link submode command. To remove the configuration, use the **no** form of the command.

**qos-class** *class*

**no qos-class** *class*

### Syntax Description

|              |                                           |
|--------------|-------------------------------------------|
| <i>class</i> | QoS Class ID. Valid range is 1 through 7. |
|--------------|-------------------------------------------|

### Defaults

No default behavior or values

### Command Modes

CS7 link submode

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

### Usage Guidelines

ITP QoS requires at least one default class peer link member. ITP QoS does not permit a QoS class to be assigned to the default class peer link member.

The QoS class must be defined before the class is assigned to a peer link.

### Examples

The following example configures a QoS class 4 for peer link 2:

```
cs7 linkset michael 10.1.1
link 2 sctp 172.18.44.147 7000 7000
qos-class 4
```

### Related Commands

| Command              | Description          |
|----------------------|----------------------|
| <b>cs7 qos class</b> | Defines a QoS class. |
| <b>show cs7 qos</b>  | Displays QoS class.  |



## qos-class (CS7 Mated-SG)

To configure a QoS class for the packets sent to the SG mate, use the **qos-class** CS7 Mated-SG submode command. To remove the configuration, use the **no** form of the command.

**qos-class** *class* [*instance-number*]

**no qos-class** *class* [*instance-number*]

### Syntax Description

|                        |                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------|
| <i>class</i>           | QoS Class ID. Valid range is 1 through 7.                                                                         |
| <i>instance-number</i> | Required if multiple instances is configured. The valid range is 0 through 7. The default instance is instance 0. |

### Defaults

No default behavior or values

### Command Modes

CS7 Mated-SG submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

The QoS class must be defined before the class is assigned to a peer link.

The QoS class goes into effect for only the subsequent mated SG connection.

### Examples

The following example configures a QoS class 4 for the mated SG named BLUE:

```
cs7 mated-sg BLUE 2905
remote-ip 5.5.5.5
qos-class 4
```

### Related Commands

| Command              | Description          |
|----------------------|----------------------|
| <b>cs7 qos class</b> | Defines a QoS class. |
| <b>show cs7 qos</b>  | Displays QoS class.  |

# qos-ip-dscp

To define the Differential Services Code Point (DSCP) setting for a QoS class, use the **qos-ip-dscp** CS7 QoS submode configuration command. To set the DSCP setting to the default, use the **no** form of this command.

**qos-ip-dscp** *ip-tos*

**no qos-ip-dscp** *ip-tos*

## Syntax Description

|               |                                                                                                          |
|---------------|----------------------------------------------------------------------------------------------------------|
| <i>ip-tos</i> | DSCP setting for the IP TOS byte, in decimal notation. Valid range is 0 through 63. The default is zero. |
|---------------|----------------------------------------------------------------------------------------------------------|

## Defaults

The IP TOS default is 0.

## Command Modes

CS7 QoS submode

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

The TOS byte in the IP header is set with the value of qos-ip-dscp on peer links that are members of the specified QoS class. The **ip-dscp** CS7 link submode command overrides the **qos-ip-dscp** TOS settings assigned through a QoS class.

## Examples

The following example sets the IP type of service to DSCP 56 for QoS class 2:

```
cs7 qos class 2
  qos-ip-dscp 56
```

## Related Commands

| Command                   | Description                             |
|---------------------------|-----------------------------------------|
| <b>cs7 linkset</b>        | Specifies a linkset.                    |
| <b>ip-dscp</b>            | Configures DSCP TOS setting for a link. |
| <b>link (CS7 linkset)</b> | Configures a link.                      |

# qos-ip-precedence

To define the IP precedence setting for a QoS class, use the **ip-precedence-qos** CS7 QoS submode configuration command. To set the IP precedence to the default setting, use the **no** form of this command.

**qos-ip-precedence** *ip-tos*

**no qos-ip-precedence** *ip-tos*

| Syntax Description | <i>ip-tos</i> | IP precedence setting, in decimal notation. Valid range is 0 through 7. The default is zero. |
|--------------------|---------------|----------------------------------------------------------------------------------------------|
|--------------------|---------------|----------------------------------------------------------------------------------------------|

| Defaults | The IP TOS default is 0. |
|----------|--------------------------|
|----------|--------------------------|

| Command Modes | CS7 QoS submode |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

| Usage Guidelines | The TOS byte in the IP header is set with the value of qos-ip-precedence on peer links that are members of the specified QoS class. The ip-precedence CS7 link submode command overrides the qos-ip-precedence tos settings assigned through a QoS class. |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | The following example sets the IP type of service to 3 for QoS class 1: |
|----------|-------------------------------------------------------------------------|
|----------|-------------------------------------------------------------------------|

```
cs7 qos class 1
  qos-ip-precedence 3
```

| Related Commands | Command                   | Description                         |
|------------------|---------------------------|-------------------------------------|
|                  | <b>cs7 linkset</b>        | Specifies a linkset.                |
|                  | <b>ip-precedence</b>      | Configure IP precedence TOS setting |
|                  | <b>link (CS7 linkset)</b> | Configures a link.                  |

## queue-depth (cs7 cdr service)

To set the available queue depth for the CDR service, use the **queue-depth** command in CS7 CDR configuration mode. To disable the queue depth setting, use the **no** form of this command.

**queue-depth** *depth*

**no queue-depth** *depth*

| Syntax Description   | <i>depth</i> The valid queue-depth range is 1000 to 1000000 CDRs. The default is 5000 CDRs.                                                                                                                                                                  |  |         |              |                      |                                                  |                 |                          |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------------|----------------------|--------------------------------------------------|-----------------|--------------------------|
| Defaults             | The default queue depth is 5000 CDRs.                                                                                                                                                                                                                        |  |         |              |                      |                                                  |                 |                          |
| Command Modes        | CS7 CDR configuration                                                                                                                                                                                                                                        |  |         |              |                      |                                                  |                 |                          |
| Command History      | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(25)SW</td><td>This command was introduced.</td></tr></table>                                                                                                                               |  | Release | Modification | 12.2(25)SW           | This command was introduced.                     |                 |                          |
| Release              | Modification                                                                                                                                                                                                                                                 |  |         |              |                      |                                                  |                 |                          |
| 12.2(25)SW           | This command was introduced.                                                                                                                                                                                                                                 |  |         |              |                      |                                                  |                 |                          |
| Usage Guidelines     | The queue depth is dependant on the available system memory and represents the number of CDRs that may be queued while awaiting acknowledgement from the CDR destination.                                                                                    |  |         |              |                      |                                                  |                 |                          |
| Examples             | <p>The following example specifies a CDR service named FDASMSC, specifies two destinations, psd1 and psd2, and specifies a queue-depth of 20000 CDRs:</p> <pre>cs7 cdr service FDASMSC   destination psd1 10   destination psd2 20   queue-depth 20000</pre> |  |         |              |                      |                                                  |                 |                          |
| Related Commands     | <table><tr><th>Command</th><th>Description</th></tr><tr><td>congestion-threshold</td><td>Set the congestion-threshold for the CDR service</td></tr><tr><td>cs7 cdr service</td><td>Specifies a CDR service.</td></tr></table>                                |  | Command | Description  | congestion-threshold | Set the congestion-threshold for the CDR service | cs7 cdr service | Specifies a CDR service. |
| Command              | Description                                                                                                                                                                                                                                                  |  |         |              |                      |                                                  |                 |                          |
| congestion-threshold | Set the congestion-threshold for the CDR service                                                                                                                                                                                                             |  |         |              |                      |                                                  |                 |                          |
| cs7 cdr service      | Specifies a CDR service.                                                                                                                                                                                                                                     |  |         |              |                      |                                                  |                 |                          |

# queue-limit

To specify the maximum number of queued operations in the outbound group send queue, use the **queue-limit** command in CS7 SMS result configuration mode. To return to the default queue limit value, use the **no** form of this command.

**queue-limit** *operations*

**no queue-limit**

| Syntax Description | <i>operations</i> Valid range is 0 to 100000 operations. The default is no queue limit. |
|--------------------|-----------------------------------------------------------------------------------------|
|--------------------|-----------------------------------------------------------------------------------------|

| Defaults | No queue limit is enforced. |
|----------|-----------------------------|
|----------|-----------------------------|

| Command Modes | CS7 SMS result configuration |
|---------------|------------------------------|
|---------------|------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Usage Guidelines | This command is available if the result group type has been specified as ESME. This command is not available if the result group type is SMSC. |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | The following example specifies an SMS type ESME result group named offisland, specifies that messages will be routed on an SMPP session previously named offisland, and sets the queue limit to 100 milliseconds: |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
cs7 sms result-group offisland esme
smpp offisland
queue-limit 100
```

| Related Commands | Command                     | Description                                            |
|------------------|-----------------------------|--------------------------------------------------------|
|                  | <b>cs7 sms result-group</b> | Specifies the result group name and result group type. |

# queue-timer

To specify the maximum time a request can remain on the outbound result-group queue before the request times out and continues to the next routing rule, use the **queue-timer** command in CS7 SMS result configuration mode. To return to the default value of 500 ms, use the **no** form of this command.

**queue-timer** *msec*

**no queue-timer** *msec*

|                           |                                                                                                                                                                                                                                                                                                             |                                                        |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> Maximum time in queue. Valid range is 0 - 600000 milliseconds. Default is 500 ms.                                                                                                                                                                                                               |                                                        |
| <b>Defaults</b>           | queue-timer defaults to 5000 ms (or 5sec)                                                                                                                                                                                                                                                                   |                                                        |
| <b>Command Modes</b>      | CS7 SMS result configuration                                                                                                                                                                                                                                                                                |                                                        |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                                                                                                                                              | <b>Modification</b>                                    |
|                           | 12.2(25)SW                                                                                                                                                                                                                                                                                                  | This command was introduced.                           |
| <b>Usage Guidelines</b>   |                                                                                                                                                                                                                                                                                                             |                                                        |
| <b>Examples</b>           | <p>The following example specifies an SMS type ESME result group named offisland, specifies that messages will be routed on an SMPP session previously named offisland, and sets the queue timer to 600 milliseconds:</p> <pre>cs7 sms result-group offisland esme   smpp offisland   queue-timer 600</pre> |                                                        |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                                                                                                                                              | <b>Description</b>                                     |
|                           | <b>cs7 sms result-group</b>                                                                                                                                                                                                                                                                                 | Specifies the result group name and result group type. |

## receive-window (CS7 local peer)

To configure the local receive window size, use the **receive-window** CS7 local peer configuration command. To disable the configuration, use the **no** form of this command.

**receive-window** *size*

**no receive-window** *size*

| Syntax Description | <i>size</i> | Receive-window size in bytes. The range is 5000 through 20971520 bytes. The default receive-window size is 64000 bytes. |
|--------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|
|--------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|

| Defaults | 64000 bytes. |
|----------|--------------|
|----------|--------------|

| Command Modes | CS7 local peer configuration |
|---------------|------------------------------|
|---------------|------------------------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

| Usage Guidelines | <p>The size of the receive window offered by the receiver generally can affect performance. SCTP adapts its transmission rate to suit the available network capacity by using a congestion-sensitive, sliding-window flow control mechanisms described in RFC 2581. At any given instance only a certain number of bytes can be outstanding through the network. Keeping the path full of packets requires both congestion window (cwnd) and receive window (rwnd) to reach the effective size of the “pipe” represented by the so-called bandwidth-delay product. We can calculate the capacity of the pipe using the following capacity equation:</p> |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

$$\text{capacity (bits)} = \text{bandwidth (bits/sec)} \times \text{round-trip-time(sec)}$$

The bandwidth-delay product can vary widely depending on the network speed and round-trip-time (rtt) between the two end points. Using the capacity equation shown in the previous paragraph, we can estimate the minimum buffer size given the bandwidth of the communication media and the round-trip time between the nodes. Assuming the nodes are connected by a 1,544,000 bits/sec T1 link with a round-trip time of 60 ms, gives an estimated minimum buffer size of 11,580 bytes. The receive-window parameter default is set for 64000 bytes. The congestion control and windowing algorithms adjust to network conditions by controlling the number of bytes that can be outstanding through the network.

| Examples | The following example sets the receive-window size to 6000 bytes: |
|----------|-------------------------------------------------------------------|
|----------|-------------------------------------------------------------------|

```
cs7 local-peer 7000
receive-window 6000
```

 receive-window (CS7 local peer)

| Related Commands | Command       | Description               |
|------------------|---------------|---------------------------|
|                  | show cs7 m2pa | Displays M2PA statistics. |



## receive-window (CS7 M3UA)

To configure the local receive window size for the local port, use the **receive-window** CS7 M3UA submode command. To disable the configuration, use the **no** form of this command.

**receive-window** *size*

**no receive-window** *size*

| Syntax Description | <i>size</i> | Receive-window size in bytes. The range is 5000 through 20971520 bytes. The default receive-window size is 64000 bytes. |
|--------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|
|--------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|

| Defaults | 64000 bytes. |
|----------|--------------|
|----------|--------------|

| Command Modes | CS7 M3UA submode |
|---------------|------------------|
|---------------|------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Examples | The following example sets the receive-window size to 6000 bytes:<br><br><pre>cs7 m3ua 2905   local-ip 4.4.4.4   receive-window 6000</pre> |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------|
|----------|--------------------------------------------------------------------------------------------------------------------------------------------|

| Related Commands | Command         | Description                                                           |
|------------------|-----------------|-----------------------------------------------------------------------|
|                  | <b>cs7 m3ua</b> | Specifies the local port number for M3UA and enters CS7 M3UA submode. |

## receive-window (CS7 SGMP)

To configure the local receive window size for the local port, use the **receive-window** CS7 SGMP submode command. To disable the configuration, use the **no** form of this command.

**receive-window** *size*

**no receive-window** *size*

|                    |                                                                                                                                     |                                                                      |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Syntax Description | <i>size</i> Receive-window size in bytes. The range is 5000 through 20971520 bytes. The default receive-window size is 64000 bytes. |                                                                      |
| Defaults           | 64000 bytes.                                                                                                                        |                                                                      |
| Command Modes      | CS7 SGMP submode                                                                                                                    |                                                                      |
| Command History    | Release                                                                                                                             | Modification                                                         |
|                    | 12.2(4)MB5                                                                                                                          | This command was introduced.                                         |
| Examples           | The following example sets the receive-window size to 6000 bytes:<br><br>cs7 sgmp 5000<br>local-ip 4.4.4.4<br>receive-window 6000   |                                                                      |
| Related Commands   | Command                                                                                                                             | Description                                                          |
|                    | cs7 sgmp                                                                                                                            | Specifies the local port number for SGMP and enter CS7 SGMP submode. |

# receive-window (CS7 SUA)

To configure the local receive window size for the local port, use the **receive-window** CS7 SUA submode command. To disable the configuration, use the **no** form of this command.

**receive-window** *size*

**no receive-window** *size*

| Syntax Description | <i>size</i> | Receive-window size in bytes. The range is 5000 through 20971520 bytes. The default receive-window size is 64000 bytes. |
|--------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|
|--------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|

| Defaults | 64000 bytes. |
|----------|--------------|
|----------|--------------|

| Command Modes | CS7 SUA submode |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Examples | The following example sets the receive-window size to 6000 bytes:<br><br><pre>cs7 sua 15000 local-IP 4.4.4.4 receive-window 6000</pre> |
|----------|----------------------------------------------------------------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------------------------------------------------------------|

| Related Commands | Command        | Description                                                         |
|------------------|----------------|---------------------------------------------------------------------|
|                  | <b>cs7 sua</b> | Specifies the local port number for SUA and enters CS7 SUA submode. |

# receive-window (group)

To configure the local receive window size, use the **receive-window** group submode command. To disable the configuration, use the **no** form of this command.

**receive-window** *size*

**no receive-window** *size*

|                           |             |                                                                                                                         |
|---------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>size</i> | Receive-window size in bytes. The range is 5000 through 20971520 bytes. The default receive-window size is 64000 bytes. |
|---------------------------|-------------|-------------------------------------------------------------------------------------------------------------------------|

|                 |              |
|-----------------|--------------|
| <b>Defaults</b> | 64000 bytes. |
|-----------------|--------------|

|                      |       |
|----------------------|-------|
| <b>Command Modes</b> | Group |
|----------------------|-------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(25)SW | This command was introduced. |

**Usage Guidelines**

The size of the receive window offered by the receiver generally can affect performance. SCTP adapts its transmission rate to suit the available network capacity by using a congestion-sensitive, sliding-window flow control mechanisms described in RFC 2581. At any given instance only a certain number of bytes can be outstanding through the network. Keeping the path full of packets requires both congestion window (cwnd) and receive window (rwnd) to reach the effective size of the “pipe” represented by the so-called bandwidth-delay product. We can calculate the capacity of the pipe using the following capacity equation:

$$\text{capacity (bits)} = \text{bandwidth (bits/sec)} \times \text{round-trip-time(sec)}$$

The bandwidth-delay product can vary widely depending on the network speed and round-trip-time (rtt) between the two end points. Using the capacity equation shown in the previous paragraph, we can estimate the minimum buffer size given the bandwidth of the communication media and the round-trip time between the nodes. Assuming the nodes are connected by a 1,544,000 bits/sec T1 link with a round-trip time of 60 ms, gives an estimated minimum buffer size of 11,580 bytes. The receive-window parameter default is set for 64000 bytes. The congestion control and windowing algorithms adjust to network conditions by controlling the number of bytes that can be outstanding through the network.

**Examples**

The following example sets the receive-window size to 6000 bytes:

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 receive-window 6000
```

# **Related Commands**

| Command   | Description                                           |
|-----------|-------------------------------------------------------|
| cs7 group | Specifies an ITP group and enables the group submode. |

# recovery-timeout

The AS recovery timeout is the amount of time after an AS goes inactive that it will queue traffic waiting for an ASP to become active. If no ASP becomes active within this time, queued messages are lost. To specify the recovery timeout value, use the **recovery-timeout** CS7 AS submode command. To disable the configuration, use the **no** form of this command.

**recovery-timeout** *msec*

**no recovery-timeout** *msec*

|                           |             |                                                                                                           |
|---------------------------|-------------|-----------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Recovery timeout value in milliseconds. The valid range is 0 through 2000 msec. The default is 2000 msec. |
|---------------------------|-------------|-----------------------------------------------------------------------------------------------------------|

|                 |            |
|-----------------|------------|
| <b>Defaults</b> | 2000 msec. |
|-----------------|------------|

|                      |                |
|----------------------|----------------|
| <b>Command Modes</b> | CS7 AS submode |
|----------------------|----------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB5 | This command was introduced. |

**Examples** The following example sets the recovery timeout to 1000 msec:

```
cs7 as BLUE m3ua
 recovery-timeout 1000
```

| <b>Related Commands</b> | Command                    | Description                    |
|-------------------------|----------------------------|--------------------------------|
|                         | <b>cs7 as</b>              | Defines an Application Server. |
|                         | <b>show cs7 asp detail</b> | Displays ASP information.      |

# redundancy

To enable inter-device redundancy, use the **redundancy** command with the keyword **inter-device** in global configuration mode. To disable redundancy, use the **no** form of this command.

**redundancy** [**inter-device**]

**no redundancy** [**inter-device**]

|                           |                                                                 |                                            |
|---------------------------|-----------------------------------------------------------------|--------------------------------------------|
| <b>Syntax Description</b> | <b>inter-device</b> (Optional) Enables inter-device redundancy. |                                            |
| <b>Defaults</b>           | No default behavior or values.                                  |                                            |
| <b>Command Modes</b>      | Global configuration                                            |                                            |
| <b>Command History</b>    | <b>Release</b>                                                  | <b>Modification</b>                        |
|                           | 12.2(25)SW                                                      | The <b>inter-device</b> keyword was added. |
| <b>Usage Guidelines</b>   | Enables inter-device redundancy submenu.                        |                                            |
| <b>Examples</b>           | The following example enables interdevice redundancy:           |                                            |
|                           | <pre>redundancy inter-device</pre>                              |                                            |
| <b>Related Commands</b>   | <b>Command</b>                                                  | <b>Description</b>                         |
|                           | show redundancy<br>inter-device                                 | Displays redundancy information.           |

## remote-ip (CS7 ASP)

To configure a remote IP address to associate incoming packets from an ASP to a configured ASP, use the `remote-ip` CS7 ASP submode command. To remove the configuration, use the `no` form of this command.

**remote-ip** *remote-ip*

**no remote-ip** *remote-ip*

### Syntax Description

|                  |                                  |
|------------------|----------------------------------|
| <i>remote-ip</i> | The remote IP address of the ASP |
|------------------|----------------------------------|

### Defaults

No default behavior or values.

### Command Modes

CS7 ASP

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

The **remote-ip** CS7 ASP command allows you to configure a remote IP address to associate incoming packets from an ASP to a configured ASP. The remote IP address configuration does not require you to configure all the possible IP addresses for multi-homing, but the remote IP should be in the list of allowed IP addresses that is learned from the INIT and/or COOKIE SCTP control messages. You can configure up to 4 remote IP addresses by specifying additional **remote-ip** commands.

### Examples

The following example configures remote IP address 2.2.2.2 for M3UA ASP1:

```
s7 asp ASP1 5000 5000 m3ua
  remote-ip 2.2.2.2
```

### Related Commands

| Command        | Description                                                          |
|----------------|----------------------------------------------------------------------|
| <b>cs7 asp</b> | Specifies an Application Server Process and enables CS7 ASP submode. |



## remote-ip (CS7 Mated-SG)

To configure a remote IP address to associate incoming packets from the mate, use the **remote-ip** CS7 Mated-SG submode command. To remove the configuration, use the **no** form of this command.

**remote-ip** *remote-ip*

**no remote-ip** *remote-ip*

| Syntax Description | <i>remote-ip</i> | The remote IP address of the mate. |
|--------------------|------------------|------------------------------------|
|--------------------|------------------|------------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | CS7 Mated-SG |
|---------------|--------------|
|---------------|--------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Usage Guidelines | The <b>remote-ip</b> CS7 Mated-SG command allows you to configure a remote IP address to associate incoming packets from the mate. The remote IP address configuration does not require you to configure all the possible IP addresses for multi-homing, but the remote IP should be in the list of allowed IP addresses that is learned from the INIT and/or COOKIE SCTP control messages. You can configure up to 4 remote IP addresses by specifying additional <b>remote-ip</b> commands. |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Examples | The following example configures a remote IP address for the mated SG named BLUE: |
|----------|-----------------------------------------------------------------------------------|
|----------|-----------------------------------------------------------------------------------|

```
cs7 mated-sg BLUE 5000
remote-ip 5.5.5.5
```

| Related Commands | Command             | Description                            |
|------------------|---------------------|----------------------------------------|
|                  | <b>cs7 mated-sg</b> | Configures a connection to a mated SG. |

## remote-ip (group peer)

To specify a remote IP address for an association, use the **remote-ip** group peer submode command. To remove the configuration, use the **no** form of this command.

**remote-ip** *ip-address*

**no remote-ip** *ip-address*

|                           |                                                                                         |                                                                |
|---------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------|
| <b>Syntax Description</b> | <i>ip-address</i> Remote IP address.                                                    |                                                                |
| <b>Defaults</b>           | No default behavior or values.                                                          |                                                                |
| <b>Command Modes</b>      | Group peer                                                                              |                                                                |
| <b>Command History</b>    | <b>Release</b>                                                                          | <b>Modification</b>                                            |
|                           | 12.2(25)SW                                                                              | This command was introduced in Group peer submode.             |
| <b>Usage Guidelines</b>   | You may configure up to four remote IP address for the association.                     |                                                                |
| <b>Examples</b>           | The fourth line in the following example assigns remote association IP address 2.2.2.2. |                                                                |
|                           | <pre>cs7 group ITP1 3333 local-ip 1.1.1.1 peer 4444 remote-ip 1.1.1.2</pre>             |                                                                |
| <b>Related Commands</b>   | <b>Command</b>                                                                          | <b>Description</b>                                             |
|                           | <b>cs7 group</b>                                                                        | Specifies an ITP Group and enables group submode.              |
|                           | <b>peer (group)</b>                                                                     | Enables the ITP to initiate the SCTP association with its peer |

## remote-ip (remote IPC SCTP)

To configure a remote IP address for an SCTP association, use the **remote-ip** command in remote IPC SCTP configuration mode. To remove the specified address from the configuration, use the **no** form of this command.

**remote-ip** *ip-address*

**no remote-ip** *ip-address*

|                           |                                                                                                                                                  |                                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>ip-address</i>                                                                                                                                | Remote IP address.                                                                                   |
| <b>Defaults</b>           | No default behavior or values.                                                                                                                   |                                                                                                      |
| <b>Command Modes</b>      | Remote IPC SCTP                                                                                                                                  |                                                                                                      |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                   | <b>Modification</b>                                                                                  |
|                           | 12.2(25)SW                                                                                                                                       | This command was introduced in IPC Transport TCP local submode.                                      |
| <b>Usage Guidelines</b>   | You can specify up to two remote IP addresses for the association.                                                                               |                                                                                                      |
| <b>Examples</b>           | The third line in the following example configures remote IP address 1.1.1.1<br><pre>protocol sctp   remote-port 22222   remote-ip 1.1.1.2</pre> |                                                                                                      |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                   | <b>Description</b>                                                                                   |
|                           | <b>remote port (local IPC SCTP)</b>                                                                                                              | Enables remote IPC SCTP submode, in which you configure the remote IP addresses for the association. |

## remote port (local IPC Sctp)

To specify the remote Sctp port, use the **remote-port** command in local IPC Sctp configuration mode. To remove the configuration, use the **no** form of this command.

**remote-port** *port-number*

**no remote-port** *port-number*

| Syntax Description | <i>port-number</i> | Remote IPC Sctp port number. Valid port numbers range from 1 to 65535. There is no default. |
|--------------------|--------------------|---------------------------------------------------------------------------------------------|
|--------------------|--------------------|---------------------------------------------------------------------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | local IPC Sctp |
|---------------|----------------|
|---------------|----------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Usage Guidelines | The remote-port number enables remote IPC Sctp mode, in which you configure the remote IP addresses for the association. |
|------------------|--------------------------------------------------------------------------------------------------------------------------|
|------------------|--------------------------------------------------------------------------------------------------------------------------|

| Examples | The second line in the following example configures remote port 2222 |
|----------|----------------------------------------------------------------------|
|----------|----------------------------------------------------------------------|

```
protocol sctp
 remote-port 2222
 remote-ip 1.1.1.2
```

| Related Commands | Command                            | Description                                                              |
|------------------|------------------------------------|--------------------------------------------------------------------------|
|                  | <b>remote-ip</b> (remote IPC Sctp) | Defines the remote IP address that will be used in the Sctp association. |

## remove route (CS7 AS route)

To delete ASes or the SG Mate associated with this AS Route table, use the **remove route** CS7 AS route command. This command will delete the ASP list associated with an AS name or the SG Mate from the AS Route definition.

```
remove route { as asname | mated-sg matename }
```

|                           |                                                                                                                                                                                                                                                                                                                               |                                                                       |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>as</b>                                                                                                                                                                                                                                                                                                                     | Application Server.                                                   |
|                           | <i>asname</i>                                                                                                                                                                                                                                                                                                                 | Name of the Application Server                                        |
|                           | <b>mated-sg</b>                                                                                                                                                                                                                                                                                                               | Mated SG                                                              |
|                           | <i>matename</i>                                                                                                                                                                                                                                                                                                               | Name of the Mated SG                                                  |
| <b>Defaults</b>           | No default behavior or values.                                                                                                                                                                                                                                                                                                |                                                                       |
| <b>Command Modes</b>      | CS7 AS route submode                                                                                                                                                                                                                                                                                                          |                                                                       |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                                                                                                                                                                                                | <b>Modification</b>                                                   |
|                           | 12.2(4)MB5                                                                                                                                                                                                                                                                                                                    | This command was introduced.                                          |
| <b>Usage Guidelines</b>   | The <b>remove route</b> command is the functional equivalent of “no update.” The specified route will be deleted from the active AS route table. If the configuration contained an <b>update route</b> command for the specified AS or Mated-SG, then the <b>update route</b> command line is removed from the configuration. |                                                                       |
| <b>Examples</b>           | The following example deletes the AS named as1 from the AS Route table named route1:                                                                                                                                                                                                                                          |                                                                       |
|                           | <pre>cs7 asroute route1 remove route as as1</pre>                                                                                                                                                                                                                                                                             |                                                                       |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                                                                                                                                                                                                | <b>Description</b>                                                    |
|                           | <b>cs7 asroute</b>                                                                                                                                                                                                                                                                                                            | Define a set of routes to a virtual point code within the IP network. |

# remove route (route table)

To remove the active MTP3 route table on the ITP, use the **remove route** route-table submode configuration command.

**remove route** *point-code* [*mask* | */length*]

## Syntax Description

|                   |                                                                                                                                                                           |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>point-code</i> | Signaling point code of the destination.                                                                                                                                  |
| <i>mask</i>       | Specifies the significant bits of the point code.                                                                                                                         |
| <i>/length</i>    | Alternate way of specifying the mask. For ANSI this alternate specification of the default would be /24. For ITU the alternate specification of the default would be /14. |

## Defaults

No default values or behavior.

## Command Modes

Route-table submode configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

The **remove route** command is the functional equivalent of “no update.” The specified route will be deleted from the active routing table. If the configuration contained an **update route** command for the specified point code then the **update route** command line is removed from the configuration. If there was no **update route** in the configuration then a **remove route** is added to the configuration.

The **remove route** configuration will show up in the ITP configuration until a new route-table is created using the **cs7 save route-table** privileged EXEC command.

## Examples

The following is an example of the remove route command:

```
remove route 1.50.2 255.255.255 linkset nyc
```

## Related Commands

| Command                           | Description      |
|-----------------------------------|------------------|
| <b>update route (route-table)</b> | Updates a route. |

## response-timer (cs7 sms profile parms)

To specify the time lapse allowed between a UCP request and the corresponding UCP response, use the **response-timer** command in CS7 SMS profile parameters configuration mode. To remove the specification, use the **no** form of this command.

**response-timer** *msec*

**no response-timer** *msec*

|                           |             |                                                                                                                                            |
|---------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Time lapse allowed between an UCP request and the corresponding UCP response. Valid range is 1000 ms. to 10000 ms. The default is 5000 ms. |
|---------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|

|                 |          |
|-----------------|----------|
| <b>Defaults</b> | 5000 ms. |
|-----------------|----------|

|                      |                                          |
|----------------------|------------------------------------------|
| <b>Command Modes</b> | CS7 SMS session parameters configuration |
|----------------------|------------------------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

### Usage Guidelines

**Examples** The following example configures an SMPP profile named mmprofile and sets several parameters:

```
cs7 sms smpp profile mmprofile
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

|                         |                                                      |                                     |
|-------------------------|------------------------------------------------------|-------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                                       | <b>Description</b>                  |
|                         | <b>bind-type (cs7 sms profile parameters)</b>        | Specifies SMPP bind type.           |
|                         | <b>inactivity-timer (cs7 sms profile parameters)</b> | Specifies session inactivity timer. |
|                         | <b>keepalive-timer (CS7 SMS profile parameters)</b>  | Specifies session keepalive timer.  |

| Command                                   | Description                        |
|-------------------------------------------|------------------------------------|
| send-window (cs7 sms profile parms)       | Specifies send window size.        |
| session-init-timer(cs7 sms profile parms) | Specifies session initiation time. |



## response-timer (cs7 sms session parms)

To specify the time lapse allowed between a UCP request and the corresponding UCP response, use the **response-timer** command in CS7 SMS session parameters configuration mode. To remove the specification, use the **no** form of this command.

**response-timer** *msec*

**no response-timer** *msec*

| Syntax Description | <i>time</i> | Time lapse allowed between an UCP request and the corresponding UCP response. Valid range is 1000 ms. to 10000 ms. The default is 5000 ms. |
|--------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|--------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|

| Defaults | 5000 ms. |
|----------|----------|
|----------|----------|

| Command Modes | CS7 SMS session parameters configuration |
|---------------|------------------------------------------|
|---------------|------------------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

### Usage Guidelines

**Examples** The following example creates an SMPP connection, configures a destination and configures several parameters:

```
cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic
destination offisland 10.10.20.2 6000
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

| Related Commands | Command                                              | Description                         |
|------------------|------------------------------------------------------|-------------------------------------|
|                  | <b>bind-type</b> (CS7 sms session parameters)        | Specifies SMPP bind type.           |
|                  | <b>inactivity-timer</b> (cs7 sms session parameters) | Specifies session inactivity timer. |
|                  | <b>keepalive-timers</b> (CS7 SMS session parameters) | Specifies session keepalive timer.  |

■ **response-timer (cs7 sms session parms)**

| Command                                           | Description                        |
|---------------------------------------------------|------------------------------------|
| <b>send-window (cs7 sms session parms)</b>        | Specifies send window size.        |
| <b>session-init-timer (cs7 sms session parms)</b> | Specifies session initiation time. |

## result (cs7 mlr ruleset rule)

To specify the processing that will be performed on a packet matching the specified trigger and rule, use the **result** command in cs7 mlr ruleset rule configuration mode.

```
result { gt addr-string [gt-addr-type] | pc dest_pc [ssn ssn] | asname as-name | group result-group
| block }
```

**no result**

| Syntax Description  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>gt</b>           | Specifies that the message will be routed using SCCP global title. The specified address will be placed in the SCCP Called Party Address, the routing indicator will be changed to RI=GT, and then routed based on the locally provisioned global title translation table.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>addr-string</i>  | Address string of 1 to 15 hexadecimal characters. The string is not input in BCD-String format, but in normal form.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>gt-addr-type</i> | (Optional) Parameters that identify attributes of the global title address being used as a result. The parameters are variant-specific, and are identical to those parameters specified on a cs7 gtt selector command. If not specified, the default is the standard E.164 address type for the network variant being used.<br><br><b>tt</b> <i>tt</i> [ <b>gti</b> <i>gti</i> ] [ <b>np</b> <i>np</i> <b>nai</b> <i>nai</i> ]<br><b>tt</b> Identifies the translation type specified within the address.<br><i>tt</i> An integer value from 0 to 255.<br><b>gti</b> Identifies the global title indicator value for the specified address. This value is only specified when cs7 variant is ITU or China.<br><i>gti</i> An integer value of 2 or 4.<br><b>np</b> Identifies the numbering plan of the specified address. Only specified when the gti parameter value is 4.<br><i>np</i> An integer value from 0 to 15.<br><b>nai</b> Identifies the nature of specified address. Only specified when the gti parameter value is 4.<br><i>nai</i> Integer value from 0 to 127. |
| <b>pc</b>           | Specifies that the message will be routed using the specified destination point code (DPC). The packet is routed in MTP3 with the specified DPC.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <i>dest-pc</i>      | DPC in variant-specific point-code format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>ssn</b>          | Specifies that the message will be routed using the subsystem number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>ssn</i>          | Subsystem number in decimal. Valid range is 2 to 255.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>asname</b>       | Specifies that the message will be routed to a particular destination M3UA or SUA application server.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <i>as-name</i>      | 1 to 12 character name identifying an M3UA or SUA application server name.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>group</b>        | Specifies that the message will be routed using a result group. A group is used to specify multiple destinations for a given rule match. The MLR result group must be defined prior to configuring the <b>result</b> command.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                     |                                                                                                                                                                       |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>result-group</i> | Identifies the name of the MLR result group containing the desired result possibilities. The name is specified as a character string with a maximum of 12 characters. |
| <b>block</b>        | Specifies that messages matching this rule will be dropped.                                                                                                           |

**Defaults**

If not specified, the default *gt-addr-type* is the standard E.164 address type for the network variant being used.

**Command Modes**

CS7 MLR ruleset-rule configuration

**Command History**

| Release    | Modification                                    |
|------------|-------------------------------------------------|
| 12.2(4)MB  | This command was introduced.                    |
| 12.2(21)SW | The <b>ssn</b> keyword and argument were added. |

**Usage Guidelines**

The MLR result group must be defined prior to configuring the **result** command.  
One result must be specified.

**Examples**

The following example specifies that a packet that matches the configured trigger and rule will be routed for processing to the result group SMS-WEIGHTED:

```
cs7 mlr ruleset ruleset1
 rule 10 sms-mo
   dest-sme 1234
   orig sme 60920025
   result group SMS-WEIGHTED
```

**Related Commands**

| Command                       | Description                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 mlr result</b>         | Specifies destination resources that process traffic to be routed based on multi-layer information.                               |
| <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table and enables CS7 MLR ruleset-rule configuration mode. |

## result (cs7 sms set rule)

To specify the result of a rule, use the **result** command in CS7 SMS Set Rule configuration mode. To delete the result, use the **no** form of this command.

```
result { block | next-rule | group result-group | gt addr [tt tt] | pc dest-pc [ssn ssn] | rule index | deliver-mt }
```

```
no result
```

| Syntax Description  |  |                                                                                                                                   |
|---------------------|--|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>block</b>        |  | Indicates that the message will be dropped.                                                                                       |
| <b>next-rule</b>    |  | Indicates that message processing will continue with next rule.                                                                   |
| <b>group</b>        |  | Indicates that message will be routed using a result group and specifies the result group name.                                   |
| <i>result-group</i> |  | Result group name.                                                                                                                |
| <b>gt</b>           |  | Indicates that message will be routed using GT.                                                                                   |
| <i>addr</i>         |  | Specifies the SCCP address, a string of 1 to 15 hexadecimal digits.                                                               |
| <b>tt</b>           |  | (Optional) Specifies the translation type.                                                                                        |
| <i>tt</i>           |  | Translation type, in the range 0 to 255.                                                                                          |
| <b>pc</b>           |  | Indicates that message will be routed using a point code and specifies the destination point code.                                |
| <i>dest-pc</i>      |  | Destination point code.                                                                                                           |
| <b>ssn</b>          |  | (Optional) Specifies a subsystem number.                                                                                          |
| <i>ssn</i>          |  | Subsystem number, in the range 2 to 255.                                                                                          |
| <b>rule</b>         |  | Indicates that message processing will continue at a specified rule.                                                              |
| <i>index</i>        |  | Rule index, in the range 1 to 1000.                                                                                               |
| <b>deliver-mt</b>   |  | Indicates that a delivery should be attempted to the destination SME as a mobile device. (Only valid for SMS-MO rule operations.) |

**Defaults** No default behavior or values

**Command Modes** CS7 SMS set rule configuration

| Command History | Release     | Modification                               |
|-----------------|-------------|--------------------------------------------|
|                 | 12.2(25)SW  | This command was introduced.               |
|                 | 12.2(25)SW1 | The <b>deliver-mt</b> parameter was added. |

**Usage Guidelines** If a valid result was returned from a rule parameter address table, then the table result overrules the rule result. Otherwise the rule result is used.

---

**Examples**

The following example configures an SMS ruleset named SMS-RULES, specifies a rule, and a result:

```
cs7 sms ruleset SMS-RULES
rule 10 sms-mo
  orig-imsi unknown
  result block
```

---

**Related Commands**

| Command                   | Description                      |
|---------------------------|----------------------------------|
| <b>cs7 sms ruleset</b>    | Configure an SMS ruleset.        |
| <b>rule (cs7 sms set)</b> | Specifies a rule and rule index. |

## retransmit-cwnd-rate (CS7 ASP)

To configure the rate at which the SCTP congestion window size is reduced due to retransmission timer expirations, use the **retransmit-cwnd-rate** CS7 ASP submode command. To disable the configuration, use the **no** form of this command.

**retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

**no retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

### Syntax Description

|                             |                                                                                                                                                                      |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i>              | Rate at which the size of the SCTP congestion window will be decreased due to retransmission timer expiration. Range is 0 to 100 percent. The default is 50 percent. |
| <b>sctp-fast-retransmit</b> | (Optional) Indicates that the setting of the SCTP congestion window should follow the rules as defined for a SCTP fast retransmission.                               |

### Defaults

The default is 50 percent.

### Command Modes

CS7 ASP submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The **retransmit-cwnd-rate** command allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to retransmission timer expirations. The administrator can select one of two methods for setting the congestion window as a result of the retransmission timer expiration. The administrator can elect to have the congestion window set as defined in RFC 2960 (the default) or elect to have the congestion window set in the manner as for a fast-retransmission.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example sets the rate for reducing the congestion window to 70 percent due to a retransmission timer expiration.

```
cs7 asp ASP1 2905 2905 m3ua
remote-ip 1.1.1
retransmit-cwnd-rate 70
```

 retransmit-cwnd-rate (CS7 ASP)

| Related Commands | Command                      | Description                                                             |
|------------------|------------------------------|-------------------------------------------------------------------------|
|                  | retransmit-timeout (CS7 ASP) | Configures the minimum retransmission timeout value for the association |



## retransmit-cwnd-rate (CS7 Link)

To configure the rate at which the SCTP congestion window size is reduced due to retransmission timer expirations, use the **retransmit-cwnd-rate** CS7 link submode command. To disable the configuration, use the **no** form of this command.

**retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

**no retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

### Syntax Description

|                             |                                                                                                                                                                      |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i>              | Rate at which the size of the SCTP congestion window will be decreased due to retransmission timer expiration. Range is 0 to 100 percent. The default is 50 percent. |
| <b>sctp-fast-retransmit</b> | (Optional) Indicates that the setting of the SCTP congestion window should follow the rules as defined for a SCTP fast retransmission.                               |

### Defaults

The default is 50 percent.

### Command Modes

CS7 link submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The **retransmit-cwnd-rate** command allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to retransmission timer expirations. The administrator can select one of two methods for setting the congestion window as a result of the retransmission timer expiration. The administrator can elect to have the congestion window set as defined in RFC 2960 (the default) or elect to have the congestion window set in the manner as for a fast-retransmission.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example sets the rate for reducing the congestion window to 70 percent due to a retransmission timer expiration.

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000

retransmit-cwnd-rate 70
```

| Related Commands | Command                       | Description                                                             |
|------------------|-------------------------------|-------------------------------------------------------------------------|
|                  | retransmit-timeout (CS7 Link) | Configures the minimum retransmission timeout value for the association |

## retransmit-cwnd-rate (CS7 Mated-SG)

To configure the rate at which the SCTP congestion window size is reduced due to retransmission timer expirations, use the **retransmit-cwnd-rate** CS7 Mated-SG submode command. To disable the configuration, use the **no** form of this command.

**retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

**no retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

|                           |                             |                                                                                                                                                                      |
|---------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percent</i>              | Rate at which the size of the SCTP congestion window will be decreased due to retransmission timer expiration. Range is 0 to 100 percent. The default is 50 percent. |
|                           | <b>sctp-fast-retransmit</b> | (Optional) Indicates that the setting of the SCTP congestion window should follow the rules as defined for a SCTP fast retransmission.                               |

|                 |                            |
|-----------------|----------------------------|
| <b>Defaults</b> | The default is 50 percent. |
|-----------------|----------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | CS7 Mated-SG submode |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(19)SW     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The <b>retransmit-cwnd-rate</b> command allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to retransmission timer expirations. The administrator can select one of two methods for setting the congestion window as a result of the retransmission timer expiration. The administrator can elect to have the congestion window set as defined in RFC 2960 (the default) or elect to have the congestion window set in the manner as for a fast-retransmission. |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Note**

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

|                 |                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the rate for reducing the congestion window to 70 percent due to a retransmission timer expiration. |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------|

```
cs7 mated-sg BLUE 5000
remote-ip 5.5.5.5

retransmit-cwnd-rate 70
```

 retransmit-cwnd-rate (CS7 Mated-SG)

| Related Commands | Command                           | Description                                                             |
|------------------|-----------------------------------|-------------------------------------------------------------------------|
|                  | retransmit-timeout (CS7 Mated-SG) | Configures the minimum retransmission timeout value for the association |

## retransmit-cwnd-rate (CS7 M3UA)

To configure the rate at which the SCTP congestion window size is reduced due to retransmission timer expirations, use the **retransmit-cwnd-rate** CS7 M3UA submode command. To disable the configuration, use the **no** form of this command.

**retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

**no retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

### Syntax Description

|                             |                                                                                                                                                                      |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i>              | Rate at which the size of the SCTP congestion window will be decreased due to retransmission timer expiration. Range is 0 to 100 percent. The default is 50 percent. |
| <b>sctp-fast-retransmit</b> | (Optional) Indicates that the setting of the SCTP congestion window should follow the rules as defined for a SCTP fast retransmission.                               |

### Defaults

The default is 50 percent.

### Command Modes

CS7 M3UA submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The **retransmit-cwnd-rate** command allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to retransmission timer expirations. The administrator can select one of two methods for setting the congestion window as a result of the retransmission timer expiration. The administrator can elect to have the congestion window set as defined in RFC 2960 (the default) or elect to have the congestion window set in the manner as for a fast-retransmission.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example sets the rate for reducing the congestion window to 70 percent due to a retransmission timer expiration.

```
cs7 m3ua 2905
local-ip 4.4.4.4

retransmit-cwnd-rate 70
```

 retransmit-cwnd-rate (CS7 M3UA)**Related Commands**

| Command                       | Description                                                             |
|-------------------------------|-------------------------------------------------------------------------|
| retransmit-timeout (CS7 M3UA) | Configures the minimum retransmission timeout value for the association |

## retransmit-cwnd-rate (CS7 SGMP)

To configure the rate at which the SCTP congestion window size is reduced due to retransmission timer expirations, use the **retransmit-cwnd-rate** CS7 SGMP submode command. To disable the configuration, use the **no** form of this command.

**retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

**no retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

### Syntax Description

|                             |                                                                                                                                                                      |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i>              | Rate at which the size of the SCTP congestion window will be decreased due to retransmission timer expiration. Range is 0 to 100 percent. The default is 50 percent. |
| <b>sctp-fast-retransmit</b> | (Optional) Indicates that the setting of the SCTP congestion window should follow the rules as defined for a SCTP fast retransmission.                               |

### Defaults

The default is 50 percent.

### Command Modes

CS7 SGMP submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The **retransmit-cwnd-rate** command allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to retransmission timer expirations. The administrator can select one of two methods for setting the congestion window as a result of the retransmission timer expiration. The administrator can elect to have the congestion window set as defined in RFC 2960 (the default) or elect to have the congestion window set in the manner as for a fast-retransmission.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example sets the rate for reducing the congestion window to 70 percent due to a retransmission timer expiration.

```
cs7 sgmp 5000
local-ip 4.4.4.4

retransmit-cwnd-rate 70
```

■ retransmit-cwnd-rate (CS7 SGMP)

| Related Commands |                               |                                                                         |
|------------------|-------------------------------|-------------------------------------------------------------------------|
|                  | Command                       | Description                                                             |
|                  | retransmit-timeout (CS7 SGMP) | Configures the minimum retransmission timeout value for the association |



## retransmit-cwnd-rate (CS7 SUA)

To configure the rate at which the SCTP congestion window size is reduced due to retransmission timer expirations, use the **retransmit-cwnd-rate** CS7 SUA submode command. To disable the configuration, use the **no** form of this command.

**retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

**no retransmit-cwnd-rate** *percent* [**sctp-fast-retransmit**]

### Syntax Description

|                             |                                                                                                                                                                      |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>percent</i>              | Rate at which the size of the SCTP congestion window will be decreased due to retransmission timer expiration. Range is 0 to 100 percent. The default is 50 percent. |
| <b>sctp-fast-retransmit</b> | (Optional) Indicates that the setting of the SCTP congestion window should follow the rules as defined for a SCTP fast retransmission.                               |

### Defaults

The default is 50 percent.

### Command Modes

CS7 SUA submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(19)SW | This command was introduced. |

### Usage Guidelines

The **retransmit-cwnd-rate** command allows the administrator to configure a rate at which the SCTP congestion window will be decreased due to retransmission timer expirations. The administrator can select one of two methods for setting the congestion window as a result of the retransmission timer expiration. The administrator can elect to have the congestion window set as defined in RFC 2960 (the default) or elect to have the congestion window set in the manner as for a fast-retransmission.



#### Note

It is extremely important to note that the behavior of the SCTP congestion control algorithms are not compliant with RFC 2960 when this parameter is changed to values other than the default. This parameter should not be changed without a thorough understanding of SCTP congestion control algorithms.

### Examples

The following example sets the rate for reducing the congestion window to 70 percent due to a retransmission timer expiration.

```
cs7 sua 15000
local-ip 4.4.4.4

retransmit-cwnd-rate 70
```

 retransmit-cwnd-rate (CS7 SUA)

| Related Commands | Command                      | Description                                                             |
|------------------|------------------------------|-------------------------------------------------------------------------|
|                  | retransmit-timeout (CS7 SUA) | Configures the minimum retransmission timeout value for the association |

## retransmit-timeout (CS7 ASP)

To configure the minimum retransmission timeout value for the association, use the **retransmit-timeout** CS7 ASP submode command. To disable the timeout value, use the **no** form of this command.

**retransmit-timeout** *rto-min rto-max*

**no retransmit-timeout**

|                           |                |                                                                                                                                                                  |
|---------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>rto-min</i> | Retransmission timeout minimum value in milliseconds. Range is 300 through 60000 milliseconds. The default is the value specified under the local port instance. |
|                           | <i>rto-max</i> | Retransmission timeout maximum value in milliseconds. Range is 300 through 60000 milliseconds. The default is 1000 milliseconds                                  |

|                 |                                                                   |
|-----------------|-------------------------------------------------------------------|
| <b>Defaults</b> | The default is the value specified under the local port instance. |
|-----------------|-------------------------------------------------------------------|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | CS7 ASP submode |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>The retransmission timeout (RTO) should be adjusted for round-trip delay between nodes. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes. There will be a compromise between allowing a long delay, and having responsive discovery of lost frames. We can calculate a simplistic estimate of round-trip times (rtt) for various packet sizes (ignoring propagation delay and latencies in transmission equipment) using the following estimated rtt equation:</p> |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

$$\text{estimated rtt} = ( (\text{packet size} * \text{bits per byte}) / \text{link speed} ) * 2$$

Assume a packet with a 20 byte IP header, 32 byte sctp header and 100 bytes of user data and a 1,544,000 bits/sec link between two nodes. Using the estimated rtt equation shown in the previous paragraph we estimate an rtt of 1.5 ms.

SCTP computes RTO values based on rtt measurements. When packet retransmission occurs, the timeout value is doubled for each retransmission, with an upper limit of max rto. Multi-homed nodes will have to compromise between allowing a long delay and having responsive switching to an alternate IP address. Switching to an alternate path is of primary importance for multi-homed nodes. The maximum rto value for multi-homed nodes should be set equal to or just slightly higher than the minimum RTO value. The number of outstanding bytes allowed decreases with each retransmission timeout. The trade-off of bounding the maximum RTO close to the minimum RTO is the frequency of retransmissions versus increasing transmit delays for packets on the transmit queue. During periods of retransmissions multi-homed nodes sends duplicate packets until the alternate address becomes the primary path. The

alternate address becomes the primary when the number of retries exceed the path-retransmit parameter. The default value for minimum and maximum RTO is 1 second. Propagation delays and latencies vary in networks, so care should be taken when selecting an RTO value.

---

**Examples**

The following example sets the minimum values of the retransmit timeout to 300 milliseconds and the maximum value to 3000 milliseconds:

```
cs7 asp ASP1 2904 2905 m3ua
  remote-ip 1.1.1.1
  retransmit-timeout 300 3000
```

---

**Related Commands**

| Command | Description                                                          |
|---------|----------------------------------------------------------------------|
| cs7 asp | Specifies an Application Server Process and enables CS7 ASP submode. |

## retransmit-timeout (CS7 Link)

To configure the retransmission timeout value on a link, use the **retransmit-timeout** CS7 link submode command. To disable the timeout value, use the **no** form of this command.

**retransmit-timeout** *min-msec max-msec*

**no retransmit-timeout**

| Syntax Description | <i>min-msec</i> | Retransmission timeout minimum value in milliseconds. Range is 100 through 60000 milliseconds. The default is 1000 milliseconds. |
|--------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------|
|                    | <i>max-msec</i> | Retransmission timeout maximum value in milliseconds. Range is 100 through 60000 milliseconds. The default is 1000 milliseconds. |

**Defaults**

Default *min-sec* value is 1000 milliseconds.

Default *max-sec* value is 1000 milliseconds.

**Command Modes**

CS7 link submode

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

**Usage Guidelines**

The retransmission timeout (RTO) should be adjusted for round-trip delay between nodes. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes. There will be a compromise between allowing a long delay, and having responsive discovery of lost frames. We can calculate a simplistic estimate of round-trip times (rtt) for various packet sizes (ignoring propagation delay and latencies in transmission equipment) using the following estimated rtt equation:

$$\text{estimated rtt} = ( (\text{packet size} * \text{bits per byte}) / \text{link speed} ) * 2$$

Assume a packet with a 20 byte IP header, 32 byte sctp header and 100 bytes of user data and a 1,544,000 bits/sec link between two nodes. Using the estimated rtt equation shown in the previous paragraph we estimate an rtt of 1.5 ms.

SCTP computes RTO values based on rtt measurements. When packet retransmission occurs, the timeout value is doubled for each retransmission, with an upper limit of max rto. Multi-homed nodes will have to compromise between allowing a long delay and having responsive switching to an alternate IP address. Switching to an alternate path is of primary importance for multi-homed nodes. The maximum rto value for multi-homed nodes should be set equal to or just slightly higher than the minimum RTO value. The number of outstanding bytes allowed decreases with each retransmission timeout. The trade-off of bounding the maximum RTO close to the minimum RTO is the frequency of retransmissions versus increasing transmit delays for packets on the transmit queue. During periods of retransmissions multi-homed nodes sends duplicate packets until the alternate address becomes the primary path. The

alternate address becomes the primary when the number of retries exceed the path-retransmit parameter. The default value for minimum and maximum RTO is 1 second. Propagation delays and latencies vary in networks, so care should be taken when selecting an RTO value.

---

**Examples**

The following example sets the minimum and maximum values of the retransmit timeout to 300 milliseconds (minimum) and 30000 milliseconds (maximum):

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
  retransmit-timeout 300 30000
```

---

**Related Commands**

| Command              | Description               |
|----------------------|---------------------------|
| <b>show cs7 m2pa</b> | Displays M2PA statistics. |

## retransmit-timeout (CS7 Mated-SG)

To configure the minimum retransmission timeout value for the association, use the **retransmit-timeout** CS7 Mated-SG submode command. To disable the timeout value, use the **no** form of this command.

**retransmit-timeout** *rto-min*

**no retransmit-timeout**

|                           |                |                                                                                                                                                                  |
|---------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>rto-min</i> | Retransmission timeout minimum value in milliseconds. Range is 300 through 60000 milliseconds. The default is the value specified under the local port instance. |
|                           | <i>rto-max</i> | Retransmission timeout maximum value in milliseconds. Range is 300 through 60000 milliseconds. The default is 1000 milliseconds                                  |

|                 |                                                                   |
|-----------------|-------------------------------------------------------------------|
| <b>Defaults</b> | The default is the value specified under the local port instance. |
|-----------------|-------------------------------------------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | CS7 Mated-SG submode |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>The retransmission timeout (RTO) should be adjusted for round-trip delay between nodes. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes. There will be a compromise between allowing a long delay, and having responsive discovery of lost frames. We can calculate a simplistic estimate of round-trip times (rtt) for various packet sizes (ignoring propagation delay and latencies in transmission equipment) using the following estimated rtt equation:</p> |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

$$\text{estimated rtt} = ( (\text{packet size} * \text{bits per byte}) / \text{link speed} ) * 2$$

Assume a packet with a 20 byte IP header, 32 byte sctp header and 100 bytes of user data and a 1,544,000 bits/sec link between two nodes. Using the estimated rtt equation shown in the previous paragraph we estimate an rtt of 1.5 ms.

SCTP computes RTO values based on rtt measurements. When packet retransmission occurs, the timeout value is doubled for each retransmission, with an upper limit of max rto. Multi-homed nodes will have to compromise between allowing a long delay and having responsive switching to an alternate IP address. Switching to an alternate path is of primary importance for multi-homed nodes. The maximum rto value for multi-homed nodes should be set equal to or just slightly higher than the minimum RTO value. The number of outstanding bytes allowed decreases with each retransmission timeout. The trade-off of bounding the maximum RTO close to the minimum RTO is the frequency of retransmissions versus increasing transmit delays for packets on the transmit queue. During periods of retransmissions multi-homed nodes sends duplicate packets until the alternate address becomes the primary path. The

alternate address becomes the primary when the number of retries exceed the path-retransmit parameter. The default value for minimum and maximum RTO is 1 second. Propagation delays and latencies vary in networks, so care should be taken when selecting an RTO value.

---

**Examples**

The following example sets the minimum value of the retransmit timeout to 300 milliseconds and the maximum value to 3000 milliseconds:

```
cs7 mated-sg BLUE 2905
  remote-ip 5.5.5.5
  retransmit-timeout 300 3000
```

---

**Related Commands**

| Command      | Description                            |
|--------------|----------------------------------------|
| cs7 mated-sg | Configures a connection to a mated SG. |



## retransmit-timeout (CS7 M3UA)

To configure the minimum retransmission timeout value used when a new SCTP association is started, use the **retransmit-timeout** CS7 M3UA submode command. To disable the timeout value, use the **no** form of this command.

**retransmit-timeout** *rto-min*

**no retransmit-timeout**

### Syntax Description

|                |                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------|
| <i>rto-min</i> | Retransmission timeout minimum value in milliseconds. Range is 300 through 60000 milliseconds. The default is 1000 milliseconds. |
| <i>rto-max</i> | Retransmission timeout maximum value in milliseconds. Range is 300 through 60000 milliseconds. The default is 1000 milliseconds  |

### Defaults

1000 milliseconds.

### Command Modes

CS7 M3UA submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

The retransmission timeout (RTO) should be adjusted for round-trip delay between nodes. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes. There will be a compromise between allowing a long delay, and having responsive discovery of lost frames. We can calculate a simplistic estimate of round-trip times (rtt) for various packet sizes (ignoring propagation delay and latencies in transmission equipment) using the following estimated rtt equation:

$$\text{estimated rtt} = ( (\text{packet size} * \text{bits per byte}) / \text{link speed} ) * 2$$

Assume a packet with a 20 byte IP header, 32 byte sctp header and 100 bytes of user data and a 1,544,000 bits/sec link between two nodes. Using the estimated rtt equation shown in the previous paragraph we estimate an rtt of 1.5 ms.

SCTP computes RTO values based on rtt measurements. When packet retransmission occurs, the timeout value is doubled for each retransmission, with an upper limit of max rto. Multi-homed nodes will have to compromise between allowing a long delay and having responsive switching to an alternate IP address. Switching to an alternate path is of primary importance for multi-homed nodes. The maximum rto value for multi-homed nodes should be set equal to or just slightly higher than the minimum RTO value. The number of outstanding bytes allowed decreases with each retransmission timeout. The trade-off of bounding the maximum RTO close to the minimum RTO is the frequency of retransmissions versus increasing transmit delays for packets on the transmit queue. During periods of retransmissions multi-homed nodes sends duplicate packets until the alternate address becomes the primary path. The

alternate address becomes the primary when the number of retries exceed the path-retransmit parameter. The default value for minimum and maximum RTO is 1 second. Propagation delays and latencies vary in networks, so care should be taken when selecting an RTO value.

---

**Examples**

The following example sets the minimum value of the retransmit timeout to 300 milliseconds and the maximum value to 3000 milliseconds:

```
cs7 m3ua 2905
local-ip 4.4.4.4
retransmit-timeout 300 3000
```

---

**Related Commands**

| Command  | Description                                                           |
|----------|-----------------------------------------------------------------------|
| cs7 m3ua | Specifies the local port number for M3UA and enters CS7 M3UA submode. |

## retransmit-timeout (CS7 SGMP)

To configure the minimum retransmission timeout value used when a new SCTP association is started, use the **retransmit-timeout** CS7 SGMP submode command. To disable the timeout value, use the **no** form of this command.

**retransmit-timeout** *rto-min*

**no retransmit-timeout**

|                           |                |                                                                                                                                  |
|---------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>rto-min</i> | Retransmission timeout minimum value in milliseconds. Range is 300 through 60000 milliseconds. The default is 1000 milliseconds. |
|                           | <i>rto-max</i> | Retransmission timeout maximum value in milliseconds. Range is 300 through 60000 milliseconds. The default is 1000 milliseconds  |

|                 |                    |
|-----------------|--------------------|
| <b>Defaults</b> | 1000 milliseconds. |
|-----------------|--------------------|

|                      |                  |
|----------------------|------------------|
| <b>Command Modes</b> | CS7 SGMP submode |
|----------------------|------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB5     | This command was introduced. |

**Usage Guidelines**

The retransmission timeout (RTO) should be adjusted for round-trip delay between nodes. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes. There will be a compromise between allowing a long delay, and having responsive discovery of lost frames. We can calculate a simplistic estimate of round-trip times (rtt) for various packet sizes (ignoring propagation delay and latencies in transmission equipment) using the following estimated rtt equation:

$$\text{estimated rtt} = ( (\text{packet size} * \text{bits per byte}) / \text{link speed} ) * 2$$

Assume a packet with a 20 byte IP header, 32 byte sctp header and 100 bytes of user data and a 1,544,000 bits/sec link between two nodes. Using the estimated rtt equation shown in the previous paragraph we estimate an rtt of 1.5 ms.

SCTP computes RTO values based on rtt measurements. When packet retransmission occurs, the timeout value is doubled for each retransmission, with an upper limit of max rto. Multi-homed nodes will have to compromise between allowing a long delay and having responsive switching to an alternate IP address. Switching to an alternate path is of primary importance for multi-homed nodes. The maximum rto value for multi-homed nodes should be set equal to or just slightly higher than the minimum RTO value. The number of outstanding bytes allowed decreases with each retransmission timeout. The trade-off of bounding the maximum RTO close to the minimum RTO is the frequency of retransmissions versus increasing transmit delays for packets on the transmit queue. During periods of retransmissions multi-homed nodes sends duplicate packets until the alternate address becomes the primary path. The

alternate address becomes the primary when the number of retries exceed the path-retransmit parameter. The default value for minimum and maximum RTO is 1 second. Propagation delays and latencies vary in networks, so care should be taken when selecting an RTO value.

---

**Examples**

The following example sets the minimum retransmit timeout value to 300 milliseconds and the maximum value to 3000 milliseconds:

```
cs7 sgmp 5000
local-ip 4.4.4.4
retransmit-timeout 300 3000
```

---

**Related Commands**

| Command  | Description                                 |
|----------|---------------------------------------------|
| cs7 sgmp | Establishes an association to the mated SG. |

## retransmit-timeout (CS7 SUA)

To configure the minimum retransmission timeout value used when a new SCTP association is started, use the **retransmit-timeout** CS7 SUA submode command. To disable the timeout value, use the **no** form of this command.

**retransmit-timeout** *rto-min*

**no retransmit-timeout**

|                           |                |                                                                                                                                  |
|---------------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>rto-min</i> | Retransmission timeout minimum value in milliseconds. Range is 300 through 60000 milliseconds. The default is 1000 milliseconds. |
|                           | <i>rto-max</i> | Retransmission timeout maximum value in milliseconds. Range is 300 through 60000 milliseconds. The default is 1000 milliseconds  |

**Defaults** 1000 milliseconds.

**Command Modes** CS7 SUA submode

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB5     | This command was introduced. |

**Usage Guidelines** The retransmission timeout (RTO) should be adjusted for round-trip delay between nodes. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes. There will be a compromise between allowing a long delay, and having responsive discovery of lost frames. We can calculate a simplistic estimate of round-trip times (rtt) for various packet sizes (ignoring propagation delay and latencies in transmission equipment) using the following estimated rtt equation:

$$\text{estimated rtt} = ( (\text{packet size} * \text{bits per byte}) / \text{link speed} ) * 2$$

Assume a packet with a 20 byte IP header, 32 byte sctp header and 100 bytes of user data and a 1,544,000 bits/sec link between two nodes. Using the estimated rtt equation shown in the previous paragraph we estimate an rtt of 1.5 ms.

SCTP computes RTO values based on rtt measurements. When packet retransmission occurs, the timeout value is doubled for each retransmission, with an upper limit of max rto. Multi-homed nodes will have to compromise between allowing a long delay and having responsive switching to an alternate IP address. Switching to an alternate path is of primary importance for multi-homed nodes. The maximum rto value for multi-homed nodes should be set equal to or just slightly higher than the minimum RTO value. The number of outstanding bytes allowed decreases with each retransmission timeout. The trade-off of bounding the maximum RTO close to the minimum RTO is the frequency of retransmissions versus increasing transmit delays for packets on the transmit queue. During periods of retransmissions multi-homed nodes sends duplicate packets until the alternate address becomes the primary path. The

alternate address becomes the primary when the number of retries exceed the path-retransmit parameter. The default value for minimum and maximum RTO is 1 second. Propagation delays and latencies vary in networks, so care should be taken when selecting an RTO value.

---

**Examples**

The following example sets the minimum value of the retransmit timeout to 300 milliseconds and the maximum value to 3000 milliseconds:

```
cs7 sua 15000
local-IP 4.4.4.4
retransmit-timeout 300 3000
```

---

**Related Commands**

| Command | Description                                                         |
|---------|---------------------------------------------------------------------|
| cs7 sua | Specifies the local port number for SUA and enters CS7 SUA submode. |

## retransmit-timeout (group peer)

To configure the retransmission timeout value on a link, use the **retransmit-timeout** group peer submode command. To disable the timeout value, use the **no** form of this command.

**retransmit-timeout** *min-msec max-msec*

**no retransmit-timeout**

| Syntax Description | <i>min-msec</i> | Retransmission timeout minimum value in milliseconds. Range is 100 through 60000 milliseconds. The default is 1000 milliseconds. |
|--------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------|
|                    | <i>max-msec</i> | Retransmission timeout maximum value in milliseconds. Range is 100 through 60000 milliseconds. The default is 1000 milliseconds. |

**Defaults**

Default *min-sec* value is 1000 milliseconds.

Default *max-sec* value is 1000 milliseconds.

**Command Modes**

Group peer submode

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Usage Guidelines**

The retransmission timeout (RTO) should be adjusted for round-trip delay between nodes. Preferably, the retransmission timeout should be greater than the round-trip delay between nodes. There will be a compromise between allowing a long delay, and having responsive discovery of lost frames. We can calculate a simplistic estimate of round-trip times (rtt) for various packet sizes (ignoring propagation delay and latencies in transmission equipment) using the following estimated rtt equation:

$$\text{estimated rtt} = ( (\text{packet size} * \text{bits per byte}) / \text{link speed} ) * 2$$

Assume a packet with a 20 byte IP header, 32 byte sctp header and 100 bytes of user data and a 1,544,000 bits/sec link between two nodes. Using the estimated rtt equation shown in the previous paragraph we estimate an rtt of 1.5 ms.

SCTP computes RTO values based on rtt measurements. When packet retransmission occurs, the timeout value is doubled for each retransmission, with an upper limit of max rto. Multi-homed nodes will have to compromise between allowing a long delay and having responsive switching to an alternate IP address. Switching to an alternate path is of primary importance for multi-homed nodes. The maximum rto value for multi-homed nodes should be set equal to or just slightly higher than the minimum RTO value. The number of outstanding bytes allowed decreases with each retransmission timeout. The trade-off of bounding the maximum RTO close to the minimum RTO is the frequency of retransmissions versus increasing transmit delays for packets on the transmit queue. During periods of retransmissions multi-homed nodes sends duplicate packets until the alternate address becomes the primary path. The

alternate address becomes the primary when the number of retries exceed the path-retransmit parameter. The default value for minimum and maximum RTO is 1 second. Propagation delays and latencies vary in networks, so care should be taken when selecting an RTO value.

---

**Examples**

The following example sets the minimum and maximum values of the retransmit timeout to 300 milliseconds (minimum) and 30000 milliseconds (maximum):

```
cs7 group ITP1 3333
local-ip 1.1.1.1
peer 4444
remote-ip 1.1.1.2
retransmit-timeout 300 30000
```

---

**Related Commands**

| Command             | Description                                                                                         |
|---------------------|-----------------------------------------------------------------------------------------------------|
| <b>peer (group)</b> | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode. |



# reuse-count

To specify the number of times that a triplet can be reused, use the **reuse-count** command in CS7 **authent-vlr** submode. To remove the specification, use the **no** form of this command.

**reuse-count** *count*

**no reuse-count** *count*

## Syntax Description

|              |                                          |
|--------------|------------------------------------------|
| <i>count</i> | Number of times a triplet can be reused. |
|--------------|------------------------------------------|

## Defaults

If **reuse-count** is not specified, the last used triplet may be returned to the MAPUA client when new triplets cannot be retrieved from the HLR.

## Command Modes

CS7 **authent-vlr**

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

## Usage Guidelines

The first use of a triplet does not count as reuse.

No MAP message is sent to the HLR to obtain new triplets if a request for triplets can be satisfied by cached entries, based on:

- the use-count of each triplet and the configured reuse-count
- the number requested, the number available in cache, and the maximum number of authentication triplets configured in the **max-return** command,

## Examples

The following example specifies that a triplet can be reused 3 times:

```
gsm-authent-vlr
 reuse-count 3
```

## Related Commands

| Command         | Description                                                                                                                           |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| gsm-authent-vlr | Enables <b>authent-vlr</b> submode for provisioning parameters specific to the <b>Process_Obtain_Authentication_Sets_VLR</b> service. |
| show cs7 mapua  | Displays MAP Proxy information.                                                                                                       |

# rotate-sls

To enable SLS rotation, use the **rotate-sls** CS7 linkset submode command. To disable the SLS rotation, use the **no** form of this command.

**rotate-sls**

**no rotate-sls**

## Syntax Description

This command has no arguments or keywords.

## Defaults

SLS rotation is enabled by default for ANSI linksets.

## Command Modes

CS7 linkset submode

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Usage Guidelines

This command is only valid when the variant is ANSI.

ANSI specifications state that SLS rotation should not be performed on C linksets. Use the no form of the command to disable SLS rotation on C linksets.

## Examples

The following example disables SLS rotation:

```
no rotate-sls
```

## Related Commands

| Command            | Description           |
|--------------------|-----------------------|
| <b>cs7 linkset</b> | Configures a linkset. |

## routing-key (CS7 AS)

The routing key describes a set of SS7 parameters and parameter values that uniquely define the range of signaling traffic to be handled by a particular AS. Routing key provisioning is extremely important to ensure that traffic is routed correctly. Routing key combinations vary for M3UA and SUA.

To configure the routing key, use the **routing-key** CS7 AS submode command. To remove the configuration, use the **no** form of this command.

### M3UA AS Syntax

```
routing-key rcontext {gtt | dpc [opc pc pc-mask] [si {isup | sccp | tup}] [[cic cic-min [cic-max]] |
[ssn ssn]]}
```

**no routing-key**

### SUA AS Syntax

```
routing-key rcontext {gtt | dpc [opc pc pc-mask] [si {isup | sccp}] [[cic cic-min [cic-max]] | [ssn
ssn]]}
```

**no routing-key**

| Syntax Description |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>rcontext</i>    |  | The routing context parameter is an unsigned decimal number that uniquely identifies a routing key. An ASP may include the routing context in the ASP Active Request to register receiving traffic for a specific AS.                                                                                                                                                                                                                                                   |
| <b>gtt</b>         |  | Global title translation. (Configuring GTT implies a sccp service indicator.)                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>dpc</i>         |  | Destination point code. The destination point code indicates the point code associated with this AS and routing key. This destination point code may be unique or share the SG's local point code, secondary point code, or capability point code. An M3UA AS or an SUA AS can share only one of the router's local point codes. For more information, refer to "Point Code Assignment and Management" in the Usage Guidelines section of this command reference entry. |
| <b>opc</b>         |  | Originating point code. The originating point code parameter further limits traffic directed to an AS to traffic from a specific point code.                                                                                                                                                                                                                                                                                                                            |
| <i>pc</i>          |  | Originating point code.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>pc-mask</i>     |  | Point code mask. The point code mask allows the user to specify a range of originating point codes by indicating the number of significant bits.                                                                                                                                                                                                                                                                                                                        |
| <b>si</b>          |  | Service indicator. The user may specify a service indicator of either isup or sccp. (This parameter applies to M3UA ASs only. SUA ASs imply an sccp service indicator.)                                                                                                                                                                                                                                                                                                 |
| <b>isup</b>        |  | Service indicator is isup.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>sccp</b>        |  | Service indicator is sccp.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>tup</b>         |  | Service indicator is tup.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>cic</b>         |  | Circuit identification code. (This parameter applies to M3UA ASs only. Configuring CIC implies an isup service indicator.)                                                                                                                                                                                                                                                                                                                                              |
| <i>cic-min</i>     |  | CIC number or minimum value in a CIC range.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <i>cic-max</i>     |  | Maximum value in a CIC range.                                                                                                                                                                                                                                                                                                                                                                                                                                           |

|            |                                                                                                               |
|------------|---------------------------------------------------------------------------------------------------------------|
| <b>ssn</b> | Subsystem number. (This parameter applies to SUA ASs only. Configuring SSN implies a sccp service indicator.) |
| <i>ssn</i> | Subsystem number value.                                                                                       |

**Defaults**

No default values or behavior.

**Command Modes**

CS7 AS submode

**Command History**

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

**Usage Guidelines**

If CS7 multiple instance is configured, duplicate routing keys are allowed for ASes or AS routes in different instances.

The ITP SG uses the routing key table to map incoming SS7 messages to the appropriate AS or AS Route table. Relevant fields of the incoming SS7 messages are compared to the existing routing keys. An AS is selected based on the best matching routing key. The routing keys are prioritized by selecting the best matching gtt keys first, followed by the longest matching routing key at the highest layer in the protocol stack. Below is a list of the routing key combinations in order of priority. The dpc must match for a non-GTT AS to be selected.

- gtt
- dpc + sccp + ssn + opc      or      dpc + isup + cic + opc
- dpc + sccp + ssn              or      dpc + isup + cic
- dpc + sccp + opc              or      dpc + isup + opc
- dpc + sccp                      or      dpc + isup
- dpc + opc
- dpc

Valid routing key combinations vary for M3UA and SUA.

**Routing Key Definitions for M3UA**

For M3UA ASs, the routing key has the following parameters:

```
routing-key rcontext {gtt [gtt-selector-name [gtt-gta]] | dpc [opc pc pc-mask] [si {isup | sccp}}
cic-min [cic-max]}
```

Specify the following parameters to configure a routing key for M3UA GTT traffic. SI SCCP is enabled by default.

```
routing-key rcontext {gtt [gtt-selector-name [gtt-gta]]
```

Specify the following parameters to configure a routing key for M3UA ISUP traffic. If **cic** is selected, then **si isup** is enabled by default.

```
routing-key rcontext dpc [opc pc pc-mask] si isup [cic cic-min [cic-max]]
```

Use the following parameters to configure a routing key for M3UA SSN traffic. **si sccp** is enabled by default.

```
routing-key rcontext dpc [opc pc pc-mask] si sccp ssn ssn
```

### Routing Key Definitions for SUA

For SUA ASs, the routing key has the following parameters. SUA only supports **si sccp**.

```
routing-key rcontext {gtt [gtt-selector-name [gtt-gta]] | dpc [opc pc pc-mask] si sccp [ssn ssn]}
```

To configure a routing key for SUA TCAP traffic:

```
routing-key rcontext dpc [opc pc pc-mask] si sccp ssn ssn
```

To configure a routing key for SUA GTT traffic:

```
routing-key rcontext {gtt [gtt-selector-name [gtt-gta]]}
```

### Point Code Assignment and Management

Special care must be taken when planning the assignment of point codes to ASs. The ITP SG feature allows point code assignment to ASs and ASPs as follows:

- An AS may be assigned the primary local point code or secondary local point code owned by the SG. The AS is sharing the point code with the SG.
- An AS may be assigned a capability code or alias point code of the SG. The AS is sharing the point code with the SG's mated-pair.
- An AS may be assigned a unique point code not previously assigned to any of the SGs in the mated-pair.
- An ASP can be assigned a unique point code by being the only ASP in an AS that has been assigned a unique point code.
- All ASs or groups of ASs serviced by the SG may share a given point code. Any group of ASs that shares the same point code is referred to as a Signaling Point Management Cluster (SPMC). Note that an M3UA AS and an SUA AS may share only one of the router's point codes (primary local, secondary local, or capability).

Assigning more than one AS the same point code can have significant affect on the ability of the SG to report ASP, AS, user part, or subsystem outages or unavailability to the SS7 network. Consider the following case:

AS1 and AS2 are sharing point code 2.2.2 in the same network appearance. AS1 handles ISUP traffic for CIC 1 to 500. AS2 handles ISUP traffic for CIC 501 to 1000 from the same OPC. AS1 and AS2 have no ASPs in common. If all of the ASPs in AS1 become unavailable, the SG cannot send a TFP to the SS7 network. Sending a TFP would inaccurately indicate that point code 2.2.2 is totally unreachable through the SG when only a subset of the ASPs in point code 2.2.2 are unreachable. If AS1 and AS2 each had its own point code, then the SG would be able send a TFP to the SS7 network.

### Unallocated MSU processing

When an MSU is received and does not match any of the configured routing keys, that MSU is referred to as an unallocated MSU. The default treatment for unallocated messages will vary. If a trap has been enabled for unallocated messages, the DPC, OPC, and SIO of an unallocated MSU will be reported to the designated management entity. If the unallocated MSU trap has not been enabled, the MSU will be counted and dropped.

To prevent this from happening you can configure routing keys with minimal parameters to catch traffic that does not match more specific routing keys. For example, in the case of ISUP traffic, the following configuration would catch errant ISUP traffic for tracking purposes:

```
cs7 as defaultisup m3ua
  routingkey 222 dpc 2.3.3 si isup
  asp isupbucket
```

All ISUP traffic for DPC 2.3.3 that does not match the CIC range of one of the more specific routing keys would be sent to the isupbucket ASP. It should be noted that if the isupbucket ASP is not active, the MSU is dropped with the appropriate warning.

### Examples

The following are examples of routing key provisioning:

```
cs7 as as1 m3ua
  routing-key 01010101 gtt
```

```
cs7 as as2 m3ua
  routing-key 02020202 2.2.2
```

```
cs7 as as3 m3ua
  routing-key 03030303 3.3.3 opc 5.5.5 255.255.128
```

```
cs7 as as4 sua
  routing-key 04040404 4.4.4 si sccp ssn 40
```

### Related Commands

| Command       | Description                                              |
|---------------|----------------------------------------------------------|
| <b>cs7 as</b> | Defines an Application Server and enters CS7 AS submode. |

## routing-key (CS7 AS Route)

To specify the routing key and the dpc that uniquely defines the range of signaling traffic to be handled by a particular AS Route table, use the **routing-key** CS7 AS Route submode command. To remove the configuration, use the no form of this command.

**routing-key** *rcontext dpc*

**no routing-key** *rcontext dpc*

|                           |                 |                                                                                                                                                                                                                        |
|---------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>rcontext</i> | The routing context parameter is an unsigned decimal number that uniquely identifies a routing key. This value is used internally and by the SG mate to associate messages with a specific AS route.                   |
|                           | <i>dpc</i>      | Destination point code. The destination point code indicates the point code associated with this AS Route table and routing key. This destination point code must be unique. It cannot share the point code of the SG. |

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | CS7 AS Route submode |
|----------------------|----------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB5     | This command was introduced. |

**Usage Guidelines**

An AS Route table is selected based on a matching DPC. When an MSU is received and does not match any of the configured routing keys, that MSU is referred to as an unallocated MSU. The default treatment for unallocated messages varies. If a trap has been enabled for unallocated messages, the DPC, OPC, and SIO of an unallocated MSU is reported to the designated management entity. If the unallocated MSU trap has not been enabled, the MSU is counted and dropped.

The routing key routing context defined in the CS7 AS route submode must be unique from routing contexts used by other ASes and ASroutes. This context is used to communicate state information regarding the route with the mated ITP.

The user cannot modify the routing-key of an active AS Route.

**Examples**

The following example specifies a routing key for the AS route named route1:

```
cs7 asroute route1
  routing-key 02020202 2.2.2
```

| <b>Related Commands</b> | <b>Command</b>     | <b>Description</b>   |
|-------------------------|--------------------|----------------------|
|                         | <b>cs7 asroute</b> | Defines an AS Route. |

## rule (cs7 mlr ruleset)

To specify the rules for a routing trigger within a multi-layer ruleset table, use the **rule** command in cs7 mlr ruleset configuration mode. To disable the specific rule, use the **no** form of this command.

**rule** *order operation-name* [**default**]

**no rule**

| Syntax Description |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | <i>order</i>          | Unsigned integer value that sets the relative searching order of the rule being defined. The order must be unique among all rules. The routing table is sequentially searched for a match, with the rules being tested in the order specified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                    | <i>operation-name</i> | <p>Specifies the operation for which the rule is valid. The operation name represents a Multi-Layer Routing (MLR) feature that may comprise one or more actual MAP operations. Valid <i>operation-name</i> parameters are:</p> <ul style="list-style-type: none"> <li>• <b>alertSc</b> Identifies the AlertServiceCenter request messages in GSM MAP.</li> <li>• <b>all</b> Identifies a match of any valid operation code. This is the default operation.</li> <li>• <b>smdpp</b> Identifies SMSDeliveryPointToPoint request messages within IS-41.</li> <li>• <b>sms-mo</b> Identifies SMS MO request messages for the table-appropriate protocol. This operation is valid for the GSM MAP, and will match all BEGIN requests containing an SMS-MO INVOKE component.</li> <li>• <b>sms-mt</b> Identifies SMS MT request messages for the table-appropriate protocol. This operation is valid for the GSM MAP, and will match all BEGIN requests containing an SMS-MT INVOKE component.</li> <li>• <b>smsNot</b> Identifies SMSNotification request messages in IS-41.</li> <li>• <b>smsReq</b> Identifies the SMSRequest messages within IS-41</li> <li>• <b>sri-sm</b> Identifies SRI SM request messages for the table-appropriate protocol. This operation is valid for GSM MAP, and will match all BEGIN requests containing an INVOKE component.</li> </ul> |



|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>dest-sme-addr-type</i> | <p>(Optional) Parameters that identify attributes of the SME address being defined in the specified <b>address-table</b>. The <i>dest-sme-addr-type</i> is composed of the following keywords:</p> <ul style="list-style-type: none"> <li>• <b>noa</b> Specifies the nature-of-address value associated with the SME address. Messages received with an "Unknown" (0) value will match any non-zero <b>noa</b> value specified.</li> <li>• <i>noa</i> An integer in the range 0 to 7.</li> <li>• <b>np</b> Specifies the numbering-plan identification value associated with the SME address. Messages received with an "Unknown" (0) value will match any non-zero <b>np</b> value specified. <b>np</b> is not valid when defining the <b>dest-sme</b> in an <b>sms-notify</b> operation.</li> <li>• <i>np</i> An integer in the range 0 to 15.</li> <li>• <b>min</b> Specifies that the address is a Mobile Identification Number (MIN). This keyword can be specified for the <i>sme-addr-type</i> of ANSI-41 operations.</li> <li>• <b>imsi</b> Specifies that the address is an International Mobile Subscriber Identification (IMSI) address. This keyword can be specified for the <i>sme-addr-type</i> of ANSI-41 operations.</li> </ul> |
| <b>default</b>            | Specifies the processing of messages that match the specified operation name only. For SMS MO and MT traffic, the default rule will not process segmented SMS messages, only TCAP BEGIN messages with an INVOKE component.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

**Defaults**

No default behavior or value.

**Command Modes**

CS7 mlr ruleset configuration

**Command History**

| Release    | Modification                                                                                                                                                                                                     |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12.2(4)MB  | This command was introduced.                                                                                                                                                                                     |
| 12.2(21)SW | The <b>alertsc</b> , <b>smdpp</b> , <b>smsreq</b> , and <b>smsnot</b> operations were added. The <b>desk-sme</b> keyword and the <b>noa</b> , <b>np</b> , <b>min</b> , and <b>imsi</b> address types were added. |

**Usage Guidelines**

The **rule** command specifies the attributes of an application-layer message to be matched, and the resulting behavior for handling the message. At least one rule must be specified for the ruleset to be valid. Enables the MLR Ruleset Rule configuration mode.

Table 24 describes the parameters that are valid based on the specified **rule** operation.

**Table 24**      **Valid Rule Parameters by Operation**

|         | dest-sme | orig-sme | orig-smsc | dest-smsc | pid | teleservice | port | multi-message |
|---------|----------|----------|-----------|-----------|-----|-------------|------|---------------|
| alertSc | X        |          |           | X         |     |             |      |               |
| all     |          |          |           |           |     |             |      | X             |
| smdpp   | X        | X        |           |           |     | X           |      |               |
| sms-mo  | X        | X        |           | X         | X   |             | X    | X             |
| sms-mt  | X        | X        | X         |           | X   |             | X    | X             |
| smsNot  | X        |          |           |           |     | X           |      |               |
| smsReq  | X        |          |           |           |     | X           |      |               |
| sri-sm  | X        |          | X         |           |     |             |      |               |

**Examples**

The following example includes three rules within a ruleset named ruleset1:

```
cs7 mlr ruleset ruleset1
rule 10 sms-mo
  dest-sme 1234
  orig-sme 60920025
  result gt 9991117777
rule 20 sms-mo
  dest-sme 60920080
  result table SMS-WEIGHTED
rule 30 sms-mo
  orig-sme 6092
  result pc 3.3.3
```

**Related Commands**

| Command                                 | Description                                                                                                            |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 mlr ruleset</b>                  | Specifies sets of rules that will be used to process traffic-matching triggers defined in a multi-layer routing table. |
| <b>dest-smsc (cs7 mlr ruleset rule)</b> | Specifies the address of the destination service center address within an SMS operation.                               |
| <b>dest-sme (cs7 mlr ruleset rule)</b>  | Specifies the address of the destination Short Message Entity (SME) within an SMS operation.                           |
| <b>orig-sme (cs7 mlr ruleset rule)</b>  | Specifies the address of the origin Short Message Entity within an SMS operation.                                      |
| <b>result (cs7 mlr ruleset rule)</b>    | Specifies the processing that will be performed on a packet matching the specified trigger and rule.                   |

## rule (cs7 sms set)

To specify a rule within a ruleset, use the **rule** command in CS7 SMS set configuration mode. To remove the rule, use the **no** form of this command.

**rule** *index* **sms-mo**

**no rule** *index* **sms-mo**

|                           |               |                                                                               |
|---------------------------|---------------|-------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>index</b>  | Specifies the order in which rules are searched. Valid numbers are 1 to 1000. |
|                           | <b>sms-mo</b> | Specifies GSM-MAP short message service mobile originated request.            |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |                           |
|----------------------|---------------------------|
| <b>Command Modes</b> | CS7 SMS set configuration |
|----------------------|---------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                               |
|-------------------------|---------------------------------------------------------------|
| <b>Usage Guidelines</b> | The rule command enables CS7 SMS set rule configuration mode. |
|-------------------------|---------------------------------------------------------------|

|                 |                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example specifies a ruleset named SMS-RULES and specifies sets a rule with search index of 1: |
|                 | <pre>cs7 sms ruleset SMS-RULES  rule 20 sms-mo    orig-imsi unknown    result group smscgrp</pre>           |

| <b>Related Commands</b> | <b>Command</b>                           | <b>Description</b>                                                              |
|-------------------------|------------------------------------------|---------------------------------------------------------------------------------|
|                         | <b>cdr-service-queue</b>                 | Tests the availability of CDR service queue as the input condition of the rule. |
|                         | <b>cs7 sms ruleset</b>                   | Specifies a ruleset.                                                            |
|                         | <b>dest-port (cs7 sms set rule)</b>      | Specifies an application destination port number.                               |
|                         | <b>dest-sme (cs7 sms set rule)</b>       | Specifies a destination short message entity.                                   |
|                         | <b>dest-sme-table (cs7 sms set rule)</b> | Specifies an SMS table of destination SME addresses.                            |
|                         | <b>dest-smsc (cs7 sms set rule)</b>      | Specifies a destination SMSC.                                                   |
|                         | <b>orig-imsi (cs7 sms set rule)</b>      | Specifies an origin IMSI.                                                       |

| Command                                   | Description                                                      |
|-------------------------------------------|------------------------------------------------------------------|
| <b>orig-imsi-table (cs7 sms set rule)</b> | Specifies an SMS table of origin IMSI addresses (address-table). |
| <b>orig-sme (cs7 sms set rule)</b>        | Specifies an origin short message entity.                        |
| <b>orig-sme-table (cs7 sms set rule)</b>  | Specifies an SMS table of origin SME addresses (address-table).  |
| <b>pid (cs7 sms set rule)</b>             | Specifies a protocol identifier (TP-PID)                         |
| <b>result (cs7 sms set rule)</b>          | Specifies a result.                                              |

## ruleset (cs7 sms smsmo)

To apply an SMS routing ruleset, use the **ruleset** command in cs7 sms smsmo configuration mode. To remove the configuration, use the **no** form of this command.

**ruleset** *ruleset*

**no ruleset** *ruleset*

| Syntax Description | <i>ruleset</i> | Ruleset name. |
|--------------------|----------------|---------------|
|--------------------|----------------|---------------|

| Defaults | No default behavior or values |
|----------|-------------------------------|
|----------|-------------------------------|

| Command Modes | CS7 sms smsmo |
|---------------|---------------|
|---------------|---------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Usage Guidelines | A ruleset is required within the gsm-map submode. |
|------------------|---------------------------------------------------|
|------------------|---------------------------------------------------|

| Examples | The following example configures an SMS route table, configures GSM MAP routing and applies an SMS routing ruleset: |
|----------|---------------------------------------------------------------------------------------------------------------------|
|----------|---------------------------------------------------------------------------------------------------------------------|

```
cs7 sms route-table
gsm-map sms-mo ssn 8
ruleset SMS-RULES
```

| Related Commands | Command                              | Description                      |
|------------------|--------------------------------------|----------------------------------|
|                  | <b>cs7 sms route-table</b>           | Specifies an SMS route table.    |
|                  | <b>gsm-map (cs7 sms route table)</b> | Specifies the GSM MAP operation. |

■ ruleset (cs7 sms smsmo)



## ITP Command Set: S - Z

---

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 Command Reference publications.

- **send-window (cs7 sms profile parms), page 911**
- **send-window (cs7 sms session parms), page 912**
- **session-init-timer(cs7 sms profile parms), page 914**
- **session-init-timer (cs7 sms session parms), page 916**
- **set, page 918**
- **share-mode (cs7 cdr service), page 920**
- **show cs7, page 921**
- **show cs7 access-lists, page 923**
- **show cs7 accounting, page 924**
- **show cs7 as, page 927**
- **show cs7 asp, page 930**
- **show cs7 asroute, page 935**
- **show cs7 cdr destination, page 937**
- **show cs7 cdr service fda, page 938**
- **show cs7 group, page 940**
- **show cs7 gtt address-conversion, page 942**
- **show cs7 gtt application-group, page 943**
- **show cs7 gtt concern-pclist, page 944**
- **show cs7 gtt config, page 945**
- **show cs7 gtt consistency, page 947**
- **show cs7 gtt gta, page 949**
- **show cs7 gtt map, page 951**
- **show cs7 gtt measurements, page 953**
- **show cs7 gtt selector, page 956**
- **show cs7 linkset, page 957**
- **show cs7 log, page 962**

- **show cs7 m2pa**, page 963
- **show cs7 m3ua**, page 970
- **show cs7 mapua**, page 972
- **show cs7 mated-sg**, page 974
- **show cs7 mlr address-table**, page 976
- **show cs7 mlr result**, page 977
- **show cs7 mlr statistics**, page 978
- **show cs7 mlr table**, page 979
- **show cs7 monitor link**, page 982
- **show cs7 monitor tcp**, page 984
- **show cs7 mtp2**, page 985
- **show cs7 mtp3 error**, page 993
- **show cs7 mtp3 event-history**, page 998
- **show cs7 mtp3 timers**, page 999
- **show cs7 nso**, page 1000
- **show cs7 offload mtp3**, page 1002
- **show cs7 pc-conversion**, page 1004
- **show cs7 ping**, page 1005
- **show cs7 point-codes**, page 1006
- **show cs7 qos**, page 1008
- **show cs7 route**, page 1010
- **show cs7 sccp gti-conversion**, page 1015
- **show cs7 sccp instance-conversion**, page 1017
- **show cs7 sccp ssn-conversion**, page 1018
- **show cs7 sccp ssn-conversion**, page 1018
- **show cs7 sgmp**, page 1019
- **show cs7 smpp**, page 1020
- **show cs7 sms address-table**, page 1023
- **show cs7 sms result**, page 1025
- **show cs7 sms route-table**, page 1026
- **show cs7 sms ruleset**, page 1028
- **show cs7 sms smpp**, page 1031
- **show cs7 sms statistics**, page 1032
- **show cs7 sms ucp**, page 1034
- **show cs7 sua**, page 1035
- **show cs7 tcap**, page 1037
- **show cs7 ucp**, page 1039
- **show cs7 virtual linkset**, page 1042



- **show hosts**, page 1045
- **show ip sctp**, page 1047
- **show redundancy inter-device**, page 1054
- **show sscf-nni**, page 1056
- **show tech-support**, page 1061
- **shutdown (CS7 AS)**, page 1063
- **shutdown (CS7 AS Route)**, page 1064
- **shutdown (CS7 ASP)**, page 1065
- **shutdown (CS7 link)**, page 1066
- **shutdown (CS7 linkset)**, page 1067
- **shutdown (CS7 link)**, page 1066
- **shutdown (CS7 MAPUA)**, page 1070
- **shutdown (CS7 Mated-SG)**, page 1071
- **shutdown (CS7 SGMP)**, page 1073
- **shutdown (CS7 SUA)**, page 1074
- **shutdown (group)**, page 1075
- **shutdown (IPC association)**, page 1076
- **sls-shift**, page 1077
- **smpp (cs7 sms result)**, page 1078
- **smpp inactivity-timer**, page 1079
- **smpp keepalive-timer**, page 1080
- **smpp response-timer**, page 1081
- **smpp send-window**, page 1082
- **smpp session-init-timer**, page 1083
- **smmc-map-version (cs7 sms smsmo)**, page 1084
- **snmp-server enable traps bits-clock**, page 1085
- **snmp-server enable traps cs7**, page 1086
- **snmp-server enable traps sctp**, page 1089
- **sscf-nni**, page 1090
- **sscop**, page 1092
- **teleservice**, page 1094
- **threshold-receive**, page 1095
- **threshold-send**, page 1096
- **timer (CS7 Linkset)**, page 1097
- **timer (CS7 Profile)**, page 1100
- **traffic-mode**, page 1102
- **traffic-rate-timer**, page 1104
- **trigger cdpa**, page 1105

- **trigger cgpa**, page 1109
- **trigger default**, page 1112
- **trigger mtp3**, page 1114
- **ttl**, page 1116
- **ttmap**, page 1117
- **tx-queue-depth (CS7 ASP)**, page 1118
- **tx-queue-depth (CS7 link)**, page 1119
- **tx-queue-depth (CS7 Mated-SG)**, page 1120
- **tx-queue-depth (CS7 M3UA)**, page 1121
- **tx-queue-depth (CS7 Profile)**, page 1122
- **tx-queue-depth (CS7 SGMP)**, page 1123
- **tx-queue-depth (CS7 SUA)**, page 1124
- **tx-queue-depth (group peer)**, page 1125
- **tx-window (cs7-cdr-dest)**, page 1126
- **ucp (cs7 SMS result)**, page 1127
- **unordered-priority (CS7 M3UA)**, page 1128
- **unordered-priority (CS7 SGMP)**, page 1129
- **unordered-priority (CS7 SUA)**, page 1130
- **update (CS7 GTT Address Conversion)**, page 1131
- **update (CS7 SCCP GTI Conversion)**, page 1132
- **update route (CS7 AS route)**, page 1134
- **update route (route-table)**, page 1135
- **variant**, page 1137
- **wait-timeout**, page 1138

## send-window (cs7 sms profile parms)

To specify the number of outstanding UCP operations between an SMSC and a SMS application, use the **send-window** command in CS7 SMS profile parameters configuration mode. To remove the specification, use the **no** form of this command.

**send-window** *operations*

**no send-window** *operations*

| Syntax Description | <i>operations</i> | Number of outstanding UCP operations between an SMSC and a SMS application. Valid range is 1 to 100. The default is 10. |
|--------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------|
|--------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------|

| Defaults | 10 outstanding UCP operations. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | CS7 SMS session profile configuration |
|---------------|---------------------------------------|
|---------------|---------------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Examples | The following example creates an SMPP profile named mmprofile and configures several parameters: |
|----------|--------------------------------------------------------------------------------------------------|
|----------|--------------------------------------------------------------------------------------------------|

```
cs7 sms smpp profile mmprofile
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

| Related Commands | Command                                              | Description                         |
|------------------|------------------------------------------------------|-------------------------------------|
|                  | <b>bind-type (cs7 sms profile parameters)</b>        | Specifies SMPP bind type.           |
|                  | <b>inactivity-timer (cs7 sms profile parameters)</b> | Specifies session inactivity timer. |
|                  | <b>keepalive-timer (CS7 SMS profile parameters)</b>  | Specifies session keepalive timer.  |
|                  | <b>response-timer (cs7 sms profile parms)</b>        | Specifies session response timer.   |
|                  | <b>session-init-timer(cs7 sms profile parms)</b>     | Specifies session initiation time.  |

# send-window (cs7 sms session parms)

To specify the number of outstanding UCP operations between an SMSC and a SMS application, use the **send-window** command in CS7 SMS session parameters configuration mode. To remove the specification, use the **no** form of this command.

**send-window** *operations*

**no send-window** *operations*

|                           |                   |                                                                                                                         |
|---------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>operations</i> | Number of outstanding UCP operations between an SMSC and a SMS application. Valid range is 1 to 100. The default is 10. |
|---------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------|

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | 10 outstanding UCP operations. |
|-----------------|--------------------------------|

|                      |                                          |
|----------------------|------------------------------------------|
| <b>Command Modes</b> | CS7 SMS session parameters configuration |
|----------------------|------------------------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(25)SW     | This command was introduced. |

## Usage Guidelines

**Examples** The following example creates an SMPP connection, configures a destination and configures several parameters:

```
cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic
destination offisland 10.10.20.2 6000
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

| <b>Related Commands</b> | <b>Command</b>                                       | <b>Description</b>                  |
|-------------------------|------------------------------------------------------|-------------------------------------|
|                         | <b>bind-type (CS7 sms session parameters)</b>        | Specifies SMPP bind type.           |
|                         | <b>inactivity-timer (cs7 sms session parameters)</b> | Specifies session inactivity timer. |
|                         | <b>keepalive-timers (CS7 SMS session parameters)</b> | Specifies session keepalive timer.  |

| Command                                           | Description                        |
|---------------------------------------------------|------------------------------------|
| <b>response-timer (cs7 sms session parms)</b>     | Specifies session response timer.  |
| <b>session-init-timer (cs7 sms session parms)</b> | Specifies session initiation time. |

## session-init-timer(cs7 sms profile parms)

To specify the time lapse allowed between a network connection being established and the establishment of the UCP connection, use the **sessions-init** command in CS7 SMS profile parameters configuration mode. To remove the specification, use the **no** form of this command.

**session-init-timer** *msec*

**no session-init-timer** *msec*

|                           |             |                                                                                                                                                                      |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Time lapse allowed between a network connection being established and the establishment of the UCP connection. Range is 500 ms to 60000 ms. The default is 10000 ms. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |           |
|-----------------|-----------|
| <b>Defaults</b> | 10000 ms. |
|-----------------|-----------|

|                      |                                       |
|----------------------|---------------------------------------|
| <b>Command Modes</b> | CS7 SMS session profile configuration |
|----------------------|---------------------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(25)SW     | This command was introduced. |

### Usage Guidelines

**Examples** The following example creates an SMPP profile named mmprofile and configures several parameters:

```
cs7 sms smpp profile mmprofile
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

| <b>Related Commands</b> | <b>Command</b>                                       | <b>Description</b>                  |
|-------------------------|------------------------------------------------------|-------------------------------------|
|                         | <b>bind-type (cs7 sms profile parameters)</b>        | Specifies SMPP bind type.           |
|                         | <b>inactivity-timer (cs7 sms profile parameters)</b> | Specifies session inactivity timer. |
|                         | <b>keepalive-timer (CS7 SMS profile parameters)</b>  | Specifies session keepalive timer.  |

| Command                                | Description                       |
|----------------------------------------|-----------------------------------|
| response-timer (cs7 sms profile parms) | Specifies session response timer. |
| send-window (cs7 sms profile parms)    | Specifies send window size.       |

## session-init-timer (cs7 sms session parms)

To specify the time lapse allowed between a network connection being established and the establishment of the UCP connection, use the **sessions-init** command in CS7 SMS session parameters configuration mode. To remove the specification, use the **no** form of this command.

**session-init-timer** *msec*

**no session-init-timer** *msec*

|                           |             |                                                                                                                                                                      |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>msec</i> | Time lapse allowed between a network connection being established and the establishment of the UCP connection. Range is 500 ms to 60000 ms. The default is 10000 ms. |
|---------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |           |
|-----------------|-----------|
| <b>Defaults</b> | 10000 ms. |
|-----------------|-----------|

|                      |                                          |
|----------------------|------------------------------------------|
| <b>Command Modes</b> | CS7 SMS session parameters configuration |
|----------------------|------------------------------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(25)SW     | This command was introduced. |

### Usage Guidelines

**Examples** The following example creates an SMPP connection, configures a destination and configures several parameters:

```
cs7 sms smpp 5000 local-ip 10.10.10.200 dynamic
destination offisland 10.10.20.2 6000
bind-type any
inactivity-timer 5000
keepalive-timer 1000
response-timer 2000
send-window 50
session-init-timer 5000
```

| <b>Related Commands</b> | <b>Command</b>                                       | <b>Description</b>                  |
|-------------------------|------------------------------------------------------|-------------------------------------|
|                         | <b>bind-type (CS7 sms session parameters)</b>        | Specifies SMPP bind type.           |
|                         | <b>inactivity-timer (cs7 sms session parameters)</b> | Specifies session inactivity timer. |



| Command                                              | Description                        |
|------------------------------------------------------|------------------------------------|
| <b>keepalive-timers (CS7 SMS session parameters)</b> | Specifies session keepalive timer. |
| <b>response-timer (cs7 sms session parms)</b>        | Specifies session response timer.  |
| <b>send-window (cs7 sms session parms)</b>           | Specifies send window size.        |

# set

To specify GTI conversion, subsystem mapping, and address-conversion tables to be assigned from one instance to another, use the **set** CS7 SCCP Instance Conversion submode command. To remove the configuration, use the **no** form of this command.

**set** {[**address-conversion** *tablename*] [**gti-conversion** *tablename*] [**message-handling** *option*] [**national-indicator** *natl-ind*] [**ssn-conversion** *tablename*]}

**no set** {[**address-conversion** *tablename*] [**gti-conversion** *tablename*] [**message-handling** *option*] [**national-indicator** *natl-ind*] [**ssn-conversion** *tablename*]}

## Syntax Description

|                                            |                                                                                                |
|--------------------------------------------|------------------------------------------------------------------------------------------------|
| <b>address-conversion</b> <i>tablename</i> | Specifies an address-conversion table.                                                         |
| <b>gti-conversion</b> <i>tablename</i>     | Specifies a gti-conversion table.                                                              |
| <b>message-handling</b> <i>option</i>      | Specifies the SCCP message handling option.<br>The values for message-handling are as follows: |
|                                            | 0                   no special options                                                         |
|                                            | 1-7                spare values (ie unassigned)                                                |
|                                            | 9-15              additional spare values (ie unassigned)                                      |
|                                            | no change        leave field unchanged                                                         |
|                                            | return-on-error   return [x]udts on error                                                      |
| <b>national-indicator</b> <i>natl-ind</i>  | Specifies the national-indicator. The following are valid options:                             |
|                                            | 0                   international                                                              |
|                                            | 1                   national                                                                   |
|                                            | no change        leave field unchanged                                                         |
| <b>ssn-conversion</b> <i>tablename</i>     | Specifies an ssn-conversion table.                                                             |

## Defaults

No default behavior or values.

## Command Modes

CS7 SCCP Instance Conversion submode

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(20)SW | This command was introduced. |

## Usage Guidelines

All three conversion methods can be used, or just one or two. This command is optional, so if no conversion methods are assigned, the GTT in the MSUs will not be changed.

## Examples

The following are examples of the **set** command with its various keywords:

```
cs7 sccp instance-conversion in-instance 1 out-instance 0
set gti-conversion gti-conv0
```

```
cs7 sccp instance-conversion in-instance 1 out-instance 0
  set ssn-conversion ssntable

cs7 sccp instance-conversion in-instance 1 out-instance 0
  set address-conversion addr-conv

cs7 sccp instance-conversion in-instance 1 out-instance 0
  set message-handling 0

cs7 sccp instance-conversion in-instance 1 out-instance 0
  set national-indicator 1
```

**Related Commands**

| Command                             | Description                                             |
|-------------------------------------|---------------------------------------------------------|
| <b>cs7 sccp instance-conversion</b> | Configures or update an SCCP instance conversion entry. |

## share-mode (cs7 cdr service)

To specify the share mode between CDR destinations within a service, use the **share-mode** command in CS7 CDR service configuration mode. To reestablish the default share mode (cost), use the **no** form of this command.

**share-mode** {cost | weight-rr}

**no share-mode** {cost | weight-rr}

|                           |                  |                                                |
|---------------------------|------------------|------------------------------------------------|
| <b>Syntax Description</b> | <b>cost</b>      | Share based on the least cost available.       |
|                           | <b>weight-rr</b> | Share based on weighted round-robin algorithm. |

**Defaults** The default share mode is cost.

**Command Modes** CS7 CDR service configuration

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

### Usage Guidelines

**Examples** The following example specifies a CDR service named FDASMSC, specifies two destinations, psd11 and psd2, and specifies a weighted round-robin share mode for the CDR destinations:

```
cs7 cdr service FDASMSC
 destination psd1 10
 destination psd2 20
 share-mode weight-rr
```

|                         |                        |                          |
|-------------------------|------------------------|--------------------------|
| <b>Related Commands</b> | <b>Command</b>         | <b>Description</b>       |
|                         | <b>cs7 cdr service</b> | Specifies a CDR service. |

# show cs7

To display ITP basic configuration status, use the **show cs7** EXEC command.

**show cs7**

**Syntax Description** This command has no arguments or keywords

**Command Modes** EXEC

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

**Examples** The following is sample output from the **show cs7** command:

```
Router# show cs7
Point Code          1.4.1
SS7 Variant         ITU
Network Indicator   national
Capability Point Code 2.4.1
GTT Load URL        flash:gttdata.txt

MTP3 Restart status  Completed
MTP3 Restart occurred 9 day(s), 19:38:01 ago

Total Linksets      8
Available Linksets   4
Total Links          8
```

Table 25 describes the fields in the display.

**Table 25** *show cs7 Field Descriptions*

| Field                 | Description                                                          |
|-----------------------|----------------------------------------------------------------------|
| Point Code            | The unique address of the node.                                      |
| SS7 Variant           | The SS7 variation (ANSI or ITU).                                     |
| Network Indicator     | The network indicator (international, national, reserved, or spare). |
| Capability Point Code | The capability point code.                                           |
| MTP3 Restart status   | Restart status.                                                      |
| MTP3 Restart occurred | Elapsed time since restart.                                          |
| Total Linksets        | Total number of configured linksets.                                 |
| Available Linksets    | Available linksets.                                                  |
| Total Links           | Total number of configured links.                                    |

**Related Commands**

| Command           | Description                                                            |
|-------------------|------------------------------------------------------------------------|
| show tech-support | Collects and displays a large amount of ITP configuration information. |

# show cs7 access-lists

To display ITP access lists, use the **show cs7 access-lists** EXEC command.

**show cs7** [*instance-number*] **access lists** [*access-list-number*] [*access-list-name*]

|                           |                           |                                                                                             |
|---------------------------|---------------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i>    | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|                           | <i>access-list-number</i> | Access list number. Valid number is in range from 2700 through 2999.                        |
|                           | <i>access-list-name</i>   | Access list name.                                                                           |

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(1)MB      | This command was introduced. |

## Examples

The following is sample output from the **show access-lists** command:

```
Router# show cs7 access-lists
Cisco SS7 access list 2700
    permit dpc 4.100.0 0.0.255
```

Table 26 describes the fields in the display.

**Table 26** *show cs7 access-lists Field Descriptions*

| Field                      | Description                                                                            |
|----------------------------|----------------------------------------------------------------------------------------|
| Cisco SS7 access list 2700 | Information about Cisco Access list number 2700.                                       |
| permit                     | Permits access if the conditions are matched.                                          |
| dpc                        | This access list is applied destination point code 4.100.0 with wildcard mask 0.0.255. |

|                         |                |                                                                                                                    |
|-------------------------|----------------|--------------------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b>                                                                                                 |
|                         | access-list    | Defines a Cisco SS7 access list.                                                                                   |
|                         | access-group   | Issued from CS7 linkset submode, assigns an access list to a linkset to screen either inbound or outbound packets. |
|                         | cs7 linkset    | Specifies a linkset and enters CS7 linkset submode.                                                                |

# show cs7 accounting

To display ITP accounting details, use the **show cs7 accounting** EXEC command.

**show cs7** [*instance-number*] **accounting** [*point-code*] [*linkset*] [**access-violations** | **gtt**] [**checkpoint**]

## Syntax Description

|                          |                                                                                             |
|--------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i>   | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <i>point-code</i>        | (Optional) Point code filter.                                                               |
| <i>linkset</i>           | (Optional) Linkset name.                                                                    |
| <b>access-violations</b> | (Optional) Displays the CS7 access-violations database.                                     |
| <b>checkpoint</b>        | (Optional) Displays the CS7 checkpointed data.                                              |
| <b>gtt</b>               | (Optional) Displays the CS7 GTT accounting database(s).                                     |

## Command Modes

EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Examples

The following is sample output from the **show cs7 accounting** command:

```
Router# show cs7 accounting
```

```
Checkpoint Interval = 5 min
```

```
Linkset = 'linkset1'
```

| DPC   | OPC   | SI | In Pkts | In Bytes | Out Pkts | Out Bytes |
|-------|-------|----|---------|----------|----------|-----------|
| 3-4-2 | 3-4-4 | 0  | 0       | 0        | 10       | 120       |
| 3-4-4 | 3-4-2 | 2  | 29      | 348      | 0        | 0         |
| 3-4-2 | 3-4-4 | 2  | 0       | 0        | 29       | 348       |

Here is the output for the an accounting report for instance 0:

```
Router# show cs7 0 accounting
```

```
Instance Number:0 Checkpoint Interval = 5 min
```

```
Linkset = 'linkset1'
```

| DPC      | OPC      | SI | In Pkts | In Bytes | Out Pkts | Out Bytes |
|----------|----------|----|---------|----------|----------|-----------|
| 1.15.1:0 | 1.11.1:0 | 1  | 1       | 9        | 0        | 0         |
| 1.11.1:0 | 1.15.1:0 | 1  | 0       | 0        | 1        | 9         |



The following is sample output from the **show cs7 accounting** command with the **access-violations** keyword. The sample output shows that access violations occurred for packets destined for 3.3.3 from origin point code 4.4.4. Packets are received on the input, but zero packets are being routed to the destination point code.

```
router# show cs7 accounting access-violations
```

```
Checkpoint Interval = 5 min
```

```
Linkset = 'linkset1'
```

| DPC   | OPC   | SI | In Pkts | In Bytes | Out Pkts | Out Bytes |
|-------|-------|----|---------|----------|----------|-----------|
| 3-7-2 | 3-4-6 | 3  | 84      | 11088    | 0        | 0         |

This data is stored in a two stage database. The first database is a quick access table that shows the data accumulated since the last checkpoint event. Checkpointing is the process of moving data records from the quick-access table to the large back-end database that stores long term accounting records. The checkpointed database contains accumulated accounting data since the last clearing or from the time accounting was originally enabled.

The following is sample output from the **show cs7 accounting** command with the **access-violations** and **checkpoint** keywords:

```
Router#show cs7 accounting access-violations checkpoint
```

```
Checkpoint Interval = 5 min
```

```
Linkset = 'linkset1'
```

| DPC   | OPC   | SI | In Pkts | In Bytes | Out Pkts | Out Bytes |
|-------|-------|----|---------|----------|----------|-----------|
| 3-7-2 | 3-4-6 | 3  | 2       | 264      | 0        | 0         |

The following is sample output from the **show cs7 accounting** command with the **checkpoint** keyword, displaying the accumulated checkpointed data:

```
Router# show cs7 accounting checkpoint
```

```
Checkpoint Interval = 5 min
```

```
Linkset = 'linkset1'
```

| DPC   | OPC   | SI | In Pkts | In Bytes | Out Pkts | Out Bytes |
|-------|-------|----|---------|----------|----------|-----------|
| 3-4-4 | 3-4-6 | 0  | 8       | 84       | 0        | 0         |
| 3-4-4 | 3-4-6 | 2  | 7893    | 94716    | 0        | 0         |
| 3-4-6 | 3-4-4 | 0  | 0       | 0        | 6        | 57        |
| 3-4-6 | 3-4-4 | 2  | 0       | 0        | 7893     | 94716     |

GTT accounting is a flow-based accounting that is performed on a per-linkset basis. This accounting generates records based on traffic entering a given linkset that is processed by the GTT function of the ITP's SCCP layer. Individual records containing output packet and byte counts are kept for traffic that matches a given GTA entry and is translated to a specific point code.

## ■ show cs7 accounting

The following is sample output from the **show cs7 accounting** command with the **gtt** keyword:

```
Router# show cs7 accounting gtt
```

```
Checkpoint Interval = 5 min
```

```
Inbound Linkset = 'linkset1'
```

| Matched<br>Selector | Matched<br>Global Title | Translated<br>Point Code | Input<br>Packets | Bytes |
|---------------------|-------------------------|--------------------------|------------------|-------|
| my_sel              | 919341                  | 3-7-1                    | 38               | 5016  |
| my_sel              | 919341                  | 3-7-2                    | 688              | 90816 |

In the following example the Instance Translation feature has been configured, so the SCCP Accounting tables show an instance number with the translated point code:

```
Router# show cs7 account gtt
```

```
Instance Number:4 Checkpoint Interval = 5 min
```

```
Inbound Linkset = 'scp-4'
```

| Matched<br>Selector | Matched<br>Global Title | Translated<br>Point Code | Input<br>Packets | Bytes |
|---------------------|-------------------------|--------------------------|------------------|-------|
| sel-4               | 919                     | 5.1.1:3                  | 2                | 86    |

Table 27 describes the fields in the display.

**Table 27** *show cs7 accounting Field Descriptions*

| Field                  | Description            |
|------------------------|------------------------|
| Destination Point Code | Destination point code |
| Originating Point Code | Originating point code |
| Input Packet           | Input packets          |
| Input Bytes            | Input bytes            |
| Output Packets         | Output packets         |
| Output Bytes           | output bytes           |

## Related Commands

| Command                     | Description                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------------------|
| <b>gtt-accounting</b>       | Enables GTT accounting on a linkset.                                                           |
| <b>clear cs7 accounting</b> | Clears the ITP accounting databases.                                                           |
| <b>show tech-support</b>    | Displays a large amount of ITP configuration information that can be used for troubleshooting. |

# show cs7 as

To display AS and routing key information, use the **show cs7 as** privileged EXEC command.

```
show cs7 [instance-number] as [[m3ua [include-gtt | exclude-gtt | only-gtt]] |  
[sua [include-gtt | exclude-gtt | only-gtt]] |  
[all [include-gtt | exclude-gtt | only-gtt]] |  
[name as-name]]  
[operational | active | all]]  
[statistics | detail | brief]
```

## Syntax Description

|                        |                                                                                                        |
|------------------------|--------------------------------------------------------------------------------------------------------|
| <i>instance-number</i> | (Optional) Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <b>m3ua</b>            | (Optional) Filter on M3UA.                                                                             |
| <b>include-gtt</b>     | (Optional) Include ASs with GTT routing keys. (Default)                                                |
| <b>exclude-gtt</b>     | (Optional) Exclude ASs with GTT routing keys.                                                          |
| <b>only-gtt</b>        | (Optional) Display only ASs with GTT routing keys.                                                     |
| <b>sua</b>             | (Optional) Filter on SUA.                                                                              |
| <b>all</b>             | (Optional) Display all ASs. (Default)                                                                  |
| <b>name</b>            | (Optional) Filter on AS name.                                                                          |
| <i>asname</i>          | AS name.                                                                                               |
| <b>operational</b>     | (Optional) Display operational ASs. (non-shut state)                                                   |
| <b>active</b>          | (Optional) Display active ASs                                                                          |
| <b>statistics</b>      | (Optional) Display AS statistics                                                                       |
| <b>detail</b>          | (Optional) Display detail format.                                                                      |
| <b>brief</b>           | (Optional) Display brief format. (Default)                                                             |

## Defaults

The default display includes ASs with GTT routing keys.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Usage Guidelines

The ASs and routing keys are displayed in the order of priority (with the first entry having the highest priority).

ASs with gtt routing keys are displayed first.

The gtt ASs are ordered alphabetically based on the AS name.

ASs with non-gtt routing keys are grouped by dpc (highest to lowest).

ASs with the same dpc display the AS with the longest matching routing key at the highest layer in the protocol stack first.

## Examples

### Syntax examples

The following command displays all M3UA ASs in detail form:

```
show cs7 as m3ua detail
```

The following command displays AS the AS named BLUE.

```
show cs7 as name blue
```

The following command displays all non-gtt ASs (default).

```
show cs7 as
```

### Output examples

If multi-instances has been enabled, the instance number is displayed following the colon in the displayed point code.

The following is output from the **show cs7 as** command with the **all** keyword in the default brief format:

```
Router# show cs7 as all
```

| AS Name      | State | Context | Routing<br>Selector | GTT | Routing Key<br>GTT Address |  |  |  |  |
|--------------|-------|---------|---------------------|-----|----------------------------|--|--|--|--|
| asname000012 | down  | 44      |                     |     |                            |  |  |  |  |
| green        | down  | 101     | 800TABLE            |     | 1123456789001              |  |  |  |  |

| AS Name  | State  | Context | Dpc     | Routing<br>Si | Routing Key<br>Opc | Ssn | Cic<br>Min | Cic<br>Max |
|----------|--------|---------|---------|---------------|--------------------|-----|------------|------------|
| kure2as  | active | 1       | 0.0.2:0 | isup          |                    |     | 0          | 1000       |
| kure2as2 | inactv | 2       | 0.0.2:4 | isup          |                    |     | 1001       | 2000       |

The following is output from the **show cs7 as** command in **detail** format:

```
Router#show cs7 as detail
```

```
AS name: as1          State: down          Type: M3UA
RoutCtxxt: 1          Traffic mode: undefined
Mate AS state: unknwn Recovery tmout: 2000 ms  Recovery queue depth: 0
QOS Class: 0          Burst recovery tmout: 4000 ms
Routing Key:
Dest PC: 2.3.4:0      Origin PC: n/a          Origin PC mask: n/a
SI: n/a               CIC min: n/a           CIC max: n/a
SSN: n/a              GTT: n/a               Network Appearance: n/a
ASP Name      AS Name      State      Type      Rmt Port Remote IP Addr  Sctp
asp1          as1          down      M3UA      2906     172.18.48.68
asp2          as1          down      M3UA      2906     172.18.57.146

AS name: as2          State: down          Type: M3UA
RoutCtxxt: 2          Traffic mode: undefined
Mate AS state: unknwn Recovery tmout: 2000 ms  Recovery queue depth: 0
QOS Class: 0          Burst recovery tmout: 4000 ms
Routing Key:
Dest PC: 3.4.5:4      Origin PC: n/a          Origin PC mask: n/a
SI: n/a               CIC min: n/a           CIC max: n/a
SSN: n/a              GTT: n/a               Network Appearance: n/a
ASP Name      AS Name      State      Type      Rmt Port Remote IP Addr  Sctp
asp1          as2          down      M3UA      2906     172.18.48.68
```

The following is output from the **show cs7 as** command, with the **name** and **detail** keywords:

```
Router# show cs7 as name BLUE detail
AS name: blue           State: active           Type: M3UA
Routing context: 100    Traffic mode: override
Recovery timeout: 2000 msec           Recovery queue depth: 0
Routing Key:
  Dest PC: 10.3.8:0    Origin PC: n/a           Origin PC mask: n/a
  SI: isup             CIC min: n/a           CIC max: n/a
  SSN: n/a
  GTT: n/a             Selector: n/a           GT addr: n/a
ASP Name      AS Name      State      Type      Rmt Port  Remote IP Addr  SCTP Assoc
ASP1          blue          active     M3UA      10001     1.1.1.1         0
ASP2          blue          active     M3UA      10001     2.2.2.2         1
```

Options for AS State include: Shutdown/Down/Inactive/Active/Pending

Options for AS Traffic Mode include: Loadshare/Override

The following is output from the **show cs7 as** command with the **statistics** keyword:

```
Router# show cs7 as statistics
AS name: myas           Type: M3UA           State: down
Active Time:           Not Active
Failover Attempts:     0           Successful Failovers: 0
Takeovers:             0           Max Recovery Que Depth: 0
Longest Recovery Time: 0           Average Recovery Time: 0
Packets Retrieved:     0           Packets Rerouted: 0
Recovery Pkts Dropped: 0           Pkts Dropped AS State: 0
Pkts Dropped Mate State: 0
Outbound Packets Rcvd: 0           Outbound Octets Rcvd: 0
Outbound Packets Sent: 0           Outbound Octets Sent: 0
```

## Related Commands

| Command                  | Description                                                                                                 |
|--------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>clear cs7 as</b>      | Clears CS7 AS measurements.                                                                                 |
| <b>cs7 as</b>            | Defines an Application Server.                                                                              |
| <b>show tech-support</b> | Collects and displays a large amount of ITP configuration information that can be used for troubleshooting. |

# show cs7 asp

To display ASP information, use the **show cs7 asp** privileged EXEC command.

**show cs7** [*instance-number*] **asp** [**m3ua** | **sua** | **all** | **name** *asp-name* | **asname** *as-name*] [**statistics** | **detail**] | **bindings** | **detail** | **event-history**]

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <b>all</b>             | Display all ASPs. (Default)                                                                 |
| <b>asname</b>          | Filter on AS name.                                                                          |
| <i>as-name</i>         | AS name.                                                                                    |
| <b>bindings</b>        | Display ASP bindings                                                                        |
| <b>detail</b>          | Display detail format.                                                                      |
| <b>event-history</b>   | Display ASP history.                                                                        |
| <b>m3ua</b>            | Filter on M3UA.                                                                             |
| <b>name</b>            | Filter on ASP name.                                                                         |
| <i>asp-name</i>        | ASP name.                                                                                   |
| <b>statistics</b>      | Display ASP statistics.                                                                     |
| <b>sua</b>             | Filter on SUA.                                                                              |

## Defaults

If no keyword is included, the keyword **all** will take effect.

Unless the keyword **detail** is included, the output defaults to **brief** format.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Usage Guidelines

In the brief format, an entry is displayed for each ASP/AS pair. So, the ASP name might appear multiple times if the ASP is in multiple ASs.

The AS name filter checks all ASs (regardless of gtt).

## Examples

### Output of the detail format

The following is output from the **show cs7 asp** command in the **detail** format and filtering on the ASP name **asp1**. This ASP asp1 (type SUA) is **down** and the association state is **closed**. It is offloaded to VIP in slot 6.

AspVipId is an internal number used to identify the ASP.

Options for ASP state include: Down/Inactive/Active/Standby

If the ASP is down or shutdown, then the remote port and remote IP address display the configured values instead of the actual values.

```
Router# show cs7 asp name asp1 detail
ASP name: asp1                                     Type: SUA
Availability: enabled                             ASP id: n/a
SCTP association state: closed                     Association id: n/a
AS name: as1                                       ASP state: down
Traffic mode: ldshr rr                            Active Time: Not Active
Configured remote port: 6000                      Actual remote port: 6000
Configured remote ip addresses: 10.10.20.2
Actual remote ip addresses: n/a
Local port: 6000
Offload to VIP: Yes Slot: 6 AspVipId: 101
ASP protocol class capability: class 0, class 1
ASP interworking with SS7 networks capability: ASP
Local receive window 64000                      Cumulative sack timeout: 200 ms
Assoc retrans: 10                               Path retrans: 4
Max init retrans: 8                             Max init RTO: 1000 ms
Minimum RTO: 1000 ms                            Maximum RTO: 1000 ms
Bundle status: on                               Bundle timeout: 5 ms
Keep alive status: true                         Keep alive timeout: 30000 ms

Unordered priority: equal                       Cleanup timeout: 0 ms

Link status T1 timeout: 0 ms                     Remote congest T6 timeout: 0 ms
SCTP congestion level: 0                         SCON congestion level: 0
Transmit queue depth: 1000
Thresholds for congestion on transmit queue
  Level 1 onset: 500                            Level 1 abate: 300
  Level 2 onset: 700                            Level 2 abate: 500
  Level 3 onset: 900                            Level 3 abate: 700
  Level 4 onset: 1000                           Level 4 abate: 900
QOS Class: 4 (instance:4) IP TOS: 0x60
Match Type: Any                                Class:4 (instance:4)
```

The following example shows ASP22, type M3UA, as active for 4 days and 20 hours. The association ID is 0x0301000B. This hexadecimal value can be used in the **show ip sctp association** command. ASP22 is not offloaded to a VIP. ASP22 serves the AS as2 with traffic mode **loadshare roundrobin**.

```
Router#show cs7 asp name asp22 detail
ASP name: asp22                                     Type: M3UA
Availability: enabled                             ASP id: n/a
SCTP association state: established                Association id: x0301000B
AS name: as2                                       ASP state: active
Traffic mode: ldshr rr                            Active Time: 4d20h
Configured remote port: 6600                      Actual remote port: 6600
Configured remote ip addresses: 172.18.48.67
Actual remote ip addresses: 172.18.48.67         State: active (effective prim)
Local port: 6600
Offload to VIP: No Slot: -1 AspVipId: 0
ASP protocol class capability: n/a
ASP interworking with SS7 networks capability: n/a
Local receive window: 64000                      Cumulative sack timeout: 200 ms
Assoc retrans: 10                               Path retrans: 4
Max init retrans: 8                             Max init RTO: 1000 ms
Minimum RTO: 1000 ms                            Maximum RTO: 1000 ms
Bundle status: on                               Bundle timeout: 5 ms
Keep alive status: true                         Keep alive timeout: 30000 ms
```

■ **show cs7 asp**

```

Unordered priority:      equal          Cleanup timeout:          0 ms
Link status T1 timeout:  0 ms           Remote congest T6 timeout: 0 ms
SCTP congestion level:   0              SCON congestion level:   0
Initial cwnd:            768000         Idle cwnd rate:          80
Retrans cwnd rate:       40             Retrans cwnd mode:       FastRetrans
Transmit queue depth:    1000
Thresholds for congestion on transmit queue
  Level 1 onset:         500            Level 1 abate:           300
  Level 2 onset:         700            Level 2 abate:           500
  Level 3 onset:         900            Level 3 abate:           700
  Level 4 onset:        1000            Level 4 abate:           900
QOS Class:               0              IP TOS:                  0x0
Match Type:              None

```

**Output of the statistics format**

The following is sample output from the **show cs7 asp** command with the **statistics** keyword:

```

Router# show cs7 asp statistics
ASP name: aspl                                     Type: SUA
  Active Time: Not Active
    Data Packets/MSU Stats
      Inbound Packets Rcvd: 0                Inbound Octets Rcvd: 0
      Inbound Packets Sent: 0               Inbound Octets Sent: 0
      Outbound Packets Rcvd: 0              Outbound Octets Rcvd: 0
      Outbound Packets Sent: 0              Outbound Octets Sent: 0
      Inbound CLDTs Rcvd: 0                 Inbound CLDTs Sent: 0
      Outbound CLDTs Rcvd: 0                Outbound CLDTs Sent: 0
      Inbound CLDRs Rcvd: 0                 Inbound CLDRs Sent: 0
      Outbound CLDRs Rcvd: 0                Outbound CLDRs Sent: 0

```

The following is sample output from the **show cs7 asp** command with the **statistics** and **detail** keywords:

```

Router# show cs7 asp statistics detail
ASP name: aspl                                     Type: SUA
  Active Time: Not Active
    Data Packets/MSU Stats
      Inbound Packets Rcvd: 0                Inbound Octets Rcvd: 0
      Inbound Packets Sent: 0               Inbound Octets Sent: 0
      Outbound Packets Rcvd: 0              Outbound Octets Rcvd: 0
      Outbound Packets Sent: 0              Outbound Octets Sent: 0
      Inbound CLDTs Rcvd: 0                 Inbound CLDTs Sent: 0
      Outbound CLDTs Rcvd: 0                Outbound CLDTs Sent: 0
      Inbound CLDRs Rcvd: 0                 Inbound CLDRs Sent: 0
      Outbound CLDRs Rcvd: 0                Outbound CLDRs Sent: 0
    ASP State Maintenance (ASPSM) Stats
      ASPUP Rcvd: 0                         ASPUP ACK Sent: 0
      ASPDN Rcvd: 0                         ASPDN ACK Sent: 0
      BEAT Rcvd: 0                          BEAT ACK Sent: 0
    ASP Traffic Maintenance (ASPTM) Stats
      ASPAC Rcvd: 0                         ASPAC ACK Sent: 0
      SPIA Rcvd: 0                          SPIA ACK Sent: 0
      ASPAC NRC Rcvd: 0                     SPIA NRC Rcvd: 0
      ASPAC Over-ride: 0
      ASPAC Load-share: 0
      ASPAC Broadcast: 0
      Active Routing Keys: 0
    MTP3 Stats
      MSUs Sent To MTP3: 0                  MSUs Dropped (Cong): 0
      MSUs Buffered: 0                      MSUs Dropped (Err): 0
    Buffer Allocation Stats
      Buffer Alloc Failures: 0                Buffer Growth Failures: 0
      MSUs Sent To MTP3: 0                  MSUs Dropped By MTP3: 0
    XUA Error Messages Sent Stats

```



```

ERR Invalid Version:      0
ERR Unsupported Type:     0
ERR Unexpected Msg:       0
ERR Invalid Stream ID:    0
ERR ASP ID Required:      0
ERR Invalid Parm Value:   0
ERR Unexpected Parm:      0
ERR Inv Network App:      0
ERR RK Change Refused:    0
ERR No Cfg As For Asp:    0
ERR Unsupported Class:    0
ERR Traffic Mode:         0
ERR Protocol Error:       0
ERR Refused, Mgmt Block:  0
ERR Invalid ASP ID:       0
ERR Parm Field Error:     0
ERR Dest Status Unknown:  0
ERR Missing Parm:         0
ERR Inv Routing Context:  0
ERR Subsystem Status :0

XUA Error Messages Received Stats
ERR Invalid Version:      0
ERR Unsupported Type:     0
ERR Unexpected Msg:       0
ERR Invalid Stream ID:    0
ERR ASP ID Required:      0
ERR Invalid Parm Value:   0
ERR Unexpected Parm:      0
ERR Inv Network App:      0
ERR RK Change Refused:    0
ERR No Cfg As For Asp:    0
ERR Unsupported Class:    0
ERR Traffic Mode:         0
ERR Protocol Error:       0
ERR Refused, Mgmt Block:  0
ERR Invalid ASP ID:       0
ERR Parm Field Error:     0
ERR Dest Status Unknown:  0
ERR Missing Parm:         0
ERR Inv Routing Context:  0
ERR Subsystem Status :0

XUA Notify Messages Sent Stats
NOTIFY-AS Inactive:      0
NOTIFY-AS Pending:       0
NOTIFY-Alt ASP Active:   0
NOTIFY-AS Active:        0
NOTIFY-Insuf ASP:        0
NOTIFY-ASP Failure:      0

Outbound SSNM From SS7 Stats
TFAs Rcvd:               0
TFRs Rcvd:               0
Cong 0 TFCs Rcvd:        0
Cong 2 TFCs Rcvd:        0
TFPs Rcvd:               0
UPUs Rcvd:               0
Cong 1 TFCs Rcvd:        0
Cong 3 TFCs Rcvd:        0

Outbound SSNM to ASP Stats
DUNAs Sent:              0
DRSTs Sent:              0
Cong 0 SCONs Sent:       0
Cong 2 SCONs Sent:       0
Cong 4 SCONs Sent:       0
Cong 6 SCONs Sent:       0
DAVAs Sent:              0
DUPUs Sent:              0
Cong 1 SCONs Sent:       0
Cong 3 SCONs Sent:       0
Cong 5 SCONs Sent:       0
Cong 7 SCONs Sent:       0

Inbound SSNM to SS7 Stats
TFAs Sent:               0
TFRs Sent:               0
Cong 0 TFCs Sent:        0
Cong 2 TFCs Sent:        0
TFPs Sent:               0
UPUs Sent:               0
Cong 1 TFCs Sent:        0
Cong 3 TFCs Sent:        0

Inbound SSNM from ASP Stats
SCON No Level Rcvd:      0
DUNAs Rcvd:              0
Cong 0 SCONs Rcvd:       0
Cong 2 SCONs Rcvd:       0
Cong 4 SCONs Rcvd:       0
Cong 6 SCONs Rcvd:       0
DAUDs Rcvd:              0
DAVAs Rcvd:              0
Cong 1 SCONs Rcvd:       0
Cong 3 SCONs Rcvd:       0
Cong 5 SCONs Rcvd:       0
Cong 7 SCONs Rcvd:       0

Congestion Stats
Pkts Dropped At Lvl 1:   0
Pkts Dropped At Lvl 3:   0
Level 1 Congestion Cnt:  0
Level 3 Congestion Cnt:  0
T1 Timeouts:             0
Pkts Dropped At Lvl 2:   0
Level 2 Congestion Cnt:  0
Level 4 Congestion Cnt:  0
T6 Timeouts:             0

```

Options for ASP state include: Down/Inactive/Active/Standby

Options for ASP availability include: Shutdown/Enabled

## Related Commands

| Command                  | Description                                                                                                 |
|--------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>cs7 asp</b>           | Specifies an Application Server Process and enables CS7 ASP submode.                                        |
| <b>cs7 sua</b>           | Specifies the local port number for SUA and enter CS7 SUA submode                                           |
| <b>cs7 m3ua</b>          | Specifies the local port number for M3UA and enter M3UA submode.                                            |
| <b>show tech-support</b> | Collects and Displays a large amount of ITP configuration information that can be used for troubleshooting. |

# show cs7 asroute

To display AS Route table information, use the **show cs7 asroute** privileged EXEC command.

**show cs7** [*instance-number*] **asroute** [**name** *name*] [**active** | **operational**] [**detail** | **event-history** | **statistics**]

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <b>active</b>          | (Optional) Display active AS Route table.                                                   |
| <b>detail</b>          | (Optional) Display detail format.                                                           |
| <b>event-history</b>   | (Optional) Display AS Route table history.                                                  |
| <b>name</b>            | (Optional) Filter on AS Route table name.                                                   |
| <i>name</i>            | (Optional) AS Route table name.                                                             |
| <b>operational</b>     | (Optional) Display operational AS Route table (non-shut state).                             |
| <b>statistics</b>      | (Optional) Display AS Route table statistics.                                               |

## Command Modes

privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Usage Guidelines

The AS Routes are ordered by the length of the AS Route name (then alphabetically).

## Examples

If multi-instances has been enabled, the instance number is displayed following the colon in the displayed point code.

The following is sample output from the **show cs7 asroute** command (in the default brief format):

Options for State include: Shutdown/ /Inactive/Active/Pending

Router# **show cs7 asroute**

| AsRoute Name | Routing Context | Routing Key Dpc | State         |
|--------------|-----------------|-----------------|---------------|
| aaa          | 111222          | 8.7.5:0         | M3UA inactive |
| vp1          | 7777            | 7.7.7:4         | shutdown      |

The following is sample output from the **show cs7 asroute** command (in the default brief format):

Router# **show cs7 asroute name scp2**

|                       |                         |             |
|-----------------------|-------------------------|-------------|
| AS Route Name: scp2   | State: M3UA restricted  | Type: M3UA  |
| Routing context: 6666 | Routing key DPC: 6.7.8  |             |
| AS Name: kure2.as1    | AS Route State: unavail | Priority: 2 |

## show cs7 asroute

Mated SG Name: bermuda      Mated SG State: avail      Priority: 4

The following is sample output from the **show cs7 asroute** with the **name** and **statistics** keywords:

```
Router#show cs7 asroute name asrout1 statistics
AS Route Name: asrout1                      State: M3UA restricted
Outbound Packets Rcvd:    0                      Outbound Octets Rcvd:    0
Outbound Packets Sent:    0                      Outbound Octets Sent:    0
DUNAs Rcvd from Mate:    0                      DAVAs Rcvd from Mate:    0
DRSTs Rcvd from Mate:    0
AS Name: test
  Outbound Packets Rcvd:    0                      Outbound Octets Rcvd:    0
  Outbound Packets Sent:    0                      Outbound Octets Sent:    0
  DUNAs Rcvd:               0                      DAVAs Rcvd:               0
AS Name: test2
  Outbound Packets Rcvd:    0                      Outbound Octets Rcvd:    0
  Outbound Packets Sent:    0                      Outbound Octets Sent:    0
  DUNAs Rcvd:               0                      DAVAs Rcvd:               0
```

### Related Commands

| Command                  | Description                                                            |
|--------------------------|------------------------------------------------------------------------|
| <b>cs7 asroute</b>       | Defines a set of routes to a virtual point code within the IP network. |
| <b>clear cs7 asroute</b> | Clears CS7 AS route measurements.                                      |

# show cs7 cdr destination

To display information about the CDR destination, use the **show cs7 cdr destination** command in privileged EXEC mode.

**show cs7 cdr destination**

|                           |                                              |
|---------------------------|----------------------------------------------|
| <b>Syntax Description</b> | <i>name</i> (Optional) CDR destination name. |
|---------------------------|----------------------------------------------|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                                         |
|------------------------|-----------------------------------------|
| <b>Command History</b> | <b>Release</b> <b>Modification</b>      |
|                        | 12.2(25)SW This command was introduced. |

**Examples** The following is sample output from the **show cs7 cdr destination** command:

ITP# **show cs7 cdr destination CDR1**

```
CDR Totals
Destination      Status      Acknowledged  Waiting      Failures
-----
CDR1             shutdown    0              0             0
```

Table 28 describes the significant fields shown in the display.

**Table 28** *show cs7 cdr destination Field Descriptions*

| Field        | Description                                                                  |
|--------------|------------------------------------------------------------------------------|
| Destination  | The end point that receives billing records.                                 |
| Status       | Available, Shutdown, Isolated, Disk full.                                    |
| Acknowledged | The number of billing records for which an acknowledgment has been received. |
| Waiting      | The number of billing records for which no acknowledgment has been received. |
| Failures     | The number of billing records that failed to be stored on the destination.   |

|                         |                                                         |
|-------------------------|---------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b> <b>Description</b>                       |
|                         | <b>cs7 cdr destination</b> Specifies a CDR destination. |

# show cs7 cdr service fda

To display information about a CDR service, use the **show cs7 cdr service** command in privileged EXEC mode.

**show cdr service** [*name*]

## Syntax Description

*name* (Optional) CDR service name.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following is sample output from the **show cs7 cdr service fda** command:

```
ITPB#show cs7 cdr ser
Name       : fda
ShareMode  : cost

Queue-Depth Configured:Actual: 5000:0
Congestion-Threshold      : 80 percent

CDRs processed  0          CDRs acknowledged  0
CDRs waiting   0          Bytes processed      0
CDR Peak Rate  0          CDR Current Rate    0

Totals
Destination  ShareVal  Status  Acknowledged  Waiting  Failures
-----
psd2         1         active    0             0         0
psd1         1         active    0             0         0
```

Table 29 describes the significant fields shown in the display.

**Table 29** *show cs7 cdr service fda Field Descriptions*

| Field                | Description                                             |
|----------------------|---------------------------------------------------------|
| Name                 | Name of the service.                                    |
| ShareMode            | Cost, Weighted Round Robin.                             |
| Queue-Depth          | The max num of records that may be queued to a service. |
| Congestion-Threshold | The threshold at which congestion will be reported.     |
| CDRs processed       | Total number CDRs processed by the service.             |
| CDRs acknowledged    | Total number CDRs acknowledged by the service.          |
| CDRs waiting         | Total number of CDRs that have not been acknowledged.   |

**Table 29** *show cs7 cdr service fda Field Descriptions (continued)*

| Field            | Description                               |
|------------------|-------------------------------------------|
| Bytes processed  | Total number of bytes processed.          |
| CDR Peak Rate    | Highest rate at which CDRs are processed. |
| CDR Current Rate | Current rate at which CDRs are processed. |

#### Related Commands

| Command         | Description               |
|-----------------|---------------------------|
| cs7 cdr service | Configures a CDR service. |

# show cs7 group

To display ITP Group operational information, use the **show cs7 group** command in Privileged EXEC mode.

**show cs7 group { counters [detailed] | state | transport }**

## Syntax Description

|                  |                                                  |
|------------------|--------------------------------------------------|
| <b>counters</b>  | Display ITP group counters.                      |
| <b>detailed</b>  | (Optional) Display detailed counter information. |
| <b>state</b>     | Display ITP Group state information.             |
| <b>transport</b> | Display ITP group transport information.         |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following example displays ITP Group state information:

```
Router# show cs7 group state
ITP Group state information:
  Redundancy Facility state:
    RF State           = 13 (ACTIVE)
    RF Peer State      = 8 (STANDBY HOT)
  Group role information:
    Current State:     Manager
    Previous State:    Negotiating
    Latest event:      NEGO_MANAGER
    Peer name:         group_member2
    Active timer:      none
  Checkpointing state:
    Last seq sent:     549
    Last seq rcvd:     0
    Congested:         FALSE
    Current send queue depth: 0
```

Table 30 describes the significant fields shown in the display.

**Table 30** *show cs7 group state Field Descriptions*

| Field         | Description                                          |
|---------------|------------------------------------------------------|
| RF State      | Current Redundancy Facility state of this device.    |
| RF Peer State | Current Redundancy Facility state of the Group peer. |
| Current State | Current Group Finite State Machine (FSM) state.      |



**Table 30** *show cs7 group state Field Descriptions (continued)*

| Field                    | Description                                                                   |
|--------------------------|-------------------------------------------------------------------------------|
| Previous State           | Group FSM state prior to latest FSM event.                                    |
| Latest event             | Last FSM event processed.                                                     |
| Peer name                | Name of Group peer.                                                           |
| Active timer             | Name of FSM timer running, or <b>none</b> .                                   |
| Last seq # sent          | Sequence number of last Group Checkpointing message sent to Group peer.       |
| Last seq # rcvd          | Sequence number of last Group Checkpointing message received from Group peer. |
| Congested                | TRUE if congestion is present on communication transport to Group peer.       |
| Current send queue depth | Number of messages waiting to be sent to Group Peer.                          |

**Related Commands**

| Command           | Description                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| cs7 group         | Configures the ITP Group feature.                                                                           |
| show tech-support | Collects and displays a large amount of ITP configuration information that can be used for troubleshooting. |

# show cs7 gtt address-conversion

To display CS7 GTT address-conversion entries, use the **show cs7 gtt address-conversion** privileged EXEC command.

**show** [*instance-number*] **cs7gtt address-conversion** [*name*]

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <i>name</i>            | (Optional) Displays output for a specified address conversion table.                        |

## Command Modes

privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB2 | This command was introduced. |

## Examples

The following is sample output from the **show cs7 gtt address-conversion** command:

```
Router# show cs7 gtt address-conversion
Conversion Table Name: e212e214
  New NP:
  New NAI:
  Ref Count: 1

  in-address      out-address      np    nai    es
  -----
65507 1456
```

## Related Commands

| Command                           | Description                                |
|-----------------------------------|--------------------------------------------|
| <b>cs7 gtt address-conversion</b> | Configures a GTA address conversion table. |

# show cs7 gtt application-group

To display CS7 GTT Application Group entries, use the **show cs7 gtt application-group** privileged EXEC command.

**show cs7** [*instance-number*] **gtt application-group** [**brief**] [*app-grp*]

|                           |                        |                                                                                             |
|---------------------------|------------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|                           | <b>brief</b>           | (Optional) Displays a brief form of the output.                                             |
|                           | <i>app-grp</i>         | (Optional) Displays information about a specific app-grp.                                   |

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | privileged EXEC |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

**Examples** The following is sample output from the **show cs7 gtt application-group** command:

```
Router# show cs7 gtt application-group
Application Group Name: group1
Multiplicity           : share
Ref Count              : 1
```

```
Application Identifier  RI      Cost
-----
PC=1.1.1      SSN=10   gt      1
PC=1.1.2      SSN=10   gt      2
PC=1.1.3      SSN=10   gt      3
```

```
Application Group Name: group2
Multiplicity           : share
Ref Count              : 1
```

```
Application Identifier  RI      Cost
-----
PC=2.2.2      SSN=10   pcssn   1
PC=2.2.3      SSN=10   pcssn   2
PC=2.2.4      SSN=10   pcssn   3
```

|                         |                                  |                                                                        |
|-------------------------|----------------------------------|------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                   | <b>Description</b>                                                     |
|                         | <b>cs7 gtt application-group</b> | Specifies a GTT application group.                                     |
|                         | <b>show cs7 gtt consistency</b>  | Displays GTT point-codes that do not have routes provisioned for them. |

# show cs7 gtt concern-pclist

To display a CS7 GTT Concerned Point Code list, use the **show cs7 gtt concern-pclist** privileged EXEC command.

**show cs7** [*instance-number*] **gtt concern-pclist** [*name*]

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <i>name</i>            | (Optional) GTT concerned PC list name.                                                      |

## Command Modes

Privileged EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Examples

The following is sample output from the **show cs7 gtt concern-pclist** command:

```
Router# show cs7 gtt concern-pclist
List Name: mylist  Ref Count = 0
Concerned Point Codes
-----
5.100.5
```

## Related Commands

| Command                       | Description                                |
|-------------------------------|--------------------------------------------|
| <b>cs7 gtt concern-pclist</b> | Specifies a GTT concerned point code list. |

# show cs7 gtt config

To display the complete configuration for GTT, use the **show cs7 gtt config** privileged EXEC command.

**show cs7** [*instance-number*] **gtt config**

|                           |                        |                                                                                             |
|---------------------------|------------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|---------------------------|------------------------|---------------------------------------------------------------------------------------------|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

|                         |                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | This command displays the equivalent of a <b>show running config</b> command for GTT commands. |
|-------------------------|------------------------------------------------------------------------------------------------|

**Examples** The following is sample output from the **show cs7 gtt config** command:

```
Router# show cs7 gtt config
cs7 gtt concern-pclist list1 1.1.1
cs7 gtt concern-pclist list2 1.3.4
cs7 gtt concern-pclist list2 1.3.5
cs7 gtt concern-pclist list2 1.3.6
!
cs7 gtt map 1.1.1 10 sol
cs7 gtt map 1.1.1 200 sol
cs7 gtt map 1.2.3 10 sol
cs7 gtt map 1.12.1 10 sol
cs7 gtt map 2.2.2 20 dom 4.5.6 20
cs7 gtt map 4.1.2 10 rrc cspclist list1 adj dom 4.1.3 10
cs7 gtt map 4.1.3 10 dom 4.1.2 10
cs7 gtt map 4.5.6 20 dom 2.2.2 20
cs7 gtt map 5.6.7 10 sol
cs7 gtt map 7.255.7 100 sol
!
cs7 gtt application-group group1
multiplicity share
pc 1.1.1 1 gt
pc 1.2.3 ssn 10 4 pcssn
!
cs7 gtt application-group group2
multiplicity share
!
cs7 gtt selector steve 0 4 7 4
gta 800 pcssn 1.1.1 gt ssn 116
gta 801 pcssn 1.1.1 gt ssn 200
gta 802 pcssn 1.1.1 gt ntt 10
gta 803 pcssn 1.1.1 pcssn ssn 200
gta 804 pcssn 1.1.1 pcssn ssn 10
gta 805 qos-class 1 pcssn 7.255.7 pcssn ssn 100
```

## ■ show cs7 gtt config

```
gta 919 app-grp group1
!  
cs7 gtt selector mysel 10 2  
gta 919 app-grp group1
```

**Related Commands**

| Command                          | Description                                  |
|----------------------------------|----------------------------------------------|
| <b>cs7 gtt application-group</b> | Configures a GTT application group.          |
| <b>cs7 gtt concern-pclist</b>    | Specifies a GTT concerned point code list.   |
| <b>cs7 gtt map</b>               | Specifies a GTT Mated Application entry.     |
| <b>cs7 gtt selector</b>          | Creates a CTT selector.                      |
| <b>gta app-grp</b>               | Creates or modifies a GTA application group. |

# show cs7 gtt consistency

To display GTT point-codes that do not have routes provisioned for them, use the **show cs7 gtt consistency** privileged EXEC command.

**show cs7 gtt consistency**

**Syntax Description** This command has no arguments or keywords.

**Command Modes** Privileged EXEC

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | 12.2(25)SW1 | This command was introduced. |

**Examples** The following is sample output from the **show cs7 gtt consistency** command:

Router# **show cs7 gtt consistency**

Report: GTT MAP PCs which do not have associated MTP3 Full, Cluster, or Summary Route configured:

| PC       | Ref Count |
|----------|-----------|
| 1.1.1:0  | 1         |
| 1.1.2:0  | 1         |
| 1.1.3:0  | 1         |
| 1.10.1:0 | 1         |
| 1.10.2:0 | 1         |
| 2.2.2:0  | 0         |
| 6.5.6:0  | 1         |

Report: GTT AppGroups which contain PCs that do not have associated MTP3 Full, Cluster, or Summary Route configured:

| Application Group | PC      |
|-------------------|---------|
| test              | 2.2.2:0 |
| steve             | 1.1.1:0 |

Report: GTT Selectors which contain PCs that do not have associated MTP3 Full, Cluster, or Summary Route configured:

| Selector | GTA             | PC      |
|----------|-----------------|---------|
| test     | 123456789012345 | 1.1.1:0 |
| test     | 1               | 1.1.3:0 |
| test     | default         | 1.1.2:0 |

 show cs7 gtt consistency**Related Commands**

| Command                        | Description                                             |
|--------------------------------|---------------------------------------------------------|
| cs7 gtt application-group      | Configures a GTT application group.                     |
| cs7 gtt map                    | Configure a Global Title Mated Application (MAP) entry. |
| show cs7 gtt application-group | Displays CS7 GTT Application Group entries.             |
| show cs7 gtt gta               | Display CS7 GTT GTA entries.                            |
| show cs7 gtt map               | Dissplays CS7 GTT MAP entries.                          |



# show cs7 gtt gta

To display CS7 GTT GTA entries, use the **show cs7 gtt gta** privileged EXEC command.

**show cs7** [*instance-number*] **gtt gta** *selector-name* [**sgta** *sgta* **egta** *egta*]

| Syntax Description     |  |                                                                                             |
|------------------------|--|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> |  | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <i>selector-name</i>   |  | Selector name                                                                               |
| <b>sgta</b>            |  | Specifies a start global title address                                                      |
| <i>sgta</i>            |  | Starting global title address                                                               |
| <b>egta</b>            |  | Specifies an end global title address                                                       |
| <i>egta</i>            |  | Ending global title address.                                                                |

| Command Modes | Privileged EXEC |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Examples** The following is sample output of the **show cs7 gtt gta** command for all GTAs on the selector named c7gsp:

Router# **show cs7 gtt gta c7gsp**

```

Selector Name  TT  GTI  NP  NAI  DFLTQOS  #GTAs
-----
c7gsp         0   4   1   3           4

GTA           PC           RI   SSN  TT   App-Grp   QOS   ASNAME
-----
3330810       158           gt
3335114       245           pcssn  250
328                                     intergroup1
339           245           pcssn  250

```

Table 31 describes the fields in the display.

**Table 31** *show cs7 gtt gta Field Descriptions*

| Field         | Description                                  |
|---------------|----------------------------------------------|
| Selector Name | Selector                                     |
| TT            | Translation Type                             |
| GTI           | Global Title Indicator                       |
| NP            | Numbering Plan for the selector              |
| NAI           | Nature of Address Indicator for the selector |

**Table 31**      *show cs7 gtt gta Field Descriptions*

|         |                                              |
|---------|----------------------------------------------|
| DFLTQOS | Default QoS characteristics for the selector |
| GTAs    | Number of GTAs for the selector              |
| GTA     | Global Title Address                         |
| PC      | Point Code                                   |
| RI      | Routing Indicator                            |
| SSN     | Subsystem Number                             |
| TT      | Translation Type                             |
| App-Grp | Application Group                            |
| QoS     | Qos characteristics for the GTA              |

**Related Commands**

| Command                         | Description                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------|
| <b>gta app-grp</b>              | Creates or modifies a GTA entry that translates a GTA to a GTT application group.                    |
| <b>gta pcssn</b>                | Creates or modifies a GTA entry that translates a GTA to a point code and optional subsystem number. |
| <b>show cs7 gtt consistency</b> | Displays GTT point-codes that do not have routes provisioned for them.                               |

# show cs7 gtt map

To display CS7 GTT MAP entries, use the **show cs7 gtt map** privileged EXEC command.

**show cs7** [*instance-number*] **gtt map** [**ppc** *ppc* [**SSN** *ssn*]] [**status**]

| Syntax Description     |  |                                                                                             |
|------------------------|--|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> |  | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <b>ppc</b>             |  | Specifies a primary point code.                                                             |
| <i>pc</i>              |  | Primary SS7 point code, in the form zone.region.sp.                                         |
| <b>SSN</b>             |  | Specifies a subsystem number.                                                               |
| <i>ssn</i>             |  | Subsystem number in the range 2 through 255.                                                |
| <b>status</b>          |  | Display the status of the subsystems.                                                       |

| Command Modes | Privileged EXEC |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Examples** The following is sample output of the **show cs7 gtt map** command with no keywords:

```
Router# show cs7 gtt map
  PPC          PSSN  MULT  BPC          BSSN  ConPCLst      RRC ADJ  Ref
2.2.2         10    sol   -----   ---          off no    1
2.2.3         10    sol   -----   ---          off no    1
2.2.4         10    sol   -----   ---          off no    1
```

The following is sample output of the **show cs7 gtt map** command, with the **statistics** keyword. The output displays the real time status of each entry in the GTT MAP table:

```
Router# show cs7 gtt map statistics
  PC          SSN  PCST  SST  CONGESTED
668          250  UNAVL  avail  -----
1003         250  avail  avail  -----
1008         250  avail  UNAVL  -----
2020         250  avail  avail  level 2
```

Table 32 describes the fields in the display.

**Table 32** *show cs7 gtt map* Field Descriptions

| Field     | Description                              |
|-----------|------------------------------------------|
| PCST      | Point Code status.                       |
| SST       | Subsystem status.                        |
| CONGESTED | MTP3 Congestion level for the point-code |

## ■ show cs7 gtt map

| Related Commands | Command                  | Description                                                            |
|------------------|--------------------------|------------------------------------------------------------------------|
|                  | cs7 gtt map              | Creates a GTT Mated Application entry.                                 |
|                  | show cs7 gtt consistency | Displays GTT point-codes that do not have routes provisioned for them. |

# show cs7 gtt measurements

To display a summary of CS7 GTT/SCCP measurements, use the **show cs7 gtt measurements** privileged EXEC command.

```
show cs7 [instance-number] gtt measurements [app-grp app-grp-name] | [counters] | [map] |
[selector [selector]] | [systot] | [line-card [line-card-num]]
```

| Syntax Description     |                                                                                                                                                        |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>app-group</b>       | (Optional) Displays measurements kept on a GTT application group basis.                                                                                |
| <i>app-grp-name</i>    | GTT application group name.                                                                                                                            |
| <b>counters</b>        | (Optional) Displays Q.752 counters for GTT.                                                                                                            |
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0.                                                            |
| <b>line-card</b>       | (Optional) Display measurements kept on a line card basis. The line-card option is available only if MTP3 offload is enabled (only on the Cisco 7500.) |
| <i>line-card-num</i>   | (Optional) Line card number. If <i>line-card-num</i> is not specified, all line-card measurements for all line cards are displayed.                    |
| <b>map</b>             | (Optional) Displays measurements kept on a GTT MAP basis.                                                                                              |
| <b>selector</b>        | (Optional) Display statistics kept on a GTT selector basis.                                                                                            |
| <i>selector</i>        | (Optional) Display statistics for a specified selector.                                                                                                |
| <b>systot</b>          | (Optional) Displays measurements kept on a system-wide basis.                                                                                          |

**Defaults** If no keyword is specified, the system totals (systot) is displayed.

**Command Modes** Privileged EXEC

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Examples** The following is sample output of the **show cs7 gtt measurements map** command:

```
Router# show cs7 gtt measurements map
GTT/SCCP Mated Application Measurements Report

Point Code  SSN  USED      CONG_RR  PC_UNAV  SS_UNAV  PC_CONG  SS_CONG  MTP3_FAIL
2.2.2       10   0         0         0         0         0         0         0
2.2.3       10   0         0         0         0         0         0         0
2.2.4       10   0         0         0         0         0         0         0
```

## show cs7 gtt measurements

The following is sample output of the **show cs7 gtt measurements selector** command with no selector specified:

```
Router# show cs7 gtt measurements selector
GTT/SCCP Selector Measurements Report

Selector Name  GTT_PERF      GTA_NF
c7gsp          0              0
itp_gtt        0              0
test           0              0
```

The following is sample output of the **show cs7 gtt measurements selector** command for the selector named c7gsp:

```
Router# show cs7 gtt measurements selector c7gsp
GTT/SCCP Selector Measurements Report

Selector Name  GTT_PERF      GTA_NF
c7gsp          0              0
```

The following is sample output of the **show cs7 gtt measurements systot** command:

```
Router# show cs7 gtt measurements systot
GTT/SCCP System Wide Measurements Report

GTT_PERF      GTTSEL_NF      BAD_GT_FMT      GTA_NF      CONGEST_RR
0              0              0              0              0

GTT_HOP_ERR    GTT_MAP_NF      UNEQUIP_SS      SCCP_UNAV      DPC_UNAV
0              0              0              0              0

SS_UNAV        DPC_CONG        SS_CONG          MTP3_FAIL
0              0              0              0
```

Table 33 describes the fields in the display.

**Table 33** *show cs7 gtt measurements Field Descriptions*

| Field       | Description                                                                                                                                          |
|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| GTT_PERF    | The total # of successful translations performed                                                                                                     |
| GTTSEL_NF   | The total # of times a message requiring GTT was received with a TT, GTI, [NP, NAI] that did not exist in the GTT selector table.                    |
| BAD_GT_FMT  | The total # of times a message requiring GTT was received with an invalid or not support format.                                                     |
| GTA_NF      | The total # of times a message requiring GTT was received with a Global Title Address that did not exist in the GTT table for the matching selector. |
| CONGEST_RR  | The total # of times a message requiring GTT was alternate routed to a backup because of congestion.                                                 |
| GTT_HOP_ERR | The total # of times a message requiring GTT was received with a hop count that violated the rules concerning XUDT messages.                         |
| GTT_MAP_NF  | The total # of times a message requiring GTT was received and final GTT was performed to a PC and SSN that was not provisioned in the GTT MAP table. |
| UNEQUIP_SS  | The total number of times SCCP failed to route due to a subsystem being unequipped in the MAP table.                                                 |
| SCCP_UNAV   | The total number of times SCCP failed to route due the SCCP subsystem being unavailable on a remote node.                                            |

**Table 33** *show cs7 gtt measurements Field Descriptions*

|           |                                                                                                                                                                                  |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DPC_UNAV  | The total number of times SCCP failed to route due the destination point-code being unavailable.                                                                                 |
| SS_UNAV   | The total number of times SCCP failed to route due the subsystem on a remote node being unavailable.                                                                             |
| DPC_CONG  | The total number of times SCCP failed to route due the destination point-code being congested.                                                                                   |
| SS_CONG   | The total number of times SCCP failed to route due the subsystem on a remote node being congested.                                                                               |
| MTP3_FAIL | The total number of times SCCP failed to route due to an MTP3 failure. (This occurs when a point code used in the GTT table has no configured route in the MTP3 routing tables.) |

#### Related Commands

| Command                      | Description                                                                                                 |
|------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>show cs7 gtt map</b>      | Displays a GTT Mated Application entry.                                                                     |
| <b>show cs7 gtt selector</b> | Displays GTT selectors.                                                                                     |
| <b>show tech-support</b>     | Collects and Displays a large amount of ITP configuration information that can be used for troubleshooting. |

# show cs7 gtt selector

To display CS7 GTT selectors, use the show cs7 gtt selector privileged EXEC command.

**show cs7** [*instance-number*] **gtt selector** [**gti** *gti*] [**nai** *nai*] [**name** *selector-name*] [**np** *np*] [**tt** *tt*]

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <b>gti</b>             | (Optional) Specifies a global title indicator.                                              |
| <i>gti</i>             | Global title indicator. Valid range is 0 through 4.                                         |
| <b>nai</b>             | (Optional) Specifies a nature of address indicator.                                         |
| <i>nai</i>             | Nature of address indicator.                                                                |
| <b>name</b>            | (Optional) CS7 GTT selector name.                                                           |
| <i>name</i>            | Selector name.                                                                              |
| <b>np</b>              | (Optional) Specifies a numbering plan.                                                      |
| <i>np</i>              | Numbering plan.                                                                             |
| <b>tt</b>              | (Optional) Specifies a translation type.                                                    |
| <i>tt</i>              | Translation type.                                                                           |

## Command Modes

EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |
| 12.2(4)MB | ttmap keyword added.         |

## Examples

The following is sample output from the **show cs7 gtt selector** command with no keyword options:

```
Router# show cs7 gtt selector
  Selector Name   TT   GTI   NP   NAI   DFLTQOS   #GTAs
  -----
  c7gsp          0     4     1     3           3
  itp_gtt        0     4     0     4           1
```

## Related Commands

| Command                 | Description                            |
|-------------------------|----------------------------------------|
| <b>cs7 gtt selector</b> | Creates and configures a GTT selector. |



# show cs7 linkset

To display ITP linkset information, use the **show cs7 linkset** EXEC command.

**show cs7** [*instance-number*] **linkset** [*ls-name* | **routes** | **sls** | **statistics** | **state** | **timers** | **ttmap**] [**brief** | **detailed**]

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <b>brief</b>           | (Optional) Does not display individual links.                                               |
| <b>cell</b>            | (Optional) Displays HSL cell counts for the linkset.                                        |
| <b>detailed</b>        | (Optional) Displays detailed linkset information                                            |
| <i>ls-name</i>         | (Optional) Linkset name. Displays information for a particular linkset.                     |
| <b>routes</b>          | (Optional) Displays all routes using a linkset.                                             |
| <b>sls</b>             | (Optional) Displays SLC to SLS relationship.                                                |
| <b>state</b>           | (Optional) Displays MTP3 states for link.                                                   |
| <b>statistics</b>      | (Optional) Displays link usage statistics.                                                  |
| <b>timers</b>          | (Optional) Displays timer values.                                                           |
| <b>ttmap</b>           | (Optional) Display TT mappings for linkset.                                                 |
| <b>utilization</b>     | (Optional) Displays link utilization statistics.                                            |

## Command Modes

EXEC

## Command History

| Release    | Modification                                       |
|------------|----------------------------------------------------|
| 12.2(1)MB  | This command was introduced.                       |
| 12.2(4)MB  | Keyword <b>ttmap</b> added.                        |
| 12.2(4)MB5 | Keywords <b>cell</b> and <b>utilization</b> added. |

## Examples

### Linkset States

- **UNAVAIL** Indicates the linkset does not have any “available” links and cannot transport traffic.
- **shutdown** Indicates the linkset has been shutdown in the configuration.
- **avail** Indicates the linkset has at least one available link and can carry traffic.

### Link States

- **UNAVAIL** Indicates the link is not available to carry traffic. This can occur if the link is remotely or locally inhibited by a user. It can also be unavailable if MTP2/M2PA has not been able to successfully activate the link connection or the link test messages sent by MTP3 are not being acknowledged.
- **shutdown** Indicates the link has been shutdown in the configuration. A link is **shutdown** when it is shutdown at the MTP3 layer.

- **avail** Indicates the link is active and able to transport traffic.
- **FAILED** A link is **FAILED** when the link is not shutdown but is unavailable at layer2 for some reason. It is **FAILED** when the link is unavailable because the link has been inhibited or it is blocked.
- **sys-shutdown** Indicates the link has been shutdown by the system. A link may be in this state when:
  - MTP3 offload is configured and the system is performing error recovery on the VIP
  - MTP3 offload has been permanently disabled on a VIP by the system due to excessive errors. When MTP3 offload has been permanently disabled on a VIP (by the system) all links on that VIP will be in the sys-shutdown state.

The following is sample output from the **show cs7 linkset** command with no keyword options:

```
Router# show cs7 linkset
lsn=to_sandy      apc=1.4.2      state=avail      available/links=1/1
  SLC  Interface      Service  PeerState      Inhib
  00   172.18.44.151 4096 4096      avail    InService      -----

lsn=to_doc        apc=1.4.3      state=avail      available/links=1/1
  SLC  Interface      Service  PeerState      Inhib
  00   Serial2/0/0:0      avail    -----      -----
```

The following is sample output from the **show cs7 linkset** command with the **cell** keyword:

```
Router# show cs7 linkset cell
lsn=7570c_to_757  apc=3.10.4      state=avail      available/links=1/1
  SLC  Cells In   Cells Out
  0    12285197   10902248
```

The following is sample output from the **show cs7 linkset** command with the **detail** keyword:

```
MSTP#show cs7 linkset STP1 detail
lsn=STP1          apc=2.76.0      state=avail      avail/links=1/1
  Local Point Code =2.24.0      Adjacent Restart Enabled = Y
  Broadcast TFP     =Y          Broadcast TFA      = Y
  Access Group IN   = NONE      Access Group OUT   = NONE
  MTP3 Accounting   = Y          GTT Accounting     = N
  Rotate SLS        = Y          Remote Processor Outage = N
  SLS Shift         = 0
  Input QOS Match   = NONE

  SLC QoS Interface      Service  PeerState      Inhib
  00  0 172.18.44.181 4100 4100      avail    InService      -----
        Address List  Pri  Eff  State      SRTT
        172.18.44.181  P   E   active      47 ms
```

The following is sample output from the **show cs7 linkset** command with the **routes** keyword:

```
Router# show cs7 linkset routes
lsn=to_sandy      apc=1.4.2      state=avail      available/links=1/1
Destination      Cong Prio QoS Route  Route Table
-----
1.4.3/14         acces      9      avail  system
1.5.3/14         INACC      9      UNAVAIL system
1.3.3/14         acces      9      avail  system
1.2.3/14         acces      9      avail  system
1.4.2/14         acces      1      avail  system

lsn=to_doc        apc=1.4.3      state=avail      available/links=1/1
Destination      Cong Prio QoS Route  Route Table
-----
1.4.3/14         acces      1      avail  system
```

The following is partial sample output for an ITU variant ITP configured for QoS. The output is from the **show cs7 linkset** command with the **sls** keyword. QoS class 0 (default class) shows peer link member slc 0 and QoS class 1 shows peer link member slc 1. QoS class 2 does not have any peer link members available.

```
router# show cs7 linkset michael sls
lsn=michael      apc=3.3.3      state=avail      available/links=2/3

QOS Level 0
sls->slc    sls->slc    sls->slc    sls->slc
00->00      04->00      08->00      12->00
01->00      05->00      09->00      13->00
02->00      06->00      10->00      14->00
03->00      07->00      11->00      15->00

QOS Level 1
sls->slc    sls->slc    sls->slc    sls->slc
00->01      04->01      08->01      12->01
01->01      05->01      09->01      13->01
02->01      06->01      10->01      14->01
03->01      07->01      11->01      15->01

No available links for QOS Level 2...
```

The following is sample output from the **show cs7 linkset** command with the **state** keyword:

```
router# show cs7 linkset STP1 state
lsn=STP1 apc=2.76.0 state=avail avail/links=1/1
Broadcast TFP = Y Broadcast TFA = Y
TCBC Q depth (cur/high) = 0/0
SLC Interface Service PeerState Inhib
00 172.18.44.181 4100 4100 avail InService -----
Link Congestion Level = 0
LSAC state = LSAC_active , emergency = F
LSAC link_loaded = T, stm_ready_rcvd = F
Link shutdown by system = NO
TSRC state =idle
TSRC link_available = T, link_inhibited = F
TSRC changeover_complete = F TSRC adjacent SP restart = F
TLAC state =available, management_request = F
TLAC locally_inhibited = F
TLAC remotely_inhibited = F, inhibit_retry = F
TLAC emergency_changeover_order = F, changeback_in_progress = F
TLAC changeover_in_progress = F, failed = F
TLAC remote_blocked = F, adjacent_SP_restarting = F
TLAC SP_restarting = F
TLAC fsn = 0
```

## show cs7 linkset

```

TCOC state = idle, buffering = F
TCOC retrieveQ depth (cur/high) = 0/0
TCOC bufferedQ depth (cur/high) = 0/0
TCOC link_unavailable = F
TCOC sequence controlled = 0, time controlled = 0
TCOC msu initiated = 0, not required = 0
TCOC not retrievable = 0, retrieve timeout = 0
TCBC state = idle, buffering = F
TCBC sequence controlled = 0 time controlled = 1
TCBC no traffic to divert = 0 not required = 0

```

The following is sample output from the **show cs7 linkset** command with the **statistics** keyword:

```

Router# show cs7 linkset statistics
lsn=to_sandy      apc=1.4.2      state=avail      available/links=1/1
  SLC      MSU In      MSU Out      Drops      LSSU In      LSSU Out      ByteCnt In      ByteCnt Out
  00      31978      32773      0      4      6      570321      583852

lsn=to_doc        apc=1.4.3      state=avail      available/links=1/1
  SLC      MSU In      MSU Out      Drops      LSSU In      LSSU Out      ByteCnt In      ByteCnt Out
  00      26369      26681      0      501      620      316140      320398

```

The following is sample output from the **show cs7 linkset** command with the **timers** keyword:



### Note

The Scope field indicates where the linkset timer value was configured. For example, if the linkset timer value was configured from the global configuration level, the scope field displays “global.” If the linkset timer value was configured from the linkset submode configuration level, the scope field displays “ls.”

```

Router# show cs7 linkset to_doc timers
lsn=to_doc        apc=1.4.3      state=avail      available/links=1/1
Timer  Value(ms) Description                                     Scope
-----
t19      68000 (supervision timer during MTP restart)             ls
t21      64000 (MTP restart timer at adjacent signaling point)      ls

link slc = 0
Timer  Value(ms) Description                                     Scope
-----
t01      800 (delay to avoid msg mis-seq. on changeover)             link
t02      1400 (waiting for changeover acknowledgement)               link
t03      800 (time controlled delay to avoid mis-seq.)               link
t04      800 (waiting for change back ack.(first attempt))           link
t05      800 (waiting for change back ack.(second attempt))          link
t12      1150 (waiting for uninhibit acknowledgement)                link
t13      1150 (waiting for force uninhibit)                          link
t14      2500 (waiting for inhibition acknowledgement)               link
t17      1150 (delay to avoid oscillation of initial alignment)      link
t22      300000 (local inhibit test timer)                           link
t23      300000 (remote inhibit test timer)                          link
t24      500 (stabilizing timer after local processor outage)         link
slt-t01  8000 (signaling link test acknowledgement timer)           link
slt-t02  60000 (interval timer for sending test msgs.)              link
retry    60000 (link activation retry timer)                          link

```

The following is sample output from the **show cs7 linkset** command with the **tmap** keyword:

```

Router# show cs7 linkset tmap
lsn=ernesto      apc=1.13.1      state=avail      available/links=1/1
  ETT  MTTin  MTTout
  254  10      ---

```

```
lsn=mgts2          apc=1.12.1      state=avail      available/links=1/1
  ETT  MTTin  MTTout
  10   254   254

lsn=mgts1          apc=1.11.1      state=avail      available/links=1/1
  ETT  MTTin  MTTout
   6   254   ---
 254   11    11
```

The following is sample output from the **show cs7 linkset** command with the **utilization** keyword:

```
Router #show cs7 linkset to-75b-fast utilization
Sample Interval(seconds):120  Thresholds onset/abate:40/30
lsn=to-75b-fast  apc=4.1.2      state=avail      available/links=4/5
  Link Utilization Thresholds Plan-capacity(bps) Kbps
    SLC      Rec  Sent  Rec  Sent  Rec  Sent      Rec  Sent
    0         0    0    50  50   128  128         0    0
    1         0    0    40  40   256  256         0    0
    7         0    0    40  40     0    0         0    0
    8         0    0    40  40     0    0         0    0
   13         0    0    40  40     0    0         0    0
```

Where

```
SLC Signaling link code
Link Utilization Rec => link receive utilization 0-999
Link Utilization Sent => link receive utilization 0-999
Link Thresholds Rec => receive threshold to generate traps
Link Thresholds Sent => Sent threshold to generate traps
Link Plan-capacity Rec => estimate of link receive capacity
Link Plan-capacity Sent => estimate of link send capacity
Kbps Rec => average Kilobits received per second on link
Kbps Sent => average Kilobits sent per second on link
```

## Related Commands

| Command                         | Description                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>cs7 prompt enhanced</b>      | Configures the command line interface (CLI) prompt to display the current linkset.                          |
| <b>cs7 util-abate</b>           | Specifies the integer range utilization threshold.                                                          |
| <b>cs7 util-sample-interval</b> | Specifies the sample interval for link utilization.                                                         |
| <b>cs7 util-threshold</b>       | Specifies the global threshold for link utilization.                                                        |
| <b>link-timer</b>               | Configures MTP3 timers that control the link.                                                               |
| <b>plan-capacity-rcvd</b>       | Specifies the link receive planning capacity.                                                               |
| <b>plan-capacity-send</b>       | Specifies the link send planning capacity.                                                                  |
| <b>show cs7 mtp3 timers</b>     | Displays all global timers, and all linkset and link timers that have been defined at the global level.     |
| <b>show tech-support</b>        | Collects and displays a large amount of ITP configuration information that can be used for troubleshooting. |
| <b>threshold-receive</b>        | Specifies the receive threshold for a link.                                                                 |
| <b>threshold-send</b>           | Specifies the send threshold for a link.                                                                    |
| <b>timer (CS7 Linkset)</b>      | Configures MTP3 timers that control the linkset (and, optionally, timers for links on the linkset.)         |
| <b>ttmap</b>                    | Assigns a translation type mapping rule to the linkset.                                                     |

# show cs7 log

To display the current log, use the **show cs7 log** command in global configuration mode.

**show cs7 log** *type*

|                           |                                        |
|---------------------------|----------------------------------------|
| <b>Syntax Description</b> | <i>type</i> Specifies the type of log. |
|---------------------------|----------------------------------------|

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | Global configuration |
|----------------------|----------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

## Examples

The is sample output from the **show cs7 log gtt** command:

```
itp# show cs7 log gtt
```

```
Error Log: 779 of 10000 errors in log.
```

```
-----
11:56:40 : No translation configured.
MsgType udt   LS: mgts2
OPC: 1-12-1   CgPA: tt 9 gta 1065433330 pc 1-12-1
DPC: 1-2-2    CdPA: tt 10 gta 712148002887 ssn 7
```

```
11:56:40 : No translation configured.
MsgType udt   LS: mgts1
OPC: 1-11-1   CgPA: tt 9 gta 1065433330 pc 1-11-1
DPC: 1-2-2    CdPA: tt 10 gta 712148002887 ssn 7
```

```
11:56:40 : No translation configured.
MsgType udt   LS: mgts2
OPC: 1-12-1   CgPA: tt 9 gta 1065433330 pc 1-12-1
DPC: 1-2-2    CdPA: tt 10 gta 712148002887 ssn 7
```

|                         |                           |                                                                                                                             |
|-------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>            | <b>Description</b>                                                                                                          |
|                         | <b>cs7 log</b>            | Enables the ITP to log events, errors, and traces                                                                           |
|                         | <b>cs7 log checkpoint</b> | Enables automatic archiving of a log to a remote or local destination at a specified interval of every <i>secs</i> seconds. |
|                         | <b>cs7 save log</b>       | Saves a log to a file.                                                                                                      |

# show cs7 m2pa

To display ITP M2PA statistics, use the **show cs7 m2pa** EXEC command.

**show cs7 m2pa** {[**link-extender** *serial interface-number*]} | [**local-peer** *port-num*] | [**peer** *ls-name* *[slc]*] | [**sctp** *ls-name* *[slc]*] | [**state** *ls-name* *[slc]*] | [**statistics** *ls-name* *[slc]*]

## Syntax Description

|                         |                                                                   |
|-------------------------|-------------------------------------------------------------------|
| <b>link-extender</b>    | (Optional) Displays M2PA link extender peer instance.             |
| <b>serial</b>           | (Optional) Serial interface.                                      |
| <i>interface-number</i> | Serial interface number.                                          |
| <b>local-peer</b>       | (Optional) Displays an M2PA local peer instance.                  |
| <i>port-num</i>         | Port number of the local peer. Valid range is 4096 through 32767. |
| <b>peer</b>             | (Optional) Displays an M2PA remote peer instance.                 |
| <i>ls-name</i>          | Linkset name.                                                     |
| <i>slc</i>              | (Optional) Signaling Link Code. Valid range is 0 through 15.      |
| <b>sctp</b>             | (Optional) Displays SCTP peer parameters.                         |
| <i>ls-name</i>          | Linkset name.                                                     |
| <i>slc</i>              | (Optional) Signaling Link Code. Valid range is 0 through 15.      |
| <b>state</b>            | (Optional) Display the M2PA state machine states.                 |
| <b>statistics</b>       | (Optional) Display the M2PA peer statistics.                      |

## Command Modes

EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Examples

The following is sample output from the **show cs7 m2pa** command using the **sctp** keyword:

```
Router#show cs7 m2pa sctp
** SCTP Association Parameters AssocID:0x00010002

AssocID:      0x00010002      Instance ID: 7      Offload: No
Assoc state: ESTABLISHED      Context:      2177134272      Uptime: 01:34:00.294
Local port: 9000
Local addresses: 172.18.44.162

Remote port: 9000
Primary dest addr: 172.18.44.170
Effective primary dest addr: 172.18.44.170
Destination addresses:

172.18.44.170      State: ACTIVE
Heartbeats:      Enabled      Timeout: 30000 ms
RTO/RTT/SRTT: 1000/0/154 ms      TOS:      0      MTU: 1500
```

## ■ show cs7 m2pa

```

cwnd:          3040          ssthresh: 64000          outstand: 0
Retrans cwnd rate: 50          Retrans cwnd mode: FastRetransmit
FastRetrans cwnd rate: 25          Idle dest cwnd rate: 50
Num retrans: 0          Max retrans: 4          Num times failed: 0
172.18.44.162 retrans: 0

Local vertag: 56773F4D Remote vertag: 4CCCC900
Num inbound streams: 2 outbound streams: 2
Max assoc retrans: 10 Max init retrans: 8 CumSack timeout: 200 ms Bundle timeout: 5 ms
enabled
Min RTO: 1000 ms Max RTO: 1000 ms
LocalRwnd: 64000 Low: 63951 RemoteRwnd: 64000 Low: 63988
Congest levels: 4 current level: 0 high mark: 2 chkSum: crc32

```

The following is sample output from the **show cs7 m2pa** command using the **stats** keyword with the linkset name (*ls-name* argument) **to\_nyc** and the signaling link code value (*slc* argument) **0**:

```

Router#show cs7 m2pa statistics to_nyc 0
CS7 M2PA Peer Statistics for (50.50.50.1 : 3000)
M2PA Peer State: InService
SCTP Peer State: SCTP_ESTABLISHED
MSU_XMIT_Count:          9064          MSU_RCV_Count:          9070
MSU_XMIT_Fail_Count: 0          MSU_XMIT_Drop_Count: 0
LSSU_XMIT_Count: 11          LSSU_RCV_Count: 11
LSSU_XMIT_Fail_Count: 0          LSSU_RCV_InvalidCount: 0
LSSU_XMIT_SIISCount: 11          LSSU_RCV_SIISCount: 11
LSSU_XMIT_SIPOCount: 0          LSSU_RCV_SIPOCount: 0
LSSU_XMIT_SIPOECount: 0          LSSU_RCV_SIPOECount: 0
LSSU_XMIT_SIBCount: 0          LSSU_RCV_SIBCount: 0
LSSU_XMIT_SIBECCount: 0          LSSU_RCV_SIBECCount: 0
BytesTransmitted: 189523          BytesReceived: 189625
Remote_PO_Count: 0          Remote_Congestion_Count: 0
CongestionCount: 0
RxCongestion status: Abated          RxCongestionCount drops: 0
RxCongestionCount onset: 0          RxCongestionCount abate: 0
TxCongestion status: Abated (Level0)
Level 1 CongestionCount: 0          Level 2 CongestionCount: 0
Level 3 CongestionCount: 0          Level 4 CongestionCount: 0
T1_TMO_Count: 0          T6_TMO_Count: 0

```

The following is sample output from the **show cs7 m2pa** command using the **state** keyword with the linkset name (*ls-name* argument) **to\_nyc** and the signaling link code value (*slc* argument) **0**:

```

Router# show cs7 m2pa state to_nyc 0
CS7 M2PA states for Peer (50.50.50.1 : 3000)
M2PA Peer State: InService          SCTP Peer State: SCTP_ESTABLISHED
T1 aligned/ready: 5000 ms          T6 remote cong: 3000 ms
Local Processor Outage: FALSE          Remote Processor Outage: FALSE
Transport Handle: 55          InService LSSU Recv'd: TRUE

```

The following is sample output from the **show cs7 m2pa** command using the **peer** keyword with the linkset name (*ls-name* argument) **to\_nyc** and the signaling link code value (*slc* argument) **0**:

```

Router# show cs7 m2pa peer to_nyc 0
CS7 M2PA internal Peer Control Block Info for (50.50.50.1 : 3000)
Peer Protocol: sctp          Peer Port: 3000
Peer Address: 50.50.50.1          RTO: 1000 ms          SRTT: 28 ms

```

```

Primary Peer Address: 50.50.50.1

```



```

Effective Peer Address: 50.50.50.1
Transport Handle: 55
Transport Handle History: 0x00010002 0x00000000 0x00000000 0x00000000
M2PA Peer State: InService
Local Processor Outage: FALSE
T1 aligned/ready: 5000 ms
Local Recv Window: 64000
InService LSSU Recv'd: TRUE
Peer Init Retransmission: 8
Peer Path Retransmission: 4
Bundle Status: ON
Minimum RTO: 1000 ms
IP Precedence: 0
Keep Alive: TRUE
Initial cwnd: 3000
Retrans cwnd rate: 50
FastRetransmit cwnd rate: 25
Tx Queue Depth: 1000
TxCongestOnset Level1: 500 ( 50% of Tx Queue Depth)
TxCongestOnset Level2: 700 ( 70% of Tx Queue Depth)
TxCongestOnset Level3: 900 ( 90% of Tx Queue Depth)
TxCongestOnset Level4: 1000 (100% of Tx Queue Depth)
Debug Mask: 0x00000000

Passive Peer: FALSE
SCTP Peer State: SCTP_ESTABLISHED
Remote Processor Outage: FALSE
T6 remote cong: 3000 ms
Remote Recv Window: 64000
Assoc Retransmission: 10
Peer Init RTO Max: 1000 ms
Cumulative Sack Timeout: 200 ms
Bundle Timeout: 5 ms
Maximum RTO: 1000 ms
QoS class: 0
Keep Alive Timeout: 30000 ms
Idle cwnd rate: 50
Retrans cwnd mode: FastRetrans

```

The following is sample output from the **show cs7 m2pa** command using the **local-peer** keyword with the port number of the local peer (*port-num* argument) **3000**:

```

Router# show cs7 m2pa local-peer 3000
CS7 M2PA Local Peer Info for local port = 3000
Local Port = 3000
Local IP = 60.60.60.1
SCTP Instance Handle: 0 Offload: No
Instance Local Recv Window: 64000 Instance maxInitRetrans: 8
Instance maxInitTimeout: 1000 ms Instance Unordered Priority: EQUAL
Instance IP Precedence: 0

```

The following is sample output from the **show cs7 m2pa** command using the **sctp** keyword with the linkset name (*ls-name* argument) **to\_nyc** and the signaling link code value (*slc* argument) **0**:

```

Router# show cs7 m2pa sctp to_nyc 0
** SCTP Association Parameters **

AssocID: 55, SourceID: 55 Instance ID: 0
Assoc state: ESTABLISHED Context: 2175613908 Uptime: 01:11:55.322
Local port: 3000
Local addresses: 60.60.60.1

Remote port: 3000
Primary dest addr: 50.50.50.1
Effective primary dest addr: 50.50.50.1
Destination addresses:

50.50.50.1 State: ACTIVE
Heartbeats: Enabled Timeout: 30000 ms
RTO/RTT/SRTT: 1000/200/28 ms TOS: 0 MTU: 1500
cwnd: 3040 ssthresh: 64000 outstand: 0
Num retrans: 0 Max retrans: 4 Num times failed: 0
60.60.60.1 retrans: 0

```

```

Local vertag: 7078E901 Remote vertag: ADB86C7A
Num inbound streams: 2 outbound streams: 2
Max assoc retrans: 10 Max init retrans: 8
CumSack timeout: 200 ms Bundle timeout: 5 ms
Min RTO: 1000 ms Max RTO: 1000 ms
LocalRwnd: 64000 Low: 63964 RemoteRwnd: 64000 Low: 64000
Congest levels: 4 current level: 0 high mark: 2 cksum type: crc32

```

Table 34 describes the fields in the **show cs7 m2pa stats** display.

**Table 34** *show cs7 m2pa stats Field Descriptions*

| Field                   | Description                                                           |
|-------------------------|-----------------------------------------------------------------------|
| M2PA Peer State         | State of the M2PA peer link                                           |
| SCTP Peer State         | State of the associated SCTP peer link                                |
| MSU_XMIT_Count          | Number of Message Signal Units transmitted                            |
| MSU_RCV_Count           | Number of Message Signal Units received                               |
| LSSU_XMIT_Count         | Total number of Link Status Signal Units transmitted                  |
| LSSU_XMIT_SIISCount     | Number of Link Status In Service Signal Units transmitted             |
| LSSU_XMIT_SIPOCount     | Number of Link Status Processor Outage Signal Units transmitted       |
| LSSU_XMIT_SIPOECount    | Number of Link Status Processor Outage Ended Signal Units transmitted |
| LSSU_XMIT_SIBCount      | Number of Link Status Busy Signal Units transmitted                   |
| LSSU_XMIT_SIBCount      | Number of Link Status Busy Ended Signal Units transmitted             |
| LSSU_RCV_Count          | Total number of Link Status Signal Units received                     |
| LSSU_RCV_SIISCount      | Number of Link Status In Service Signal Units received                |
| LSSU_RCV_SIPOCount      | Number of Link Status Processor Outage Signal Units received          |
| LSSU_RCV_SIPOECount     | Number of Link Status Processor Outage Ended Signal Units received    |
| LSSU_RCV_SIBCount       | Number of Link Status Busy Signal Units received                      |
| LSSU_RCV_SIBCount       | Number of Link Status Busy Ended Signal Units received                |
| LSSU_RCV_InvalidCount   | Total number of invalid Link Status Signal Units received             |
| BytesTransmitted        | Total number of bytes transmitted (MSUs only)                         |
| BytesReceived           | Total number of bytes received (MSU's only)                           |
| Remote_PO_Count         | Number of times Remote Processor Outage occurred                      |
| Remote_Congestion_Count | Number of times remote congestion occurred                            |
| CongestionCount         | Number of times peer link when into congestion                        |
| T1_TMO_Count            | Number of times link alignment timer expired                          |
| T6_TMO_Count            | Number of times remote congestion timer expired                       |

Table 35 describes the fields in the **show cs7 m2pa state** display.

**Table 35** *show cs7 m2pa state Field Descriptions*

| Field                   | Description                                                               |
|-------------------------|---------------------------------------------------------------------------|
| M2PA Peer State         | State of the M2PA peer link                                               |
| SCTP Peer State         | State of the associated SCTP peer link                                    |
| T1 aligned/ready        | Current value of the T1 link alignment timer                              |
| T6 remote cong          | Current value of the T6 remote congestion timer                           |
| Local Processor Outage  | Current condition of local Processor Outage                               |
| Remote Processor Outage | Current condition of Remote Processor Outage                              |
| InService LSSU Recv'd   | Indicates whether a Link Status in Service Signal Units has been received |
| Transport Handle        | Identifier assigned by transport for this peer                            |

Table 36 describes the fields in the **show cs7 m2pa peer** display.

**Table 36** *show cs7 m2pa peer Field Descriptions*

| Field                   | Description                                                               |
|-------------------------|---------------------------------------------------------------------------|
| Peer Protocol           | Transport protocol used by M2PA.                                          |
| Peer Port               | Remote peer port number.                                                  |
| Peer Address            | IP address of remote peer.                                                |
| RTO                     | Retransmission timeout value for this remote IP address.                  |
| SRTT                    | Smoothed Round-Trip-Time for this remote IP address.                      |
| Primary Peer Address    | Primary remote IP address.                                                |
| Effective Peer Address  | Effective remote IP address=50.50.50.2.                                   |
| Transport Handle        | Identifier assigned by transport layer to identify this peer link.        |
| Passive Peer            | Indicates whether the remote peer should initiate the connection.         |
| M2PA Peer State         | State of the M2PA peer link.                                              |
| SCTP Peer State         | State of the SCTP peer link.                                              |
| Local Processor Outage  | Indicates whether local processor outage condition is present.            |
| Remote Processor Outage | Indicates whether remote processor outage condition is present.           |
| T1 aligned/ready        | T1 link alignment timer timeout.                                          |
| T6 remote cong          | T6 remote congestion timer timeout.                                       |
| Local Recv Window       | Local receive window size.                                                |
| Remote Recv Window      | Remote receive window size.                                               |
| InService LSSu Recv'd   | Indicates whether a Link Status In Service Signal Unit has been received. |
| Assoc Retransmission    | Maximum number of retransmissions allowed for the association.            |

**Table 36** *show cs7 m2pa peer Field Descriptions (continued)*

| Field                    | Description                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------|
| Peer Init Retransmission | Maximum number of retries allowed for peer initialization packets.                                              |
| Peer Init RTO Max        | Maximum retransmission timeout for peer initialization packets.                                                 |
| Peer Path Retransmission | Maximum number of retries before the corresponding address is marked inactive.                                  |
| Cumulative Sack Timeout  | Cumulative Acknowledgement timer.                                                                               |
| Bundle Status            | Indicates whether bundling is enabled.                                                                          |
| Bundle Timeout           | Maximum amount of time SCTP waits for messages from M2PA for bundling.                                          |
| Minimum RTO              | Minimum retransmission timeout.                                                                                 |
| Maximum RTO              | Maximum retransmission timeout.                                                                                 |
| IP Precedence            | IP precedence bits setting in IP header for this peer.                                                          |
| QoS                      | QoS class.                                                                                                      |
| Keep Alive               | Indicates whether keepalives are enabled.                                                                       |
| Keep Alive Timeout       | Keepalive timeout value.                                                                                        |
| Initial cwnd             | Size in bytes of the SCTP initial congestion <i>window-size</i> .                                               |
| Idle cwnd rate           | Rate at which the size of the SCTP congestion window will be decreased due to the association being idle.       |
| Retrans cwnd rate        | Rate at which the size of the SCTP congestion window will be decreased due to retransmission timer expirations. |
| Retrans cwnd mode        | The congestion window is set for a fast-retransmission.                                                         |
| FastRetransmit cwnd rate | Rate at which the size of the SCTP congestion window will be decreased due to a fast retransmission.            |
| Tx Queue Depth           | Maximum-allowed depth of transmitQ: (Used by M2PA to determine txCongestion thresholds.)                        |
| TxCongestionOnset Level1 | M2PA transmit congestion level threshold. Value results from configuration of the tx-queue-depth command        |
| TxCongestionOnset Level2 | M2PA transmit congestion level threshold. Value results from configuration of the tx-queue-depth command        |
| TxCongestionOnset Level3 | M2PA transmit congestion level threshold. Value results from configuration of the tx-queue-depth command        |
| TxCongestionOnset Level4 | M2PA transmit congestion level threshold. Value results from configuration of the tx-queue-depth command        |
| Debug Mask               | Mask indicating which levels of M2PA debug are active.                                                          |

Table 37 describes the fields in the **show cs7 m2pa local-peer** display.

**Table 37** *show cs7 m2pa local peer Field Descriptions*

| Field                       | Description                                                                                                 |
|-----------------------------|-------------------------------------------------------------------------------------------------------------|
| Local Port                  | Value of local port number.                                                                                 |
| Local IP                    | IP addresses assigned to this local peer.                                                                   |
| SCTP Instance Handle        | Identifier assigned by transport to identify this local peer.                                               |
| Instance Local Recv Window  | Current value of local receive window.                                                                      |
| Instance maxInitRetrans     | Default number of retries of initialization packets for peers assigned to this local peer.                  |
| Instance maxInitTimeout     | Default maximum transmission timeout for peer initialization packets for peers assigned to this local peer. |
| Instance Unordered Priority | Indicates the priority by which unordered packets will be delivered to MTP3.                                |
| Instance IP Precedence      | IP ToS setting that is used for peer link initialization packets.                                           |

#### Related Commands

Refer to the “Tuning SCTP Parameters” section on page 328.

# show cs7 m3ua

To display M3UA node information, use the **show cs7 m3ua** privileged EXEC command.

**show cs7** [*instance-number*] **m3ua** *local\_port*

|                           |                        |                                                                                             |
|---------------------------|------------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|                           | <i>local_port</i>      | (Optional) M3UA local port number. Range is 1024 to 65535.                                  |

**Defaults** No default behavior or values

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

## Examples

The following is sample output from the **show cs7 m3ua** command.

This M3UA version uses SIGTRAN RFC 3332.

This M3UA instance (local port 7100) is **shutdown**. The instance handle is **inactive**.

This M3UA instance is NOT offloaded to any VIP.

```
Router# show cs7 m3ua 7100
Sigtran M3UA RFC number: 3332
```

```
M3UA Local port: 7100      State: shutdown      SCTP instance handle: nactive
Local ip address:          172.18.48.123
Number of active M3UA peers: 0
Max number of inbound streams allowed: 17
Local receive window:      64000
Max init retransmissions:  8
Max init timeout:          1000 ms
Unordered priority:        equal
Extended UPU support:      disabled
Offload to VIP:            No      Slot: -1
SCTP defaults for new associations
Transmit queue depth:      1000      Cumulative sack timeout: 200 ms
Assoc retransmissions:     10        Path retransmissions:    4
Minimum RTO:               1000 ms   Maximum RTO:             1000 ms
Bundle status:              on        Bundle timeout:          5 ms
Keep alive status:          true       Keep alive timeout:      30000 ms
Initial cwnd:               1234567   Idle cwnd rate:          10
Retrans cwnd rate:          60        Retrans cwnd mode:       FastRetrans
FastRetrans cwnd rate:     20
```

## Related Commands

| Command                  | Description                                                                                                 |
|--------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>cs7 m3ua</b>          | Specifies the local port number for M3UA and enters CS7 M3UA submode.                                       |
| <b>show tech-support</b> | Collects and displays a large amount of ITP configuration information that can be used for troubleshooting. |

# show cs7 mapua

To display MAP Proxy information, use the **show cs7 mapua** command in privileged EXEC command.

**show cs7 mapua [auth-cache | statistics]**

|                           |                   |                                                  |
|---------------------------|-------------------|--------------------------------------------------|
| <b>Syntax Description</b> | <b>auth-cache</b> | Display authentication triplets cached per IMSI. |
|                           | <b>statistics</b> | Show MAP procedure-specific statistics.          |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

|                        |                |                                                                             |
|------------------------|----------------|-----------------------------------------------------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                                                         |
|                        | 12.2(4)MB7     | This command was introduced.                                                |
|                        | 12.2(25)SW     | The command shows MAP Proxy information for an MMSC Gateway implementation. |

**Examples** The following is sample output from the **show cs7 mapua** command showing examples of MAP Proxy information for a GSM MAP authentication configuration and for an MMSC Gateway implementation. The first two examples represent MAP Proxy information for a GSM MAP authentication configuration:

```
Router#show cs7 mapua
MAP UA Name: lauren
Local Port: 1919      Protocol: radius      State: listen
Local IP addr: 172.18.44.163:(up)
Source SS7 address: International pc 2.2.2
IMSI SS7 address parameters: International tt 0 gti 4 np 6 nai 4

MAP procedure: Obtain_Authentication_Sets_VLR      Status: Enabled
Number of successful requests      :      0
Number of error messages returned:      0
Number of Invoke timeouts         :      0
Number of IMSIs in cache          :      0
Current Cache Size                 :    65535
Cache hit ratio                    :      0%
Number of stale sets returned     :      0

Client      Port    Vsa Encryption
172.18.44.129  00000  off
```

The following is sample output from the **show cs7 mapua** command with the **auth-cache** keyword:

```
Router#show cs7 mapua auth-cache
Authentication triplet cache contents

bucket IMSI      Trip Use counts
```



```

-----
30157 012345678901234 4 1 0 0 0
30165 382502935012532 4 1 1 0 0
30317 482109462943204 2 1 1

```

The next two examples represent MAP Proxy information for an MMSC Gateway implementation:

```

router#show cs7 mapua
MAP UA Name: imsi
Local Port: 9000 Protocol: smpp State: listen SessionId=0x04010001
Local IP addr: 172.18.40.10
Source SS7 address: International 9192222222 tt 0 gti 4 np 1 nai 4
MSISDN SS7 address parameters: International tt 0 gti 4 np 1 nai 4

```

```

Procedure: GetIMSI
SendIMSI = 0 SRIforSMv1 = 0 SRIforSMv2 = 0 SRIforSMv3 = 5
Version Fallback: To Version 1 = 0, To Version 2 = 0

```

| Client        | Type | RxPort | RxSessionId | TxPort | TxSessionId |
|---------------|------|--------|-------------|--------|-------------|
| 10.10.20.20   | Cfg  | 00000  | 0x00000000  | 00000  | 0x00000000  |
| 10.82.201.205 | Dyn  | 03483  | 0x04010008  | 03474  | 0x04010007  |

```

MAP UA Name: msrn
Local Port: 9001 Protocol: smpp State: listen SessionId=0x04010002
Local IP addr: 172.18.40.10
Source SS7 address: International 9193333333 tt 0 gti 4 np 1 nai 4
MSISDN SS7 address parameters: International tt 0 gti 4 np 1 nai 4

```

```

Procedure: GetMSRN
SRI = 0
Version Fallback: To Version 1 = 0, To Version 2 = 0

```

| Client      | Type | RxPort | RxSessionId | TxPort | TxSessionId |
|-------------|------|--------|-------------|--------|-------------|
| 10.10.20.20 | Cfg  | 00000  | 0x00000000  | 00000  | 0x00000000  |

#### router#show cs7 mapua statistics

```

mapua imsi ip 172.18.40.10 port 9000 inQ 0(0) maxQ 1
Client Request In Syntax Error Timed Out Successful Aborted
10.10.20.20 0 0 0 0 0
10.82.201.205 5 0 0 5 0

mapua msrn ip 172.18.40.10 port 9001 inQ 0(0) maxQ 0
Client Request In Syntax Error Timed Out Successful Aborted
10.10.20.20 0 0 0 0 0

```

#### Related Commands

| Command   | Description                                                                                                      |
|-----------|------------------------------------------------------------------------------------------------------------------|
| cs7 mapua | Specifies the name, protocol, and local port number for the MAP Proxy feature and enables the CS7 MAPUA submode. |

## show cs7 mated-sg

To display mated SG information, use the **show cs7 mated-sg** privileged EXEC command.

**show cs7** [*instance-number*] **mated-sg** [**detail** | **statistics**] |

| Syntax Description     |  |                                                                                             |
|------------------------|--|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> |  | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <b>detail</b>          |  | (Optional) Display detail format.                                                           |
| <b>statistics</b>      |  | (Optional) Display mated SG statistics.                                                     |

**Command Modes** privileged EXEC

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

### Examples

The following is sample output from the **show cs7 mated-sg** command in the default brief format:

Options for the SG Mate state include: Inactive/Active/Shutdown

If the Mate is shutdown, then the remote port and remote IP address display the configured values instead of the actual values.

Router# **show cs7 mated-sg**

| Mate Name | State  | Passive | Remote Port | Remote IP Addr | SCTP Assoc |
|-----------|--------|---------|-------------|----------------|------------|
| bermuda   | active | no      | 14002       | 172.18.48.15   | 0          |

The following is sample output from the **show cs7 mated-sg** command in detail format:

Options for SG Mate state include: Inactive/Active/Shutdown

Router# **show cs7 mated-sg detail**

|                                              |                                 |
|----------------------------------------------|---------------------------------|
| Mated SG name: bermuda                       | Type: SGMP                      |
| State: active                                | Passive: no                     |
| SCTP association state: established          | Association id: 0               |
| Configured remote port: 14002                | Actual remote port: 14002       |
| Configured remote ip addresses: 172.18.48.15 |                                 |
| Actual remote ip addresses: 172.18.48.15     | State: active (effective prim)  |
| Local receive window: 5555                   | Cumulative sack timeout: 200 ms |
| Assoc retrans: 17                            | Path retrans: 4                 |
| Max init retrans: 8                          | Max init RTO: 1000 ms           |
| Minimum RTO: 1001 ms                         | Maximum RTO: 1002 ms            |
| Bundle status: on                            | Bundle timeout: 100 ms          |
| Keep alive status: true                      | Keep alive timeout: 23234 ms    |
| Unordered priority: equal                    | Cleanup timeout: 0 ms           |
| Link status T1 timeout: 0 ms                 | Remote congest T6 timeout: 0 ms |
| Initial cwnd: 3000                           | Idle cwnd rate: 50              |
| Retrans cwnd rate: 50                        | Retrans cwnd mode: RFC          |
| Transmit queue depth: 1000                   | Congestion transmit level: 0    |
| Thresholds for congestion on transmit queue  |                                 |

```

Level 1 onset:      500          Level 1 abate:      300
Level 2 onset:      700          Level 2 abate:      500
Level 3 onset:      900          Level 3 abate:      700
Level 4 onset:     1000          Level 4 abate:      900
QOS class:4 (instance:4)        IP TOS: 0x60

```

The following is sample output from the **show cs7 mated-sg** command with the statistics keyword:

```

Router# show cs7 mated-sg statistics
Mated-Sg name: bermuda          Type: SGMP
Active Time: 2d12h
  Data Packets/MSU Stats
Inbound Packets Rcvd: 0          Inbound Octets Rcvd: 0
Inbound Packets Sent: 0          Inbound Octets Sent: 0
Outbound Packets Sent: 0          Outbound Octets Sent: 0
  Buffer Allocation Stats
Buffer Alloc Failures: 0          Buffer Growth Failures: 0
Buffer Reused: 0
  XUA Error Messages Sent Stats
ERR Invalid Version: 0           ERR Inv Network App: 0
ERR Unsupported Class: 0          ERR Unsupported Type: 0
ERR Traffic Mode: 0              ERR Unexpected Msg: 0
ERR Protocol Error: 0            ERR Invalid Stream ID: 0
ERR Refused, Mgmt Block: 0
ERR Invalid ASP ID: 0            ERR Inv Routing Contxt: 0
ERR Invalid Parm Value: 0         ERR Ukwn Routing Contxt: 0
  XUA Error Messages Received Stats
ERR Invalid Version: 0           ERR Inv Network App: 0
ERR Unsupported Class: 0          ERR Unsupported Type: 0
ERR Traffic Mode: 0              ERR Unexpected Msg: 0
ERR Protocol Error: 0            ERR Invalid Stream ID: 0
ERR Refused, Mgmt Block: 0
ERR Invalid ASP ID: 0            ERR Inv Routing Contxt: 0
ERR Invalid Parm Value: 0         ERR Ukwn Routing Contxt: 0
  Congestion Stats
Pkts Dropped At Lvl 1: 0          Pkts Dropped At Lvl 2: 0
Pkts Dropped At Lvl 3: 0
Level 1 Congestion Cnt: 0          Level 2 Congestion Cnt: 0
Level 3 Congestion Cnt: 0          Level 4 Congestion Cnt: 0
T1 Timeouts: 0                    T6 Timeouts: 0

```

## Related Commands

| Command             | Description                            |
|---------------------|----------------------------------------|
| <b>cs7 mated-sg</b> | Configures a connection to a mated SG. |

# show cs7 mlr address-table

To display the addresses matched within the MLR address table, use the **show cs7 mlr address-table** privileged EXEC command.

**show cs7** [*instance-number*] **mlr address-table** **table-name**

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <i>table-name</i>      | The name associated with the multi layer result table.                                      |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(21)SW | This command was introduced. |

## Examples

The following is sample output of the **show cs7 mlr result** command:

```
router#show cs7 1 mlr address-table B-ADDRS
```

```
-----
Name: B-ADDRS   Instance: 1
Table Lookups: 0
Address          Result Type-Address    Match
-----
09200800         PC   1-1-3              0
09200800*        AS   smsc1              0
38012650007149   grp  SMSC-GROUP1         0
ABCD*            PC   1-2-3              0
1800*            PC   1-2-3              0
4082             PC   1-2-3              0
1900*            PC   1-2-3              0
```

## Related Commands

| Command                      | Description                                                                                                       |
|------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <b>cs7 mlr address-table</b> | Specifies a table of addresses that is to be used when searching with the previously specified routing parameter. |

# show cs7 mlr result

To display multi-layer SMS routing result information, use the **show cs7 mlr result** privileged EXEC command.

**show cs7** [*instance-number*] **mlr result**

| Syntax Description | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|--------------------|------------------------|---------------------------------------------------------------------------------------------|
|--------------------|------------------------|---------------------------------------------------------------------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | Privileged EXEC |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Examples** The following is sample output of the **show cs7 mlr result** command:

```
router#show cs7 1 mlr result
Result Group: voting-grp
Instance: 1
```

| Result Type | Weight | UseCount | Remain | Matches |
|-------------|--------|----------|--------|---------|
| AS suassn8  | 1      | 1        |        | 10      |
| AS vlrbakup | 1      | 1        |        | 10      |

| Related Commands | Command               | Description                           |
|------------------|-----------------------|---------------------------------------|
|                  | <b>cs7 mlr result</b> | Specifies a multi-layer result table. |

# show cs7 mlr statistics

To display multi-layer SMS statistics, use the **show cs7 mlr statistics** privileged EXEC command.

## show cs7 mlr statistics

| Syntax Description | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|--------------------|------------------------|---------------------------------------------------------------------------------------------|
|--------------------|------------------------|---------------------------------------------------------------------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | Privileged EXEC |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Examples** The following is sample output of the **show cs7 mlr statistics** command:

```
router#show cs7 mlr statistics
CS7 Multi-Layer Routing Statistics
CS7 Multi-Layer Routing Statistics for Instance 1

Total packets received by MLR:                22
Packets MLR direct routed:                    2
Packets MLR default routed (resume SCCP):     20
  Default routed due to segmented SM:         0
Packets MLR failed/aborted:                   0
  Failed due to blocking:                     0
Successful trigger matches:                   0
  Blocking trigger matches:                   0
  Continue trigger matches:                   0
Successful rule matches:                      0
  Blocking rule matches:                     0
  Continue rule matches:                     0
SMS-MO operations:                            0
SMS-MT operations:                            0
SRI-SM operations:                            0
ALERTSC operations:                           0
SMDPP operations:                             0
SMSREQ operations:                             0
SMSNOT operations:                             0
```

| Related Commands | Command                       | Description                                                                   |
|------------------|-------------------------------|-------------------------------------------------------------------------------|
|                  | <b>rule (cs7 mlr ruleset)</b> | Specifies the rules for a routing trigger within a multi-layer ruleset table. |

# show cs7 mlr table

To display multi-layer SMS routing information use the **cs7 mlr table** privileged EXEC command. The default display is rule-summary.

**show cs7** *instance-number* **mlr table** *name* [**detail** | **result-summary** | **rule-summary**]

## Syntax Description

|                        |                                                                                                                                                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>instance-number</i> | (Optional) Displays output for a specified instance. Valid range is 0 to 7.                                                                     |
| <b>detail</b>          | Display the parameters and results associated with each routing trigger.                                                                        |
| <i>name</i>            | The name of the CS7 MLR table.                                                                                                                  |
| <b>result-summary</b>  | Display the result parameters associated with a particular rule along with the number of times the rule has been matched for the given trigger. |
| <b>rule-summary</b>    | Display the rule parameters associated with a particular rule along with the number of times the rule has been matched for the given trigger.   |

## Defaults

The default display is rule-summary.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                            |
|------------|-----------------------------------------|
| 12.2(4)MB  | This command was introduced.            |
| 12.2(21)SW | The <i>instance</i> argument was added. |

## Examples

The following is sample output of the **show cs7 mlr table** command:

```
router#show cs7 1 mlr table sms-router
Name: sms-router Instance: 1
```

```
-----
Primary Trigger: MTP3 dpc 1-1-1 opc n/a si 3
Ruleset: sms_rules Trigger Matches: 0
Rule Oper dest-sme orig-sme dest-smsc Match
----
5 smsreq 60920080 n/a n/a 0
7 smsreq 609200800* n/a n/a 0
10 smdpp 38012650007149 4091254283 n/a 0
11 smdpp * * ABCD 0
12 smdpp 1800* * * 0
13 smdpp 4082* * n/a 0
14 smdpp * 1900 n/a 0
16 smdpp * * n/a 0
20 smdpp * * * 0
25 smdpp SME-ADDRS * n/a 0
28 smsreq * n/a n/a 0
30 deflt n/a n/a n/a 0
```

# show cs7 mlr table

```

router#show cs7 mlr table SMS-WEIGHTED detail
Name: SMS-WEIGHTED
Trigger: MTP3 DPC: 1-1-1 OPC: N/A SI: 3
Rule: 1 Matches: 5
Operation: smdpp
Protocol: IS-41
Parameters:
  Dest-SME: Address-Table SME-ADDRS Orig-SME: 60920025
  Dest-SMSC: * PID: *
Result:
  GT Selector: E.164 (default) Digits: 9991117777
-----
Rule: 2 Matches: 2
Operation: sms-mo
Protocol: GSM MAP
Parameters:
  Dest-SME: 60920080 Orig-SME: *
  Dest-SMSC: * PID: *
Result:
  GT Selector: e164 Digits: 9991117778
-----
Rule: 3 Matches: 10
Operation: sms-mo
Protocol: IS-41
Parameters:
  Dest-SME: 6092* Orig-SME: *
  Dest-SMSC: * PID: *
Result:
  Dest PC: 3.3.3
-----
Routing Trigger: 4 Matches: 0
Operation: sms-mo
Protocol: IS-41
Parameters:
  Dest-SME: * Orig-SME: *
  Dest-SMSC: * PID: *
Result:
  GT Selector: E.164 (default) Digits: 9991117779

```

Table 38 describes the fields in the display.

**Table 38** *show cs7 mlr table Field Descriptions*

| Field           | Description                                                                                                                                                   |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Name            | The name of the CS7 MLR table                                                                                                                                 |
| Protocol        | The name of the protocol.\                                                                                                                                    |
| Primary Trigger | The SS7 network layer routing parameters that constitute the routing key, or trigger, used to identify traffic requiring parsing into the application layers. |
| Ruleset         | The name of the ruleset that is used to process matching triggers.                                                                                            |
| Matches         | The total number of matches.                                                                                                                                  |
| Rule            | The order in which the rules in the ruleset are searched.                                                                                                     |



**Table 38**      **show cs7 mlr table Field Descriptions**

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation | The GSM MAP operation code. The operation name represents a multi-layer routing feature that may comprise one or more actual MAP operations. In the current release, there is one valid choice for this parameter:<br><br>sms-mo is used to identify SMS MO request messages for the table-appropriate protocol. This operation is valid for the GSM MAP, and will match all BEGIN requests containing an SMS-MO INVOKE component. |
| Dest-SME  | The address of the destination Short Message Entity (SME) within an SMS operation.                                                                                                                                                                                                                                                                                                                                                 |
| Orig-SME  | The address of the origin SME within an SMS operation.                                                                                                                                                                                                                                                                                                                                                                             |
| Dest SMSC | The address of the destination service center address within an SMS operation.                                                                                                                                                                                                                                                                                                                                                     |
| PID       | The protocol identifier value for an SMS-MO rule.                                                                                                                                                                                                                                                                                                                                                                                  |
| Result    | Specifies the processing performed on a matching packet.                                                                                                                                                                                                                                                                                                                                                                           |

**Related Commands**

| Command       | Description                                              |
|---------------|----------------------------------------------------------|
| cs7 mlr table | Specifies the name of the multi-layer SMS routing table. |

# show cs7 monitor link

To display CS7 Monitor link status, use the **show cs7 monitor** command in EXEC configuration mode.

**show cs7 monitor link** [*tcp-listen-port*] | [*interface*] | [**statistics**]

|                           |                        |                                                                                            |
|---------------------------|------------------------|--------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>tcp-listen-port</i> | Identifies a specific TCP port for display of links list, link status, or link statistics. |
|                           | <i>interface</i>       | Identifies specific interface for display of link status or link statistics.               |
|                           | <b>statistics</b>      | Displays link statistics.                                                                  |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

**Examples** The following is sample output from the **show cs7 monitor link** command with a *tcp-listen-port* value of 9000:

```
Router# show cs7 monitor link 9000
port=9000      status=connected      remote=11.11.11.14/40902      links=3
  Interface      Status      Description
  ATM5/0/0       Active      HSL link between ITP1 & ITP2
  Serial5/1/0:0  Active      SS7 link between ITP2 & ITP4 (slc=00)
  Serial5/1/0:1  Active      SS7 link between ITP2 & ITP4 (slc=01)
```

The following is sample output from the **show cs7 monitor link** command with a *tcp-listen-port* value of 9000, and **statistics** keyword:

```
Router# show cs7 monitor link 9000 statistics
port=9000      status=connected      remote=11.11.11.14/40902      links=3
  Interface      MSUs Rcvd    MSUs/sec    Bits/sec    Drops
  ATM5/0/0       26741        394         166000      0
  Serial5/1/0:0  560          20          6000        0
  Serial5/1/0:1  560          20          6000        0
```

The following is sample output from the **show cs7 monitor link** command with the *serial5/1/0:0* value, and **statistics** keyword:

```
Router# show cs7 monitor Serial5/1/0:0 statistics
port=9000      status=connected      remote=11.11.11.14/40902      links=3
  Interface      MSUs Rcvd    MSUs/sec    Bits/sec    Drops
  Serial5/1/0:0  962          20          6000        0
```

## Related Commands

| Command     | Description                                                                                                  |
|-------------|--------------------------------------------------------------------------------------------------------------|
| cs7 monitor | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

# show cs7 monitor tcp

To display CS7 Monitor TCP session status, use the **show cs7 monitor tcp** command in EXEC configuration mode.

**show cs7 monitor tcp***[tcp-listen-port [parameters] [statistics]]*

|                           |                        |                                                                                     |
|---------------------------|------------------------|-------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>tcp-listen-port</i> | Identifies a specific TCP port for display of TCP session parameters or statistics. |
|                           | <b>parameters</b>      | Display CS7 Monitor TCP session parameters.                                         |
|                           | <b>statistics</b>      | Displays CS7 Monitor statistics for either TCP or link.                             |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB      | This command was introduced. |

**Examples** The following is sample output from the **cs7 monitor tcp** command with a *tcp-listen-port* value of 9000:

```
Router# show cs7 monitor tcp 9000
port=9000    status=connected    remote=11.11.11.14/40902    links=3
```

The following is sample output from the **cs7 monitor tcp** command with a *tcp-listen-port* value of 9000, and the **parameters** keyword:

```
Router# cs7 monitor tcp 9000 parameters
port=9000    status=connected    remote=11.11.11.14/40902    links=3
  Keepalive  MaxQDepth  RcvWndSize  FastStart
    5000      100      20000      disabled
```

The following is sample output from the **cs7 monitor tcp** command with a *tcp-listen-port* value of 9000, and the **statistics** keyword:

```
Router# show cs7 monitor tcp 9000 statistics
port=9000    status=connected    remote=11.11.11.14/40902    links=3
  MSUs Rcvd    MSU Drops    TCP Sent    TCP Drops    TCP Queue
    4812        0          210         0          0/100
```

|                         |                    |                                                                                                              |
|-------------------------|--------------------|--------------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>     | <b>Description</b>                                                                                           |
|                         | <b>cs7 monitor</b> | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

# show cs7 mtp2

To display ITP MTP2 status, use the **show cs7 mtp2** EXEC command.

**show cs7 mtp2** [**congestion** | **state** | **statistics** | **timers** | **variant**] *interface*

|                           |                   |                            |
|---------------------------|-------------------|----------------------------|
| <b>Syntax Description</b> | <b>congestion</b> | MTP2 congestion status.    |
|                           | <b>state</b>      | MTP2 state machine status. |
|                           | <b>statistics</b> | MTP2 link statistics.      |
|                           | <b>timers</b>     | MTP2 timer values.         |
|                           | <b>variant</b>    | MTP2 protocol variant.     |
|                           | <i>interface</i>  | Serial interface number.   |

**Defaults** No default behavior or values

**Command Modes** EXEC

|                        |                |                                           |
|------------------------|----------------|-------------------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                       |
|                        | 12.2(1)MB      | This command was introduced.              |
|                        | 12.2(20)SW     | TTC timer values are displayed in output. |

**Examples** This section includes samples of output from the **show cs7 mtp2** command using the keywords **congestion**, **state**, **statistics**, **timers**, and **variant**.

The following is sample output of from the **show cs7 mtp2** command using the **congestion** keyword:

```
Router# show cs7 mtp2 congestion serial0/1/0:0
CS7 MTP2 congestion status for interface Serial0/1/0:0
Protocol version for interface Serial0/1/0:0 is ITU-T Q.703 (1996) (White Book)

Layer3 congestion status      = Abate

CongestionRxInd               = Abate
CongestionTxInd               = Abate (Level0)

CongestionTxOnset Level1     = 250 ( 50% of xmitQ maxDepth)
CongestionTxOnset Level2     = 350 ( 70% of xmitQ maxDepth)
CongestionTxOnset Level3     = 450 ( 90% of xmitQ maxDepth)
CongestionTxOnset Level4     = 500 (100% of xmitQ maxDepth)

XmitQ depth (max-used)       = 1
XmitQ depth (max-allowed)    = 500
```

Table 39 describes the fields in the display.

**Table 39** *show cs7 mtp2 congestion Field Descriptions*

| Field                    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Layer3 congestion status | <p>Receive congestion status at Layer3 (i.e. MTP3). There are 2 possible values:</p> <ul style="list-style-type: none"> <li>• Abate = MTP3 not congested. MTP2 may forward packets to MTP3</li> <li>• Onset = MTP3 congested. MTP2 may NOT forward paks to MTP3</li> </ul> <p>During Layer 3 congestion onset, MTP2 will send SIBs to the remote to indicate the route is “Busy” and cannot accept input packets</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| CongestionRxInd          | <p>Receive congestion status at Layer2 (i.e. MTP2)</p> <p>There are 2 possible values:</p> <ul style="list-style-type: none"> <li>• Abate = MTP2 not congested; Remote may send packets to MTP2.</li> <li>• Onset = MTP2 congested:Remote may NOT send paks to MTP2.</li> </ul> <p>During MTP2 congestion onset, MTP2 will send SIBs to the remote to indicate the route is “Busy” and cannot accept input packets.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| CongestionTxInd          | <p>Transmit congestion status at Layer2 (i.e. MTP2)</p> <p>There are 5 possible values:</p> <ul style="list-style-type: none"> <li>• Abate (Level0) == MTP2 not congested; MTP3 may send packets to MTP2.</li> <li>• Onset (Level1) == MTP2 congested; MTP3 may send priority 1+ packets.</li> <li>• Onset (Level2) == MTP2 congested; MTP3 may send priority 2+ packets.</li> <li>• Onset (Level3) == MTP2 congested; MTP3 may send priority 3+ packets.</li> <li>• Onset (Level4) == MTP2 congested; MTP3 may not send packets to MTP2.</li> </ul> <p>The levels correspond to ANSI congestion levels. (ITU has a similar option.)</p> <p>MTP3 paks have an associated priority (0-3).</p> <p>For example, if CongestionTxInd is Onset (Level2), MTP3 may continue sending packets with a priority of 2 or above, but must drop any packets with a priority of 1 or below.</p> |

**Table 39** *show cs7 mtp2 congestion Field Descriptions (continued)*

| Field                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CongestionTxOnset Level1        | MTP2 transmit congestion level thresholds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| CongestionTxOnset Level2        | MTP2 determines its txCongestion level as a percentage of packets waiting on its transmitQ (i.e. "XmitQ depth (max-allowed)").                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| CongestionTxOnset Level3        | <p>The thresholds are documented in this output (and may NOT be configured or changed by the user).</p> <p>The XmitQ depth (max-allowed) value is configurable by the user and the new threshold values will be reflected in the output.</p> <p>For example, if you configure a new xmitQ maxDepth via "cs7 mtp2 transmitQ 256":</p> <p>CongestionTxOnset Level1 = 128 ( 50% of xmitQ maxDepth)</p> <p>CongestionTxOnset Level2 = 179 ( 70% of xmitQ maxDepth)</p> <p>CongestionTxOnset Level3 = 230 ( 90% of xmitQ maxDepth)</p> <p>CongestionTxOnset Level4 = 256 (100% of xmitQ maxDepth)</p> |
| CongestionTxOnset Level4        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| XmitQ depth (max-used)          | <p>Maximum number of packets that have waited on the xmitQ</p> <p>This count indicates how much of the xmitQ is being used and may help guide configuration of "XmitQ depth (max-allowed)" value.</p>                                                                                                                                                                                                                                                                                                                                                                                            |
| XmitQ depth (max-allowed) = 500 | Maximum-allowed depth of xmitQ: (used by MTP2 to determine txCongestion thresholds)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

The following is sample output of from the **show cs7 mtp2** command using the **state** keyword:

```

Router# show cs7 mtp2 state serial0/1/0:0
CS7 MTP2 states for interface Serial0/1/0:0
Protocol version for interface Serial0/1/0:0 is ITU-T Q.703 (1996) (White Book)

Link State Control (LSC)           = In Service
Initial Alignment Control (IAC)    = Idle
Transmission Control (TXC)        = In Service
Reception Control (RC)             = In Service
Signal Unit Error Rate Monitor (SUERM) = Monitoring
Alignment Unit Error Rate Monitor (AERM) = Idle
Congestion (CONG)                 = Idle

Layer3 link status                 = Started
Layer3 congestion status           = Abate

```

Table 40 describes the fields in the display.

**Table 40** *show cs7 mtp2 state Field Descriptions*

| Field                                                                                                                                                                                                                                                                                                  | Description                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Link State Control (LSC) = In Service<br>Initial Alignment Control (IAC) = Idle<br>Transmission Control (TXC) = In Service<br>Reception Control (RC) = Inservice<br>Signal Unit Error Rate Monitor (SUERM) = Monitoring<br>Alignment Unit Error Rate Monitor (AERM) = Idle<br>Congestion (CONG) = Idle | Each state represents the state machines that run the MTP2 protocol and are defined in the ANSI/ITU specifications for MTP2.                                                                                                                                           |
| Link3 link status = Started                                                                                                                                                                                                                                                                            | Indicates status of the link from Layer3 perspective. There are 2 values: Started or Stopped                                                                                                                                                                           |
| Layer3 congestion status = Abate                                                                                                                                                                                                                                                                       | Indicates the congestion status from Layer3 perspective. There are 2 values: <ul style="list-style-type: none"> <li>Abate = MTP3 not congested --- MTP2 may forward packets to MTP3</li> <li>Onset = MTP3 congested ----- MTP2 may NOT forward paks to MTP3</li> </ul> |

The following is sample output of from the **show cs7 mtp2** command using the **statistics** keyword:

```
Router# show cs7 mtp2 statistics serial0/1/0:0
CS7 MTP2 Statistics for interface Serial0/1/0:0
Protocol version for interface Serial0/1/0:0 is ITU-T Q.703 (1996) (White Book)

OMtimeINSV (secs)          = 1591
OMtimeNotINSV (secs)       = 200

OMIACAlignAttemptCount    = 7
OMIACAlignFailCount       = 2
OMIACAlignCompleteCount   = 2

OMMSU_L3_XMIT_Count       = 82
OMMSU_XMIT_Count          = 82
OMMSUBytesTransmitted     = 1654
OMMSU_RE_XMIT_Count       = 0
OMMSUBytesRetransmitted   = 0

OMMSU_RCV_Count           = 80
OMMSUBytesReceived        = 1636

OMFISU_XMIT_Count         = 82
OMFISU_RCV_Count          = 327

OMLSSU_XMIT_Count         = 23
OMLSSU_XMIT_SINCount      = 0
OMLSSU_XMIT_SIECount      = 4
OMLSSU_XMIT_SIOCount      = 7
OMLSSU_XMIT_SIOSCount     = 12
```



```

OMLSSU_XMIT_SIPOCount    = 0
OMLSSU_XMIT_SIBCount     = 0

OMLSSU_RCV_Count         = 20
OMLSSU_RCV_SINCount      = 8
OMLSSU_RCV_SIECount      = 0
OMLSSU_RCV_SIOCount      = 8
OMLSSU_RCV_SIOSCount     = 4
OMLSSU_RCV_SIPOCount     = 0
OMLSSU_RCV_SIBCount      = 0

OMT1_TMO_Count           = 0
OMT2_TMO_Count           = 0
OMT3_TMO_Count           = 1
OMT4_TMO_Count           = 2
OMT5_TMO_Count           = 0
OMT6_TMO_Count           = 0
OMT7_TMO_Count           = 0

OMAERMCount              = 2
OMAERMFailCount          = 0
OMSUERMCount             = 2
OMSUERMFailCount         = 0

OMCongestionRxCount      = 0
OMCongestionTxCount      = 0
OMRemote_Congestion_Cnt = 0

OMxmitQ_maxcount         = 1

OMNACK_XMIT_Count        = 0
OMNACK_RCV_Count         = 0

OMunreasonableFSN_rcvd   = 0      (error)
OMunreasonableBSN_rcvd   = 0      (error)
OMabnormalBSN_rcvd       = 0      (error)
OMabnormalFIB_rcvd       = 0      (error)

OMFISU_notAccepted       = 0      (packets dropped)
OMMSU_notAccepted        = 0      (packets dropped)
OMFISU_congestionDrops   = 0      (packets dropped)
OMMSU_congestionDrops    = 0      (packets dropped)
OMMSU_too_long           = 0      (packets dropped)
OMMSU_unexpectedFSN      = 0      (packets dropped)
OMMSU_discarded          = 0      (packets dropped)

```

Table 41 describes the fields in the display.

**Table 41** *show cs7 mtp2 statistics Field Descriptions*

| Field                   | Description                                                |
|-------------------------|------------------------------------------------------------|
| OMtimeINSV (secs)       | Length of time link has been in-service                    |
| OMtimeNotINSV (secs)    | Length of time link has been out-of-service                |
| OMIACAlignAttemptCount  | Number of times IAC has attempted link alignment           |
| OMIACAlignFailCount     | Number of times alignment attempt has failed               |
| OMIACAlignCompleteCount | Number of times alignment attempt has succeeded            |
| OMMSU_L3_XMIT_Count     | Number of MSUs queued from Layer3 for transmit             |
| OMMSU_XMIT_Count        | Number of MSUs actually transmitted (includes retransmits) |

**Table 41** *show cs7 mtp2 statistics Field Descriptions (continued)*

| Field                   | Description                                            |
|-------------------------|--------------------------------------------------------|
| OMMSUBytesTransmitted   | Number of MSU bytes transmitted (includes retransmits) |
| OMMSU_RE_XMIT_Count     | Number of MSU retransmitted                            |
| OMMSUBytesRetransmitted | Number of MSU bytes retransmitted                      |
| OMMSU_RCV_Count         | Number of MSUs received                                |
| OMBytesReceived         | Number of MSU bytes received                           |
| OMFISU_XMIT_Count       | Number of FISUs transmitted (not counting autoTx-FISU) |
| OMFISU_RCV_Count        | Number of FISUs received (not counting filtered-FISU)  |
| OMLSSU_XMIT_Count       | Number of LSSUs transmitted (not counting autoTx-LSSU) |
| OMLSSU_XMIT_SINCount    | Number of SINS transmitted (not counting autoTx-LSSU)  |
| OMLSSU_XMIT_SIECount    | Number of SIEs transmitted (not counting autoTx-LSSU)  |
| OMLSSU_XMIT_SIOCount    | Number of SIOs transmitted (not counting autoTx-LSSU)  |
| OMLSSU_XMIT_SIOSCount   | Number of SIOSs transmitted (not counting autoTx-LSSU) |
| OMLSSU_XMIT_SIPOCount   | Number of SIPOs transmitted (not counting autoTx-LSSU) |
| OMLSSU_XMIT_SIBCount    | Number of SIBs transmitted (not counting autoTx-LSSU)  |
| OMLSSU_RCV_Count        | Number of LSSUs received (not counting filtered-LSSU)  |
| OMLSSU_RCV_SINCount     | Number of SINS received (not counting filtered-LSSU)   |
| OMLSSU_RCV_SIECount     | Number of SIEs received (not counting filtered-LSSU)   |
| OMLSSU_RCV_SIOCount     | Number of SIOs received (not counting filtered-LSSU)   |
| OMLSSU_RCV_SIOSCount    | Number of SIOSs received (not counting filtered-LSSU)  |
| OMLSSU_RCV_SIPOCount    | Number of SIPOs received (not counting filtered-LSSU)  |
| OMLSSU_RCV_SIBCount     | Number of SIBs received (not counting filtered-LSSU)   |
| OMT1_TMO_Count          | Number of times T1 timer has expired                   |
| OMT2_TMO_Count          | Number of times T2 timer has expired                   |
| OMT3_TMO_Count          | Number of times T3 timer has expired                   |
| OMT4_TMO_Count          | Number of times T4 timer has expired                   |
| OMT5_TMO_Count          | Number of times T5 timer has expired                   |
| OMT6_TMO_Count          | Number of times T6 timer has expired                   |
| OMT7_TMO_Count          | Number of times T7 timer has expired                   |
| OMAERMCCount            | Number of times AERM has been activated                |
| OMAERMFaillCount        | Number of times AERM has failed                        |
| OMSUERMCount            | Number of times SUERM has been activated               |
| OMSUERMFaillCount       | Number of times SUERM has failed                       |
| OMCongestionRxCount     | Number of times link has entered RxCongestionOnset     |
| OMCongestionTxCount     | Number of times link has entered TxCongestionOnset     |
| OMRemote_Congestion_Cnt | Number of times remote has gone into RxCongestion      |
| OMxmitQ_maxcount        | Max number of paks that were ever waiting on xmitQ     |

**Table 41** *show cs7 mtp2 statistics Field Descriptions (continued)*

| Field                   | Description                                                            |
|-------------------------|------------------------------------------------------------------------|
| OMNACK_XMIT_Count       | Number of negative acknowledgement transmitted on link                 |
| OMNACK_RCV_Count        | Number of negative acknowledgement received on link                    |
| OMunreasonableFSN_rcvdy | Number of invalid FSNs received from remote                            |
| OMunreasonableBSN_rcvd  | Number of invalid BSNs received from remote                            |
| OMabnormalBSN_rcvd      | Number of abnormal BSNs received from remote (2 invalid BSNs in a row) |
| OMabnormalFIB_rcvd      | Number of abnormal FIBs received from remote (2 invalid FIBs in a row) |
| OMFISU_notAccepted      | Number of FISUs dropped due to MTP2 NoAccept state                     |
| OMMSU_notAccepted       | Number of FISUs dropped due to MTP2 NoAccept state                     |
| OMFISU_congestionDrops  | Number of FISU packets dropped due to rxCongestion                     |
| OMMSU_congestionDrops   | Number of MSU packets dropped due to rxCongestion                      |
| OMMSU_too_long          | Number of MSUs dropped due to exceed max pakSize                       |
| OMMSU_unexpectedFSN     | Number of MSU packets dropped due to unexpected FSN received           |
| OMMSU_discarded         | Number of MSUs dropped (total)                                         |

The following is sample output of from the **show cs7 mtp2** command using the **timers** keyword. The variant is TTC:

```
Router# show cs7 mtp2 timers serial0/1/0:0
CS7 MTP2 Timers for interface Serial0/1/0:0 (in milliseconds)
Protocol version for interface Serial0/1/0:0 is ITU-T Q.703 (1996) (White Book)

t1 (aligned/ready)      = 15000
t2 (not aligned)        = 5000
t3 (aligned)            = 3000
t4 (emergency proving)   = 3000
t4 (normal proving)      = 200
t5 (sending SIB)        = 100
t6 (remote congestion)  = 3000
t7 (excess ack delay)   = 3000
tx (TTC timers)         = 24
```

Table 42 describes the fields in the display.

**Table 42** *show cs7 mtp2 timers Field Descriptions*

| Field                      | Description                                                                                   |
|----------------------------|-----------------------------------------------------------------------------------------------|
| T1 (aligned/ready) = 40000 | Alignment ready timer. ANSI default is 13000 milliseconds. ITU default is 40000 milliseconds. |
| T2 (not aligned) = 5000    | Not aligned timer. ANSI default is 11500 milliseconds. ITU default is 5000 milliseconds.      |
| T3 (aligned) = 1500        | Aligned timer. ANSI default is 11500 milliseconds. ITU default is 1500 milliseconds.          |

**Table 42** *show cs7 mtp2 timers Field Descriptions (continued)*

| Field                         | Description                                                                                                   |
|-------------------------------|---------------------------------------------------------------------------------------------------------------|
| T4 (emergency proving) = 500  | Emergency proving period timer. ANSI default is 600 milliseconds. ITU default is 500 milliseconds.            |
| t4 (normal proving) = 8200    | Normal proving period timer. ANSI default is 2300 milliseconds. ITU default is 8200 milliseconds.             |
| t5 (sending SIB) = 100        | Sending SIB timer. ANSI default is 80 milliseconds. ITU default is 100 milliseconds.                          |
| t6 (remote congestion) = 3000 | Remote congestion timer. ANSI default is 1000 milliseconds. ITU default is 3000 milliseconds.                 |
| t7 (excess ack delay) = 1000  | Excessive delay of acknowledgment timer. ANSI default is 1000 milliseconds. ITU default is 1000 milliseconds. |
| tx (TTC timers) = 24          | TTC timers (TA, TF, TO, TS). Default is 20 milliseconds.                                                      |

**Note**

Ranges are ANSI or ITU defined.

The following is sample output of from the **show cs7 mtp2** command using the **variant** keyword:

```
Router# show cs7 mtp2 variant serial0/1/0:0
Protocol version for interface Serial0/1/0:0 is ITU-T Q.703 (1996) (White Book)
```

Table 43 describes the fields in the display.

**Table 43** *show cs7 mtp2 variant Field Descriptions*

| Field                                                                           | Description                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protocol version for interface Serial0/1/0:0 is ITU-T Q.703 (1996) (White Book) | Identifies the variant supported on the interface. There are 4 possible values: <ul style="list-style-type: none"> <li>ansi ANSI SS7 protocol variant</li> <li>china CHINA SS7 protocol variant</li> <li>itu ITU SS7 protocol variant</li> <li>ttc Japan TTC SS7 protocol variant</li> </ul> |

**Related Commands**

| Command           | Description                                                                         |
|-------------------|-------------------------------------------------------------------------------------|
| <b>mtp2-timer</b> | Tunes MTP2 encapsulation timers or specifies the threshold for transmit congestion. |

# show cs7 mtp3 error

To display a list of MTP errors use the **show cs7 mtp3 errors** EXEC command.

## show cs7 mtp3 errors

**Syntax Description** This command has no arguments or keywords

**Defaults** No default behavior or values.

**Command Modes** EXEC

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(13)MB | This command was introduced. |

**Examples** The following is sample output from the **show cs7 mtp3 errors** command. The error type is preceded by the number of occurrences of the error.

```
ITP# show cs7 mtp3 errors
itp#sho cs7 mtp3 error
32      - Undefined Error Type
19      - SLT undefined OPC
4       - MTP3 Management process not started
```

Table 44 provides descriptions of the various types of MTP errors encountered on the devices supporting the IP Transfer Point product. The errors are listed in alphabetical order.

**Table 44** *show cs7 mtp3 errors*

| Error                            | Description                                                                                                                                                                       |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACL received linkset match       | An access list applied to all MSU arriving on a linkset matched and the result was to drop MSU.                                                                                   |
| ACL send linkset match           | An access list applied to all MSU to be transmitted on a linkset matched and the result was to drop MSU.                                                                          |
| AS not found for routing Context | Unable to locate routing context for Application service. No error message will be issued and Packet will be dropped.                                                             |
| Denied                           | A packet was received and an output linkset was selected. The Destination Point Code was denied (TFP) or an access List outbound linkset indicated that packet should be dropped. |
| Detected looping packet          | A packet was received that specified OPC that match the signalling points primary or secondary point-coded. The packet will be dropped and no messages will be issued.            |

**Table 44** *show cs7 mtp3 errors (continued)*

| Error                                          | Description                                                                                                                                                                                                                                                                  |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure inserting M3UA headers in message      | Unable to insert necessary information into header of M3UA message. No error message will be issued and Packet will be dropped.                                                                                                                                              |
| Failure to locate active ASP                   | Unable to locate active Application Server Process. No error message will be issued and Packet will be dropped.                                                                                                                                                              |
| HMRT event overflow                            | The signalling message handling - message routing queue has reached limit and MSU will be discard without error message being issued.                                                                                                                                        |
| Incorrect HO value in SLTC message             | A packet was received that contained an incorrect value for H0 field. An error message will be logged to console indicating source of packet and packet will be dropped.                                                                                                     |
| Incorrect H1 value in SLTC message             | A packet was received that contained an incorrect value for H1 field. An error message will be logged to console indicating source of packet and packet will be dropped                                                                                                      |
| Incorrect link type                            | A packet was received that contained an undefined link type in "lp->type" field. This is likely a software error. Packet will be dropped without issuing error message.                                                                                                      |
| Incorrect Network Indicator received in packet | A packet was received with a different network indicator. The packet is dropped.                                                                                                                                                                                             |
| Incorrect peer protocol                        | This error type is not currently used.                                                                                                                                                                                                                                       |
| Incorrect SCTP link status                     | This error type is not currently used.                                                                                                                                                                                                                                       |
| Incorrect SCTP stream number                   | This error type is not currently used.                                                                                                                                                                                                                                       |
| Invalid packet size (MSU size exceeded)        | A MSU was received that exceed specified limit. No error message will be issued and Packet will be dropped.                                                                                                                                                                  |
| Link event discarded (verification failed)     | A MTP3 event was queued for processing. However, event can not be processed because the target resource does not exist. This can occur when links or linkset are un-configured. MTP3 event will be discarded without issuing error message.                                  |
| Local Point Code not defined                   | A packet was received before local point-coded was defined. The packet is dropped.                                                                                                                                                                                           |
| MTP3 Management process not started            | A packet was received and did not contain a valid link pointer in packet.                                                                                                                                                                                                    |
| Multi-layer Routing abort                      | A MSU processed by Multi-layer Routing has matched rule indicating it should be aborted. No error message will be issued and Packet will be dropped.                                                                                                                         |
| No instance                                    | A MSU was received on a link and the Instance information is inconsistent. This can occur when instances are removed or linkset are moved between instances. It may also occur as a by-product of some software error. MSU will be discarded without issuing message to log. |
| No link                                        | A MSU was received that specified a destination point code. The output linkset did not have any operational links. MSU will be dropped and no error messages will be displayed.                                                                                              |

**Table 44** *show cs7 mtp3 errors (continued)*

| Error                                          | Description                                                                                                                                                                                                                                                                  |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure inserting M3UA headers in message      | Unable to insert necessary information into header of M3UA message. No error message will be issued and Packet will be dropped.                                                                                                                                              |
| Failure to locate active ASP                   | Unable to locate active Application Server Process. No error message will be issued and Packet will be dropped.                                                                                                                                                              |
| HMRT event overflow                            | The signalling message handling - message routing queue has reached limit and MSU will be discard without error message being issued.                                                                                                                                        |
| Incorrect HO value in SLTC message             | A packet was received that contained an incorrect value for H0 field. An error message will be logged to console indicating source of packet and packet will be dropped.                                                                                                     |
| Incorrect H1 value in SLTC message             | A packet was received that contained an incorrect value for H1 field. An error message will be logged to console indicating source of packet and packet will be dropped                                                                                                      |
| Incorrect link type                            | A packet was received that contained an undefined link type in "lp->type" field. This is likely a software error. Packet will be dropped without issuing error message.                                                                                                      |
| Incorrect Network Indicator received in packet | A packet was received with a different network indicator. The packet is dropped.                                                                                                                                                                                             |
| Incorrect peer protocol                        | This error type is not currently used.                                                                                                                                                                                                                                       |
| Incorrect SCTP link status                     | This error type is not currently used.                                                                                                                                                                                                                                       |
| Incorrect SCTP stream number                   | This error type is not currently used.                                                                                                                                                                                                                                       |
| Invalid packet size (MSU size exceeded)        | A MSU was received that exceed specified limit. No error message will be issued and Packet will be dropped.                                                                                                                                                                  |
| Link event discarded (verification failed)     | A MTP3 event was queued for processing. However, event can not be processed because the target resource does not exist. This can occur when links or linkset are un-configured. MTP3 event will be discarded without issuing error message.                                  |
| Local Point Code not defined                   | A packet was received before local point-coded was defined. The packet is dropped.                                                                                                                                                                                           |
| MTP3 Management process not started            | A packet was received and did not contain a valid link pointer in packet.                                                                                                                                                                                                    |
| Multi-layer Routing abort                      | A MSU processed by Multi-layer Routing has matched rule indicating it should be aborted. No error message will be issued and Packet will be dropped.                                                                                                                         |
| No instance                                    | A MSU was received on a link and the Instance information is inconsistent. This can occur when instances are removed or linkset are moved between instances. It may also occur as a by-product of some software error. MSU will be discarded without issuing message to log. |
| No link                                        | A MSU was received that specified a destination point code. The output linkset did not have any operational links. MSU will be dropped and no error messages will be displayed.                                                                                              |

**Table 44** *show cs7 mtp3 errors (continued)*

| Error                           | Description                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No link pointer in packet       | A packet was received and did not contain a valid link pointer in packet.                                                                                                                                                                                                                                                                                                                |
| No linkset                      | A MSU was received that specified a destination point-code. The destination was either unavailable from the reception of TFP or no route had been configured to destination. MSU will be dropped and no error messages will be displayed.                                                                                                                                                |
| No memory for cs7_info chunk    | A MSU was received but could not be processed because necessary additional storage was unavailable. No error message will be issued. Packet will be dropped.                                                                                                                                                                                                                             |
| No memory for SCTP buffer.      | A packet was received but could not be processed because the SCTP layer was unable to obtain packet buffer. No error message will be issued. Packet will be dropped.                                                                                                                                                                                                                     |
| Received partial SCTP buffer    | A partial packet was received and could not be processed by SCTP layer. No error message will be issued. Packet will be dropped.                                                                                                                                                                                                                                                         |
| Remote congestion               | A link used to transport MSU to next Signalling point is congestions. MSU are discarded as required by congestion control. Messages will be logged to console when link enters and exits congestions.                                                                                                                                                                                    |
| Send failure                    | An error occurred when attempting to send packet on link. Packet will be dropped without issuing error message.                                                                                                                                                                                                                                                                          |
| SLT failed                      | A Signalling Link Test Message failed. This error occurs when the sender of the SLT messages did not receive a response in the required timeframe. <ul style="list-style-type: none"> <li>• The variant is miss-configured.</li> <li>• The link has some type of mismatch on configuration</li> <li>• Link has some type of hardware problem.</li> </ul>                                 |
| SLT incorrect network indicator | A Signalling Link Test Message was received with a different network indicator. An Error message will be logged to console indicating link receiving SLTM.                                                                                                                                                                                                                               |
| SLT incorrect OPC               | A Signalling Link Test Message was received from a different Origination Point-Code than was expected for the linkset containing link. For example a linkset is configured to connect to point-code 1.1.1 and received a response from 1.2.1. Error messages will be logged to console indicating the linkset on which link was received and the linkset that should have received SLTM. |
| SLT incorrect SLC               | A Signalling Link Test Message was received from a different Signalling Link Code than was expected for the link. For example a link is configured with SLC of 5 and is incorrect connected to link with SLC of 15.2.1. Error messages will be logged to console indicating the link that was miss-configured.                                                                           |



**Table 44** *show cs7 mtp3 errors (continued)*

| Error                                      | Description                                                                                                                                                                                                                                                                                                                              |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SLT invalid                                | A Signalling Link Test Message which contained incorrectly formatted data and could not be processed.                                                                                                                                                                                                                                    |
| SLT received bad pattern                   | A Signalling Link Test Message received with an incorrectly formatted pattern. This can occur in the following situations: <ul style="list-style-type: none"> <li>• The variant is incorrectly configured.</li> <li>• The link has some type of mismatch on configuration</li> <li>• Link has some type of hardware problem.</li> </ul>  |
| SLT received from non-adjacent OPC         | A Signalling Link Test Message was received from an Origination Point-Code that could not be accessed by directly attached linkset and the OPC is specified in the routing table indicating the OPC is not directly attached to device. Error messages will be logged to console indicating the linkset on which this SLTM was received. |
| SLT undefined OPC                          | A Signalling Link Test Message was received from an Origination Point-Code that is not defined to any linkset.                                                                                                                                                                                                                           |
| SLT undefined SLC                          | A Signalling Link Test Message was received from a Signalling Link Code not in use for linkset. An error message will be logged indicating which link received SLTM messages and the incorrect SLC.                                                                                                                                      |
| Undefined Error Type                       | An error unknown error type was encountered that likely indicates some type of software problem has occurred.                                                                                                                                                                                                                            |
| Unlock requested lock count!=0<br>cs7_info | An internal software error has occurred during the processing of an MSU. No error message will be issued. Packet will be dropped.                                                                                                                                                                                                        |
| Unsupported management messages            | This error type is not currently used.                                                                                                                                                                                                                                                                                                   |
| Variant not defined                        | A packet was received before all variant information has been defined. The packet is dropped.                                                                                                                                                                                                                                            |

**Related Commands**

| Command                            | Description                                                                                                 |
|------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>show cs7 mtp3 event-history</b> | Displays MTP3 logged events.                                                                                |
| <b>show tech-support</b>           | Collects and displays a large amount of ITP configuration information that can be used for troubleshooting. |

## show cs7 mtp3 event-history

The events exchanged among the 3 MTP components, traffic, link, and route management, are logged in memory by default. To display logged events, use the **show cs7 mtp3 event-history** EXEC command.

**show cs7** [*instance-number*] **mtp3 event-history** *number*

|                           |                        |                                                                                             |
|---------------------------|------------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|                           | <i>number</i>          | Number of events to display. Valid numbers are in the range 0 to 1024.                      |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(1)MB      | This command was introduced. |

|                         |                                                                                               |
|-------------------------|-----------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | To capture all events in one display, configure the <b>terminal length</b> EXEC command to 0. |
|-------------------------|-----------------------------------------------------------------------------------------------|

|                 |                                                                                                                                                               |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following is sample output from the <b>show cs7 mtp3 event-history</b> command with the number of events to display ( <i>number</i> argument) <b>10</b> : |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
Router# show cs7 mtp3 event-history 10
22:26:01 CS7 MTP3 MGMT event history. Max configured to be saved: 1024
Num of events currently saved: 16. Num to be displayed: 10
NOTE: Event history logging will be suspended while events are being displayed
```

```
00:00:13 LOG MTP3 Event: To: TPRC Fm: MGMT Ev: SP_restart_indication
00:00:13 LOG MTP3 Event: To: LLSC Fm: TPRC Ev: restart_begins tony
00:00:13 LOG MTP3 Event: To: LLSC Fm: TPRC Ev: restart_begins michael
00:00:13 LOG MTP3 Event: To: TSRC Fm: TPRC Ev: restart_begins
00:00:13 LOG MTP3 Event: To: TSFC Fm: TPRC Ev: restart_begins
00:00:13 LOG MTP3 Event: To: TLAC Fm: TPRC Ev: restart_begins tony 0
00:00:13 LOG MTP3 Event: To: TLAC Fm: TPRC Ev: restart_begins michael 0
00:00:13 LOG MTP3 Event: To: RSRT Fm: TPRC Ev: restart_begins
00:00:13 LOG MTP3 Event: To: LSAC Fm: LLSC Ev: activate_link tony 0
00:00:13 LOG MTP3 Event: To: LSAC Fm: LLSC Ev: activate_link michael 0
```

|                         |                             |                                     |
|-------------------------|-----------------------------|-------------------------------------|
| <b>Related Commands</b> | <b>Command</b>              | <b>Description</b>                  |
|                         | <b>show cs7 mtp3 timers</b> | Displays the values of MTP3 timers. |

# show cs7 mtp3 timers

To display the values of MTP3 timers, use the **show cs7 mtp3 timers** EXEC command.

**show cs7** [*instance-number*] **mtp3 timers**

|                           |                        |                                                                                             |
|---------------------------|------------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|---------------------------|------------------------|---------------------------------------------------------------------------------------------|

|                      |      |
|----------------------|------|
| <b>Command Modes</b> | EXEC |
|----------------------|------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(1)MB      | This command was introduced. |

|                         |                                                                                                                                                                                                                                          |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The Scope field shows all global MTP3 timers and all linkset and link timers that have been defined at the global level. Linkset timers have the value “ls” in the scope field and link timers have the value “link” in the scope field. |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                              |
|-----------------|------------------------------------------------------------------------------|
| <b>Examples</b> | The following is sample output from the <b>show cs7 mtp3 timers</b> command: |
|-----------------|------------------------------------------------------------------------------|

```
Router# show cs7 mtp3 timers
CS7 MTP3 Timers global timers in milli-seconds
Timer    Value(ms) Description                               Scope
-----
t06       800 (avoid mis-seq. on controlled rerouting)      global
t08       1000 (transfer-prohibited inhibited timer)         global
t10       45000 (waiting to repeat route-set-test message)   global
t11       60000 (transfer-restricted)                       global
t15       2500 (repeat signaling route set congestion test)   global
t16       1700 (waiting for route-set congestion update)      global
t18       30000 (MTP restart link supervision)               global
t20       60000 (MTP restart timer at the signaling point)    global
```

|                         |                       |                                             |
|-------------------------|-----------------------|---------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>        | <b>Description</b>                          |
|                         | <b>cs7 mtp3 timer</b> | Configures MTP3 management timers globally. |

# show cs7 nso

To display NSO information, use the **show cs7 nso** command in EXEC mode.

**show cs7 nso { counters [detailed] | state }**

|                           |                 |                                     |
|---------------------------|-----------------|-------------------------------------|
| <b>Syntax Description</b> | <b>counters</b> | Display counters maintained by NSO. |
|                           | <b>detailed</b> | (Optional) Display detailed output. |
|                           | <b>state</b>    | Display NSO state information.      |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(23)SW     | This command was introduced. |

**Examples** The following example displays NSO state information:

```
Router# show cs7 nso state
ITP NSO state information:
  Current State:                operative
  Operating Redundancy Mode:    sso
  Configured Redundancy Mode:   sso
  Redundancy State:             ACTIVE
  Peer Redundancy State:        STANDBY HOT
  Checkpointing state:
    Last seq # sent:            143657
    Last seq # rcvd:            0
    Congested:                  FALSE
    Current send queue depth:   0
```

Table 45 describes the significant fields shown in the display.

**Table 45** *show cs7 nso Field Descriptions*

| Field                      | Description                                     |
|----------------------------|-------------------------------------------------|
| Current State              | Fields describe the current state.              |
| Operating Redundancy Mode  | Current operational redundancy mode.            |
| Configured Redundancy Mode | Current setting of redundancy mode command.     |
| Redundancy State           | Current redundancy state.                       |
| Peer Redundancy State      | Current redundancy state of other RSP.          |
| Checkpointing state        | Fields describe current state of checkpointing. |

**Table 45** *show cs7 nso Field Descriptions (continued)*

| Field                    | Description                                                                |
|--------------------------|----------------------------------------------------------------------------|
| Last seq # sent          | Sequence number of last NSO Checkpointing message sent to other RSP.       |
| Last seq # rcvd:         | Sequence number of last NSO Checkpointing message received from other RSP. |
| Congested                | TRUE if congestion is present on communication to other RSP.               |
| Current send queue depth | Number of messages waiting to be sent to other RSP.                        |

**Related Commands**

| Command           | Description                                                                                                 |
|-------------------|-------------------------------------------------------------------------------------------------------------|
| cs7 nso           | Enable ITP Non-Stop Operation (NSO).                                                                        |
| show tech-support | Collects and displays a large amount of ITP configuration information that can be used for troubleshooting. |

# show cs7 offload mtp3

To display the current status, counters, and events maintained by the MTP3 offload feature, use the **show cs7 offload mtp3** EXEC command.

**show cs7 offload mtp3** [*slot*] [**detailed**] [**events** [**combined**] [**detailed**] ]

## Syntax Description

|                 |                                                                                                                                                                                                                                      |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>slot</i>     | (Optional) VIP slot number. Valid numbers are in the range 0 to 12.                                                                                                                                                                  |
| <b>events</b>   | (Optional) Displays all the events logged in the maintenance of the configuration and status on the VIP. If the slot number and <b>combined</b> keyword are not specified, then the events are displayed independently for each VIP. |
| <b>detailed</b> | (Optional) Displays the counters maintained for the configuration download to the VIP. When the <b>detailed</b> keyword is specified with the <b>events</b> keyword, additional information related to the event is also displayed.  |
| <b>combined</b> | (Optional) When specified without a slot number, displays the events interixed for all VIPs int he timestamp order in which they occurred.                                                                                           |

## Defaults

No default behavior or values.

## Command Modes

EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Examples

The following is sample output from the **show cs7 offload mtp3** command. The output indicates that MTP3 Offload is enabled on VIPs 2 and 4, and is functioning normally.

```
Router#show cs7 offload mtp3
```

```
MTP3 offload enabled.
```

```
Slot  Status    Offload
2      Normal     Enabled
4      Normal     Enabled
```

Table 47 describes the fields in the display, including the possible values that can be displayed in the Status and Offload columns.

**Table 46** *show cs7 offload mtp3 Field Descriptions*

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slot         | VIP slot.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Status       | The Status column indicates which phase is currently applicable for the MTP3 offload on each VIP. The possible values that can be displayed in the Status column are <b>Disabled</b> , <b>Init</b> , <b>Normal</b> , and <b>PermDisabled</b> .                                                                                                                                                                                                                        |
| Disabled     | MTP3 offload is temporarily disabled on the VIP. This will be indicated when error recovery is in progress.                                                                                                                                                                                                                                                                                                                                                           |
| Init         | MTP3 offload is being initialized on the VIP.                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Normal       | MTP3 offload is enabled and operating normally.                                                                                                                                                                                                                                                                                                                                                                                                                       |
| PermDisabled | MTP3 offload has been permanently disabled on the VIP. This will be indicated when excessive errors have been encountered on the VIP and repeated error recovery attempts have failed.<br><br>When a VIP enters this state, the status of all links on the VIP will be displayed as “sys-shutdown” when the <b>show cs7 linkset</b> command is executed.<br><br>A VIP in this state can be restarted manually by issuing the <b>cs7 offload mtp3 restart</b> command. |
| Offload      | The Offload column indicates whether or not MTP3 is operational on the VIP. The possible values that can be displayed in the Offload column are <b>DisabledSys</b> and <b>Enabled</b> .                                                                                                                                                                                                                                                                               |
| DisabledSys  | MTP3 offload has been disabled by the system. This will be displayed whenever the ITP is performing error recovery or when MTP3 offload has been permanently disabled on the VIP.                                                                                                                                                                                                                                                                                     |
| Enabled      | MTP# offload has been enabled on the VIP.                                                                                                                                                                                                                                                                                                                                                                                                                             |

#### Related Commands

| Command                 | Description                       |
|-------------------------|-----------------------------------|
| <b>cs7 offload mtp3</b> | Enables MTP3 offload on all VIPs. |

# show cs7 pc-conversion

To display mapping of real to alias point codes, use the **show cs7 pc-conversion** EXEC command.

**show cs7** [*instance-number*] **pc-conversion**

## Syntax Description

|                        |                  |
|------------------------|------------------|
| <i>instance-number</i> | Instance number. |
|------------------------|------------------|

## Defaults

No default behavior or values.

## Command Modes

EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

This command can be issued either globally or on an instance.

## Examples

The following is sample output from the **show cs7 pc-conversion** command:

```
Router#show cs7 0 pc-conversion
PC                ALIAS PC
-----
1.84.1:1          0.85.7:4
1.84.4:4          1.85.7:1
```

## Related Commands

| Command                           | Description                                                                   |
|-----------------------------------|-------------------------------------------------------------------------------|
| <b>cs7 instance pc-conversion</b> | Enables the conversion of packets bwtween instances on the ITP.               |
| <b>cs7 multi-instance</b>         | Enables multiple instances of of a variant and network indicator combination. |



# show cs7 ping

To display output from a ping test, use the **show cs7 ping** EXEC command.

**show cs7 ping** *point-code*

| Syntax Description | <i>point-code</i> | Point code of the device to ping. |
|--------------------|-------------------|-----------------------------------|
|--------------------|-------------------|-----------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | EXEC |
|---------------|------|
|---------------|------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

| Examples | <p>The following is sample output from the <b>show cs7 ping</b> command:</p> <pre>Router# show cs7 ping 10.44.156      running state Generating, 5 seconds left current send sequence 4, receive seq 4</pre> |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Related Commands | Command  | Description                    |
|------------------|----------|--------------------------------|
|                  | ping cs7 | Starts a ping to a point code. |

# show cs7 point-codes

To display the point codes that this router is responding to, use the **show cs7 point-codes** privileged EXEC command.

**show cs7** [*instance-number*] **point-codes** [**event-history** | **ssn**]

| Syntax Description | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|--------------------|------------------------|---------------------------------------------------------------------------------------------|
|                    | <b>event-history</b>   | Displays point code history.                                                                |
|                    | <b>ssn</b>             | Displays SUA point code/SSN status.                                                         |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

**Usage Guidelines** The **show cs7 point-codes** command will display the point codes that this router is responding to. These point codes include the local point code, secondary point code, capability point code, AS point codes (DPC in the routing key), and AS Route point codes.

**Examples** The following is sample output from the **show cs7 point-codes** command:

```
router# show cs7 point-codes
```

| CS7 Point Code | Type      | Status          |
|----------------|-----------|-----------------|
| -----          | -----     | -----           |
| 0.0.4          | local     | active          |
| 0.0.4          | AS        | M3UA inactive   |
| 0.0.3          | secondary | active          |
| 0.0.3          | AS        | M3UA inactive   |
| 0.0.6          | AS        | M3UA inactive   |
| 1.2.3          | AS        | M3UA active     |
| 7.8.9          | AS        | M3UA inactive   |
| 8.7.5          | AS Route  | M3UA inactive   |
| 8.8.8          | AS Route  | M3UA restricted |
| 9.9.9          | AS        | M3UA active     |

**Related Commands**

| Command                                  | Description                                                                                                  |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>clear cs7 pointcode event-history</b> | Clears the CS7 M3UA or SUA point code measurements.                                                          |
| <b>show tech-support</b>                 | Collects and displays a large amount of ITP configuration information that can use used for troubleshooting. |

# show cs7 qos

To display the QoS class information, use the **show cs7 qos** privileged EXEC command.

**show cs7** [*instance-number*] **qos** {[**class** *class*] | [**statistics** *ls-name*]}

| Syntax Description     |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <b>class</b>           | (Optional) Specifies QoS class.                                                             |
| <i>class</i>           | QoS class identifier. Valid range is 0 through 7.                                           |
| <b>statistics</b>      | Displays QoS link usage statistics.                                                         |
| <i>ls-name</i>         | Linset name.                                                                                |

| Defaults | No default behavior or values |
|----------|-------------------------------|
|----------|-------------------------------|

| Command Modes | EXEC |
|---------------|------|
|---------------|------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

**Examples** The following is sample output from the show cs7 qos command with the **class** keyword:

```
router# show cs7 qos class
  QoS  Prec  DSCP  Acc-Grp  MatchType      Input Linkset
  ---  ----  ----  -
  0      1      14      none
  1      3      2701   any       to_nyc
  2      4      none   access-group to_la
  3      4      none
```

Table 47 describes the fields in the display.

**Table 47** *show cs7 qos class Field Descriptions*

| Field         | Description                                              |
|---------------|----------------------------------------------------------|
| QoS           | QoS class.                                               |
| Prec          | IP precedence value assigned to QoS class.               |
| DSCP          | Differential Services Code Point assigned to QoS class.  |
| Acc-Grp       | Access group assigned to QoS class.                      |
| Match Type    | Packet matching criteria assigned to QoS class.          |
| Input Linkset | Input linkset where packet matching criteria is defined. |

The following is sample output from the **show cs7 qos** command with the **statistics** keyword:

```
Router# show cs7 qos statistics michael
lsn=michael      apc=3.3.3      state=avail      available/links=2/3
  SLC  QoS      MSU In    MSU Out  Drops  ByteCnt In  ByteCnt Out
  00   0         520      488     0      10320      8784
  01   1         488      520     0       8784     10320
  02   2          0        0     0         0         0
```

Table 48 describes the fields in the display.

**Table 48** *show cs7 qos statistics Field Descriptions*

| Field       | Description                      |
|-------------|----------------------------------|
| SLC         | Signal Link Code.                |
| QoS         | QoS class assigned to this link. |
| MSU In      | MSUs received on this link.      |
| MSU Out     | MSUs sent on this link.          |
| Drops       | MSUs dropped.                    |
| ByteCnt In  | Byte count of MSUs received.     |
| ByteCnt Out | Byte count of MSUs sent.         |

#### Related Commands

| Command       | Description                |
|---------------|----------------------------|
| cs7 qos class | Specifies a CS7 QoS class. |

# show cs7 route

To display the ITP routing table, use the **show cs7 route** EXEC command.

**show cs7** [*instance-number*] **route** [*pc* [**summary-routes**]] [**brief** | **detailed**]

## Syntax Description

|                        |                                                                                                                                                                |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Required only if the <b>cs7 multi-instance</b> feature is enabled. Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
| <i>pc</i>              | Point code.                                                                                                                                                    |
| <b>summary-routes</b>  | (Optional) Displays summary routes information for the specified pc.                                                                                           |
| <b>brief</b>           | (Optional) Displays a brief form of the output.                                                                                                                |
| <b>detailed</b>        | (Optional) Displays a detailed form of the output.                                                                                                             |

## Defaults

No default behavior or values

## Command Modes

EXEC

## Command History

| Release   | Modification                                       |
|-----------|----------------------------------------------------|
| 12.2(1)MB | This command was introduced.                       |
| 12.2(4)MB | Show output enabled for multiple instance feature. |

## Usage Guidelines

The output of the **show cs7 route** command will vary based on the options specified, the variant, the masks used to configure routes and configuration options.

There are two basic types of routes. The first type of route is fully qualified. A fully qualified route has a mask specifying all of the allowed bits of the destination point code. For example, a fully qualified route for the ANSI variant would have a mask of 255.255.255 or mask length of 24 bits. When the variant is ITU the fully qualified route would have a mask of 7.255.7 or mask length of 14 bits. The second type of route is a summary route that represents a group of destination point codes. For example, with a variant of ITU and a point-code of 5.11.0 and a mask of 7.255.0 the route represents all points in the range of 5.11.0 to 5.11.7. A special type of summary route is a cluster route. Cluster routes are only defined for ANSI variant and mask where the mask must be 255.255.0.

The following configuration options effect the route and destination status information:

### summary-routing-exception

The summary-routing-exception configuration option indicates whether to use the summary route when the fully qualified route is not available. By default the summary-routing-exception option is off and summary route can be used to route MTP3 messages. In this case, when a summary route is available and fully qualified route is unavailable the destination status for the fully qualified route will be restricted rather than unavailable. When summary-routing-exception option is enable the destination status for the fully qualified route will be unavailable.

**max-dynamic-routes**

The max-dynamic-routes configuration option defines the maximum number of dynamic route allowed for the signalling point. If the limit is reached the status of some routes will not reflect the information reflected in the MTP3 management packets.

**national-options TFR**

This option applies only to ITU and china variants and indicates whether transfer restricted MTP3 management messages will be exchanged between signalling points. When this options is enabled route and destination statuses can display the restricted state.

**national-options multiple-congestion****Note**

Changing any of the global configuration options on an operational box will not update all route and destination statuses. Routing behavior will change correctly, although it might not match what would be indicated by some destination statuses. These options are intended to be a one-time configuration before the box is put in service.

**Examples**

The **show cs7 route** command without options produces a list of destinations and the associated routes used to access each destination. The following are 2 samples of output from the **show cs7 route** command executed with no modifier keywords.:

```
Router# show cs7 route
Routing table = system Destinations = 3 Routes = 3
Instance = 3
```

| Destination | Prio | Linkset Name | Route |
|-------------|------|--------------|-------|
| 1.1.0/11    | accs | 1 barbados   | avail |
| 1.1.1/14    | accs | 1 bermuda    | avail |
|             |      | 5 bimini     | avail |
| 3.1.1/14    | accs | 5 bermuda    | avail |

```
Routing table = XUA
```

| Destination | Type           |
|-------------|----------------|
| 2.1.1/14    | INACC AS       |
| 2.2.2/14    | RESTR AS Route |
| 4.1.1/14    | INACC AS       |
| 4.4.4/14    | RESTR AS Route |

The following sample includes an example of a host names to point code mapping.

```
Router#show cs7 route
Dynamic Routes 0 of 500 with 0 drops
```

```
Routing table = system Destinations = 5 Routes = 5
Instance = 0
```

| Destination | Prio  | Linkset Name | Route   |
|-------------|-------|--------------|---------|
| 666/14      | INACC | 1 one        | UNAVAIL |
| green       | INACC | 5 one        | UNAVAIL |
| red         | INACC | 5 one        | UNAVAIL |
| 5120/11     | INACC | 5 one        | UNAVAIL |
| 5221/14     | INACC | 5 one        | UNAVAIL |

# show cs7 route

Dynamic Routes 0 of 500 with 0 drops

Routing table = system1 Destinations = 2 Routes = 2

Instance = 1

| Destination | Prio  | Linkset | Name | Route   |
|-------------|-------|---------|------|---------|
| green       | INACC | 5       | two  | UNAVAIL |
| 3.3.3/24    | INACC | 1       | two  | UNAVAIL |

The **show cs7 route** command with the **brief** keyword produces only a list of destinations. The following is sample output from the **show cs7 route** command executed with the **brief** keyword:

Router# **show cs7 route brief**

Routing table = system

| Destination | Cong  |
|-------------|-------|
| 1.1.0/11    | acces |
| 1.1.1/14    | acces |
| 3.1.1/14    | acces |

Routing table = XUA

| Destination | Type           |
|-------------|----------------|
| 2.1.1/14    | INACC AS       |
| 2.2.2/14    | RESTR AS Route |
| 4.1.1/14    | INACC AS       |
| 4.4.4/14    | RESTR AS Route |

The **show route** command with the **detailed** option produces a list of destinations and associated routes with the available management information. The following is sample output from the **show cs7 route** command executed with the **detailed** keyword:

Router# **show cs7 route detailed**

Routing table = system

C=Cong Q=QoS P=Prio

| Destination | C     | Q | P | Linkset  | Name | Linkset | Non-adj | Route |
|-------------|-------|---|---|----------|------|---------|---------|-------|
| 1.1.0/11    | acces |   | 1 | barbados |      | avail   |         | avail |
| 1.1.1/14    | acces |   | 1 | bermuda  |      | avail   | allowed | avail |
|             |       |   | 5 | bimini   |      | avail   | allowed | avail |
| 3.1.1/14    | acces |   | 5 | bermuda  |      | avail   | allowed | avail |

Routing table = XUA

| Destination | Type           | XUA     | Name |
|-------------|----------------|---------|------|
| 2.1.1/14    | INACC AS       | cuba    | down |
| 2.2.2/14    | RESTR AS Route | asrout2 |      |
| 4.1.1/14    | INACC AS       | newone  | down |
|             | AS             | as2     | down |
| 4.4.4/14    | RESTR AS Route | asrout1 |      |

The following is sample output from the **show cs7 route** command executed with a destination point code (*destination* argument) of 4.1.1:



```
Router# show cs7 route 4.1.1
Routing table = XUA
```

```
Destination          Type
-----
4.1.1/14             INACC  AS
```

The show cs7 route command with a point-code destination argument and summary-routes keyword will produce a list of route matching the specified destination. The following is sample output from the show cs7 route command executed with the point-code destination argument and summary-routes keyword:

```
Router# show cs7 route 1.1.1 summary-routes detail
Routing table = system
C=Cong Q=QoS P=Prio
Destination          C Q P Linkset Name      Linkset Non-adj Route
-----
1.1.0/11             acces      1  barbados          avail   allowed avail
1.1.1/14             acces      1  bermuda           avail   allowed avail
5 bimini avail allowed avail
```

Table 49 describes the fields in the display.

**Table 49** *show cs7 route Field Descriptions*

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Destination  | <p>This field is displayed in the format "dpc/masklength status".</p> <p>dpc is the destination point code.</p> <p>masklength is the number of significant leading bits in the point code.</p> <p>status can be one of the following:</p> <p>      acces      Accessible</p> <p>      INACC     Inaccessible</p> <p>      RESTR     Restricted</p> <p>The restricted status is only available under the ITU variant when the cs7 national-options TFR configuration option has been specified.</p> <p>The destination information is followed by one or more routes to that destination in the default and detailed views.</p> |
| C            | <p>Congestion information will appear when the <b>brief</b> or <b>detailed</b> keyword has been specified. This is the destination congestion status. Normally the congestion status is zero and nothing is displayed. In ANSI networks, or in ITU networks with the national option for multiple congestion levels turned on, this field displays the congestion level with numbers 1, 2, or 3. In ITU networks with the national option for multiple congestion levels turned off, this field would display the number 1 if the destination is congested.</p>                                                                |
| Q            | <p>This is the QoS class assigned to the destination, a decimal number in the range 1 to 7.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| P            | <p>This is the route priority, a decimal number in the range 1 to 9.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linkset Name | <p>This identifies the linkset for a route to the destination.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

**Table 49**      *show cs7 route Field Descriptions (continued)*

| Field        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |       |         |           |            |            |            |             |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------|---------|-----------|------------|------------|------------|-------------|
| Linkset      | <p>The linkset status can be one of the following:</p> <p>avail            Available</p> <p>UNAVAIL        Unavailable</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |       |         |           |            |            |            |             |
| Non-adj      | <p>The non-adjacent status shows the accessibility of the destination from the adjacent point code at the remote end of the linkset. It can be one of the following:</p> <p>allowed        Allowed</p> <p>RESTRIC       Restricted</p> <p>PROHIB        Prohibited</p>                                                                                                                                                                                                                                                                                                                                                                                                           |              |       |         |           |            |            |            |             |
| Route        | <p>This is the route status. This can be one of the following:</p> <p>avail            Available</p> <p>RESTRIC       Restricted</p> <p>UNAVAIL        Unavailable</p> <p>The route status is derived from the linkset status and the non-adjacent status. The latter are displayed in the detailed view. If the linkset is unavailable, the route is unavailable. If the linkset is available, the non-adjacent status is mapped to Route Status as follows:</p> <table> <tr> <th>Non-Adjacent</th><th>Route</th></tr> <tr> <td>allowed</td><td>available</td></tr> <tr> <td>restricted</td><td>restricted</td></tr> <tr> <td>prohibited</td><td>unavailable</td></tr> </table> | Non-Adjacent | Route | allowed | available | restricted | restricted | prohibited | unavailable |
| Non-Adjacent | Route                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |       |         |           |            |            |            |             |
| allowed      | available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              |       |         |           |            |            |            |             |
| restricted   | restricted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |       |         |           |            |            |            |             |
| prohibited   | unavailable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |       |         |           |            |            |            |             |

**Related Commands**

| Command                    | Description                                                                                                 |
|----------------------------|-------------------------------------------------------------------------------------------------------------|
| cs7 host                   | Maps a host name to a point code.                                                                           |
| show tech-support          | Collects and displays a large amount of ITP configuration information that can be used for troubleshooting. |
| update route (route-table) | Updates the route table.                                                                                    |

# show cs7 sccp gti-conversion

To display the CS7 GTI conversion table, use the **show cs7 sccp gti-conversion** privileged EXEC command.

**show cs7 sccp gti-conversion [measurements]**

| Syntax Description | measurements | Display a count of how many MSUs matched each rule in the GTI table. |
|--------------------|--------------|----------------------------------------------------------------------|
|--------------------|--------------|----------------------------------------------------------------------|

| Command Modes | privileged EXEC |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(20)SW | This command was introduced. |

| Usage Guidelines | If the measurements keyword is specified, a count of how many MSUs matched each rule in the GTI table is displayed. This count is cleared by the <b>clear cs7 all</b> command |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Examples** The following is sample output from the **show cs7 sccp gti-conversion** command:

```
Router# show cs7 sccp gti-conversion
SCCP GTI Conversion Table: gti4
```

| GTI | TT  | SSN | NP | NAI | ES | --> | OUT-GTI | OUT-TT | OUT-SSN | OUT-NP | OUT-NAI | OUT-ES |
|-----|-----|-----|----|-----|----|-----|---------|--------|---------|--------|---------|--------|
| 2   | 10  | *   | -  | -   | -  |     | 4       | 11     | *       | 1      | 1       | 2      |
| 2   | 250 | *   | -  | -   | -  |     | 4       | 34     | *       | 1      | 3       | 2      |

```
SCCP GTI Conversion Table: gti2
-OUT
```

| GTI | TT  | SSN | NP | NAI | ES | --> | OUT-GTI | OUT-TT | OUT-SSN | OUT-NP | OUT-NAI | OUT-ES |
|-----|-----|-----|----|-----|----|-----|---------|--------|---------|--------|---------|--------|
| 2   | 250 | *   | -  | -   | -  |     | 2       | 0      | 10      | -      | -       | -      |

The following is sample output from the **show cs7 sccp gti-conversion** command with the **measurements** keyword:

```
Router#show cs7 sccp gti-conversion measurements
SCCP GTI Conversion Table: gti4
```

| GTI | TT  | SSN | NP | NAI | ES | --> | USED |
|-----|-----|-----|----|-----|----|-----|------|
| 2   | 10  | *   | -  | -   | -  |     | 1239 |
| 2   | 250 | *   | -  | -   | -  |     | 11   |

```
SCCP GTI Conversion Table: gti2
```

| GTI | TT  | SSN | NP | NAI | ES | --> | USED |
|-----|-----|-----|----|-----|----|-----|------|
| 2   | 250 | *   | -  | -   | -  |     | 187  |

 **show cs7 sccp gti-conversion**

| Related Commands | Command                        | Description                                             |
|------------------|--------------------------------|---------------------------------------------------------|
|                  | <b>clear cs7 all</b>           | Clears all accounting, statistics, and GTT measurements |
|                  | <b>cs7 sccp gti-conversion</b> | Configures a GTI conversion table.                      |
|                  |                                |                                                         |

# show cs7 sccp instance-conversion

To display the CS7 SCCP Instance conversion table, use the **show cs7 sccp instance-conversion** privileged EXEC command.

**show cs7 sccp instance-conversion [measurements]**

## Syntax Description

|                     |                                                                                    |
|---------------------|------------------------------------------------------------------------------------|
| <b>measurements</b> | Display a count of how many SCCP MSUs were converted from one instance to another. |
|---------------------|------------------------------------------------------------------------------------|

## Command Modes

privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(20)SW | This command was introduced. |

## Usage Guidelines

If the measurements keyword is specified, a count of how many SCCP MSUs were converted from one instance to another is displayed. This count is cleared by the **clear cs7 all** command

## Examples

The following is sample output from the **show cs7 sccp instance-conversion** command:

Router# **show cs7 sccp instance-conversion**

| InInst->OutInst | GTI-CONV | SSN-CONV | ADDR-CONV | MsgHandling | NatInd |
|-----------------|----------|----------|-----------|-------------|--------|
| 0 -> 6          | test     | none     | none      | return-on-e | 0      |
| 0 -> 1          | none     | ssn1     | none      | no-chg      | 1      |
| 1 -> 0          | none     | ssn0     | none      | no-chg      | no-chg |
| 3 -> 4          | gti4     | none     | addr4     | no-chg      | no-chg |
| 4 -> 3          | gti2     | none     | addr3     | no-chg      | no-chg |

Router# **show cs7 sccp instance-conversion measurements**

| InInst->OutInst | PKTS    |
|-----------------|---------|
| 0 -> 6          | 0       |
| 0 -> 1          | 133393  |
| 1 -> 0          | 0       |
| 3 -> 4          | 0       |
| 4 -> 3          | 3934984 |

## Related Commands

| Command                        | Description                                             |
|--------------------------------|---------------------------------------------------------|
| <b>clear cs7 all</b>           | Clears all accounting, statistics, and GTT measurements |
| <b>cs7 sccp-gtt-conversion</b> | Configures a CS7 SCCP GTT conversion table.             |

# show cs7 sccp ssn-conversion

To display the SSN conversion table, use the **show cs7 sccp ssn-conversion** privileged EXEC command.

**show cs7 sccp ssn-conversion**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                              |
|-----------------|------------------------------|
| <b>Defaults</b> | No default behavior or value |
|-----------------|------------------------------|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(20)SW     | This command was introduced. |

|                 |                                                                                     |
|-----------------|-------------------------------------------------------------------------------------|
| <b>Examples</b> | The following is sample output from the <b>show cs7sccp ssn-conversion</b> command: |
|-----------------|-------------------------------------------------------------------------------------|

```
Router#show cs7 sccp ssn-conversion
```

```
SCCP SSN Conversion Table: ssn0
```

|        |         |
|--------|---------|
| IN-SSN | OUT-SSN |
| 10     | 250     |
| 200    | 20      |
| *      | 200     |

```
SCCP SSN Conversion Table: ssn1
```

|        |         |
|--------|---------|
| IN-SSN | OUT-SSN |
| 250    | 255     |

|                         |                                |                                   |
|-------------------------|--------------------------------|-----------------------------------|
| <b>Related Commands</b> | <b>Command</b>                 | <b>Description</b>                |
|                         | <b>cs7 sccp ssn-conversion</b> | Creates a subsystem mapping table |

# show cs7 sgmp

To display Signaling Gateway Mate Protocol (SGMP) information, use the **show cs7 sgmp** privileged EXEC command.

**show cs7** [*instance-number*] **sgmp**

## Syntax Description

|                        |                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------|
| <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|------------------------|---------------------------------------------------------------------------------------------|

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following is sample output from the **show cs7 sgmp** command:

```
router#show cs7 sgmp
SGMP Local port: 14002      State: active      SCTP instance handle: 5
Local ip address:          172.18.48.39
Number of active SGMP peers: 0
Max number of inbound streams allowed: 17
Local receive window:      5555
Max init retransmissions:   8
Max init timeout:          1000 ms
Unordered priority:         equal
Offload to VIP: No         Slot: -1
SCTP defaults for new associations
  Transmit queue depth:    1000      Cumulative sack timeout: 200 ms
  Assoc retransmissions:   17        Path retransmissions:    4
  Minimum RTO:             1000 ms   Maximum RTO:             1000 ms
  Bundle status:           on        Bundle timeout:          5 ms
  Keep alive status:       true      Keep alive timeout:      30000 ms
  Initial cwnd:            3000      Idle cwnd rate:          50
  Retrans cwnd rate:       50        Retrans cwnd mode:       RFC
  FastRetrans rate:       50
```

## Related Commands

| Command         | Description                                                                          |
|-----------------|--------------------------------------------------------------------------------------|
| <b>cs7 sgmp</b> | Establish an association to the mated signaling gateway and enters CS7 SGMP submode. |

# show cs7 smpp

To display information about SMPP sessions, use the **show cs7 smpp** privileged EXEC command.

**show cs7 smpp** {**detail** *session-id* | **list** | **statistics** *session-id*}

| Syntax Description | detail            | Display SMPP session details.                                 |
|--------------------|-------------------|---------------------------------------------------------------|
|                    | <i>session-id</i> | 4294967294> session identifier, in the range 1 to 4294967294. |
|                    | <b>list</b>       | Display SMPP session list.                                    |
|                    | <b>statistics</b> | Display SMPP session statistics.                              |

| Command Modes | Privileged EXEC |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Examples** The following is sample output from the **show cs7 smpp** command with the **list** keyword:

```
ITP# show cs7 smpp list
```

```
** SMPP Session List **
```

| sessionId  | state     | source             | destination        |
|------------|-----------|--------------------|--------------------|
| 0x04010001 | Listening | 172.18.44.163 4000 | 0.0.0.0 0          |
| 0x04010004 | BoundRx   | 172.18.44.163 4000 | 172.18.44.170 4000 |
| 0x04010005 | BoundRx   | 172.18.44.163 4000 | 172.18.44.170 4001 |
| 0x04010006 | BoundRx   | 172.18.44.163 4000 | 172.18.44.170 4002 |

Table 50 describes the significant fields shown in the display.

**Table 50** *show cs7 smpp list* Field Descriptions

| Field       | Description                                                 |
|-------------|-------------------------------------------------------------|
| sessionId   | Internal identifier for the session                         |
| state       | State of the session.                                       |
| source      | Source IP address and source port of the session.           |
| destination | Destination IP address and destination port of the session. |

The following is sample output from the **show cs7 smpp** command with the **detail** keyword:

```
ITP#show cs7 smpp detail 0x04010004
```

```
** SMPP Session Parameters SessionId: 0x04010004 **
```

```
sessionId:      0x04010004      uptime:      00:03:04.867
```



```

session state:      BoundRx      transport state:    Connected
local address:     172.18.44.163  local port:        4000
dest address:      172.18.44.170  dest port:         4000
protocol:          SMPP           protocolMode:       SMSC
snf:               1              snl:               1
send window:       10             sock fd:           3
cmd queue:         0              response queue:     0
response tmo:      5000           enquire link tmo:  60000
session init tmo:  120000         inactivity tmo:    1800000
soc write block:   0              soc write fail:    0
soc queue full:    0              soc partial send:  0
soc partial rcv:   0              soc would block:   0

```

Table 51 describes the significant fields shown in the display.

**Table 51** *show cs7 smpp detail Field Descriptions*

| Field            | Description                                                                    |
|------------------|--------------------------------------------------------------------------------|
| sessionID        | Internal identifier for the session.                                           |
| uptime           | Elapsed time session has been active.                                          |
| session state    | State of the session.                                                          |
| transport state  | State of the transport connection.                                             |
| local address    | Local ip address.                                                              |
| local port       | Local port number.                                                             |
| dest address     | Destination ip address.                                                        |
| dest port        | Destination port number.                                                       |
| protocol         | Type of protocol used for session (SMPP, UCP).                                 |
| protocol mode    | Mode assigned to the session (SMSC, ESME)                                      |
| snf              | Sequence number of the oldest packet.                                          |
| snl              | Sequence number of the last packet.                                            |
| send window      | Session transmit window size.                                                  |
| sock fd          | Socket layer file descriptor.                                                  |
| cmd queue        | Number of elements on queue waiting to be sent.                                |
| response queue   | Number of elements on queue waiting for response.                              |
| response tmo     | Length of time session waits for a response to a sent packet.                  |
| enquire link tmo | Length of time session waits before inquiring about session status.            |
| session init tmo | Length of time session waits before session is bound.                          |
| inactivity tmo   | Length of time session waits before session is closed due to lack of activity. |
| soc write block  | Number of times the socket layer transmit was blocked.                         |
| soc write fail   | Number of times the socket layer transmit failed.                              |
| soc queue full   | Number of times the socket layer transmit queue was full.                      |
| soc partial send | Number of times the socket layer transmitted partial number of bytes.          |

**Table 51** *show cs7 smpp detail Field Descriptions (continued)*

| Field            | Description                                                          |
|------------------|----------------------------------------------------------------------|
| soc partial recv | Number of times the socket layer received a partial number of bytes. |
| soc would block  | Number of times the socket layer would block on transmit.            |

The following is sample output from the **show cs7 smpp** command with the **statistics** keyword:

```
ITP#show cs7 smpp statistics 0x04010004
```

```
** SMPP Session Statistics SessionId: 0x04010004 **
```

|                           |   |                           |   |
|---------------------------|---|---------------------------|---|
| tx_generic_nack:          | 0 | rx_generic_nack:          | 0 |
| tx_bind_receiver:         | 0 | rx_bind_receiver:         | 1 |
| tx_bind_receiver_resp:    | 1 | rx_bind_receiver_resp:    | 0 |
| tx_bind_transmitter:      | 0 | rx_bind_transmitter:      | 0 |
| tx_bind_transmitter_resp: | 0 | rx_bind_transmitter_resp: | 0 |
| tx_submit_sm:             | 0 | rx_submit_sm:             | 0 |
| tx_submit_sm_resp:        | 0 | rx_submit_sm_resp:        | 0 |
| tx_deliver_sm:            | 0 | rx_deliver_sm:            | 5 |
| tx_deliver_sm_resp:       | 5 | rx_deliver_sm_resp:       | 0 |
| tx_unbind:                | 0 | rx_unbind:                | 0 |
| tx_unbind_resp:           | 0 | rx_unbind_resp:           | 0 |
| tx_bind_transceiver:      | 0 | rx_bind_transceiver:      | 0 |
| tx_bind_transceiver_resp: | 0 | rx_bind_transceiver_resp: | 0 |
| tx_outbind:               | 0 | rx_outbind:               | 0 |
| tx_enquire_link:          | 1 | rx_enquire_link:          | 0 |
| tx_enquire_link_resp:     | 0 | rx_enquire_link_resp:     | 1 |
| response_tmo:             | 0 | inactivity_tmo:           | 0 |
| session_init_tmo:         | 0 | enquire_link_tmo:         | 2 |

Table 52 describes the significant fields shown in the display.

**Table 52** *show cs7 smpp statistics Field Descriptions*

| Field            | Description                                         |
|------------------|-----------------------------------------------------|
| response_tmo     | Number of times the response timer has expired.     |
| inactivity_tmo   | Number of times the inactivity timer has expired.   |
| session_init_tmo | Number of times the session init timer has expired. |
| enquire_link_tmo | Number of times the enquire link timer has expired. |

**Related Commands**

| Command      | Description                  |
|--------------|------------------------------|
| cs7 sms smpp | Configures SMPP connections. |

# show cs7 sms address-table

To display SMS address table information, use the **show cs7 sms address-table** command in Privileged EXEC mode.

**show cs7 smpp address-table** [**addr** *address*] [**name** *name*] [**prefix** *digits*]

## Syntax Description

|                |                                                             |
|----------------|-------------------------------------------------------------|
| <b>addr</b>    | Filter on matching addresses.                               |
| <i>address</i> | Digit string.                                               |
| <b>name</b>    | Filter on address table name.                               |
| <i>name</i>    | Address table name.                                         |
| <b>prefix</b>  | Filter on addresses prefixed with a specified digit string. |
| <i>digits</i>  | Digit string.                                               |

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following is sample output from the **show cs7 sms address-table** command:

```
ITP#show cs7 sms address-table
```

```
Name: shortcodes      Instance: 0    Address Count: 4
```

| Address | Matches | Result   |
|---------|---------|----------|
| 11112*  | 0       | GRP grp2 |
| 1111*   | 4000    | GRP grp1 |
| 2222*   | 1000    | GRP grp1 |
| 5551212 | 0       | GRP grp3 |

Table 53 describes the significant fields shown in the display.

**Table 53** *show cs7 sms address-table* Field Descriptions

| Field    | Description                                                                                                              |
|----------|--------------------------------------------------------------------------------------------------------------------------|
| Name     | Address table name.                                                                                                      |
| Instance | Instance number.                                                                                                         |
| Address  | Address as specified in the address table. "*" indicates longer addresses that match this prefix are considered a match. |

**Table 53** *show cs7 sms address-table Field Descriptions (continued)*

| Field   | Description                                                                                                      |
|---------|------------------------------------------------------------------------------------------------------------------|
| Matches | Indicates the number of times this address has been invoked where this address matched the value in the request. |
| Result  | Indicates the result, if specified, that will be executed when a match occurs.                                   |

**Related Commands**

| Command               | Description                     |
|-----------------------|---------------------------------|
| cs7 sms address-table | Specifies an SMS address table. |

# show cs7 sms result

To display SMS result group information, use the **show cs7 sms result** command in Privileged EXEC mode.

**show cs7 sms result** *name*

## Syntax Description

|             |                          |
|-------------|--------------------------|
| <i>name</i> | Result group table name. |
|-------------|--------------------------|

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following is sample output from the **show cs7 sms result** command:

```
ITP# show cs7 sms result
Instance: 0 Result Group: grp1          Type: esme

Result                                Weight  Matches
-----
SMPP  D06000000000 172.10.22.1    2729    1      2500
SMPP  D06000000001 172.10.22.1    2732    1      2500
```

Table 54 describes the significant fields shown in the display.

**Table 54** *show cs7 sms result* Field Descriptions

| Field   | Description                                                                                  |
|---------|----------------------------------------------------------------------------------------------|
| Result  | Describes the result group member.                                                           |
| Weight  | Weight assigned to the result group member for weighted round robin load balancing purposes. |
| Matches | Number of times this result group member has been chosen for routing.                        |

## Related Commands

| Command                     | Description                    |
|-----------------------------|--------------------------------|
| <b>cs7 sms result-group</b> | Specifies an SMS result group. |

# show cs7 sms route-table

To display attributes of the SMS route table, use the **show cs7 sms route-table** command in Privileged EXEC mode.

**show cs7** [**instance** *instance-number*] **sms route-table** [**gsm-map** [**sms-mo** [**ssn** *ssn*]]]

## Syntax Description

|                        |                                                                                                           |
|------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>instance</b>        | (Optional) Specifies an instance.                                                                         |
| <i>instance-number</i> | Instance number.                                                                                          |
| <b>gsm-map</b>         | (Optional) Displays information regarding handling of inbound GSM MAP messages.                           |
| <b>sms-mo</b>          | (Optional) Displays information regarding handling of inbound SMS MO operations.                          |
| <b>ssn</b>             | (Optional) Displays information regarding handling of inbound SMS MO messages to the specified subsystem. |
| <i>ssn</i>             | Identifies the subsystem number in the range 2 to 255.                                                    |

## Command Modes

Privileged EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(25)SW1 | This command was introduced. |

## Usage Guidelines

The only currently supported protocol-operation-correlation filter is gsm-map/sms-mo/ssn.

## Examples

The following is sample output from the **show cs7 sms route-table** command:

```
ITP# show cs7 sms route-table gsm-map sms-mo ssn 8
SMS Route-table
Transaction-timer: 300          CDR-Service: pds

Protocol:          gsm-map Operation:  sms-mo Correlator: SSN 8
Ruleset:           smsc-rules Status: Enabled
map-source-addr:   use national digits 9193923943 tt 10 gti 2
Invoke Timer:      30 Max-messages:    0
SMSC MAP Version:  3 Proxy-error-use:  True
MNP Primary TT:    11 Secondary TT:     10
GPRS Delivery:     Prefer MSC
```

Table 55 describes the significant fields shown in the display.

**Table 55** *show cs7 sms route-table Field Descriptions*

| Field                  | Description                                                                                                                                                         |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transaction-timer: 300 | Displays the configured maximum lifetime of a message transaction in seconds.                                                                                       |
| CDR-Service: pds       | Displays the name of the CDR service used by the SMS routing subsystem.                                                                                             |
| Protocol: gsm-map      | Identifies the protocol routing instance. Currently only gsm-map is supported.                                                                                      |
| Operation: sms-mo      | Identifies the the GSM-MAP operation.                                                                                                                               |
| Correlator: SSN 8      | Identifies the subsystem number.                                                                                                                                    |
| Ruleset: smsc-rules    | Identifies the configured ruleset name.                                                                                                                             |
| Status: enabled        | Indicates that the protocol is enabled.                                                                                                                             |
| map-source-addr        | Identifies the address used as the calling party address for all MAP-generated messages.                                                                            |
| Invoke Timer           | Indicates the timer value, in seconds, configured to supervise initiated dialogues.                                                                                 |
| Max-messages           | Indicates the maximum number of open SMS MO messages allowed before a congestion response is generated.                                                             |
| SMSC MAP Version       | Indicates the SMSC MAP version.                                                                                                                                     |
| Proxy-error-use: True  | Specifies return the error received from the last MO Proxy procedure.                                                                                               |
| MNP Primary TT         | Identifies the primary tt in the SCCP called party address used to send all SRI-SM messages to the HLR.                                                             |
| Secondary TT           | Identifies the secondary tt, to be used to send a second request if the response to a message sent with the MNP primary tt contains the error "Unknown Subscriber." |
| GPRS Delivery          | Indicates that DSMR will attempt SMS MT delivery to the SGSN address when the HLR provides both MSC and SGSN addresses in an SRI confirmation.                      |

#### Related Commands

| Command                    | Description                    |
|----------------------------|--------------------------------|
| <b>cs7 sms route-table</b> | Configures an SMS route table. |

# show cs7 sms ruleset

To display the attributes of a configured SMS ruleset, use the **show cs7 sms ruleset** command in Privileged EXEC mode.

**show cs7 sms ruleset** [*name ruleset-name*] [**detail** | **result-summary** | **rule-summary**]

## Syntax Description

|                       |                                                                     |
|-----------------------|---------------------------------------------------------------------|
| <b>name</b>           | Specifies a ruleset name.                                           |
| <i>ruleset-name</i>   | Ruleset name.                                                       |
| <b>detail</b>         | (Optional) Displays detailed SMS ruleset information.               |
| <b>result-summary</b> | (Optional) Displays a summary of the results within an SMS ruleset. |
| <b>rule-summary</b>   | (Optional) Displays a summary of the rules within an SMS ruleset.   |

## Command Modes

Privileged EXEC

## Command History

| Release     | Modification                                                                                         |
|-------------|------------------------------------------------------------------------------------------------------|
| 12.2(25)SW  | This command was introduced.                                                                         |
| 12.2(25)SW1 | The <b>name</b> , <b>detail</b> , <b>result-summary</b> and <b>rule-summary</b> keywords were added. |

## Examples

The following is sample output from the **show cs7 sms ruleset** command filtered on ruleset **name** SMS-RULES2 and no other keyword. The default display is **result-summary** display mode.

```
ITP#show cs7 sms ruleset name SMS-RULES2
Name: SMS-RULES2   Instance:0   Protocol: n/a
```

| Rule | Result                                   | Rule<br>Checked | Rule<br>Matches | Result<br>Successful |
|------|------------------------------------------|-----------------|-----------------|----------------------|
| 100  | GT 123 tt 12 gti 2                       | 0               | 0               | 0                    |
| 250  | BLOCK                                    | 0               | 0               | 0                    |
| 480  | GT 123456789123456 tt 0 gti 4 np 4 nai 0 | 0               | 0               | 0                    |

The following is sample output from the **show cs7 sms ruleset** command filtered on ruleset **name** SMS-RULES2 and displayed in **rule-summary** display mode:

```
ITP#show cs7 sms ruleset name SMS-RULES2 rule-summary
Name: SMS-RULES2   Instance:0   Protocol: n/a
```

| Rule | Oper   | dest-sme             | orig-sme          | More<br>Param | Rule<br>Matches |
|------|--------|----------------------|-------------------|---------------|-----------------|
| 100  | sms-mo | 123*                 | 1234              | +             | 0               |
| 250  | sms-mo | *                    | *                 | +             | 0               |
| 480  | sms-mo | 12345678901234567890 | 1234567891234567* | +             | 0               |



The following is sample output from the **show cs7 sms ruleset** command filtered on ruleset **name SMS-RULES2** and displayed in **detail** mode:

```
ITP#show cs7 sms ruleset name SMS-RULES2 detail
Name: SMS-RULES2      Instance:0   Protocol: n/a
-----
Rule       : 100        Protocol: gsm-map
Rule Checked Count      :          0
Rule Matched Count      :          0
Result Successful Count :          0
CDR Service Queue       : -
Operation : sms-mo
Parameters:
  Destination SME : 123*                Noa:0  Np:0
  Origination SME : 1234                Noa:5  Np:2
  Destination SMSC: 12345*             MinDigits:6  MaxDigits:10 Noa:0  Np:0
  Origin IMSI      : 123*
  Protocol ID      : 35
  Destination Port: 30
Result : GT 123 tt 12 gti 2

Rule       : 250        Protocol: gsm-map
Rule Checked Count      :          0
Rule Matched Count      :          0
Result Successful Count :          0
CDR Service Queue       : -
Operation : sms-mo
Parameters:
  Destination SME : -
  Origination SME : -
  Destination SMSC: -
  Origin IMSI      : 123456
  Protocol ID      : -
  Destination Port: -
Result : BLOCK

Rule       : 480        Protocol: gsm-map
Rule Checked Count      :          0
Rule Matched Count      :          0
Result Successful Count :          0
CDR Service Queue       : unavailable
Operation : sms-mo
Parameters:
  Destination SME : 12345678901234567890* MinDigits:20 MaxDigits:20 Noa:0  Np:4
  Origination SME : 1234567891234567*      MinDigits:16 MaxDigits:16 Noa:0  Np:4
  Destination SMSC: 1234567891234567*      MinDigits:16 MaxDigits:16 Noa:0  Np:4
  Origin IMSI      : 1234567891234567*      MinDigits:16 MaxDigits:16
  Protocol ID      : 254
  Destination Port: 65534
Result : GT 123456789123456 tt 0 gti 4 np 4 nai 0
```

Table 56 describes the significant fields shown in the display.

**Table 56** *show cs7 sms ruleset Field Descriptions*

| Field    | Description      |
|----------|------------------|
| Name     | Ruleset name.    |
| Instance | Instance number. |
| Protocol | Protocol.        |
| Rule     | Rule number.     |

**Table 56** *show cs7 sms ruleset Field Descriptions (continued)*

| Field                | Description                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------------------|
| Result               | Configured result for this rule.                                                                          |
| Oper                 | Operator                                                                                                  |
| dest-sme             | Destination SME                                                                                           |
| orig-sme             | Originating SME                                                                                           |
| More Param           | There are more parameters in the configuration. The <b>detail</b> keyword shows the entire configuration. |
| Rule Checked Count   | Number of rules that were checked.                                                                        |
| Rule Matched Count   | Number of rules that were matched.                                                                        |
| Result Success Count | Number of times the configured result was successfully used.                                              |
| Operation            | SMS-MO                                                                                                    |
| Parameters           | The configured parameters.                                                                                |

**Related Commands**

| Command         | Description                                                         |
|-----------------|---------------------------------------------------------------------|
| cs7 sms ruleset | Specifies a name and an application layer protocol for the ruleset. |

# show cs7 sms smpp

To display information about SMS SMPP sessions, use the **show cs7 sms smpp** command in Privileged EXEC mode.

**show cs7 sms smpp** *name*

## Syntax Description

*name* SMPP session name.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following is sample output from the **show cs7 sms smpp** command:

```
ITP#show cs7 sms smpp
SMS SMPP Session Data: 0

Local Port: 4000 Local IP: 172.18.44.163
Session Name IP address Port Status Rq Send Rsp Rcvd Rq Rcvd Rsp Sent
-----
D04000000000 64.102.86.172 3068 ESME-RX 0 0 0 0
```

Table 57 describes the significant fields shown in the display.

**Table 57** *show cs7 sms smpp* Field Descriptions

| Field        | Description                                                 |
|--------------|-------------------------------------------------------------|
| Local Port   | Local port number.                                          |
| Local IP     | Local IP address.                                           |
| Session Name | Internal identifier for the session.                        |
| IP address   | IP address of the remote peer.                              |
| Port         | Port number of the remote peer.                             |
| Status       | Status of the connection (Whether the connection is bound.) |
| Rq Send      | Number of requests sent.                                    |
| Rsp Rcvd     | Number of responses received.                               |
| Rq Rcvd      | Number of requests received.                                |
| Rsp Sent     | Number of responses sent.                                   |

## Related Commands

| Command             | Description                        |
|---------------------|------------------------------------|
| <b>cs7 sms smpp</b> | Configures an SMS SMPP connection. |

# show cs7 sms statistics

To display SMS statistics, use the **show cs7 sms statistics** command in Privileged EXEC mode.

**show cs7 sms statistics** [**detail** | **rate**]

|                           |               |                                                                         |
|---------------------------|---------------|-------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>detail</b> | Includes transport statistics.                                          |
|                           | <b>rate</b>   | Displays traffic rate information for the previous collection interval. |

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                |                                    |
|------------------------|----------------|------------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                |
|                        | 12.2(25)SW     | This command was introduced.       |
|                        | 12.2(25)SW1    | The <b>rate</b> keyword was added. |

## Examples

The following is sample output from the **show cs7 sms statistics** command

```
ITP# show cs7 sms statistics
CS7 SMS Routing Statistics
```

```
Instance: 0
Total short messages routed:                5000
  Successfully delivered:                    0
    Delivered via SMPP:                     5000
    Delivered via UCP:                      0
    Delivered via GSM:                      0
    Deferred via GSM:                       0
  Error/aborted/not delivered:              200
    Routing not configured:                  0
    No result succeeded:                     0
    Internal error:                         0
    Parse/receive error:                    0
    Resource shortage:                      0
    Provisioning error:                     0
    Destination not reachable:              0
    Destination signaled error:             0
    Timed out:                              0
    Blocked:                                200
```

The following is sample output from the **show cs7 sms statistics** command with the **rate** keyword:

```
ITP# show cs7 sms statistics
CS7 SMS Traffic Rate                        Per second  Raw count  Highwater
-----
Instance: 0
Total short messages routed:                57          3441      57
  Successfully delivered:                    57          3441      57
    Delivered via SMPP:                      0           0        0
    Delivered via UCP:                       0           0        0
```

|                              |    |      |    |
|------------------------------|----|------|----|
| Delivered via GSM:           | 57 | 3441 | 57 |
| Deferred via GSM:            | 0  | 0    | 0  |
| Status Reports via GSM:      | 28 | 1706 | 28 |
| Error/aborted/not delivered: | 0  | 0    | 0  |
| Routing not configured:      | 0  | 0    | 0  |
| No result succeeded:         | 0  | 0    | 0  |
| Internal error:              | 0  | 0    | 0  |
| Parse/receive error:         | 0  | 0    | 0  |
| Resource shortage:           | 0  | 0    | 0  |
| Provisioning error:          | 0  | 0    | 0  |
| Destination not reachable:   | 0  | 0    | 0  |
| Destination signaled error:  | 0  | 0    | 0  |
| Timed out:                   | 0  | 0    | 0  |
| Blocked:                     | 0  | 0    | 0  |

**Related Commands**

| Command            | Description                                                                                      |
|--------------------|--------------------------------------------------------------------------------------------------|
| traffic-rate-timer | Configures the data collection interval that will be used to calculate traffic rate information. |

# show cs7 sms ucp

To display information about SMS UCP sessions, use the **show cs7 sms ucp** command in Privileged EXEC mode.

**show cs7 sms ucp** *session-id*

## Syntax Description

*name* UCP session name.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

## Examples

The following is sample output from the **show cs7 sms ucp** command:

```
ITP#show cs7 sms ucp
SMS UCP Session Data: 0
```

```
Local Port: 6000 Local IP: 172.18.44.163
Session Name IP address      Port  Status  Rq Send  Rsp Rcvd  Rq Rcvd  Rsp Sent
-----
D06000000000 64.102.86.172  2798  BOUND   0         0         0         0
```

Table 58 describes the significant fields shown in the display.

**Table 58** *show cs7 sms ucp Field Descriptions*

| Field        | Description                                                 |
|--------------|-------------------------------------------------------------|
| Local Port   | Local port number.                                          |
| Local IP     | Local IP address.                                           |
| Session Name | Internal identifier for the session.                        |
| IP address   | IP address of the remote peer.                              |
| Port         | Port number of the remote peer.                             |
| Status       | Status of the connection (Whether the connection is bound.) |
| Rq Send      | Number of requests sent.                                    |
| Rsp Rcvd     | Number of responses received.                               |
| Rq Rcvd      | Number of requests received.                                |
| Rsp Sent     | Number of responses sent.                                   |

## Related Commands

| Command | Description |
|---------|-------------|
|         |             |

# show cs7 sua

To display SUA node information, use the **show cs7 sua** privileged EXEC command.

**show cs7** [*instance-number*] **sua** *local-port*

|                           |                        |                                                                                             |
|---------------------------|------------------------|---------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>instance-number</i> | Specifies the instance. The valid range is 0 through 7. The default instance is instance 0. |
|                           | <i>local-port</i>      | SUA local port number. Valid range is 4096 to 32767.                                        |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

**Examples** The following is sample output from the **show cs7 sua** command. This SUA instance is offloaded to the VIP in slot 6.

This SUA version uses SIGTRAN SUA draft version 15.

This SUA instance (local port 6000) is active. The instance handle (2) can be used in **show ip sctp** commands.

This SUA instance is offloaded to the VIP in slot 6.

```
Router#show cs7 sua 6000
Sigtran SUA draft version: 15
```

```
SUA Local port: 6000      State: active      Sctp instance handle: 2
Local ip address:        10.10.20.3
Number of active SUA peers: 0
Max number of inbound streams allowed: 17
Local receive window: 64000
Max init retransmissions: 8
Max init timeout: 1000 ms
Unordered priority: equal
Offload to VIP: Yes Slot: 6

Sctp defaults for new associations
Transmit queue depth: 1000      Cumulative sack timeout: 200 ms
Assoc retransmissions: 10      Path retransmissions: 4
Minimum RTO: 1000 ms          Maximum RTO: 1000 ms
Bundle status: on              Bundle timeout: 5 ms
Keep alive status: true        Keep alive timeout: 30000 ms
Initial cwnd: 1234567          Idle cwnd rate: 50
Retrans cwnd rate: 30          Retrans cwnd mode: RFC
FastRetrans cwnd rate: 10
```

| Related Commands | Command           | Description                                                                                                 |
|------------------|-------------------|-------------------------------------------------------------------------------------------------------------|
|                  | cs7 sua           | Specifies the local port number for SUA and enters CS7 SUA submode.                                         |
|                  | show tech-support | Collects and displays a large amount of ITP configuration information that can be used for troubleshooting. |



# show cs7 tcap

To display CS7 TCAP information, use the **show cs7 tcap** privileged EXEC command.

**show cs7 tcap [statistics | transactions]**

|                           |                     |                                                              |
|---------------------------|---------------------|--------------------------------------------------------------|
| <b>Syntax Description</b> | <b>statistics</b>   | (Optional) Display TCAP statistics.                          |
|                           | <b>transactions</b> | (Optional) Display outstanding TCAP transaction information. |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB7     | This command was introduced. |

**Examples** The following is sample output from the **show cs7 tcap** command with no keywords:

```
Router#show cs7 tcap
TCAP protocol layer is up
TCAP variant is ITU
  0 bytes input, 0 bytes output
  0 active transactions/dialogues
  0 transaction/dialogue requests
  0 transaction/dialogue indications
  0 total error conditions detected
```

The following is sample output from the **show cs7 tcap** command with the **statistics** keyword:

```
Router#show cs7 tcap statistics
TCAP layer statistics:
  BEGIN      requests 0, indications 0
  CONTINUE   requests 0, indications 0
  END        requests 0, indications 0
  U_ABORT    requests 0, indications 0
  P_ABORT    indications 0
  NOTICE    indications 0
  0 component requests
  0 component indications
  INVOKE     requests 0, indications 0
  RESULT_L   requests 0, indications 0
  RESULT_NL  requests 0, indications 0
  U_ERROR    requests 0, indications 0
  REJECT     requests 0, indications 0
  U_CANCEL   requests 0
  L_CANCEL   indications 0
  0 warning conditions detected
  0 api error conditions detected
  0 protocol error conditions detected
```

■ show cs7 tcap

| Related Commands | Command                   | Description                                             |
|------------------|---------------------------|---------------------------------------------------------|
|                  | clear cs7 tcap statistics | Clears CS7 TCAP measurements                            |
|                  | cs7 tcap tid-timer        | Sets the minimum expiration time for TCAP transactions. |
|                  |                           |                                                         |

# show cs7 ucp

To display information about UCP sessions, use the **show cs7 ucp** privileged EXEC command.

**show cs7 ucp** {**detail** *session-id* | **list** | **statistics** *session-id*}

| Syntax Description |                                                               |
|--------------------|---------------------------------------------------------------|
| <b>detail</b>      | Display SMPP session details.                                 |
| <i>session-id</i>  | 4294967294> session identifier, in the range 1 to 4294967294. |
| <b>list</b>        | Display SMPP session list.                                    |
| <b>statistics</b>  | Display SMPP session statistics.                              |

| Command Modes | Privileged EXEC |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

**Examples** The following is sample output from the **show cs7 ucp** command with the **list** keyword:

```
ITP# show cs7 ucp list
```

```
** UCP Session List **
```

| sessionId  | state     | source             | destination        |
|------------|-----------|--------------------|--------------------|
| 0x04010002 | Listening | 172.18.44.163 6000 | 0.0.0.0 0          |
| 0x04010003 | BoundRx   | 172.18.44.163 6000 | 64.102.86.172 1277 |

Table 59 describes the significant fields shown in the display.

**Table 59** *show cs7 ucp list* Field Descriptions

| Field       | Description                                                 |
|-------------|-------------------------------------------------------------|
| sessionId   | Internal identifier for the session                         |
| state       | State of the session.                                       |
| source      | Source IP address and source port of the session.           |
| destination | Destination IP address and destination port of the session. |

The following is sample output from the **show cs7 ucp** command with the **detail** keyword:

```
ITP#show cs7 ucp detail 0x04010003
```

```
** UCP Session Parameters SessionId: 0x04010003 **
```

|                |               |                  |           |
|----------------|---------------|------------------|-----------|
| sessionId:     | 0x04010003    | uptime:          | 01w5d     |
| session state: | BoundUcp      | transport state: | Connected |
| local address: | 172.18.44.163 | local port:      | 6000      |

```

dest address: 64.102.86.172    dest port: 1277
protocol: UCP                  protocolMode: SMSC
snf: 2                        snl: 2
send window: 10               sock fd: 2
cmd queue: 0                  response queue: 0
response tmo: 5000            enquire link tmo: N/A
session init tmo: 120000      inactivity tmo: OFF
soc write block: 0            soc write fail: 0
soc queue full: 0            soc partial send: 0
soc partial rcv: 0           soc would block: 0

```

Table 60 describes the significant fields shown in the display.

**Table 60** *show cs7 ucp detail Field Descriptions*

| Field            | Description                                                                    |
|------------------|--------------------------------------------------------------------------------|
| sessionID        | Internal identifier for the session.                                           |
| uptime           | Elapsed time session has been active.                                          |
| session state    | State of the session.                                                          |
| transport state  | State of the transport connection.                                             |
| local address    | Local ip address.                                                              |
| local port       | Local port number.                                                             |
| dest address     | Destination ip address.                                                        |
| dest port        | Destination port number.                                                       |
| protocol         | Type of protocol used for session (SMPP, UCP).                                 |
| protocol mode    | Mode assigned to the session (SMSC, ESME)                                      |
| snf              | Sequence number of the oldest packet.                                          |
| snl              | Sequence number of the last packet.                                            |
| send window      | Session transmit window size.                                                  |
| sock fd          | Socket layer file descriptor.                                                  |
| cmd queue        | Number of elements on queue waiting to be sent.                                |
| response queue   | Number of elements on queue waiting for response.                              |
| response tmo     | Length of time session waits for a response to a sent packet.                  |
| enquire link tmo | Length of time session waits before inquiring about session status.            |
| session init tmo | Length of time session waits before session is bound.                          |
| inactivity tmo   | Length of time session waits before session is closed due to lack of activity. |
| soc write block  | Number of times the socket layer transmit was blocked.                         |
| soc write fail   | Number of times the socket layer transmit failed.                              |
| soc queue full   | Number of times the socket layer transmit queue was full.                      |
| soc partial send | Number of times the socket layer transmitted partial number of bytes.          |

**Table 60** *show cs7 ucp detail Field Descriptions (continued)*

| Field            | Description                                                          |
|------------------|----------------------------------------------------------------------|
| soc partial recv | Number of times the socket layer received a partial number of bytes. |
| soc would block  | Number of times the socket layer would block on transmit.            |

The following is sample output from the **show cs7 ucp** command with the **statistics** keyword:

```
ITP#show cs7 ucp statistics 0x04010003
```

```
** UCP Session Statistics SessionId: 0x04010003 **
```

```
tx_ucp_60:      0      rx_ucp_60:      1
tx_ucp_60_resp: 1      rx_ucp_60_resp: 0
tx_ucp_52:      3      rx_ucp_52:      0
tx_ucp_52_resp: 0      rx_ucp_52_resp: 3
response_tmo:   0      inactivity_tmo: 0
session_init_tmo: 0
```

Table 61 describes the significant fields shown in the display.

**Table 61** *show cs7 ucp statistics Field Descriptions*

| Field            | Description                                         |
|------------------|-----------------------------------------------------|
| response_tmo     | Number of times the response timer has expired.     |
| inactivity_tmo   | Number of times the inactivity timer has expired.   |
| session_init_tmo | Number of times the session init timer has expired. |
| enquire_link_tmo | Number of times the enquire link timer has expired. |

**Related Commands**

| Command     | Description                 |
|-------------|-----------------------------|
| cs7 sms ucp | Configures UCP connections. |

# show cs7 virtual linkset

To display information about virtual linksets, including link utilization and associated measurements, use the **show cs7 virtual linkset** privileged EXEC command.

**show cs7 virtual-linkset** [*linkset-name*] [**brief**] [**routes**] [**statistics**] | [**utilization**]

## Syntax Description

|                     |                                                                            |
|---------------------|----------------------------------------------------------------------------|
| <i>linkset-name</i> | (Optional) Display information about a specific linkset.                   |
| <b>brief</b>        | (Optional) Display output in brief format. Don't display individual links. |
| <b>routes</b>       | (Optional) Display all routes using linkset.                               |
| <b>statistics</b>   | (Optional) Display link usage statistics.                                  |
| <b>utilization</b>  | (Optional) Display link utilization for linkset.                           |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(23)SW1 | This command was introduced. |

## Usage Guidelines

A virtual linkset is a connection from one instance to another. There are two virtual linksets between any two instances in the ITP. For example, between instanceX and instanceY, there are virtual linksets VirtualLSx-y and VirtualLSy-x. VirtualLSx-y appears to be a linkset in Instance x, and it will appear in Instance x's route table, for alias destinations whose true point code exists in Instance y. VirtualLSy-x appears to be a linkset in Instance y, and it will appear in Instance y's route table, for alias destinations whose true point code exists in Instance x.

Virtual linksets are not the same as real linksets. Virtual linksets do not have queues, and are not bandwidth limited.

Virtual linkset are created automatically when a new instance is created. When an alias point code is defined, the alias point code is automatically entered in the alias instance's routing table using the virtual linkset.

## Examples

The following is partial sample output from the **show cs7 virtual linkset** command with no keywords:

```
Router#show cs7 virtual linkset
lsn=VirtualLS1-0      apc=0.30.1:0      state=avail      avail/links=1/1
  SLC  Interface      Service  PeerState      Inhib
  00   Virtual      avail    -----      ----

lsn=VirtualLS0-1      apc=1.30.1:1      state=avail      avail/links=1/1
  SLC  Interface      Service  PeerState      Inhib
  00   Virtual      avail    -----      ----
```

The following is sample output from the **show cs7 virtual linkset** command with the **brief** keyword:

```
Router#show cs7 virtual-linkset brief
lsn=VirtualLS1-0      apc=0.30.1:0      state=avail      avail/links=1/1
lsn=VirtualLS3-0      apc=0.30.1:0      state=avail      avail/links=1/1
lsn=VirtualLS0-1      apc=1.30.1:1      state=avail      avail/links=1/1
lsn=VirtualLS3-1      apc=1.30.1:1      state=avail      avail/links=1/1
lsn=VirtualLS0-3      apc=3.30.1:3      state=avail      avail/links=1/1
lsn=VirtualLS1-3      apc=3.30.1:3      state=avail      avail/links=1/1
```

The following is sample output from the **show cs7 virtual linkset** command with the **routes** keyword:

```
Router#show cs7 virtual-linkset routes
lsn=VirtualLS1-0      apc=0.30.1:0      state=avail      avail/links=1/1
Destination           Cong Prio QoS Route   Route Table
-----
0.1.1/24      acces      1      avail   system1

lsn=VirtualLS3-0      apc=0.30.1:0      state=avail      avail/links=1/1
Destination           Cong Prio QoS Route   Route Table
-----
0.1.2/14      acces      1      avail   system3

lsn=VirtualLS0-1      apc=1.30.1:1      state=avail      avail/links=1/1
Destination           Cong Prio QoS Route   Route Table
-----
1.2.1/24      acces      1      avail   system

lsn=VirtualLS3-1      apc=1.30.1:1      state=avail      avail/links=1/1
Destination           Cong Prio QoS Route   Route Table
-----

lsn=VirtualLS0-3      apc=3.30.1:3      state=avail      avail/links=1/1
Destination           Cong Prio QoS Route   Route Table
-----
3.2.1/24      acces      1      avail   system

lsn=VirtualLS1-3      apc=3.30.1:3      state=avail      avail/links=1/1
Destination           Cong Prio QoS Route   Route Table
-----
```

The following is sample output from the **show cs7 virtual linkset** command with the **statistics** keyword:

```
Router#show cs7 virtual-linkset VirtualLS0-1 statistics
lsn=VirtualLS0-1      apc=1.30.1:1      state=avail      avail/links=1/1
SLC    MSU In    MSU Out  Drops    LSSU In  LSSU Out  ByteCnt In  ByteCnt Out
00      0          0        0        0        0        0        0          0
```

The following is sample output from the **show cs7 virtual linkset** command with the **utilization** keyword:

```
Router#show cs7 virtual-linkset VirtualLS0-1 utilization
Sample Interval(seconds):61/7  Thresholds onset/abate:40/30
lsn=VirtualLS0-1      apc=1.30.1:1      state=avail      avail/links=1/1
Link Utilization Thresholds Plan-capacity      Kbps      Cong
SLC  Rec  Sent  Rec  Sent  Rec  Sent  Rec  Sent  Rec  Sent  Lvl
0    0    0    40  40  256  256  0    0    0    0
all  0    0    --- --- 256  256  0    0    ---
```

Table 62 describes the fields shown in the display.

**Table 62** *show cs7 virtual linkset Field Descriptions*

| Field            | Description                                                                                                                                                                      |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| lsn=VirtualLS1-0 | The link set name, in this example a virtual linkset from instance 1 to instance 0.                                                                                              |
| apc=0.30.1:0     | The adjacent point code. This is the alias point code, 0.30.1 instance 0.                                                                                                        |
| state=avail      | The state of the virtual linkset, in this example available. Allowed state are avail and UNAVAIL.<br>The virtual linkset is unavail when all real linksets to instance are down. |
| avail/links=1/1  | The number of links available in the virtual linkset. A virtual linkset contains only 1 virtual link. In this example, the link is available.                                    |
| SLC              | Signal Link Code. Valid range is 0-15.                                                                                                                                           |
| Interface        | Interface type. This is a virtual interface.                                                                                                                                     |
| Service          | The status of the service. In this example the service is available. Allowed state are avail and UNAVAIL.                                                                        |
| PeerState        | This field is always blank.                                                                                                                                                      |
| Inhib            | This field is always blank. No inhibit commands for virtual linksets.                                                                                                            |

#### Related Commands

| Command                           | Description                                                                                                                                 |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <b>cs7 instance pc-conversion</b> | Enables instance translation, creating a virtual link between the instance of the real point code and the instance of the alias point code. |
| <b>show cs7 pc-conversion</b>     | Displays a mapping of real to alias point codes.                                                                                            |



# show hosts

To display information about a host, use the **show host** privileged EXEC command.

## show hosts

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Examples** The following is sample output from the **show hosts** command with no keywords:

```
Router#show hosts
Default domain is not set
Name/address lookup uses static mappings

Codes: u - unknown, e - expired, * - OK, ? - revalidate
        t - temporary, p - permanent

  Port St Host                Age  Type    Address(es)
* NA   p bologna              **   SS7     5121
* None p topsail              **   IP      172.18.44.155

Router#

Router#show hosts
Default domain is not set
Name/address lookup uses static mappings

Codes: u - unknown, e - expired, * - OK, ? - revalidate
        t - temporary, p - permanent

  Port St Host                Age  Type    Address(es)
* NA   p bari                0    SS7     1.1.1:1
                        1234:0
* NA   p bologna              0    SS7     5121:0
* None p topsail              41   IP      172.18.44.155

Router#

Router#show cs7 route
Dynamic Routes 0 of 500 with 0 drops

Routing table = system Destinations = 5 Routes = 5
Instance = 0
Destination          Prio Linkset Name          Route
-----
```

# show hosts

```

666/14          INACC  1  one          UNAVAIL
bari            INACC  5  one          UNAVAIL
bologna         INACC  5  one          UNAVAIL
5120/11         INACC  5  one          UNAVAIL
5221/14         INACC  5  one          UNAVAIL

```

Dynamic Routes 0 of 500 with 0 drops

Routing table = system1 Destinations = 2 Routes = 2

Instance = 1

| Destination | Prio  | Linkset | Name  | Route   |
|-------------|-------|---------|-------|---------|
| -----       | ----  | -----   | ----- | -----   |
| bari        | INACC | 5       | two   | UNAVAIL |
| 3.3.3/24    | INACC | 1       | two   | UNAVAIL |

Router#

## Related Commands

| Command  | Description                      |
|----------|----------------------------------|
| cs7 host | Map a host name to a point code. |

# show ip sctp

To display ITP SCTP statistics, use the **show ip sctp** EXEC command.

```
show ip sctp {[association [list | parameters assocId | statistics assocId]] | [errors] | [instances]
| [statistics]}
```

## Syntax Description

|                    |                                                       |
|--------------------|-------------------------------------------------------|
| <b>association</b> | Specifies an SCTP connection.                         |
| <b>list</b>        | Current SCTP association.                             |
| <b>parameters</b>  | SCTP association parameters.                          |
| <i>assocId</i>     | Association ID number. Valid range is 0 through 1024. |
| <b>statistics</b>  | SCTP association statistics.                          |
| <b>errors</b>      | SCTP error statistics.                                |
| <b>instances</b>   | SCTP local peer instances.                            |
| <b>statistics</b>  | SCTP internal statistics.                             |

## Command Modes

EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Examples

This section shows sample output from various forms of the **show ip sctp** command. Each sample is followed by a table describing the fields in the output display.

The following is sample output from **show ip sctp** command using the **association list** keywords:

```
Router# show ip sctp association list
** SCTP Association List **

AssocID:0, Instance ID:0
Current state:ESTABLISHED, uptime:00:21:24
Local port:9000, Addrs:172.18.44.162
Remote port:9000, Addrs:172.18.44.170
```

Table 63 describes the fields in the show ip sctp association list display.

**Table 63** *show ip sctp association list Field Descriptions*

| Field         | Description                                   |
|---------------|-----------------------------------------------|
| AssocID       | SCTP association identifier.                  |
| Current state | State of SCTP association.                    |
| uptime        | Duration of time association has been active. |
| Local Port    | Local port number                             |

**Table 63** *show ip sctp association list Field Descriptions (continued)*

| Field       | Description                    |
|-------------|--------------------------------|
| Addr        | Local or Remote Peer Addresses |
| Remote Port | Remote port number             |

The following is sample output from **show ip sctp** command using the **association parameters** keywords with *assocId* 0:

```
Router# show ip sctp association parameters 0

** SCTP Association Parameters **

AssocID:0 Context:2167490164 InstanceID:0
Assoc state:ESTABLISHED Uptime:07:10:58
Local port:9000
Local addresses:172.18.44.162

Remote port:9000
Primary dest addr:172.18.44.170
Effective primary dest addr:172.18.44.170
Destination addresses:

172.18.44.170: State: ACTIVE
Heartbeats: Enabled Timeout:30000 ms
RTO/RTT/SRTT:1000/0/0 ms TOS:0 MTU:1500
cwnd:3000 ssthresh:64000 outstand:0
Num retrans:0 Max retrans:4 Num times failed:0

Local vertag:E170819 Remote vertag:5A3F8A70
Num inbound streams:2 outbound streams:2
Max assoc retrans:10 Max init retrans:8
CumSack timeout:200 ms Bundle timeout:5 ms
Min RTO:1000 ms Max RTO:1000 ms
LocalRwnd:64000 Low:63982 RemoteRwnd:64000 Low:63980
Congest levels:4 current level:0 high mark:2
```

Table 64 describes the fields in the **show ip sctp association parameters** display.

**Table 64** *show ip sctp association parameters Field Descriptions*

| Field                       | Description                         |
|-----------------------------|-------------------------------------|
| AssocID                     | SCTP association ID                 |
| Context                     | Internal upper layer handle         |
| InstanceID                  | Instance ID                         |
| Assoc state                 | SCTP association state              |
| Uptime                      | Duration of time association active |
| Local port                  | Local port number                   |
| Local addresses             | Local IP addresses                  |
| Remote port                 | Remote port number                  |
| Primary dest addr           | Primary destination address         |
| Effective primary dest addr | Current primary destination address |

**Table 64** *show ip sctp association parameters Field Descriptions (continued)*

| Field                   | Description                                                     |
|-------------------------|-----------------------------------------------------------------|
| Heartbeats              | Status of hearbeats                                             |
| Timeout                 | Heartbeat timeout                                               |
| RTO/RTT/SRTT            | Retransmission timeout/Round trip time/Smoothed round trip time |
| TOS                     | IP precedence setting                                           |
| Cwnd                    | Congestion window                                               |
| Ssthresh                | Slow start threshold                                            |
| Outstand                | Number of outstanding bytes                                     |
| Num inbound streams     | Maximum inbound streams                                         |
| Outbound streams        | Maximum outbound streams                                        |
| LocalRwnd/Low           | Local receive window/Lowest local receive window reported       |
| RemoteRwnd/Low          | Remote receive window/Lowest remote receive window reported     |
| Current level/high mark | Current congestion level/highest number of packets queued       |

The following is sample output from the **show ip sctp** command using the **association statistics** keywords with *assocId 0*:

```
Router# show ip sctp association statistics 0
```

```
** Sctp Association Statistics **
```

```
AssocID/InstanceID:0/0
Current State:ESTABLISHED
Control Chunks
  Sent:3574  Rcvd:2717
Data Chunks Sent
  Total:875  Retransmitted:0
  Ordered:875  Unordered:0
  Avg bundled:0  Total Bytes:15740
Data Chunks Rcvd
  Total:1456  Discarded:0
  Ordered:1456  Unordered:0
  Avg bundled:1  Total Bytes:25615
  Out of Seq TSN:0
ULP Dgrams
  Sent:875  Ready:1456  Rcvd:1456
DataGrams Sent:3854  DataGrams Rcvd:1454
RexmitTO:0  RexmitFAST:0
```

Table 65 describes the fields in the **show ip sctp association statistics** display.

**Table 65** *show ip sctp association statistics Field Descriptions*

| Field              | Description                      |
|--------------------|----------------------------------|
| AssocID/InstanceID | Association and Instance IDs     |
| Current State      | SCTP association state           |
| Control Chunks     | SCTP Control chunks send/receive |

**Table 65** *show ip sctp association statistics Field Descriptions (continued)*

| Field               | Description                                               |
|---------------------|-----------------------------------------------------------|
| Data Chunks Sent    | SCTP Data chunks sent                                     |
| Data Chunks Rcvd    | SCTP Data chunks received                                 |
| ULP Dgrams          | Number of datagrams sent/received by Upper Layer Protocol |
| DataGrams Sent/Rcvd | Total number of datagrams sent/received                   |
| RexmitTO            | Retransmits due to retransmission timer timeout           |
| RexmitFast          | Retransmits due to FAST retransmit                        |

The following is sample output from **show ip sctp** command using the **errors** keyword:

Router# **show ip sctp errors**

\*\* SCTP Error Statistics \*\*

```

Not Ready:                1
Rcvd Dgram too small:    272
Invalid verification tag: 30
Rcvd dgram unconfig local addr: 30
Out-of-the-blue dgrams:  7716072
Communication Lost:       463
Destination Address Failed: 481
Unknown INIT params rcvd  480
Peer restarted:           69
No Listening instance:     2608

```

Table 66 describes all possible fields of the **show ip sctp errors** output. In actual output, each field includes a value that represents the number of times the error has occurred since errors were last cleared.

**Table 66** *show ip sctp errors Field Descriptions*

| Field                          | Description                                                        |
|--------------------------------|--------------------------------------------------------------------|
| Not Ready                      | SCTP is not initialized.                                           |
| memory Unavail                 | No memory available.                                               |
| Attempt to Free Null Ptr       | Attempt to free a null pointer.                                    |
| Attempt to Free Not In Use     | Attempt to free memory that is not in use.                         |
| Rcvd Dgram too small           | Received datagram length is invalid; too small.                    |
| Partial chunk rcvd             | Received datagram contains a partial chunk.                        |
| Dgram with no chunks           | Received datagram does not contain any chunks.                     |
| Invalid Adler checksum         | Adler checksum of received datagram is invalid.                    |
| Invalid Crc32 checksum         | CRC32 checksum of received datagram is invalid.                    |
| Invalid bundled chunks         | Received datagram contains chunks that can't be bundled together.  |
| Invalid verification tag       | Received datagram contains invalid verification tag.               |
| Rcvd dgram unconfig local addr | Received a datagram with an unconfigured local address.            |
| Out-of-the-blue dgrams         | Received an unexpected datagram based on state of the association. |
| Invalid stream rcvd            | Received chunk has invalid stream number.                          |

**Table 66** *show ip sctp errors Field Descriptions*

| Field                       | Description                                                           |
|-----------------------------|-----------------------------------------------------------------------|
| Unknown Appl Req type       | Unknown internal application request.                                 |
| Communication Lost          | Association failed because communication was lost to peer.            |
| Destination Address Failed  | Destination address marked unreachable due to max number retries.     |
| Unknown INIT params rcvd    | Unknown parameter field found in Init or Init-Ack chunk               |
| Null Timer Id specified     | invalid timer id. internal error                                      |
| Unknown Timer type expired  | Unknown timer expiration. internal error.                             |
| chunk ordering errors       | Chunks received in datagram are out of order as specified in RFC.     |
| ECNE chunk type rcvd        | Explicit congestion notification echo chunk received.                 |
| CWR chunk type rcvd         | Congestion window reduced chunk received.                             |
| Unknown chunk type rcvd     | Unknown chunk type detected in received datagram                      |
| Unknown Init params rcvd    | Unknown parameter field found in Init or Init-Ack chunk               |
| Invalid cookie signature    | Invalid cookie signature computed                                     |
| Expired cookie              | Cookie lifetime expired. cookie is invalid                            |
| Peer restarted              | Received cookie chunk while association was already established.      |
| Incoming assoc disallowed   | Association denied because port instance is being deleted             |
| No Listening Instance       | No port instance found for incoming datagram.                         |
| Invalid linktype rcvd       | Received datagram link type is not IP.                                |
| IPv6 addr params rcvd       | IPv6 params received in Init or Init-Ack chunks.                      |
| Invalid stream error rcvd   | Invalid stream error cause received in error chunk.                   |
| Missing param error rcvd    | Missing parameter error cause received in error chunk.                |
| stale cookie error rcvd     | Stale cookie error cause received in error chunk.                     |
| Out of resource error rcvd  | Out of resource error cause received in error chunk.                  |
| Unresolvable addr err rcvd  | Unresolved address error cause received in error chunk.               |
| Unrecognized chunk err rcvd | Unrecognized error type received in error chunk.                      |
| Invalid param err rcvd      | Invalid mandatory parameter error cause received in error chunk.      |
| Unrecognized param err rcvd | Unrecognized parameter error cause received in error chunk.           |
| No user data error rcvd     | No user data error cause received in error chunk.                     |
| Cookie in shutdown err rcvd | Cookie received while shutting down error cause rcv'd in error chunk. |
| Chunk too small             | Received chunk is too small.                                          |
| Chunk too large             | Received chunk is too large.                                          |
| Missing parameters          | Parameter missing from received chunk.                                |
| No room for incoming data   | Local receive window is full.                                         |
| Low IO memory               | IO memory is low. packets are dropped.                                |

The following is sample output from **show ip sctp** command using the **instances** keyword:

Router# **show ip sctp instances**

\*\* Sctp Instances \*\*

```
Instance ID:0  Local port:9000
Instance state:available
Local addrs:172.18.44.162
Default streams inbound:2  outbound:2
  Current associations: (max allowed:100)
    AssocID:0  State:ESTABLISHED  Remote port:9000
      Dest addrs:172.18.44.170
```

Table 67 describes the fields in the **show ip sctp instances** display.

**Table 67** *show ip sctp instances Field Descriptions*

| Field                | Description                          |
|----------------------|--------------------------------------|
| Instance ID          | SCTP instance ID                     |
| Local Port           | Local port number                    |
| Instance state       | SCTP instance state                  |
| Local Addrs          | Local IP address                     |
| Default streams      | Default inbound and outbound streams |
| Current Associations | Current SCTP associations            |

The following is sample output from **show ip sctp** command using the **statistics** keyword:

Router# **show ip sctp statistics**

```
** Sctp Overall Statistics **
Total Chunks Sent:          5359
Total Chunks Rcvd:          4491
Received Ordered Data Chunks: 1549
Received UnOrdered Data Chunks:0
Total Data Chunks Sent:     1009
Total Data Chunks Rcvd:     1549
Total Data Bytes Sent:      18085
Total Data Bytes Rcvd:      27407
Total Data Chunks Discarded: 6
Total Data Chunks Retrans:  12

Total SCTP Datagrams Sent:  4237
Total SCTP Datagrams Rcvd:  4134
Total ULP Datagrams Sent:   954
Total ULP Datagrams Ready:  1549
Total ULP Datagrams Rcvd:   1549
```



Table 68 describes the fields in the **show ip sctp statistics** display.

**Table 68** *show ip sctp statistics Field Descriptions*

| Field                          | Description                                   |
|--------------------------------|-----------------------------------------------|
| Total Chunks Sent              | Total chunks Sent                             |
| Total Chunks Rcvd              | Total chunks Received                         |
| Received Ordered Data Chunks   | Number of rrdered data chunks received        |
| Received UnOrdered Data Chunks | Number of Unordered data chunks received      |
| Total Data Chunks Sent         | Total number of data chunks sent              |
| Total Data Chunks Rcvd         | Total number of data chunks received          |
| Total Data Bytes Sent          | Total data bytes sent                         |
| Total Data Bytes Rcvd          | Total data bytes received                     |
| Total Data Chunks Discarded    | Total data chunks discarded                   |
| Total Data Chunks Retrans      | Total data chunks retransmitted               |
| Total SCTP Datagrams Sent      | Total SCTP datagrams sent                     |
| Total SCTP Datagrams Rcvd      | Total SCTP datagrams received                 |
| Total ULP Datagrams Sent       | Total Upper Layer Protocol datagrams sent     |
| Total ULP Datagrams Ready      | Total Upper Layer Protocol datagrams ready    |
| Total ULP Datagrams Rcvd       | Total Upper Layer Protocol datagrams received |

# show redundancy inter-device

To display redundancy information, use the **show redundancy inter-device** command in Privileged EXEC mode.

**show redundnacy inter-device**

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

| Command History | Release    | Modification                             |
|-----------------|------------|------------------------------------------|
|                 | 12.2(25)SW | This command was introduced for the ITP. |

**Examples** The following example displays inter-device redundancy information:

```
Router# show redundancy inter-device
Redundancy inter-device state: RF_INTERDEV_STATE_ACT
      Scheme: Platform
      Peer present: RF_INTERDEV_PEER_COMM
```

Table 30 describes the significant fields shown in the display.

**Table 69** *show redundancy interface Field Descriptions*

| Field                         | Description                                                                              |
|-------------------------------|------------------------------------------------------------------------------------------|
| Redundancy inter-device state | Displays internal state of inter-device redundancy finite state machine.                 |
| RF_INTERDEV_STATE_INIT        | Initial state.                                                                           |
| RF_INTERDEV_STATE_PC_NO_PLAT  | Peer communication established but redundancy role has not been determined.              |
| RF_INTERDEV_STATE_PNC_NO_PLAT | Peer communication has not been established and redundancy role has not been determined. |
| RF_INTERDEV_STATE_ACT         | This device is the Active device.                                                        |
| RF_INTERDEV_STATE_STDBY       | This device is the Standby device.                                                       |
| Scheme                        | Entity that determines redundancy role.                                                  |
| Platform                      | Redundancy role is determined based on platform state.                                   |
| Standby                       | Redundancy role is determined by HSRP.                                                   |
| Peer Present                  | Fields describe communication with peer device.                                          |

**Table 69** *show redundancy interface Field Descriptions (continued)*

| Field                    | Description                                     |
|--------------------------|-------------------------------------------------|
| RF_INTERDEV_PEER_COMM    | Communication established with peer device.     |
| RF_INTERDEV_PEER_NO_COMM | Communication not established with peer device. |

**Related Commands**

| Command    | Description                                                                         |
|------------|-------------------------------------------------------------------------------------|
| redundancy | Configures inter-device redundancy when used with the keyword <b>inter-device</b> . |

# show sscf-nni

To display SSCF information, use the **show sscf-nni atm** EXEC command.

**show sscf-nni** *interface*

| Syntax Description | <i>interface</i> | If no interface number is specified, all interfaces supporting SSCF-NNI will be displayed. |
|--------------------|------------------|--------------------------------------------------------------------------------------------|
|--------------------|------------------|--------------------------------------------------------------------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | EXEC |
|---------------|------|
|---------------|------|

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(2)MB | This command was introduced. |

**Examples** The following is sample output from the **show sscf-nni** command for the ATM interface:

```
Router# show sscf-nni atm
SSCF-NNI details for interface ATM5/0/0
SSCF-NNI Current State = In Service
ULP Current State = In Service
SSCF-NNI Configured Parameters:
N1 = 90000 T1 = 5 T2 = 120
T3 = 1 SSCOP Rec = 60 Force Proving = 10
No Credit = 2 NRP = 0
SSCF-NNI Dynamic Parameters:
C1 = 0 MaxNRP = 1
MPS = 11 UPS = 4 Congestion Level = 0
SSCF-NNI Most Recent SSCOP-UU values:
Local Proving Status= 4 Local Release Status= 1
Remote Proving Status= 4 Remote Release Status= 0
SSCF-NNI Statistics:
MSU's Sent = 3334178, MSU's Received = 3346602, MSU's Ignored = 0
LSSU's Sent = 1010831, LSSU's Received = 796648, LSSU's Ignored = 0
Byte's Sent = 119636773, Byte's Received = 120107750
```

Table 70 describes the fields in the **show sscf** display.

**Table 70** *show sscf Field Descriptions*

| Field                  | Description                                                                   |
|------------------------|-------------------------------------------------------------------------------|
| SSCF-NNI Current State | Current state as defined in Q.2140.                                           |
| ULP Current State -    | Current state of upper layer protocol as viewed by SSCF as defined in Q.2140. |
| Configured parameters  | The configured parameters.                                                    |

**Table 70**      **show sscf Field Descriptions**

| Field              | Description                                             |
|--------------------|---------------------------------------------------------|
| Dynamic parameters | Variables used by SSCEF, defined in Q.2140.             |
| SSCOP-UU values    | Most recent values sent or received, defined in Q.2140. |
| Stats              | Statistics.                                             |

# show sscop

To display Service-Specific Connection-Oriented Protocol (SSCOP) details for all ATM interfaces, use the **show sscop** EXEC command.

**show sscop** *interface*

| Syntax Description | <i>interface</i> | If no interface is specified, all interfaces supporting SSCOP will be displayed. |
|--------------------|------------------|----------------------------------------------------------------------------------|
|--------------------|------------------|----------------------------------------------------------------------------------|

| Defaults | No default behavior or values. |
|----------|--------------------------------|
|----------|--------------------------------|

| Command Modes | EXEC |
|---------------|------|
|---------------|------|

| Command History | Release | Modification                 |
|-----------------|---------|------------------------------|
|                 | 10.0    | This command was introduced. |

**Examples** The following is sample output from the **show sscop** command:

```
Router# show sscop
SSCOP details for interface ATM4/0/0
  Current State = Active,   Uni version = NNI
  Send Sequence Number: Current = 1118,   Maximum = 2142
  Send Sequence Number Acked = 1118
  Rcv Sequence Number: Lower Edge = 1137, Upper Edge = 1137, Max = 2161
  Poll Sequence Number = 35181, Poll Ack Sequence Number = 35181
  Vt(Pd) = 0   Vt(Sq) = 1   MaxPd = 500
  Timer_IDLE = 100 - Inactive
  Timer_CC = 200 - Inactive
  Timer_POLL = 100 - Inactive
  Timer_KEEPLIVE = 100 - Inactive
  Timer_NO-RESPONSE = 1500 - Inactive
  Current Retry Count = 0, Maximum Retry Count = 10
  AckQ count = 0, RcvQ count = 0, TxQ count = 0
  AckQ HWM = 279, RcvQ HWM = 0, TxQ HWM = 42
  Local connections currently pending = 0
  Max local connections allowed pending = 0
  Statistics -
    Pdu's Sent = 61744, Pdu's Received = 61903, Pdu's Ignored = 0
    Begin = 0/2, Begin Ack = 2/0, Begin Reject = 0/0
    End = 0/6, End Ack = 0/0
    Resync = 0/0, Resync Ack = 0/0
    Sequenced Data = 49840/49660, Sequenced Poll Data = 0/0
    Poll = 6099/5997, Stat = 5982/6099, Unsolicited Stat = 0/0
    Unassured Data = 0/0, Mgmt Data = 0/0, Unknown Pdu's = 0
    Error Recovery/Ack = 0/0, lack of credit 0
```

Table 71 describes the fields in the **show sscop** display.

**Note**

“Inactive” status (in the Timer fields) does not mean that the timer is disabled. Inactive means that the timer is currently not running.

**Table 71** *show sscop Field Descriptions*

| Field                       | Description                                                                                   |
|-----------------------------|-----------------------------------------------------------------------------------------------|
| SSCOP details for interface | Interface slot and port.                                                                      |
| Current State               | SSCOP state for the interface.                                                                |
| Uni Version                 | The version of the SSCF layer. For ITP the Uni Version is NNI.                                |
| Send Sequence Number        | Current and maximum send sequence number.                                                     |
| Send Sequence Number Acked  | Sequence number of packets already acknowledged.                                              |
| Rcv Sequence Number         | Sequence number of packets received.                                                          |
| Poll Sequence Number        | Current poll sequence number.                                                                 |
| Poll Ack Sequence Number    | Poll sequence number already acknowledged.                                                    |
| Vt(Pd)                      | Number of sequenced data (SD) frames sent, which triggers a sending of a Poll frame.          |
| Vt(Sq)                      | Transmitter connection sequence number that helps peer detect connection message retransmits. |
| MaxPd                       | Maximum number of packets sent before a POLL packet is sent.                                  |
| Timer_IDLE                  | Configured sscop idle-timer in milli-seconds and the Active/Inactive status.                  |
| Timer_CC                    | Configured sscop cc-timer in milli-seconds.                                                   |
| Timer_POLL                  | Configured sscop poll-timer in milli-seconds.                                                 |
| Timer_KEEPAK                | Configured sscop keepalive-timer in milli-seconds.                                            |
| Timer_NO-RESPONSE           | Configured sscop noResponse-timer in milli-seconds.                                           |
| Connection Control          | Timer used for establishing and terminating SSCOP.                                            |
| Keep Alive Timer            | Timer used to send keepalives on an idle link.                                                |
| Current Retry Count         | Current count of the retry counter.                                                           |
| Maximum Retry Count         | Maximum value the retry counter can take.                                                     |
| AckQ HWM                    | Current number of packets waiting for acknowledgement and the high water mark.                |
| RcvQ HWM                    | Current number of packets in receive queue yet to be processed and high water mark.           |
| TxQ HWM                     | Current number of packets in transmit queue waiting to be sent.                               |
| Pdu's Sent                  | Total number of SSCOP frames sent.                                                            |
| Pdu's Received              | Total number of SSCOP frames received.                                                        |
| Pdu's Ignored               | Number of invalid SSCOP frames ignored.                                                       |
| Begin                       | Number of Begin frames received/sent.                                                         |
| Begin Ack                   | Number of Begin Ack frames received/sent.                                                     |
| Begin Reject                | Number of Begin Reject frames received/sent.                                                  |

**Table 71**      *show sscop Field Descriptions (continued)*

| <b>Field</b>        | <b>Description</b>                                                                             |
|---------------------|------------------------------------------------------------------------------------------------|
| End                 | Number of End frames received/sent.                                                            |
| End Ack             | Number of End Ack frames received/sent.                                                        |
| Resync              | Number of Resync frames received/sent.                                                         |
| Resync Ack          | Number of Resync Ack frames received/sent.                                                     |
| Sequenced Data      | Number of Sequenced Data frames received/sent.                                                 |
| Sequenced Poll Data | Number of Sequenced Poll Data frames received/sent.                                            |
| Poll                | Number of Poll frames received/sent.                                                           |
| Stat                | Number of Stat frames received/sent.                                                           |
| Unsolicited Stat    | Number of Unsolicited Stat frames received/sent.                                               |
| Unassured Data      | Number of Unassured Data frames received/sent.                                                 |
| Mgmt Data           | Number of Mgmt Data frames sent/received.                                                      |
| Unknown Pdu's       | Number of Unknown Pdu's frames received/sent.                                                  |
| Error Recovery/Ack  | Number of error recovery PDUs sent/number of error recovery ACK PDUs sent.                     |
| Lack of credit      | Number of times an attempt to transmit data failed because send window was closed by the peer. |



# show tech-support

To collect and display a large amount of information about your ITP configuration for troubleshooting purposes, use the **show tech-support** privileged EXEC command.

## show tech-support

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                |                                                             |
|------------------------|----------------|-------------------------------------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                                         |
|                        | 12.2(25)SW1    | This command was enhanced to display information about ITP. |

|                         |                                                                                                                                                                                                                                                                  |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The <b>show tech-support</b> command is useful for collecting a large amount of information about your ITP configuration for troubleshooting purposes. The output of this command can be provided to technical support representatives when reporting a problem. |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

The **show tech-support** command displays the output of a number of show commands at once. The output from this command will vary depending on your platform and configuration.

For information about general output, refer to the **show tech-support** entry in the “Troubleshooting and Fault Management Commands” section of the *Cisco IOS Configuration Fundamentals Command Reference, Release 12.2*.

Specific ITP information collected by the following commands is displayed as output of the **show tech-support** command:

- show cs7
- show cs7 mtp3 errors
- show cs7 route
- show cs7 linkset
- show cs7 linkset statistics
- show cs7 accounting
- show cs7 gtt measurements

When M3UA or SUA is configured, output of the following commands is displayed:

- show cs7 m3ua
- show cs7 sua
- show cs7 asp
- show cs7 as

- show cs7 point-codes

When ITP Non-stop Operation (NSO) is configured, output of the following commands is displayed:

- show cs7 nso state
- show cs7 nso counters detailed

When ITP Group is configured, output of the following commands is displayed:

- show cs7 group state
- show cs7 group counters detailed
- show cs7 group transport

#### Related Commands

| Command                          | Description                                                 |
|----------------------------------|-------------------------------------------------------------|
| <b>show cs7</b>                  | Displays ITP basic configuration status.                    |
| <b>show cs7 accounting</b>       | Displays ITP accounting details.                            |
| <b>show cs7 as</b>               | Displays AS and routing key information.                    |
| <b>show cs7 asp</b>              | Displays ASP information.                                   |
| <b>show cs7 group</b>            | Displays ITP Group operational information.                 |
| <b>show cs7 gtt measurements</b> | Displays a summary of CS7 GTT/SCCP measurements.            |
| <b>show cs7 linkset</b>          | Displays ITP linkset information.                           |
| <b>show cs7 m3ua</b>             | Displays M3UA node information.                             |
| <b>show cs7 mtp3 error</b>       | Displays a list of MTP errors.                              |
| <b>show cs7 nso</b>              | Displays NSO information.                                   |
| <b>show cs7 point-codes</b>      | Displays the point codes that this router is responding to. |
| <b>show cs7 route</b>            | Displays the ITP routing table.                             |
| <b>show cs7 sua</b>              | Displays SUA node information.                              |

# shutdown (CS7 AS)

To disable an AS without deleting the configuration, use the **shutdown** CS7 AS submode command. To reen able, use the **no** version of this command.

**shutdown**

**no shutdown**

## Syntax Description

This command has no arguments or keywords.

## Defaults

No default behavior or values

## Command Modes

CS7 AS submode

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example disables the AS named as1 without deleting the configuration:

```
cs7 as as1
shutdown
```

## Related Commands

| Command | Description                                                 |
|---------|-------------------------------------------------------------|
| cs7 as  | Specifies the Application Server and enters CS7 AS submode. |

# shutdown (CS7 AS Route)

To disable an AS Route without deleting the configuration, use the **shutdown** CS7 AS Route submode command. To reenable, use the **no** version of this command.

**shutdown**

**no shutdown**

---

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

---

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

---

|                      |                      |
|----------------------|----------------------|
| <b>Command Modes</b> | CS7 AS Route submode |
|----------------------|----------------------|

---

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(4)MB5     | This command was introduced. |

---

---

|                 |                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example disables the AS Route named asroute1:<br><br><pre>cs7 asroute asroute1 shutdown</pre> |
|-----------------|-------------------------------------------------------------------------------------------------------------|

---

| <b>Related Commands</b> | <b>Command</b>     | <b>Description</b>                                                                                     |
|-------------------------|--------------------|--------------------------------------------------------------------------------------------------------|
|                         | <b>cs7 asroute</b> | Defines a set of routes to a virtual point code within the IP network and enters CS7 AS Route submode. |

---

# shutdown (CS7 ASP)

To disable an ASP without deleting the configuration, use the **shutdown** CS7 ASP submode command. To reenable, use the **no** version of this command.

**shutdown**

**no shutdown**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or values |
|-----------------|-------------------------------|

|                      |         |
|----------------------|---------|
| <b>Command Modes</b> | CS7 ASP |
|----------------------|---------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB5     | This command was introduced. |

|                 |                                                                                                           |
|-----------------|-----------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example disables the ASP named ASP1:<br><br><pre>cs7 asp ASP1 2904 2905 m3ua shutdown</pre> |
|-----------------|-----------------------------------------------------------------------------------------------------------|

|                         |                |                                                                      |
|-------------------------|----------------|----------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b>                                                   |
|                         | cs7 asp        | Specifies an Application Server Process and enables CS7 ASP submode. |

# shutdown (CS7 link)

To disable a link, use the **shutdown** CS7 link submode command. To bring a link into the active state (under the condition that its parent linkset is already in the active state), use the **no** form of the command.

**shutdown**

**no shutdown**

---

**Syntax Description** This command has no arguments or keywords.

---

**Defaults** No default behavior or values.

---

**Command Modes** CS7 link submode

---

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(1)MB | This command was introduced. |

---



---

**Usage Guidelines** A link can be brought back into the active state with the **no shutdown** command only if its parent link is in the active state.



**Note**

---

The **cs7 prompt enhanced** command is an optional global configuration command that changes the prompt in linkset configuration mode to display the linkset (and where applicable, the link) that is currently being configured. This command is intended to help avoid the possibility of inadvertently shutting down the wrong linkset/link.

---



---

**Examples** The following example disables the link:

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
shutdown
```

---

| Related Commands | Command                    | Description                                                                                                                                  |
|------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                  | <b>cs7 inhibit</b>         | Inhibits a link.                                                                                                                             |
|                  | <b>cs7 prompt enhanced</b> | Changes the prompt in linkset configuration mode to display the linkset (and where applicable, the link) that is currently being configured. |

---

# shutdown (CS7 linkset)

To disable a linkset, use the **shutdown** CS7 linkset submode command. To reactivate a disabled linkset, use the **no** form of this command.

**shutdown**

**no shutdown**

---

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

---

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

---

|                      |                     |
|----------------------|---------------------|
| <b>Command Modes</b> | CS7 linkset submode |
|----------------------|---------------------|

---

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(1)MB      | This command was introduced. |

---

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|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | <p>A linkset can be activated or deactivated with the (<b>no</b>) <b>shutdown</b> command.</p> <p>When you deactivate a linkset with the <b>shutdown</b> command, all links in that linkset are deactivated. The linkset will be shown as “SHUTDOWN” in the output of the <b>show term</b> command.</p> <p>However, the links in the linkset will not appear as “SHUTDOWN” because they were not administratively shutdown.</p> <p>Also, when a link is administratively shut down, it remains in the shutdown state (and will not be activated, even when its linkset is activated) until a <b>no shutdown</b> command is specified for the link. The reason for requiring an explicit reactivation (no shutdown) of a link is to allow the user to maintain the state of the link when linksets are activated, in case the user does not want a link to be activated.</p> |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Note**

---

The **cs7 prompt enhanced** command is an optional global configuration command that changes the prompt in linkset configuration mode to display the linkset (and where applicable, the link) that is currently being configured. This command is intended to help avoid the possibility of inadvertently shutting down the wrong linkset/link.

---

---

|                 |                                                                             |
|-----------------|-----------------------------------------------------------------------------|
| <b>Examples</b> | The following example shuts down the linkset, and all links in the linkset: |
|-----------------|-----------------------------------------------------------------------------|

```
cs7 linkset rosebud
shutdown
```

The following example reactivates the linkset named rosebud, but all links belonging to the linkset remain deactivated, until explicitly activated with the link subcommand **no shut**:

```
cs7 linkset rosebud
no shutdown
```

| Related Commands | Command             | Description                                                                                                                                  |
|------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                  | cs7 linkset         | Specifies a linkset.                                                                                                                         |
|                  | cs7 prompt enhanced | Changes the prompt in linkset configuration mode to display the linkset (and where applicable, the link) that is currently being configured. |



# shutdown (CS7 M3UA)

To shutdown the M3UA protocol, use the **shutdown** CS7 M3UA submode command. To reenable, use the **no** version of this command.

**shutdown**

**no shutdown**

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values.

**Command Modes** CS7 M3UA

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

**Examples** The following example disables M3UA on port 2905:

```
cs7 m3ua 2905
shutdown
```

| Related Commands | Command  | Description                                                           |
|------------------|----------|-----------------------------------------------------------------------|
|                  | cs7 m3ua | Specifies the local port number for M3UA and enters CS7 M3UA submode. |

# shutdown (CS7 MAPUA)

To disable the MAPUA on this MAP Proxy ITP router, use the **shutdown** command in CS7 MAPUA submode. To re-enable the MAPUA on this MAP Proxy ITP router, use the **no** form of this command.

**shutdown**

**no shutdown**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

|                      |           |
|----------------------|-----------|
| <b>Command Modes</b> | CS7 MAPUA |
|----------------------|-----------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB7 | This command was introduced. |

|                         |
|-------------------------|
| <b>Usage Guidelines</b> |
|-------------------------|

|                 |                                                                  |
|-----------------|------------------------------------------------------------------|
| <b>Examples</b> | The following example disables the MAPUA instance named rad2000: |
|-----------------|------------------------------------------------------------------|

```
cs7 mapua rad2000 radius 2000
shutdown
```

| <b>Related Commands</b> | Command   | Description                                                                                                      |
|-------------------------|-----------|------------------------------------------------------------------------------------------------------------------|
|                         | cs7 mapua | Specifies the name, protocol, and local port number for the MAP Proxy feature and enables the CS7 MAPUA submode. |

# shutdown (CS7 Mated-SG)

To disable a mated SG without deleting the configuration, use the **shutdown** CS7 Mated-SG submode command. To re-enable, use the **no** version of this command.

**shutdown**

**no shutdown**

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values

**Command Modes** CS7 Mated-SG

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

**Examples** The following example disables the mated SG named BLUE:

```
cs7 mated-sg BLUE 5000
shutdown
```

| Related Commands | Command      | Description                                                           |
|------------------|--------------|-----------------------------------------------------------------------|
|                  | cs7 mated-sg | Specifies a connection to a mated SG and enters CS7 Mated SG submode. |

# shutdown (CS7 Monitor)

To terminate the TCP connection with the remote server and reject incoming TCP connection requests from the remote server, use the **shut** command in CS7 monitor configuration mode.

## shutdown

**Syntax Description** This command has no keywords.

**Defaults** No default behavior or values.

**Command Modes** CS7 monitor configuration

| Command History | Release     | Modification                 |
|-----------------|-------------|------------------------------|
|                 | 12.2(4)MB12 | This command was introduced. |

**Examples** The following example terminates the TCP connection with the remote host and rejects incoming TCP connection requests from the remote server:

```
cs7 monitor 9000
shut
```

| Related Commands | Command     | Description                                                                                                  |
|------------------|-------------|--------------------------------------------------------------------------------------------------------------|
|                  | cs7 monitor | Configures the ITP as a monitor and defines the port number on which to listen for incoming TCP connections. |

# shutdown (CS7 SGMP)

To disable SGMP, use the **shutdown** CS7 SGMP submode command. To re-enable, use the **no** version of this command.

**shutdown**

**no shutdown**

## Syntax Description

This command has no arguments or keywords.

## Defaults

No default behavior or values

## Command Modes

CS7 SGMP

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example disables SGMP on port 5000:

```
cs7 sgmp 5000
shutdown
```

## Related Commands

| Command         | Description                                  |
|-----------------|----------------------------------------------|
| <b>cs7 sgmp</b> | Configures SGMP and enters CS7 SGMP submode. |

# shutdown (CS7 SUA)

To disable the SUA protocol on a local port without deleting the configuration, use the **shutdown** CS7 AS submode command. To re-enable, use the **no** version of this command.

**shutdown**

**no shutdown**

---

**Syntax Description** This command has no arguments or keywords.

---

**Defaults** No default behavior or values

---

**Command Modes** CS7 SUA

---

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

---



---

**Examples** The following example disables the SUA protocol on port 15000:

```
cs7 sua 15000
shutdown
```

---

| Command | Description                                                         |
|---------|---------------------------------------------------------------------|
| cs7 sua | Specifies the local port number for SUA and enters CS7 SUA submode. |

---

# shutdown (group)

To administratively disable the ITP Group feature while retaining the feature configuration, use the **shutdown** group submode command. To enable the association, use the **no** form of the command.

**shutdown**

**no shutdown**

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values.

**Command Modes** Group

| Command History | Release    | Modification                                   |
|-----------------|------------|------------------------------------------------|
|                 | 12.2(25)SW | This command was introduced in the Group mode. |

**Examples** The following example disables the inter-device association:

```
cs7 group ITP1 3333
shutdown
```

| Related Commands | Command   | Description               |
|------------------|-----------|---------------------------|
|                  | cs7 group | Configures the ITP group. |

# shutdown (IPC association)

To administratively disable the inter-device association, use the **shutdown** IPC association submode command. To enable the association, use the **no** form of the command.

**shutdown**

**no shutdown**

---

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

---

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

---

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | IPC Association submode |
|----------------------|-------------------------|

---

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                                  |
|------------------------|----------------|------------------------------------------------------|
|                        | 12.2(25)SW     | This command was introduced in IPC association mode. |

---

---

|                 |                                                                                                                                         |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | <p>The third line of the following example enables the inter-device association:</p> <pre>ipc zone default association 1 shutdown</pre> |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------|

---

| <b>Related Commands</b> | <b>Command</b>     | <b>Description</b>                                             |
|-------------------------|--------------------|----------------------------------------------------------------|
|                         | <b>association</b> | Configures an association between two devices in the IPC zone. |

---



# sls-shift

When the variant is ITU, to shift which signaling link selection (SLS) bits are used for link and linkset selection, use the **sls-shift** CS7 linkset submode command. To disable the specification, use the **no** form of this command.

**sls-shift {0-3}**

**no sls-shift**

## Syntax Description

|            |                                                                                                                                                                     |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>0-3</b> | This argument indicates a range, from least significant bit (0) to most significant bit (3) of the SLS, to be used for linkset selection within a combined linkset. |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Defaults

The default is 0, the equivalent of the **no sls-shift** command.

## Command Modes

CS7 linkset submode

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

## Usage Guidelines

This command is only valid when the variant is ITU. It affects MSUs received on the linkset, and changes which bit in the SLS is used for linkset selection.

It is necessary to be able to change which bit to use for linkset selection because ITU, unlike ANSI, does not perform SLS rotation. If all nodes in the network use the same bit for linkset selection, traffic won't balance evenly.

## Examples

The following example specifies that the most significant bit (3) of the SLS, is to be used for linkset selection within a combined linkset:

```
cs7 linkset linkset1
sls-shift 3
```

## Related Commands

| Command            | Description          |
|--------------------|----------------------|
| <b>cs7 linkset</b> | Specifies a linkset. |

## smpp (cs7 sms result)

To specify that messages will be routed on an SMPP session, use the **smpp** command in CS7 SMS result configuration mode. To remove the configuration, use the **no** form of this command.

**smpp** *session-name* **weight** *weight*

**no smpp** *session-name* **weight** *weight*

### Syntax Description

|                     |                                                                                      |
|---------------------|--------------------------------------------------------------------------------------|
| <i>session-name</i> | SMPP session name.                                                                   |
| <b>weight</b>       | (Optional) Specifies the weight applied to the weighted round robin (WRR) algorithm. |
| <i>weight</i>       | Weight value, in the range 0 to 10.                                                  |

### Defaults

No default behavior or values

### Command Modes

CS7 SMS result configuration

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(25)SW | This command was introduced. |

### Usage Guidelines

### Examples

The following example configures a result group named OFFISLAND and specifies that messages will be routed in SMPP sessions:

```
CS7 sms result-group OFFISLAND esme
  smpp OFFISLAND1 weight 3
  smpp OFFISLAND2 weight 4
```

### Related Commands

| Command                     | Description                     |
|-----------------------------|---------------------------------|
| <b>cs7 sms result-group</b> | Configures an SMS result group. |

# smpp inactivity-timer

To specify the maximum time lapse in milliseconds allowed between transactions, use the **smpp inactivity-timer** command in cs7 mapua configuration mode. To return to the default value, use the **no** form of this command.

**smpp inactivity-timer** *ms*

**no smpp inactivity-timer**

|                           |           |                                                                                                                       |
|---------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>ms</i> | Time in milliseconds allowed between transactions. Valid range is 1,000 to 9,000,000 ms. The default is 1,800,000 ms. |
|---------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------|

|                 |               |
|-----------------|---------------|
| <b>Defaults</b> | 1,800,000 ms. |
|-----------------|---------------|

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | CS7 mapua configuration |
|----------------------|-------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                 |                                                                                                            |
|-----------------|------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the smpp inactivity timer to 9,000,000 ms:<br><br>smpp inactivity-timer 9000000 |
|-----------------|------------------------------------------------------------------------------------------------------------|

|                         |                |                                                                                |
|-------------------------|----------------|--------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b>                                                             |
|                         | cs7 mapua      | Specifies the name, protocol, and local port number for the MAP Proxy feature. |

# smpp keepalive-timer

To specify the maximum time lapse in milliseconds allowed between SMPP operations over an SMPP connection, use the **smpp keepalive-timer** command in cs7 mapua configuration mode. To return to the default value, use the **no** form of this command.

**smpp keepalive-timer** *ms*

**no smpp keepalive-timer**

|                           |                                                                                                              |                                                                                |
|---------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>ms</i> Time in milliseconds. Valid range is 0 to 600,000 ms. The default is 60,000 ms.                    |                                                                                |
| <b>Defaults</b>           | 60,000 ms.                                                                                                   |                                                                                |
| <b>Command Modes</b>      | CS7 mapua configuration                                                                                      |                                                                                |
| <b>Command History</b>    | <b>Release</b>                                                                                               | <b>Modification</b>                                                            |
|                           | 12.2(25)SW                                                                                                   | This command was introduced.                                                   |
| <b>Examples</b>           | <p>The following example sets the smpp keepalive-timer to 9,000 ms:</p> <pre>smpp keepalive-timer 9000</pre> |                                                                                |
| <b>Related Commands</b>   | <b>Command</b>                                                                                               | <b>Description</b>                                                             |
|                           | cs7 mapua                                                                                                    | Specifies the name, protocol, and local port number for the MAP Proxy feature. |

## smpp response-timer

To specify the maximum time lapse in milliseconds allowed between SMPP an request and the corresponding SMPP response, use the **smpp response-timer** command in cs7 mapua configuration mode. To return to the default value, use the **no** form of this command.

**smpp response-timer** *ms*

**no smpp response-timer**

|                           |           |                                                                                |
|---------------------------|-----------|--------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>ms</i> | Time in milliseconds. Valid range is 50 to 30,000 ms. The default is 5,000 ms. |
|---------------------------|-----------|--------------------------------------------------------------------------------|

|                 |           |
|-----------------|-----------|
| <b>Defaults</b> | 5,000 ms. |
|-----------------|-----------|

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | CS7 mapua configuration |
|----------------------|-------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                 |                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the smpp response-timer to 9,000 ms:<br><br>smpp response-timer 9000 |
|-----------------|-------------------------------------------------------------------------------------------------|

|                         |                |                                                                                |
|-------------------------|----------------|--------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b>                                                             |
|                         | cs7 mapua      | Specifies the name, protocol, and local port number for the MAP Proxy feature. |

# smpp send-window

To specify the maximum number of outstanding SMPP operations allowed between an MMSC and the ITP, use the **smpp send-window** command in cs7 mapua configuration mode. To return to the default value, use the **no** form of this command.

**smpp send-window** *operations*

**no smpp send-window**

|                           |                                                                                                                    |                                                                                |
|---------------------------|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>operations</i> Number of outstanding SMPP operations. Valid range is 1 to 100 ms. The default is 10 operations. |                                                                                |
| <b>Defaults</b>           | 10 operations.                                                                                                     |                                                                                |
| <b>Command Modes</b>      | CS7 mapua configuration                                                                                            |                                                                                |
| <b>Command History</b>    | <b>Release</b>                                                                                                     | <b>Modification</b>                                                            |
|                           | 12.2(25)SW                                                                                                         | This command was introduced.                                                   |
| <b>Examples</b>           | The following example sets the smpp send-window to 50:<br><pre>smpp send-window 50</pre>                           |                                                                                |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                     | <b>Description</b>                                                             |
|                           | cs7 mapua                                                                                                          | Specifies the name, protocol, and local port number for the MAP Proxy feature. |

# smpp session-init-timer

To specify the maximum time lapse in milliseconds allowed between the establishment of a network connection and the establishment of the SMPP connection, use the **smpp session-init-timer** command in cs7 mapua configuration mode. To return to the default value , use the **no** form of this command.

**smpp session-init-timer** *ms*

**no smpp session-init-timer**

|                           |           |                                                                                    |
|---------------------------|-----------|------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>ms</i> | Time in milliseconds. Valid range is 500 to 120,000 ms. The default is 120,000 ms. |
|---------------------------|-----------|------------------------------------------------------------------------------------|

|                 |             |
|-----------------|-------------|
| <b>Defaults</b> | 120,000 ms. |
|-----------------|-------------|

|                      |                         |
|----------------------|-------------------------|
| <b>Command Modes</b> | CS7 mapua configuration |
|----------------------|-------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                 |                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the smpp session-init-timer to 9,000 ms:<br><br>smpp session-init-timer 9000 |
|-----------------|---------------------------------------------------------------------------------------------------------|

|                         |                |                                                                                |
|-------------------------|----------------|--------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b>                                                             |
|                         | cs7 mapua      | Specifies the name, protocol, and local port number for the MAP Proxy feature. |

## smsc-map-version (cs7 sms smsmo)

To specify a locally supported MAP version, use the **smsc-map-version** command in cs7 sms smsmo configuration mode. To return to the default MAP version, use the **no** form of this command.

**smsc-map-version** *version*

**no smsc-map-version** *version*

|                           |                |                                                                        |
|---------------------------|----------------|------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>version</i> | GSM MAP version. Version number in the range 1 to 3. The default is 3. |
|---------------------------|----------------|------------------------------------------------------------------------|

|                 |                                   |
|-----------------|-----------------------------------|
| <b>Defaults</b> | The default GSM MAP version is 3. |
|-----------------|-----------------------------------|

|                      |                             |
|----------------------|-----------------------------|
| <b>Command Modes</b> | CS7 sms smsmo configuration |
|----------------------|-----------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(25)SW     | This command was introduced. |

|                         |                                                                                               |
|-------------------------|-----------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | This is the maximum version used when establishing SMS MO dialogues with both MSCs and SMSCs. |
|-------------------------|-----------------------------------------------------------------------------------------------|

|                 |                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example configures an SMS route table, specifies a CDR service, specifies GSM MAP routing and GSM MAP version 3. |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------|

```
cs7 sms route-table
  cdr-service
  gsm-map sms-mo 5
  smsc-map-version 3
```

|                         |                                      |                                                                             |
|-------------------------|--------------------------------------|-----------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>                       | <b>Description</b>                                                          |
|                         | <b>cs7 sms route-table</b>           | Specifies an SMS route table.                                               |
|                         | <b>gsm-map (cs7 sms route table)</b> | Specifies the GSM MAP operation.                                            |
|                         | <b>gprs-delivery prefer-sgsn</b>     | Specifies that DSMR will first attempt SMS MT delivery to the SGSN address. |



# snmp-server enable traps bits-clock

To enable Simple Network Management Protocol (SNMP) to generate notifications about the Building Integrated Timing Supply (BITS) clocking sources and modes of operations, use the **snmp-server enable traps bits-clock** global configuration command. To disable the sending of traps, use the **no** form of the command.

**snmp-server enable traps bits-clock**

**no snmp-server enable traps bits-clock**

**Syntax Description** This command has no arguments or keywords.

**Defaults** No default behavior or values.

**Command Modes** Global configuration

| Release     | Modification                 |
|-------------|------------------------------|
| 12.2(25)SW1 | This command was introduced. |

**Usage Guidelines** The **snmp-server enable traps bits-clock** command provides support for CISCO-BITS-CLOCK-MIB.my

**Examples** The following example generates notifications to indicate when clocking sources change roles or become unavailable:

```
snmp-server enable traps bits-clock
```

| Command                      | Description                                                                                             |
|------------------------------|---------------------------------------------------------------------------------------------------------|
| <b>snmp-server community</b> | Configures community access string to permit access to the Simple Network Management Protocol protocol. |
| <b>snmp-server host</b>      | Specifies the recipient of a Simple Network Management Protocol notification operation.                 |

## snmp-server enable traps cs7

To enable Simple Network Management Protocol (SNMP) ITP traps to be sent, use the **snmp-server enable traps cs7** global configuration command. To disable the sending of traps, use the **no** form of the command.

```
snmp-server enable traps cs7 [gtt-map-state] [gw-gtt-errors] [gw-gtt-load] [gw-dest-state]
[gw-link-congestion] [gw-link-state] [gw-link-utilization] [gw-linkset-state]
[gw-map-state] [gw-route-load] [gw-route-mgmt-state] [link-congestion] [link-state]
[link-utilization] [linkset-state] [mlr-table-load] [monitor-congestion] [monitor-state]
[route-state] [xua-state]
```

```
no snmp-server enable traps cs7 [gtt-map-state] [gw-gtt-errors] [gw-gtt-load] [gw-dest-state]
[gw-link-congestion] [gw-link-state] [gw-link-utilization] [gw-linkset-state]
[gw-map-state] [gw-route-load] [gw-route-mgmt-state] [link-congestion] [link-state]
[link-utilization] [linkset-state] [mlr-table-load] [monitor-congestion] [monitor-state]
[route-state] [xua-state]
```

### Syntax Description

|                            |                                                                                                                                                                                                                                                                          |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>gtt-map-state</b>       | (Optional) Enables the gateway GTT map-state trap (ciscoGsccpGttMapStateChange) in CISCO-ITP-GSCCP-MIB.my.<br><i>Deprecated and replaced by gw-map-state.</i>                                                                                                            |
| <b>gw-gtt-errors</b>       | (Optional) Enables the gateway GTT Errors trap in CISCO-ITP-GSCCP-MIB.my. This notification is generated whenever any global title error is encountered in the last interval specified by the cgsccpGttErrorPeriod or when the cgsccpInstErrorIndicator is set to false. |
| <b>gw-gtt-load</b>         | (Optional) Enables the gateway GTT load table trap (ciscoGsccpGttLoadTable) in CISCO-ITP-GSCCP-MIB.my.                                                                                                                                                                   |
| <b>gw-dest-state</b>       | (Optional) Enables the gateway destination state change trap (ciscoGrtDestStateChange) in CISCO-ITP-GRT-MIB.my.                                                                                                                                                          |
| <b>gw-link-congestion</b>  | (Optional) Enables the gateway link-congestion trap (ciscoGspCongestionChange) in CISCO-ITP-GSP-MIB.my.                                                                                                                                                                  |
| <b>gw-link-state</b>       | (Optional) Enables the gateway link-state trap (ciscoGspLinkStateChange) in CISCO-ITP-GSP-MIB.my.                                                                                                                                                                        |
| <b>gw-link-utilization</b> | (Optional) Enable gateway link-utilization traps (ciscoGspLinkRcvdUtilChange, ciscoGspLinkSentUtilChange) in CISCO-ITP-GSP-MIB.my.                                                                                                                                       |
| <b>gw-linkset-state</b>    | (Optional) Enables the gateway linkset-state trap (ciscoGspLinksetStateChange) in CISCO-ITP-GSP-MIB.my.                                                                                                                                                                  |
| <b>gw-map-state</b>        | (Optional) Enables gateway Mated Appl (MAP) state trap.                                                                                                                                                                                                                  |
| <b>gw-route-load</b>       | (Optional) Enables the gateway route table load trap (ciscoGrtRouteTableLoad) in CISCO-ITP-GRT-MIB.my.                                                                                                                                                                   |
| <b>gw-route-mgmt-state</b> | (Optional) Enables the gateway route management state change trap (ciscoGrtMgmtStateChange) in CISCO-ITP-GRT-MIB.my.                                                                                                                                                     |
| <b>link-congestion</b>     | (Optional) Enables the link-congestion trap (cItpSpCongestionChange) in CISCO-ITP-SP-MIB.my.<br><i>Deprecated and replaced by gw-link-congestion.</i>                                                                                                                    |

|                           |                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>link-state</b>         | (Optional) Enables the link-state trap (cItpSpLinkStateChange) in CISCO-ITP-SP-MIB.my.<br><i>Deprecated and replaced by gw-link-state.</i>                                                                                                                                                                                                               |
| <b>link-utilization</b>   | (Optional) Enable link-utilization trap.<br><i>Deprecated and replaced by gw-link-utilization.</i>                                                                                                                                                                                                                                                       |
| <b>linkset-state</b>      | (Optional) Enables the linkset-state trap (cItpSpLinksetStateChange) in CISCO-ITP-SP-MIB.my.<br><i>Deprecated and replaced by gw-linkset-state.</i>                                                                                                                                                                                                      |
| <b>mlr-table-load</b>     | (Optional) Enables the MLRtable load trap in CISCO-ITP-MLR-MIB.my. This notification is generated whenever a load operation is started or completed. Route table configurations can be loaded by CLI requests. In addition, route tables can be loaded using configuration statements. This allows MLR tables to be reloaded whenever a device restarts. |
| <b>monitor-congestion</b> | (Optional) Enables the ciscoItpMonitorCongestion notification in CISCO-ITP-MONITOR-MIB.my.                                                                                                                                                                                                                                                               |
| <b>monitor-state</b>      | (Optional) Enables the monitor-state trap in CISCO-ITP-MONITOR-MIB.my. Notification is generated when a connection changes states. The value of cItpmConnMonitorState indicates new state.                                                                                                                                                               |
| <b>route-state</b>        | (Optional) Enables the route-state trap (cItpRouteStateChange) in CISCO-ITP-RT-MIB.my.<br><i>Deprecated and replaced by gw-route-mgmt-state.</i>                                                                                                                                                                                                         |
| <b>xua-state</b>          | (Optional) Enables the following traps in CISCO-ITP-XUA-MIB.my.<br>ciscoItpXuaAspStateChange - ASP state change<br>ciscoItpXuaSgmStateChange - Mated SG state change<br>ciscoItpXuaAsStateChange - AS State change<br>ciscoItpXuaAspCongChange - ASP Congestion state change<br>ciscoItpXuaSgmCongChange - Mated SG congestion state change              |

**Defaults**

Disabled

**Command Modes**

Global configuration

**Command History**

| Release     | Modification                                                                                     |
|-------------|--------------------------------------------------------------------------------------------------|
| 12.2(1)MB   | This command was introduced.                                                                     |
| 12.2(4)MB   | The keywords <b>gtt-map-state</b> , <b>link-utilization</b> , and <b>route-state</b> were added. |
| 12.2(4)MB5  | The keyword <b>xua-state</b> was added.                                                          |
| 12.2(21)SW  | The keyword <b>monitor-congestion</b> was added.                                                 |
| 12.2(25)SW  | The <b>monitor-state</b> keyword was added.                                                      |
| 12.2(25)SW1 | The <b>gw-gtt-errors</b> and <b>mlr-table-load</b> keywords were added.                          |

**Usage Guidelines**

When you enable CS7 traps, the default value for trap queue length (10 events) might cause traps to be lost. To avoid this situation set the trap queue length to 100 using the **snmp-server queue-length** global configuration command.

For more information about SNMP, refer to “Configuring SNMP Support” in the Cisco IOS Release 12.1 *Configuration Fundamentals Configuration Guide*, Part 3, Cisco IOS System Management, at the following URL:  
[http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun\\_c/fcprt3/fcd301.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgcr/fun_c/fcprt3/fcd301.htm)

**Examples**

The following example enables SNMP network management traps to be sent to the specified host for the Cisco ITP. The example also increases the trap queue length (from the default 10 events) to 100 events to reduce the possibility of dropping traps:

```
snmp-server enable traps cs7
snmp community public RO
snmp host 64.102.86.159 version 2c public
snmp-server queue-length 100
```

**Related Commands**

| Command                         | Description                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------|
| <b>snmp-server community</b>    | Configures community access string to permit access to the Simple Network Management Protocol protocol. |
| <b>snmp-server host</b>         | Specifies the recipient of a Simple Network Management Protocol notification operation.                 |
| <b>snmp-server queue-length</b> | Specifies the message queue length for each TRAP host.                                                  |

# snmp-server enable traps sctp

To enable Simple Network Management Protocol (SNMP) SCTP traps to be sent, use the **snmp-server enable traps sctp** global configuration command. To disable the sending of traps, use the **no** form of the command.

**snmp-server enable traps sctp [dest-address-state]**

**no snmp-server enable traps sctp [dest-address-state]**

## Syntax Description

|                           |                                                |
|---------------------------|------------------------------------------------|
| <b>dest-address-state</b> | Enables destination address state change trap. |
|---------------------------|------------------------------------------------|

## Defaults

No default behavior or values.

## Command Modes

Interface configuration

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB3 | This command was introduced. |

## Examples

The following example enables the destination address state change trap:

```
snmp-server enable traps sctp dest-address-state
```

## Related Commands

| Command                      | Description                                                                                             |
|------------------------------|---------------------------------------------------------------------------------------------------------|
| <b>snmp-server community</b> | Configures community access string to permit access to the Simple Network Management Protocol protocol. |
| <b>snmp-server host</b>      | Specifies the recipient of a Simple Network Management Protocol notification operation.                 |

## sscf-nni

To specify SSCF NNI parameters for the CS7 HSL profile, use the **sscf-nni** CS7 HSL profile commands. To remove the configuration, use the **no** form of the command.

**sscf-nni** {**force-proving** *minutes* | **n1** *number* | **no-credit** *seconds* | **nrp** *number* | **sscop-recovery** *minutes* | **t1** *seconds* | **t2** *seconds* | **t3** *milliseconds*}

**no sscf-nni** {**force-proving** *minutes* | **n1** *number* | **no-credit** *seconds* | **nrp** *number* | **sscop-recovery** *minutes* | **t1** *seconds* | **t2** *seconds* | **t3** *milliseconds*}

### Syntax Description

|                                      |                                                                                                                                                                    |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>force-proving</b> <i>minutes</i>  | Specifies the time (in minutes) to monitor the link after proving. The range is 0 to 20 minutes. The default is 10 minutes.                                        |
| <b>n1</b> <i>number</i>              | Specifies the number of PDUs sent during proving. The range is 5 to 180000 PDUs. The default for ITU is 1000 PDUs. The default for ANSI is 60000 PDUs.             |
| <b>no-credit</b> <i>seconds</i>      | Specifies the time (in seconds) allowed with no credit. The range is 1 to 6 seconds. The default is 2 seconds.                                                     |
| <b>nrp</b> <i>number</i>             | Specifies the maximum number of retransmissions allowed during proving. The range is 1 to 10 retransmissions. The default is 1 retransmission.                     |
| <b>sscop-recovery</b> <i>minutes</i> | Specifies the time (in minutes) for SSCOP recovery. The range is 30 to 1440 minutes. The default is 60 minutes.                                                    |
| <b>t1</b> <i>seconds</i>             | Specifies the time (in seconds) to reestablish connection. The range is 1 to 15 seconds. The default is 5 seconds.                                                 |
| <b>t2</b> <i>seconds</i>             | Specifies the time (in seconds) for alignment to complete. The range is 15 to 180 seconds. The default for ITU is 30 seconds. The default for ANSI is 120 seconds. |
| <b>t3</b> <i>milliseconds</i>        | Specifies the time (in milliseconds) to send proving packets. The range is 1 to 5000 milliseconds. The default is 1 millisecond.                                   |

### Defaults

The default **force-proving** *minutes* is 10 minutes.

The default **n1** *number* is 1000 (ITU) and 60000 (ANSI)..

The default **no-credit** *seconds* is 100 milliseconds.

The default **nrp** *number* is 4 retries.

The default **sscop-recovery** *minutes* is 500 Sd frames.

The default **t1** *seconds* is 1500 milliseconds.

The default **t2** *seconds* is 100 milliseconds.

The default **t3** *milliseconds* is 1024 frames.

### Command Modes

CS7 HSL profile, CS7 linkset

**Command History**

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB4 | This command was introduced. |

**Usage Guidelines**

SSCF NNI parameters can be configured in either a CS7 HSL profile or individually under a link.

**Examples**

## sscop

To specify SSCOP parameters for the CS7 HSL profile, use the **sscop** CS7 HSL profile commands. To remove the configuration, use the **no** form of the command.

**sscop** {**cc-timer** *msecs* | **idle-timer** *msecs* | **keepalive-timer** *msecs* | **max-cc** *number* | **max-pd** *number* | **noResponse-timer** *msecs* | **poll-timer** *msecs* | **receive-window** *number* | **send-window** *number*}

**nosscop** {**cc-timer** *msecs* | **idle-timer** *msecs* | **keepalive-timer** *msecs* | **max-cc** *number* | **max-pd** *number* | **noResponse-timer** *msecs* | **poll-timer** *msecs* | **receive-window** *number* | **send-window** *number*}

| Syntax Description                   |  |                                                                                                                                                                         |
|--------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>cc-timer</b> <i>msecs</i>         |  | Specifies the time (in milliseconds) to send BGN/END/RS/ER PDU at the connection control phase. The range is 100 to 2000 milliseconds. The default is 200 milliseconds. |
| <b>idle-timer</b> <i>msecs</i>       |  | Specifies the time (in milliseconds) to send poll PDU at the idle phase. The range is 25 to 1000 milliseconds. The default is 100 milliseconds.                         |
| <b>keepalive-timer</b> <i>msecs</i>  |  | Specifies the time (in milliseconds) to send poll PDU at the transient phase. The range is 25 to 500 milliseconds. The default is 100 milliseconds.                     |
| <b>max-cc</b> <i>number</i>          |  | Specifies the maximum number of retries for connection control operations. The range is 1 to 127 retries. The default is 4 retries.                                     |
| <b>max-pd</b> <i>number</i>          |  | Specifies the maximum number of Sd frames to send before sending a Poll. The range is 1 to 500 Sd frames. The default is 500 Sd frames.                                 |
| <b>noResponse-timer</b> <i>msecs</i> |  | Specifies the time (in milliseconds) in which at least one STAT PDU must be received. The range is 200 to 2000 milliseconds. The default is 1500 milliseconds.          |
| <b>poll-timer</b> <i>msecs</i>       |  | Specifies the times (in milliseconds) to send poll PDU at the active phase. The range is 25 to 500 milliseconds. The default is 100 milliseconds.                       |
| <b>receive-window</b> <i>number</i>  |  | Specifies the maximum number of Sd(p) frames our partner can send. The range is 1 to 1024 Sd(p) frames. The default is 1024 Sd(p) frames.                               |
| <b>send-window</b> <i>number</i>     |  | Specifies the maximum number of Sd frames to send before waiting for acknowledgement. The range is 1 to 1024 frames. The default is 1024 frames.                        |

### Defaults

The default cc-timer is 200 milliseconds.  
 The default idle-timer is 100 milliseconds.  
 The default keepalive-timer is 100 milliseconds.  
 The default max-cc is 4 retries.  
 The default max-pd is 500 Sd frames.  
 The default noResponse-timer is 1500 milliseconds.  
 The default poll-timer is 100 milliseconds.  
 The default receive-window is 1024 frames.  
 The default send-sindow is 1024 frames.



---

**Command Modes** CS7 HSL profile, CS7 linkset

---

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB4 | This command was introduced. |

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**Usage Guidelines** SSCOP parameters can be configured in either a CS7 HSL profile or individually under a link.

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**Examples**

# teleservice

To specify a particular service identifier value for an **smdpp**, **sri-sm**, or **sms-notify** operation, use the **teleservice** CS7 MLR ruleset configuration mode command. To remove the configuration, use the **no** form of the command.

**teleservice** *id*

**no teleservice**

| Syntax Description | <div><i>id</i></div> <div>An integer in the range 0 to 65535.</div>                                                                                                                                            |  |         |              |                 |                                                                                                          |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------------|-----------------|----------------------------------------------------------------------------------------------------------|
| Defaults           | No default behavior or values.                                                                                                                                                                                 |  |         |              |                 |                                                                                                          |
| Command Modes      | CS7 MLR ruleset                                                                                                                                                                                                |  |         |              |                 |                                                                                                          |
| Command History    | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(21)SW</td><td>This command was introduced.</td></tr></table>                                                                                 |  | Release | Modification | 12.2(21)SW      | This command was introduced.                                                                             |
| Release            | Modification                                                                                                                                                                                                   |  |         |              |                 |                                                                                                          |
| 12.2(21)SW         | This command was introduced.                                                                                                                                                                                   |  |         |              |                 |                                                                                                          |
| Usage Guidelines   | The value of the teleservice maps to the values specified for the SMS TeleserviceIdentifier parameter in IS-41.                                                                                                |  |         |              |                 |                                                                                                          |
| Examples           | <p>The following example sets the teleservice id to 500:</p> <pre>teleservice 500</pre>                                                                                                                        |  |         |              |                 |                                                                                                          |
| Related Commands   | <table><tr><th>Command</th><th>Description</th></tr><tr><td>cs7 mlr ruleset</td><td>Specifies a set of rules that will be used to process traffic matching triggers defined in an MLR table.</td></tr></table> |  | Command | Description  | cs7 mlr ruleset | Specifies a set of rules that will be used to process traffic matching triggers defined in an MLR table. |
| Command            | Description                                                                                                                                                                                                    |  |         |              |                 |                                                                                                          |
| cs7 mlr ruleset    | Specifies a set of rules that will be used to process traffic matching triggers defined in an MLR table.                                                                                                       |  |         |              |                 |                                                                                                          |

# threshold-receive

To configure the receive threshold for a link, use the **threshold-receive** CS7 link submode command. To remove the configuration, use the **no** form of the command.

**threshold-receive** *percent*

**no threshold-receive** *percent*

|                           |                                                                                                 |
|---------------------------|-------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>percent</i> Receive threshold for trap generation in percent. The range is 0 to 100 percent. |
|---------------------------|-------------------------------------------------------------------------------------------------|

|                 |                                                                                            |
|-----------------|--------------------------------------------------------------------------------------------|
| <b>Defaults</b> | The range defaults to the value specified by the <b>cs7 util-threshold</b> global command. |
|-----------------|--------------------------------------------------------------------------------------------|

|                      |                  |
|----------------------|------------------|
| <b>Command Modes</b> | CS7 link submode |
|----------------------|------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB4 | This command was introduced. |

|                         |                                                                                                                                                |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | This value is only required when the value specified by the <b>cs7 util-threshold</b> global command is not appropriate for a particular link. |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                            |
|-----------------|----------------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the receive threshold for link 0 to 50 percent: |
|-----------------|----------------------------------------------------------------------------|

```
cs7 linkset michael 10.1.1
link 0 sctp 172.18.44.147 7000 7000
threshold-receive 50
```

| <b>Related Commands</b> | Command                   | Description                                          |
|-------------------------|---------------------------|------------------------------------------------------|
|                         | <b>cs7 util-abate</b>     | Specifies the integer range utilization threshold.   |
|                         | <b>cs7 util-threshold</b> | Specifies the global threshold for link utilization. |
|                         | <b>plan-capacity-rcvd</b> | Specifies the link receive planning capacity.        |
|                         | <b>plan-capacity-send</b> | Specifies the link send planning capacity.           |
|                         | <b>threshold-send</b>     | Specifies the send threshold for a link.             |

# threshold-send

To configure the send threshold for a link, use the **threshold-send** CS7 link submode command. To remove the configuration use the **no** form of the command.

**threshold-send** *percent*

**no threshold-send** *percent*

| Syntax Description        | <i>percent</i> Send threshold for trap generation in percent. The range is 0 to 100 percent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------|--------------|-----------------------|----------------------------------------------------|---------------------------|------------------------------------------------------|---------------------------|-----------------------------------------------|---------------------------|--------------------------------------------|--------------------------|---------------------------------------------|
| Defaults                  | The range defaults to the value specified by the <b>cs7 util-threshold</b> global command.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| Command Modes             | CS7 link submode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| Command History           | <table><tr><th>Release</th><th>Modification</th></tr><tr><td>12.2(4)MB4</td><td>This command was introduced.</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | Release | Modification | 12.2(4)MB4            | This command was introduced.                       |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| Release                   | Modification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| 12.2(4)MB4                | This command was introduced.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| Usage Guidelines          | This value is only required when the value specified by the <b>cs7 util-threshold</b> global command is not appropriate for a particular link.                                                                                                                                                                                                                                                                                                                                                                                                                      |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| Examples                  | <p>The following example sets the send threshold for link 0 to 50 percent:</p> <pre>cs7 linkset michael 10.1.1   link 0 sctp 172.18.44.147 7000 7000     threshold-send 50</pre>                                                                                                                                                                                                                                                                                                                                                                                    |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| Related Commands          | <table><tr><th>Command</th><th>Description</th></tr><tr><td><b>cs7 util-abate</b></td><td>Specifies the integer range utilization threshold.</td></tr><tr><td><b>cs7 util-threshold</b></td><td>Specifies the global threshold for link utilization.</td></tr><tr><td><b>plan-capacity-rcvd</b></td><td>Specifies the link receive planning capacity.</td></tr><tr><td><b>plan-capacity-send</b></td><td>Specifies the link send planning capacity.</td></tr><tr><td><b>threshold-receive</b></td><td>Specifies the receive threshold for a link.</td></tr></table> |  | Command | Description  | <b>cs7 util-abate</b> | Specifies the integer range utilization threshold. | <b>cs7 util-threshold</b> | Specifies the global threshold for link utilization. | <b>plan-capacity-rcvd</b> | Specifies the link receive planning capacity. | <b>plan-capacity-send</b> | Specifies the link send planning capacity. | <b>threshold-receive</b> | Specifies the receive threshold for a link. |
| Command                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| <b>cs7 util-abate</b>     | Specifies the integer range utilization threshold.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| <b>cs7 util-threshold</b> | Specifies the global threshold for link utilization.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| <b>plan-capacity-rcvd</b> | Specifies the link receive planning capacity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| <b>plan-capacity-send</b> | Specifies the link send planning capacity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |
| <b>threshold-receive</b>  | Specifies the receive threshold for a link.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |         |              |                       |                                                    |                           |                                                      |                           |                                               |                           |                                            |                          |                                             |

## timer (CS7 Linkset)

To configure the ITP MTP3 management timers that control the linkset (and, optionally a link on the linkset), use the **timer** CS7 linkset submode command. To reset a timer to its default value, use the **no** form of this command.

```
timer { retry msec | slt-t1 msec | slt-t2 msec | t01 msec | t02 msec | t03 msec | t04 msec | t05 msec |  
          t12 msec | t13 msec | t14 msec | t17 msec | t19 msec | t20 msec | t21 msec | t22 msec | t23 msec  
          | t24 msec | t25 msec | t28 msec | t29 msec | t30 msec | t32 msec }
```

```
no timer { retry | slt-t1 | slt-t2 | t01 | t02 | t03 | t04 | t05 | t12 | t13 | t14 | t17 | t19 | t20 | t21 | t22 |  
            t23 | t24 | t25 | t28 | t29 | t30 | t32 }
```



### Note

Ranges are ANSI or ITU defined.

### Syntax Description

|                    |                                                                                                                                                                             |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>retry</b> msec  | (ANSI, ITU) Link activation retry timer.<br>(ANSI, ITU) Range of msec is 60000 through 90000 milliseconds.<br>Default is 60000 milliseconds.                                |
| <b>slt-t1</b> msec | (ANSI, ITU) Link test acknowledgment timer.<br>(ANSI, ITU) ITU Range of msec is 4000 through 12000 milliseconds.<br>Default is 8000 milliseconds.                           |
| <b>slt-t2</b> msec | (ANSI, ITU) Interval timer for sending test messages.<br>(ANSI, ITU) Range of msec is 30000 through 90000 milliseconds.<br>(ANSI, ITU) Default is 60000 milliseconds.       |
| <b>t01</b> msec    | (ANSI, ITU) Delay to avoid message mis-sequencing.<br>(ANSI, ITU) Range of msec is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds.               |
| <b>t02</b> msec    | (ANSI, ITU) Wait for changeover acknowledgment.<br>(ANSI, ITU) Range of msec is 700 through 2000 milliseconds.<br>(ANSI, ITU) Default is 1400 milliseconds.                 |
| <b>t03</b> msec    | (ANSI, ITU) Delay to avoid mis-sequencing in changeback.<br>(ANSI, ITU) Range of msec is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds.         |
| <b>t04</b> msec    | (ANSI, ITU) Wait for changeback acknowledgment (first attempt).<br>(ANSI, ITU) Range of msec is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds.  |
| <b>t05</b> msec    | (ANSI, ITU) Wait for changeback acknowledgment (second attempt).<br>(ANSI, ITU) Range of msec is 500 through 1200 milliseconds.<br>(ANSI, ITU) Default is 800 milliseconds. |
| <b>t12</b> msec    | (ANSI, ITU) Wait for uninhibited acknowledgment.<br>(ANSI, ITU) Range of msec is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                |
| <b>t13</b> msec    | (ANSI, ITU) Wait for force uninhibited.<br>(ANSI, ITU) Range of msec is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                         |

|                        |                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t14</b> <i>msec</i> | (ANSI, ITU) Wait for inhibition acknowledgment.<br>(ANSI, ITU) Range of <i>msec</i> is 2000 through 3000 milliseconds.<br>(ANSI, ITU) Default is 2500 milliseconds.                                                                                                                                                                                           |
| <b>t17</b> <i>msec</i> | (ANSI, ITU) Delay to avoid oscillation of alignment failure and link restart.<br>(ANSI, ITU) Range of <i>msec</i> is 800 through 1500 milliseconds.<br>(ANSI, ITU) Default is 1150 milliseconds.                                                                                                                                                              |
| <b>t19</b> <i>msec</i> | (ANSI) Failed link craft referral timer.<br>(ANSI) Range of <i>msec</i> is 480000 through 600000 milliseconds.<br>(ANSI) Default is 540000.<br><br>(ITU) Supervision timer during MTP restart.<br>(ITU) Range of <i>msec</i> is 67000 through 69000 milliseconds.<br>(ITU) Default is 68000 milliseconds.                                                     |
| <b>t20</b> <i>msec</i> | (ANSI) Waiting to repeat local inhibit test.<br>(ANSI) Range of <i>msec</i> is 90000 through 120000 milliseconds.<br>(ANSI) Default is 105000 milliseconds.                                                                                                                                                                                                   |
| <b>t21</b> <i>msec</i> | (ANSI) Waiting to repeat remote inhibit test.<br>(ANSI) Range of <i>msec</i> is 90000 through 120000 milliseconds.<br>(ANSI) Default is 105000 milliseconds.<br><br>(ITU) MTP restart timer at signaling point adjacent to one whose MTP restarts.<br>(ITU) Range of <i>msec</i> is 63000 through 65000 milliseconds.<br>(ITU) Default is 64000 milliseconds. |
| <b>t22</b> <i>msec</i> | (ITU) Local inhibit test timer.<br>(ITU) Range of <i>msec</i> is 180000 through 360000 milliseconds.<br>(ITU) Default is 300000 milliseconds.                                                                                                                                                                                                                 |
| <b>t23</b> <i>msec</i> | (ITU) Remote inhibit test timer.<br>(ITU) Range of <i>msec</i> is 180000 through 360000 milliseconds.<br>(ITU) Default is 300000 milliseconds.                                                                                                                                                                                                                |
| <b>t24</b> <i>msec</i> | (ITU) Stabilizing timer after removal of local processor outage, used in LPO latching to RPO.<br>(ITU) Range of <i>msec</i> is 400 through 600 milliseconds.<br>(ITU) Default is 500 milliseconds.                                                                                                                                                            |
| <b>t25</b> <i>msec</i> | (ANSI) Timer at SP adjacent to restarting SP, waiting for traffic restart allowed message.<br>(ANSI) Range of <i>msec</i> is 30000 through 35000 milliseconds.<br>(ANSI) Default is 30000 milliseconds.                                                                                                                                                       |
| <b>t28</b> <i>msec</i> | (ANSI) Timer at SP adjacent to restarting SP waiting for traffic restart waiting message.<br>(ANSI) Range of <i>msec</i> is 3000 through 35000 milliseconds.<br>(ANSI) Default is 30000 milliseconds.                                                                                                                                                         |
| <b>t29</b> <i>msec</i> | (ANSI) Timer started when TRA sent in response to unexpected TRA or TRW.<br>(ANSI) Range of <i>msec</i> is 60000 through 65000 milliseconds.<br>(ANSI) Default is 63000 milliseconds.                                                                                                                                                                         |

|                 |                                                                                                                                                                                                 |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>t30 msec</b> | (ANSI) Timer to limit sending TFPs and TFRs in response to unexpected TRA and TRW.<br>(ANSI) Range of <i>msec</i> is 30000 through 35000 milliseconds.<br>(ANSI) Default is 33000 milliseconds. |
| <b>t32 msec</b> | (ANSI) Link oscillation timer - Procedure A.<br>Range of <i>msec</i> is 60000 through 120000 milliseconds.<br>Default is 60000 milliseconds.                                                    |

**Defaults**

See defaults listed in Syntax Description.

**Command Modes**

CS7 linkset submenu

**Command History**

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

**Usage Guidelines**

MTP3 timers can be defined at 3 levels: global, linkset, and link.

All global, linkset, and link specific timers can be defined at the global level. These values serve as defaults and are propagated down to the lower levels.

All linkset and link specific timers can be defined at the linkset level. These values serve as defaults for the linkset and all links defined within that linkset. Any values defined here will override any global values.

All timers defined at the link level will apply to the link and will override any values for that timer defined at either the linkset, or global level.

**Examples**

The following example sets the ITP MTP3 T1 timer to 1000 milliseconds:

```
timer t01 1000
```

**Related Commands**

| Command                 | Description                          |
|-------------------------|--------------------------------------|
| <b>cs7 mtp3 timer</b>   | Globally configures all MTP3 timers. |
| <b>show cs7 linkset</b> | Displays ITP linkset information     |
| <b>link-timer</b>       | Configures timers for a link.        |

## timer (CS7 Profile)

Traditional SS7 links use serial interfaces. ITP interfaces are configured to use encapsulation MTP2. You can define several MTP2 timers in a CS7 profile and apply the profile to a linkset. To configure MTP2 encapsulation timers in a CS7 profile, use the **timer** CS7 profile configuration command. To reset the timers, use the **no** form of the command.

**timer** {**t1 msec** | **t2 msec** | **t3 msec** | **t4e msec** | **t4n msec** | **t5 msec** | **t6 msec** | **t7 msec** | **ttc timer msec**}

**no timer** {**t1 msec** | **t2 msec** | **t3 msec** | **t4e msec** | **t4n msec** | **t5 msec** | **t6 msec** | **t7 msec** | **ttc timer msec**}



### Note

Ranges are ANSI or ITU defined.

### Syntax Description

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| t1  | Alignment ready timer. ANSI default is 13000 milliseconds. ITU default is 40000 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| t2  | Not aligned timer. ANSI default is 11500 milliseconds. ITU default is 5000 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| t3  | Aligned timer. ANSI default is 11500 milliseconds. ITU default is 1500 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| t4e | Emergency proving period timer. ANSI default is 600 milliseconds. ITU default is 500 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| t4n | Normal proving period timer. ANSI default is 2300 milliseconds. ITU default is 8200 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| t5  | Sending SIB timer. ANSI default is 80 milliseconds. ITU default is 100 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| t6  | Remote congestion timer. ANSI default is 1000 milliseconds. ITU default is 3000 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| t7  | Excessive delay of acknowledgment timer. ANSI default is 1000 milliseconds. ITU default is 1000 milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| ttc | <p><b>ttc ta timer</b>: TTC Timer for sending SIE. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> <p><b>ttc te timer</b>: TTC Timer for error monitoring. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> <p><b>ttc tf timer</b>: TTC Timer for sending FISU. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> <p><b>ttc to timer</b>: TTC Timer for sending SIO. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> <p><b>ttc ts timer</b>: TTC Timer for sending SIOS. Valid range is 10 to 250 milliseconds. Default is 20 milliseconds.</p> |

### Defaults

T1: ANSI = 13000; ITU = 40000

T2: ANSI = 11500; ITU = 5000



T3: ANSI = 11500; ITU = 1500

T4E: ANSI = 600; ITU = 500

T4N: ANSI = 2300; ITU = 8200

T5: ANSI = 80; ITU = 100

T6: ANSI = 1000; ITU = 3000

T7: ANSI= 1000; ITU = 1000

**Command Modes** CS7 profile

| Command History | Release   | Modification                 |
|-----------------|-----------|------------------------------|
|                 | 12.2(4)MB | This command was introduced. |

**Usage Guidelines** MTP2 parameters can also be specified in CS7 Linkset configuration mode.

**Examples** The following example defines a profile named timers, configures the profile to support MTP2, configures the t1 and t2 settings in the timers profile, then applies the timers profile to all the links in linkset ITPa:

```
cs7 profile timers
  mtp2
    timer t1 15000
    timer t2 9000
.
.
.
cs7 linkset itpa
  profile timers
```

| Related Commands | Command                          | Description                                                                       |
|------------------|----------------------------------|-----------------------------------------------------------------------------------|
|                  | <b>bundling (CS7 Link)</b>       | Enables and configures message bundling.                                          |
|                  | <b>cs7 profile</b>               | Define a profile of MTP2 parameters that you can apply to all links in a linkset. |
|                  | <b>show cs7 mtp2</b>             | Displays ITP MTP2 status.                                                         |
|                  | <b>tx-queue-depth (CS7 link)</b> | Configures the MTP2 transmit queue depth.                                         |

# traffic-mode

To identify the traffic mode of operation of the ASP within an AS, use the **traffic-mode** CS7 AS submode command. To remove the configuration, use the **no** form of this command.

**traffic-mode** { **broadcast** | **loadshare** [**bindings** | **roundrobin**] | **override** }

**no traffic-mode** { **broadcast** | **loadshare** [**bindings** | **roundrobin**] | **override** }

| Syntax Description |  |                                                                                                                                                                                                  |
|--------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>broadcast</b>   |  | Broadcast mode. In broadcast mode, the ASP will receive the same messages as any other currently active ASP.                                                                                     |
| <b>loadshare</b>   |  | Loadshare mode. In loadshare mode, an ASP shares in the traffic distribution with any other currently active ASPs. The user can loadshare based on ASP bindings or using a roundrobin algorithm. |
| <b>bindings</b>    |  | Loadshare based on ASP bindings. (Default)                                                                                                                                                       |
| <b>roundrobin</b>  |  | Loadshare based on roundrobin.                                                                                                                                                                   |
| <b>override</b>    |  | Override mode. In override mode, one ASP takes over all traffic for an AS (primary/backup operation), possibly overriding any currently active ASP in the AS.                                    |

**Defaults** Loadshare based on ASP bindings.

**Command Modes** CS7 AS submode.

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

**Usage Guidelines**

This command is used to validate the traffic mode specified on the ASP Active messages. ASPs connecting with a different traffic mode will be failed.

The traffic mode type supported by an AS is dynamically determined as follows. The traffic mode of the AS is set to **loadshare** if the first valid ASP Active message received from an ASP in the AS has the traffic mode type set to **loadshare**.

**Examples** The following example sets the traffic-mode to loadshare mode:

```
cs7 as BLUE m3ua
  routing-key 100 10.3.8
  asp ASP1
  asp ASP2
  traffic-mode loadshare
```

# Related Commands

| Command         | Description                                                           |
|-----------------|-----------------------------------------------------------------------|
| <b>cs7 as</b>   | Defines an Application Server and enters CS7 AS submode.              |
| <b>cs7 asp</b>  | Specifies an Application Server Process and enables CS7 ASP submode.  |
| <b>cs7 m3ua</b> | Specifies the local port number for M3UA and enters CS7 M3UA submode. |
| <b>cs7 sua</b>  | Specifies the local port number for SUA and enters CS7 SUA submode.   |

# traffic-rate-timer

To configure the data collection interval that will be used to calculate traffic rate information, use the **traffic-rate-timer** command in cs7 sms route table configuration mode. To remove the configuration, use the **no** form of this command.

**traffic-rate-timer** *timer*

**no traffic-rate-timer** *timer*

|                           |                                                                                                                                                |                              |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>Syntax Description</b> | <i>timer</i> Data collection interval, in seconds. Valid range is 60-3600 seconds. The default is 600 seconds.                                 |                              |
| <b>Defaults</b>           | 600 seconds                                                                                                                                    |                              |
| <b>Command Modes</b>      | CS7 SMS route table configuration.                                                                                                             |                              |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                 | <b>Modification</b>          |
|                           | 12.2(25)SW1                                                                                                                                    | This command was introduced. |
| <b>Examples</b>           | <p>The following example sets the traffic-rate-timer to an interval of 120 seconds:</p> <pre>cs7 sms route-table  traffic-rate-timer 120</pre> |                              |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                 | <b>Description</b>           |
|                           | show cs7 sms statistics                                                                                                                        | Displays SMS statistics.     |

# trigger cdpa

To specify the routing parameters for a Multi-layer SMS routing table and indicate that the routing trigger is located in the SCCP called party address (CdPA) field of the incoming MSU, use the **trigger cdpa** CS7 MLR table mode command. To delete the trigger command and disable the specific routing trigger, use the **no** form of this command.

**trigger cdpa** { **gt** *addr-string* [*gt-addr-type*] | **pc** *point-code* *ssn* *ssn* } [**block** | **continue** | **ruleset** *ruleset-name*]

**no trigger cdpa**

| Syntax Description  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>gt</b>           | Indicates that the CdPA trigger being defined is received with RI=GT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>addr-string</i>  | Address string of 1 to 15 hexadecimal characters. The string is not input in BCD-String format, but in normal form.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <i>gt-addr-type</i> | <p>(Optional) Parameters that identify attributes of the global title address being used as a trigger. The parameters are variant-specific, and are identical to those parameters specified on the <b>cs7 gtt selector</b> command. If not specified, the default is the standard E.164 address type for the network variant being used.</p> <p><b>tt</b> <i>tt</i> [<b>gti</b> <i>gti</i>] [<b>np</b> <i>np</i> <b>nai</b> <i>nai</i>]</p> <p><b>tt</b> Identifies the translation type specified within the address.</p> <p><i>tt</i> An integer value from 0 to 255.</p> <p><b>gti</b> Identifies the global title indicator value for the specified address. This value is only specified when the CS7 variant is ITU or China.</p> <p><i>gti</i> Integer value of 2 or 4.</p> <p><b>np</b> Identifies the numbering plan of the specified address. Only specified when the <i>gti</i> parameter value is 4.</p> <p><i>np</i> Integer value from 0 to 15.</p> <p><b>nai</b> Identifies the nature of specified address. Only specified when the <i>gti</i> parameter value is 4.</p> <p><i>nai</i> Integer value from 0 to 127.</p> |
| <b>pc</b>           | Specifies that the trigger will be matched if it contains the specified point code. The PC within the SCCP CdPA will be inspected first. If the PC is not present, then the DPC in the routing label is used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>point-code</i>   | The point code in variant-specific point-code format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>ssn</b>          | Specifies that the trigger will be matched if it contains the specified subsystem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>ssn</i>          | Subsystem number in decimal. Valid range is 2 to 255.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>block</b>        | (Optional) This trigger action specifies that messages matching this trigger should be dropped. The <b>block</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger configuration submode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

|                     |                                                                                                                                                                                                                                                                                                             |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>continue</b>     | (Optional) This trigger action specifies that messages matching this trigger should be routed as received. This is the same behavior that would occur if no primary trigger had been matched. The <b>continue</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode. |
| <b>ruleset</b>      | (Optional) This trigger action specifies the MLR ruleset table that should be used if this trigger is matched and not overruled by a secondary trigger ruleset. Ruleset is ignored if combination triggers are defined within the CS7 MLR trigger mode.                                                     |
| <i>ruleset-name</i> | Name of a defined CS7 MLR ruleset table. The name is specified as a character string with a maximum of 12 characters.                                                                                                                                                                                       |

**Defaults**

No default behavior or value.

**Command Modes**

CS7 MLR table

**Command History**

| Release    | Modification                           |
|------------|----------------------------------------|
| 12.2(4)MB  | This command was introduced.           |
| 12.2(21)SW | The <b>continue</b> keyword was added. |

**Usage Guidelines**

For a description of types of triggers and the commands to specify triggers at various configuration levels, see the “Trigger Terminology” section on page 1107.

Use the **trigger cdpa** command to configure a primary routing key that will be used to route or block messages based on the CdPA. (If no primary triggers are specified, creation of the MLR table will fail.)

**Trigger Rules**

- Trigger values must be unique.
- **cdpa gt** triggers must specify a defined GTT entry.
- 

**Trigger Match Hierarchy**

If primary CdPA and CgPA triggers are configured, the triggers are not searched sequentially. The first trigger match is used based on the following hierarchy:

1. The default trigger is defined (the only trigger configured).
2. CdPA GT triggers when SCCP CdPA is RI=GT.
3. CdPA PC/SSN triggers when SCCP CdPa is RI=SSN
4. CgPA GT triggers when SCCP CgPA is RI=GT
5. CgPA PC/SSN triggers when SCCP CgPA is RI=SSN

### Trigger Terminology

Table 72 describes types of triggers and the commands you use to specify triggers at various configuration levels.

**Table 72**      **Trigger Terminology**

| Term                     | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>trigger</b>           | A trigger represents the SS7 network-layer routing parameters that are used to efficiently identify traffic requiring parsing into the application layers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>primary trigger</b>   | <p>The primary trigger represents the network layer information that is first compared to an incoming packet for possible MLR routing.</p> <p>A primary trigger is specified in CS7 MLR table mode (after the <b>cs7 mlr table</b> command has been specified).</p> <p>The following example shows the command to specify a primary trigger. (Note that the CLI prompt changes to indicate that CL7 MLR trigger mode has been enabled.)</p> <pre>Router(config-cs7 mlr)# <b>trigger mtp3 dpc 1-1-1</b> Router(cfg-cs7-mlr-trigger)#</pre> <p>Primary trigger values must be unique.</p> <p>Possible primary trigger commands are <b>trigger cdpa</b>, <b>trigger cgpa</b>, <b>trigger default</b>, and <b>trigger mtp3</b>.</p> <p>MTP3 may be specified as a primary trigger only.</p>                                                                                                          |
| <b>secondary trigger</b> | <p>A secondary trigger is specified in CS7 MLR trigger mode (after the primary trigger has been specified). If one or more secondary triggers are specified, then the primary AND one of the secondary trigger values must match for MLR to further process the message. If no secondary triggers are specified, then the primary trigger alone is used for MLR processing. Secondary triggers are matched sequentially in the order in which they are defined.</p> <p>The following example shows the command to specify a secondary trigger. Note that configuring a secondary trigger does not enable a new mode. The prompt does not change.</p> <pre>Router(cfg-cs7-mlr-trigger)# <b>cdpa pc 1-1-1 ssn 11</b> Router(cfg-cs7-mlr-trigger)#</pre> <p>Secondary triggers need not be unique.</p> <p>Possible secondary trigger commands are <b>cdpa</b>, <b>cgpa</b>, and <b>default</b>.</p> |

**Table 72**      **Trigger Terminology (continued)**

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>tertiary trigger</b>    | <p>A tertiary trigger is specified in CS7 MLR trigger mode (after the secondary trigger has been specified). If a tertiary trigger is specified, then one of the primary, secondary AND tertiary trigger values must match for MLR to further process the message. If no tertiary triggers are specified, then the primary and secondary triggers are only used for MLR processing. Tertiary triggers are matched sequentially in the order in which they are defined.</p> <p>The following example shows the command to specify a tertiary trigger. Note that configuring a tertiary trigger does not enable a new mode. The prompt does not change</p> <pre>Router(cfg-cs7-mlr-trigger)#cgpa pc 2-2-2 ssn 8</pre> <p>Tertiary triggers need not be unique.</p> <p>Possible tertiary trigger commands are <b>cdpa</b>, <b>cgpa</b>, and <b>default</b>.</p> |
| <b>subtrigger</b>          | A subtrigger is a generic term used to describe a trigger defined within another trigger's submode. A default trigger cannot have subtriggers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>combination trigger</b> | A combination trigger is a composite MLR trigger comprised of more than one trigger. The two possible combination triggers are primary+secondary or primary+secondary+tertiary. When a combination trigger is matched, the trigger action defined on the lowest trigger in the hierarchy is used for MLR processing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**Examples**

The following example specifies a trigger to route messages based on the CdPA field of the incoming MSU. The trigger is specified for the table named SMS-TABLE:

```
cs7 mlr table SMS-TABLE
trigger cdpa gt 9991117770 ruleset ruleset1
```

The following example configures triggers to block messages based on specified CdPA. The trigger is specified for the table named SMS-BLOCKING:

```
cs7 mlr table SMS-BLOCKING
trigger cdpa gt 9991117770 tt 10 block
```

**Related Commands**

| Command              | Description                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>cgpa</b>          | Creates a secondary trigger based on the CgPA, to be used in conjunction with a primary trigger based on the CdPA. |
| <b>cs7 mlr table</b> | Specifies the name of the multi-layer SMS routing table and enables CS7 MLR table mode.                            |
| <b>trigger cgpa</b>  | Specifies a primary routing trigger that is located in the SCCP calling party address field of the incoming MSU.   |



# trigger cgpa

To specify the routing parameters for a Multi-layer SMS routing table and indicate that the routing trigger is located in the SCCP calling party address (CgPA) field of the incoming MSU, use the **trigger cgpa** CS7 MLR table mode command. To delete the trigger command and disable the specific routing trigger, use the **no** form of this command.

**trigger cgpa** {**gt** *addr-string* [*gt-addr-type*] | **pc** *point-code* *ssn* *ssn*} [**block** | **continue** | **ruleset** *ruleset-name*]

**no trigger cgpa**

## Syntax Description

|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>gt</b>           | Indicates that the CgPA trigger being defined is received with RI=GT.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>addr-string</i>  | Address string of 1 to 15 hexadecimal characters. The string is not input in BCD-String format, but in normal form.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>gt-addr-type</i> | (Optional) Parameters that identify attributes of the global title address being used as a trigger. The parameters are variant-specific, and are identical to those parameters specified on the <b>cs7 gtt selector</b> command. If not specified, the default is the standard E.164 address type for the network variant being used.<br><br><b>tt tt</b> [ <b>gti</b> <i>gti</i> ] [ <b>np</b> <i>np</i> <b>nai</b> <i>nai</i> ]<br><br><b>tt</b> Identifies the translation type specified within the address.<br><i>tt</i> An integer value from 0 to 255.<br><br><b>gti</b> Identifies the global title indicator value for the specified address. This value is only specified when the CS7 variant is ITU or China.<br><i>gti</i> Integer value of 2 or 4.<br><br><b>np</b> Identifies the numbering plan of the specified address. Only specified when the <i>gti</i> parameter value is 4.<br><i>np</i> Integer value from 0 to 15.<br><br><b>nai</b> Identifies the nature of specified address. Only specified when the <i>gti</i> parameter value is 4.<br><i>nai</i> Integer value from 0 to 127. |
| <b>pc</b>           | Specifies that the trigger will be matched if it contains the specified point code. The PC within the SCCP CgPA will be inspected first. If the PC is not present, then the OPC is used.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>point-code</i>   | The point code in variant-specific point-code format.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>ssn</b>          | Specifies that the trigger will be matched if it contains the specified subsystem.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>ssn</i>          | Subsystem number in decimal. Valid range is 2 to 255.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>block</b>        | (Optional) This trigger action specifies that messages matching this trigger should be dropped. The <b>block</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger configuration submode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|                     |                                                                                                                                                                                                                                                                                                             |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>continue</b>     | (Optional) This trigger action specifies that messages matching this trigger should be routed as received. This is the same behavior that would occur if no primary trigger had been matched. The <b>continue</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode. |
| <b>ruleset</b>      | (Optional) This trigger action specifies the MLR ruleset table that should be used if this trigger is matched and not overruled by a secondary trigger ruleset. Ruleset is ignored if combination triggers are defined within the CS7 MLR trigger mode.                                                     |
| <i>ruleset-name</i> | Name of a defined CS7 MLR ruleset table. The name is specified as a character string with a maximum of 12 characters.                                                                                                                                                                                       |

**Defaults**

No default behavior or value.

**Command Modes**

CS7 MLR table

**Command History**

| Release    | Modification                           |
|------------|----------------------------------------|
| 12.2(4)MB  | This command was introduced.           |
| 12.2(21)SW | The <b>continue</b> keyword was added. |

**Usage Guidelines**

For a description of types of triggers and the commands you use to specify triggers at various configuration levels, see the “Trigger Terminology” section on page 1107.

Use the **trigger cgpa** command to configure a primary routing key that will be used to route or block messages based on the CgPA. (If no primary triggers are specified, creation of the MLR table will fail.)

If primary CdPA and CgPA triggers are configured, the triggers are not searched sequentially. The first trigger match is used based on the following hierarchy:

1. The default trigger is defined (the only trigger configured).
2. CdPA GT triggers when SCCP CdPA is RI=GT.
3. CdPA PC/SSN triggers when SCCP CdPa is RI=SSN
4. CgPA GT triggers when SCCP CgPA is RI=GT
5. CgPA PC/SSN triggers when SCCP CgPA is RI=SSN

**Examples**

The following example specifies a trigger to route messages based on the CgPA field of the incoming MSU. The trigger is specified for the table named SMS-TABLE:

```
cs7 mlr table SMS-TABLE
trigger cgpa gt 9991117770 ruleset ruleset1
```

The following example configures triggers to block messages based on specified CgPA. The trigger is specified for the table named SMS-BLOCKING:

```
cs7 mlr table SMS-BLOCKING
trigger cgpa gt 9991117770 tt 10 block
```

## Related Commands

| Command              | Description                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>cgpa</b>          | Creates a secondary trigger based on the CgPA, to be used in conjunction with a primary trigger based on the CdPA. |
| <b>cs7 mlr table</b> | Specifies the name of the multi-layer SMS routing table and enables CS7 MLR table mode.                            |
| <b>default</b>       | Creates a trigger to be used if all other subtriggers are unmatched.                                               |
| <b>trigger cdpa</b>  | Specifies a primary routing trigger that is located in the SCCP CdPA field of the incoming MSU.                    |

# trigger default

To specify that the trigger matches all packets received, use the **trigger default** CS7 MLR table mode command. To delete the trigger command and disable the specific routing trigger, use the **no** form of this command

**trigger default** [**block** | **continue** | **ruleset** *ruleset-name*]

**no trigger default**

|                           |                     |                                                                                                                                                                                                                                                                                                        |
|---------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>block</b>        | (Optional) This optional trigger-action specifies that messages matching this trigger should be dropped. The <b>block</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode.                                                                                    |
|                           | <b>continue</b>     | (Optional) This optional trigger-action specifies that messages matching this trigger should be routed as received. This is the same behavior as if no primary trigger had been matched. The <b>continue</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode. |
|                           | <b>ruleset</b>      | (Optional) This optional trigger-action specifies the MLR ruleset table that should be used if this trigger is matched and not overruled by a secondary trigger ruleset. Ruleset is ignored if combination triggers are defined within the CS7 MLR trigger mode.                                       |
|                           | <i>ruleset-name</i> | Name of a defined CS7 MLR ruleset table. The name is specified as a character string with a maximum of 12 characters.                                                                                                                                                                                  |

**Defaults** No default behavior or value.

**Command Modes** CS7 MLR table

|                        |                |                                        |
|------------------------|----------------|----------------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>                    |
|                        | 12.2(4)MB      | This command was introduced.           |
|                        | 12.2(21)SW     | The <b>continue</b> keyword was added. |

**Usage Guidelines** For a description of types of triggers and the commands you use to specify triggers at various configuration levels, see the “Trigger Terminology” section on page 1107.

The **trigger default** command enables the CS7 MLR trigger mode.

**Examples** The following example specifies that the trigger matches all packets received. The trigger is specified for the table named SMS-TABLE:

```
cs7 mlr table SMS-TABLE
trigger default ruleset ruleset1
```

# Related Commands

| Command       | Description                                                                             |
|---------------|-----------------------------------------------------------------------------------------|
| cs7 mlr table | Specifies the name of the multi-layer SMS routing table and enables CS7 MLR table mode. |

# trigger mtp3

To specify the routing parameters for a Multi-layer SMS routing table and indicate that the trigger is based on an MTP3 routing label field, use the **trigger mtp3** CS7 MLR table mode command. To delete the trigger command and disable the specific routing trigger, use the **no** form of this command.

```
trigger mtp3 {[dpc point-code] [opc point-code] [si indicator]} [block | continue | ruleset
ruleset-name]
```

```
no trigger mtp3
```

| Syntax Description  |  |                                                                                                                                                                                                                                                                                                             |
|---------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>dpc</b>          |  | Indicates that the trigger is found within the MTP3 destination point code field of the routing label.                                                                                                                                                                                                      |
| <i>point-code</i>   |  | The point code in instance-specific point-code format.                                                                                                                                                                                                                                                      |
| <b>opc</b>          |  | Specifies that the trigger is found within the MTP3 origination point code field of the routing label.                                                                                                                                                                                                      |
| <i>point-code</i>   |  | The point code in instance-specific point-code format.                                                                                                                                                                                                                                                      |
| <b>si</b>           |  | Specifies that the trigger will be matched only if the specified service indicator is received in the packet.                                                                                                                                                                                               |
| <i>indicator</i>    |  | Service indicator. An integer in the range of 3 to 15.                                                                                                                                                                                                                                                      |
| <b>block</b>        |  | (Optional) This trigger action specifies that messages matching this trigger should be dropped. The <b>block</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger configuration submode.                                                                                 |
| <b>continue</b>     |  | (Optional) This trigger action specifies that messages matching this trigger should be routed as received. This is the same behavior that would occur if no primary trigger had been matched. The <b>continue</b> parameter is ignored if combination triggers are defined within the CS7 MLR trigger mode. |
| <b>ruleset</b>      |  | (Optional) This trigger action specifies the MLR ruleset table that should be used if this trigger is matched and not overruled by a secondary trigger ruleset. Ruleset is ignored if combination triggers are defined within the CS7 MLR trigger mode.                                                     |
| <i>ruleset-name</i> |  | Name of a defined CS7 MLR ruleset table. The name is specified as a character string with a maximum of 12 characters.                                                                                                                                                                                       |

|                 |                               |
|-----------------|-------------------------------|
| <b>Defaults</b> | No default behavior or value. |
|-----------------|-------------------------------|

|                      |               |
|----------------------|---------------|
| <b>Command Modes</b> | CS7 MLR table |
|----------------------|---------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(21)SW | This command was introduced. |

## Usage Guidelines

For a description of types of triggers and the commands you use to specify triggers at various configuration levels, see the “Trigger Terminology” section on page 1107.

The **trigger mtp3** command enables the CS7 MLR trigger mode.

## Examples

The following example specifies a trigger to route messages based on the CdPA field of the incoming MSU. The trigger is specified for the table named SMS-TABLE:

```
cs7 mlr table SMS-TABLE
trigger cdpa gt 9991117770 ruleset ruleset1
```

The following example configures triggers to block messages based on specified CdPA. The trigger is specified for the table named SMS-BLOCKING:

```
cs7 mlr table SMS-BLOCKING
trigger cdpa gt 9991117770 tt 10 block
```

## Related Commands

| Command              | Description                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>cgpa</b>          | Creates a secondary trigger based on the CgPA, to be used in conjunction with a primary trigger based on the CdPA. |
| <b>cs7 mlr table</b> | Specifies the name of the multi-layer SMS routing table and enables CS7 MLR table mode                             |
| <b>trigger cgpa</b>  | Specifies a primary routing trigger that is located in the SCCP calling party address field of the incoming MSU.   |

# ttl

To specify the amount of elapsed time in seconds that a cached authentication triplet will be stored, use the **ttl** command in **Authent-vlr** submode. To return to the default value of 604800 seconds (7 days), use the **no** form of this command.

**ttl** *time-to-live*

**no ttl** *time-to-live*

|                           |                     |                                                                                                                                                               |
|---------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>time-to-live</i> | Amount of elapsed time in seconds that a cached authentication triplet will be stored. Valid values are decimal numbers in the range of 0 through 2147483647. |
|---------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                            |
|-----------------|------------------------------------------------------------|
| <b>Defaults</b> | The default time-to-live value is 604800 seconds (7 days). |
|-----------------|------------------------------------------------------------|

|                      |                        |
|----------------------|------------------------|
| <b>Command Modes</b> | CS7 <b>authent-vlr</b> |
|----------------------|------------------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(4)MB7     | This command was introduced. |

## Usage Guidelines

**Examples** The following example specifies 300000 seconds as the elapsed time that a cached authentication triplet will be stored:

```
gsm-authent-vlr
 cache-size 100
 max-return 2
 ttl 300000
```

|                         |                 |                                                                                                                                                                           |
|-------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b>  | <b>Description</b>                                                                                                                                                        |
|                         | cache-size      | Specifies the total number of IMSIs for which authentication triplets will be cached.                                                                                     |
|                         | gsm-authent-vlr | Enables <b>authent-VLR</b> submode in which you can allow the user to provision parameters specific to the GSM MAP <b>Process_Obtain_Authentication_Sets_VLR</b> service. |
|                         | max-return      | Specifies the maximum number of authentication triplets that may be returned to a MAPUA client for a single request                                                       |



# tmap

TT mapping rules can be added to existing linksets. To add a rule, use the **tmap** CS7 linkset submode command. To remove a TT map rule, use the **no** form of this command.

**tmap** *existing\_tt mapped\_tt*

**no tmap** *existing\_tt mapped\_tt*

|                           |                                                                                                          |                                                    |
|---------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| <b>Syntax Description</b> | <i>existing_tt</i>                                                                                       | Existing translation type. Valid range is 1 to 255 |
|                           | <i>mapped_tt</i>                                                                                         | Mapped translation type. Valid range is 1 to 255.  |
| <b>Defaults</b>           | No default behavior or values                                                                            |                                                    |
| <b>Command Modes</b>      | CS7 linkset submode                                                                                      |                                                    |
| <b>Command History</b>    | <b>Release</b>                                                                                           | <b>Modification</b>                                |
|                           | 12.2(4)MB                                                                                                | This command was introduced.                       |
| <b>Usage Guidelines</b>   | This command is available only when the variant is ANSI.                                                 |                                                    |
| <b>Examples</b>           | The following example adds a rule that maps all incoming messages that have a TT=6 to now have a TT=254: |                                                    |
|                           | <pre>cs7 linkset to_doc   tmap 6 254 in</pre>                                                            |                                                    |
| <b>Related Commands</b>   | <b>Command</b>                                                                                           | <b>Description</b>                                 |
|                           | <b>show cs7 linkset tmap</b>                                                                             | Displays TT mapping rules for the linkset.         |

## tx-queue-depth (CS7 ASP)

To configure the maximum transmit queue depth for the association, use the **tx-queue-depth** CS7 ASP submode command. To remove the configuration, use the **no** form of this command.

**tx-queue-depth** *depth*

**no tx-queue-depth** *depth*

| Syntax Description | <i>depth</i> | Number of packets to be queued. The range is 100 through 20000 packets. The default is the value specified under the local port instance. |
|--------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|--------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------|

| Defaults | The default transmit queue depth is the value specified under the local port instance. |
|----------|----------------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------------|

| Command Modes | CS7 link submode |
|---------------|------------------|
|---------------|------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Examples | The following example sets the transmit queue depth for ASP1 to 2000 packets: |
|----------|-------------------------------------------------------------------------------|
|----------|-------------------------------------------------------------------------------|

```
cs7 asp ASP1 2904 2905 m3ua
  tx-queue-depth 2000
```

| Related Commands | Command             | Description                                                          |
|------------------|---------------------|----------------------------------------------------------------------|
|                  | <b>cs7 asp</b>      | Specifies an Application Server Process and enables CS7 ASP submode. |
|                  | <b>show cs7 asp</b> | Displays ASP statistics.                                             |

## tx-queue-depth (CS7 link)

You can adjust the number of packets that can be queued for transmission. To configure the transmit queue depth, use the **tx-queue-depth** CS7 link submode command. To return to the default queue depth, use the **no** form of this command.

**tx-queue-depth** *queue-depth*

**no tx-queue-depth** *queue-depth*

### Syntax Description

|                    |                                                                                                                                                                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>queue-depth</i> | Number of packets to be queued. The values for this parameter vary depending on the type of link. For an SCTP link, the range is 100 to 20000 packets, with a default of 1000 packets. For an MTP2 link, the range is 25 to 5000 packets with a default of 500 packets. |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Defaults

1000 packets (SCTP link)  
500 packets (MTP2 link)

### Command Modes

CS7 link submode

### Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

### Usage Guidelines

The tx-queue-depth parameter controls the number of packets allowed on the transmit queue. The tx-queue exist to absorb inevitable traffic burst. When selecting the tx-queue-depth, there will be a compromise between hitting transmit congestion thresholds causing dropped packets and transmit delays due to queuing times. Applications that are sensitive to small delays should account for transmit delays due to queuing when selecting a tx-queue-depth. During periods of link congestion, the tx-queue-depth will control the number of packets that can be queued before packets are discarded, causing application retransmissions.

### Examples

The following example sets the transmit queue depth to 2000 packets:

```
cs7 linkset michael 10.1.1
 link 0 sctp 172.18.44.147 7000 7000
 tx-queue-depth 2000
```

### Related Commands

| Command              | Description                  |
|----------------------|------------------------------|
| <b>mtp2-timer</b>    | Specifies MTP2 timer values. |
| <b>show cs7 m2pa</b> | Displays M2PA statistics.    |
| <b>show cs7 mtp2</b> | Displays MTP2 statistics     |

## tx-queue-depth (CS7 Mated-SG)

To configure the maximum transmit queue depth for the association, use the **tx-queue-depth** CS7 Mated-SG submode command. To remove the configuration, use the **no** form of this command.

**tx-queue-depth** *queue-depth*

**no tx-queue-depth** *queue-depth*

| Syntax Description | <i>queue-depth</i> | Number of packets to be queued. The range is 100 through 20000 packets. The default is the value specified under the local port instance. |
|--------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|--------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------|

| Defaults | The default is the value specified under the local port instance. |
|----------|-------------------------------------------------------------------|
|----------|-------------------------------------------------------------------|

| Command Modes | CS7 Mated-SG submode |
|---------------|----------------------|
|---------------|----------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Examples | The following example sets the transmit queue depth to 2000 packets: |
|----------|----------------------------------------------------------------------|
|----------|----------------------------------------------------------------------|

```
cs7 mated-sg BLUE 5000
  tx-queue-depth 2000
```

| Related Commands | Command             | Description                                                               |
|------------------|---------------------|---------------------------------------------------------------------------|
|                  | <b>cs7 mated-sg</b> | Establish an association to the mated SG and enters CS7 Mated SG submode. |

## tx-queue-depth (CS7 M3UA)

To configure the maximum transmit queue depth for new SCTP associations established with this local port, use the **tx-queue-depth** CS7 M3UA submode command. To return to the default queue depth, use the **no** form of this command.

**tx-queue-depth** *queue-depth*

**no tx-queue-depth** *queue-depth*

| Syntax Description | <i>queue-depth</i> | Number of packets to be queued. The range is 100 through 20000 packets. The default is 1000 packets. |
|--------------------|--------------------|------------------------------------------------------------------------------------------------------|
|--------------------|--------------------|------------------------------------------------------------------------------------------------------|

| Defaults | 1000 packets. |
|----------|---------------|
|----------|---------------|

| Command Modes | CS7 M3UA submode |
|---------------|------------------|
|---------------|------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Examples | The following example sets the transmit queue depth to 2000 packets: |
|----------|----------------------------------------------------------------------|
|----------|----------------------------------------------------------------------|

```
cs7 m3ua 2905
  tx-queue-depth 2000
```

| Related Commands | Command         | Description                                                           |
|------------------|-----------------|-----------------------------------------------------------------------|
|                  | <b>cs7 m3ua</b> | Specifies the local port number for M3UA and enters CS7 M3UA submode. |

## tx-queue-depth (CS7 Profile)

To configure the MTP2 maximum transmit queue depth in a CS7 MTP2 profile, use the **tx-queue-depth** CS7 MTP2 profile configuration command. To remove the configuration, use the **no** form of this command.

**tx-queue-depth** *queue-depth*

**no tx-queue-depth** *queue-depth*

|                           |                    |                                                                       |
|---------------------------|--------------------|-----------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>queue-depth</i> | Number of packets to be queued. The range is 25 through 5000 packets. |
|---------------------------|--------------------|-----------------------------------------------------------------------|

|                 |                                                                   |
|-----------------|-------------------------------------------------------------------|
| <b>Defaults</b> | The default is the value specified under the local port instance. |
|-----------------|-------------------------------------------------------------------|

|                      |                  |
|----------------------|------------------|
| <b>Command Modes</b> | CS7 MTP2 profile |
|----------------------|------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB5 | This command was introduced. |

|                 |                                                                                                                                                                                                                |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | The following example defines a profile named timers, configures the profile to support MTP2, configures the tx-queue-depth to 3000 packets, then applies the timers profile to all the links in linkset ITPa: |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

```
cs7 profile timers
  mtp2
    tx-queue-depth 3000

!
cs7 linkset itpa
  profile timers
```

| <b>Related Commands</b> | Command     | Description                                      |
|-------------------------|-------------|--------------------------------------------------|
|                         | <b>mtp2</b> | Configures CS7 link profile parameters for MTP2. |

## tx-queue-depth (CS7 SGMP)

To configure the maximum transmit queue depth for new SCTP associations established with this local port, use the **tx-queue-depth** CS7 SGMP submode command. To return to the default queue depth, use the **no** form of this command.

**tx-queue-depth** *queue-depth*

**no tx-queue-depth** *queue-depth*

|                           |                    |                                                                                                      |
|---------------------------|--------------------|------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>queue-depth</i> | Number of packets to be queued. The range is 100 through 20000 packets. The default is 1000 packets. |
|---------------------------|--------------------|------------------------------------------------------------------------------------------------------|

|                 |               |
|-----------------|---------------|
| <b>Defaults</b> | 1000 packets. |
|-----------------|---------------|

|                      |                  |
|----------------------|------------------|
| <b>Command Modes</b> | CS7 SGMP submode |
|----------------------|------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(4)MB5 | This command was introduced. |

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the transmit queue depth to 2000 packets: |
|-----------------|----------------------------------------------------------------------|

```
cs7 sgmp 5000
tx-queue-depth 2000
```

| <b>Related Commands</b> | Command         | Description                                              |
|-------------------------|-----------------|----------------------------------------------------------|
|                         | <b>cs7 sgmp</b> | Establish an association to the mated signaling gateway. |

## tx-queue-depth (CS7 SUA)

To configure the maximum transmit queue depth for new SCTP associations established with this local port, use the **tx-queue-depth** CS7 SUA submode command. To return to the default queue depth, use the **no** form of this command.

**tx-queue-depth** *queue-depth*

**no tx-queue-depth** *queue-depth*

| Syntax Description | <i>queue-depth</i> | Number of packets to be queued. The range is 100 through 20000 packets. The default is 1000 packets. |
|--------------------|--------------------|------------------------------------------------------------------------------------------------------|
|--------------------|--------------------|------------------------------------------------------------------------------------------------------|

| Defaults | 1000 packets. |
|----------|---------------|
|----------|---------------|

| Command Modes | CS7 SUA submode |
|---------------|-----------------|
|---------------|-----------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

**Examples** The following example sets the transmit queue depth to 2000 packets:

```
cs7 sua 15000
  tx-queue-depth 2000
```

| Related Commands | Command        | Description                                                         |
|------------------|----------------|---------------------------------------------------------------------|
|                  | <b>cs7 sua</b> | Specifies the local port number for SUA and enters CS7 SUA submode. |



## tx-queue-depth (group peer)

You can adjust the number of packets that can be queued for transmission. To configure the transmit queue depth, use the **tx-queue-depth** group peer submode command. To return to the default queue depth, use the **no** form of this command.

**tx-queue-depth** *queue-depth*

**no tx-queue-depth** *queue-depth*

|                           |                    |                                                                                                                                                                                                                                                                         |
|---------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>queue-depth</i> | Number of packets to be queued. The values for this parameter vary depending on the type of link. For an SCTP link, the range is 100 to 20000 packets, with a default of 1000 packets. For an MTP2 link, the range is 25 to 5000 packets with a default of 500 packets. |
|---------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                     |
|-----------------|-----------------------------------------------------|
| <b>Defaults</b> | 1000 packets (SCTP link)<br>500 packets (MTP2 link) |
|-----------------|-----------------------------------------------------|

|                      |                    |
|----------------------|--------------------|
| <b>Command Modes</b> | Group peer submode |
|----------------------|--------------------|

| <b>Command History</b> | Release    | Modification                 |
|------------------------|------------|------------------------------|
|                        | 12.2(25)SW | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | The tx-queue-depth parameter controls the number of packets allowed on the transmit queue. The tx-queue exist to absorb inevitable traffic burst. When selecting the tx-queue-depth, there will be a compromise between hitting transmit congestion thresholds causing dropped packets and transmit delays due to queuing times. Applications that are sensitive to small delays should account for transmit delays due to queuing when selecting a tx-queue-depth. During periods of link congestion, the tx-queue-depth will control the number of packets that can be queued before packets are discarded, causing application retransmissions. |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| <b>Examples</b> | The following example sets the transmit queue depth to 2000 packets: |
|-----------------|----------------------------------------------------------------------|

```
cs7 group ITP1 3333
 local-ip 1.1.1.1
 peer 4444
  remote-ip 1.1.1.2
  tx-queue-depth 2000
```

| <b>Related Commands</b> | Command             | Description                                                                                         |
|-------------------------|---------------------|-----------------------------------------------------------------------------------------------------|
|                         | <b>peer (group)</b> | Enables the ITP to initiate the SCTP association with its peers and enables the group peer submode. |

# tx-window (cs7-cdr-dest)

To Specify the transmit window value for a CDR destination, use the **tx-window** command in CS7 CDR destination configuration mode. To return to the default the value, use the **no** form of this command.

**tx-window** *value*

**no tx-window** *value*

| Syntax Description | <i>tx-window</i> | Transmit window value. Valid range is 10 to 1000. |
|--------------------|------------------|---------------------------------------------------|
|--------------------|------------------|---------------------------------------------------|

## Defaults

| Command Modes | CS7 CDR destination configuration |
|---------------|-----------------------------------|
|---------------|-----------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

## Usage Guidelines

| Examples | The following example configures a CDR destination named CDR1 and sets the transmit window value to 300: |
|----------|----------------------------------------------------------------------------------------------------------|
|----------|----------------------------------------------------------------------------------------------------------|

```
cs7 cdr destination CDR2 5000 3.3.3.3 4.4.4.4
tx-window 300
```

| Related Commands | Command                     | Description                     |
|------------------|-----------------------------|---------------------------------|
|                  | <b>cs7 sms result-group</b> | Configures an SMS result group. |

## ucp (cs7 SMS result)

To specify that messages will be routed on a UCP session, use the **ucp** command in CS7 SMS result configuration mode. To remove the configuration, use the **no** form of this command.

**ucp** *session-name* **weight** *weight*

**no ucp** *session-name* **weight** *weight*

| Syntax Description | <i>session-name</i> | UCP session name.                                                                    |
|--------------------|---------------------|--------------------------------------------------------------------------------------|
|                    | <b>weight</b>       | (Optional) Specifies the weight applied to the weighted round robin (WRR) algorithm. |
|                    | <i>weight</i>       | Weight value, in the range 0 to 10.                                                  |

| Defaults | No default behavior or values |
|----------|-------------------------------|
|----------|-------------------------------|

| Command Modes | CS7 SMS result configuration |
|---------------|------------------------------|
|---------------|------------------------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

### Usage Guidelines

| Examples | The following example configures a result group named OFFISLAND and specifies that messages will be routed in SMPP sessions: |
|----------|------------------------------------------------------------------------------------------------------------------------------|
|----------|------------------------------------------------------------------------------------------------------------------------------|

```
CS7 sms result-group OFFISLAND esme
ucp OFFISLAND1 weight 3
ucp OFFISLAND2 weight 4
```

| Related Commands | Command                     | Description                     |
|------------------|-----------------------------|---------------------------------|
|                  | <b>cs7 sms result-group</b> | Configures an SMS result group. |

# unordered-priority (CS7 M3UA)

To configure the priority of the unordered packets, use the **unordered-priority** CS7 M3UA command. To remove the configuration, use the **no** form of this command.

**unordered-priority** {equal | high}

**no unordered-priority**

## Syntax Description

|              |                                                        |
|--------------|--------------------------------------------------------|
| <b>equal</b> | Unordered packets delivered in the order received.     |
| <b>high</b>  | Unordered packets delivered before any sequenced data. |

## Defaults

Unordered packets delivered in the order received.

## Command Modes

CS7 M3UA

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

## Examples

The following example specifies that unordered packets are delivered before any sequenced data:

```
cs7 m3ua 2905
 unordered-priority high
```

## Related Commands

| Command         | Description                                                           |
|-----------------|-----------------------------------------------------------------------|
| <b>cs7 m3ua</b> | Specifies the local port number for M3UA and enters CS7 M3UA submode. |

## unordered-priority (CS7 SGMP)

To configure the priority of the unordered packets, use the **unordered-priority** CS7 SGMP command. To remove the configuration, use the **no** form of this command.

**unordered-priority {equal | high}**

**no unordered-priority**

| Syntax Description | equal | Unordered packets delivered in the order received.     |
|--------------------|-------|--------------------------------------------------------|
|                    | high  | Unordered packets delivered before any sequenced data. |

| Defaults | Unordered packets delivered in the order received. |
|----------|----------------------------------------------------|
|----------|----------------------------------------------------|

| Command Modes | CS7 SGMP |
|---------------|----------|
|---------------|----------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(4)MB5 | This command was introduced. |

| Examples | <p>The following example specifies that unordered packets are delivered in the order received:</p> <pre>cs7 sgmp 5000 unordered-priority equal</pre> |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------|
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------|

| Related Commands | Command         | Description                                                                          |
|------------------|-----------------|--------------------------------------------------------------------------------------|
|                  | <b>cs7 sgmp</b> | Establish an association to the mated signaling gateway and enters CS7 SGMP submode. |

## unordered-priority (CS7 SUA)

To configure the priority of the unordered packets, use the **unordered-priority** CS7 SUA command. To remove the configuration, use the **no** form of this command.

**unordered-priority** { **equal** | **high** }

**no unordered-priority**

|                           |                                                                                                                                                          |                                                                     |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| <b>Syntax Description</b> | <b>equal</b>                                                                                                                                             | Unordered packets delivered in the order received.                  |
|                           | <b>high</b>                                                                                                                                              | Unordered packets delivered before any sequenced data.              |
| <b>Defaults</b>           | Unordered packets delivered in the order received.                                                                                                       |                                                                     |
| <b>Command Modes</b>      | CS7 SUA                                                                                                                                                  |                                                                     |
| <b>Command History</b>    | <b>Release</b>                                                                                                                                           | <b>Modification</b>                                                 |
|                           | 12.2(4)MB5                                                                                                                                               | This command was introduced.                                        |
| <b>Examples</b>           | <p>The following example specifies that unordered packets are delivered before any sequenced data:</p> <pre>cs7 sua 15000  unordered-priority high</pre> |                                                                     |
| <b>Related Commands</b>   | <b>Command</b>                                                                                                                                           | <b>Description</b>                                                  |
|                           | cs7 sua                                                                                                                                                  | Specifies the local port number for SUA and enters CS7 SUA submode. |

## update (CS7 GTT Address Conversion)

To add, remove, or change a GTT address-conversion entry, use the **update in-address** CS7 GTT address conversion submode command. To delete the entry, use the **no** form of this command.

**update** [**in-address** *in-address*] [**nai** *nai*] [**np** *np*] [**out-address** *out-address*] [**es** *es-val*]

**no update** [**in-address** *in-address*] [**nai** *nai*] [**np** *np*] [**out-address** *out-address*] [**es** *es-val*]

### Syntax Description

|                    |                                                                                    |
|--------------------|------------------------------------------------------------------------------------|
| <b>in-address</b>  | (Optional) Specifies the input address.                                            |
| <i>in-address</i>  | SCCP address. Valid numbers are between one and 15 digits long, in hex.            |
| <b>nai</b>         | (Optional) Specifies a new nature of address indicator.                            |
| <i>nai</i>         | NAI value. Range is 0 through 127.                                                 |
| <b>np</b>          | (Optional) Specifies a new numbering plan.                                         |
| <i>np</i>          | NP value. Range is 0 through 15.                                                   |
| <b>out-address</b> | (Optional) Specifies the output address.                                           |
| <i>out-address</i> | SCCP address. Valid numbers are between one and 15 digits long, in hex.            |
| <b>es</b>          | (Optional) Specifies a specific encoding scheme for the address conversion result. |
| <i>es-val</i>      | Encoding scheme value. Valid range is 0 through 2.                                 |

### Defaults

No default behavior or values

### Command Modes

CS7 GTT address conversion submode

### Command History

| Release     | Modification                     |
|-------------|----------------------------------|
| 12.2(4)MB2  | This command was introduced.     |
| 12.2(25)SW1 | The <b>es</b> keyword was added. |

### Examples

The following example specifies a new input address of 410123:

```
update in-address 410123
```

### Related Commands

| Command                           | Description                                         |
|-----------------------------------|-----------------------------------------------------|
| <b>cs7 gtt address-conversion</b> | Configures a global title address conversion table. |

## update (CS7 SCCP GTI Conversion)

To add, remove, or change an SCCP GTI conversion table entry, use the **update** CS7 SCCP GTI Conversion submode command. To delete the entry, use the **no** form of this command.

**update** [**gti-in** *gti-in*] [**tt-in** *tt-in*] [**ssn-in** *ssn-in*] [**es-in** *es-in*] [**np-in** *np-in*] [**nai-in** *nai-in*] [**gti-out** *gti-out*] [**tt-out** *tt-out*] [**ssn-out** *ssn-out*] [**es-out** *es-out*] [**np-out** *np-out*] [**nai-out** *nai-out*] [**addr-conv** *addr-conv*]

**no update** [**gti-in** *gti-in*] [**tt-in** *tt-in*] [**ssn-in** *ssn-in*] [**es-in** *es-in*] [**np-in** *np-in*] [**nai-in** *nai-in*] [**gti-out** *gti-out*] [**tt-out** *tt-out*] [**ssn-out** *ssn-out*] [**es-out** *es-out*] [**np-out** *np-out*] [**nai-out** *nai-out*] [**addr-conv** *addr-conv*]

### Syntax Description

|                |                                                                                                                                                                          |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>gti-in</b>  | (Optional) Input GTI.                                                                                                                                                    |
| <i>gti-in</i>  | Valid values are 2, 4                                                                                                                                                    |
| <b>tt-in</b>   | (Optional) Input TT.                                                                                                                                                     |
| <i>tt-in</i>   | Valid range 0 to 255. All TT match if not specified.                                                                                                                     |
| <b>ssn-in</b>  | (Optional) Input SSN.                                                                                                                                                    |
| <i>ssn-in</i>  | Valid range 0 to 255. All SSN match if not specified.                                                                                                                    |
| <b>es-in</b>   | (Optional) Input ES.                                                                                                                                                     |
| <i>es-in</i>   | Allowed if <i>gti-in</i> is 4. Not allowed if <i>gti-in</i> is 2.                                                                                                        |
| <b>np-in</b>   | (Optional) Input NP.                                                                                                                                                     |
| <i>np-in</i>   | Allowed if <i>gti-in</i> is 4. Not allowed if <i>gti-in</i> is 2.                                                                                                        |
| <b>nai-in</b>  | (Optional) Input NAI.                                                                                                                                                    |
| <i>nai-in</i>  | Allowed if <i>gti-in</i> is 4. Not allowed if <i>gti-in</i> is 2.                                                                                                        |
| <b>gti-out</b> | (Optional) Valid values are 2, 4.                                                                                                                                        |
| <i>gti-out</i> | Valid values are 2, 4.                                                                                                                                                   |
| <b>tt-out</b>  | Output TT.                                                                                                                                                               |
| <i>tt-out</i>  | Valid range 0 to 255. TT unchanged if not specified.                                                                                                                     |
| <b>ssn-out</b> | (Optional) Output SSN.                                                                                                                                                   |
| <i>ssn-out</i> | Valid range 0 to 255. SSN unchanged if not specified.                                                                                                                    |
| <b>es-out</b>  | Output ES. Required if <i>gti-in</i> is 2 and <i>gti-out</i> is 4.<br>Optional if <i>gti-in</i> and <i>gti-out</i> are both 4.<br>Not allowed if <i>gti-out</i> is 2.    |
| <i>es-out</i>  | Valid range is 0 to 15. ES is unchanged if not specified. ES is not used if <i>gti-out</i> is 2.                                                                         |
| <b>np-out</b>  | Output NP.<br>Required if <i>gti-in</i> is 2 and <i>gti-out</i> is 4.<br>Optional if <i>gti-in</i> and <i>gti-out</i> are both 4.<br>Not allowed if <i>gti-out</i> is 2. |
| <i>np-out</i>  | Valid range is 0 to 15. NP is unchanged if not specified. NP is not used if <i>gti-out</i> is 2.                                                                         |



|                  |                                                                                                                                                                           |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>nai-out</b>   | Output NAI.<br>Required if <i>gti-in</i> is 2 and <i>gti-out</i> is 4.<br>Optional if <i>gti-in</i> and <i>gti-out</i> are both 4.<br>Not allowed if <i>gti-out</i> is 2. |
| <i>nai-out</i>   | Valid range is 0 to 127. NAI is unchanged if not specified. NAI is not used if <i>gti-out</i> is 2.                                                                       |
| <b>addr-conv</b> | If specified, this GTI address conversion takes precedence over any GTT address conversion table specified per instance conversion rule.                                  |
| <i>addr-conv</i> | Address conversion table name.                                                                                                                                            |

**Defaults**

No default behavior or values

**Command Modes**

CS7 SCCP GTI Conversion submode

**Command History**

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(20)SW | This command was introduced. |

**Usage Guidelines**

GTI Conversion can be used to update the GTI, TT, SSN, Encoding Scheme, Numbering Plan, and Nature of Address Indicator in an SCCP address. The user specifies sets of input parameters and output parameters. For ANSI, GTI 2 is supported. For ITU, GTI 2 and 4 are supported.

**Examples**

The following example converts all MSUs with GTI 2 to GTI 4 and sets the Encoding Scheme to 2, Numbering Plan to 1, and Nature of Address to 3, while leaving the TT, and SSN unchanged:

```
cs7 sccp gti-conversion gti-conv1
  update gti-in 2 gti-out 4 es-out 2 np-out 1 nai-out 3
```

**Related Commands**

| Command                             | Description                            |
|-------------------------------------|----------------------------------------|
| <b>cs7 sccp gti-conversion</b>      | Configures a GTI conversion table.     |
| <b>show cs7 sccp gti-conversion</b> | Displays the SCCP GTI conversion table |

## update route (CS7 AS route)

To list the ASPs and the SG Mate contained in this AS Route, use the **update route** CS7 AS route command. To remove the configuration, use the **no** form of this command.

**update route** {**as** *asname* | **mated-sg** *matename*} **priority** *priority*

**no update route** {**as** *asname* | **mated-sg** *matename*} **priority** *priority*

### Syntax Description

|                 |                                                                            |
|-----------------|----------------------------------------------------------------------------|
| <b>as</b>       | Application Server.                                                        |
| <i>asname</i>   | Application Server name.                                                   |
| <b>mated-sg</b> | Mated SG.                                                                  |
| <i>matename</i> | Mated SG name.                                                             |
| <b>priority</b> | Priority.                                                                  |
| <i>priority</i> | Priority values range from 1 to 9, with 1 indicating the highest priority. |

### Defaults

No default behavior or values.

### Command Modes

CS7 AS route submode

### Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

### Usage Guidelines

The **update route** command lists ASPs and the SG Mate contained in this AS Route. The AS name is used to retrieve the ASP list within the specified AS. You can associate multiple ASPs to this AS Route by specifying multiple **update route** commands. Note that the ASP parameters are configured using the **cs7 asp** command. The priority value determines which active ASP or Mate is used if multiple are available. The SG Mate should never be defined as the highest priority.

### Examples

The following is an example of the update route command:

```
cs7 asroute route1
  update route as as1 priority 3
```

### Related Commands

| Command            | Description                       |
|--------------------|-----------------------------------|
| <b>cs7 asroute</b> | Specifies an AS route table name. |

# update route (route-table)

To update a route, use the **update route** route table submode command.

**update route** *point-code* [*mask* | *//length*] **linkset** *ls-name* [**priority** *priority-value*] [**qos-class** *class*]

|                           |                       |                                                                                                                                                                                                                                                     |
|---------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>point-code</i>     | Signaling point code of the destination.                                                                                                                                                                                                            |
|                           | <i>mask</i>           | Specifies the significant bits of the point code.                                                                                                                                                                                                   |
|                           | <i>//length</i>       | Alternate way of specifying the mask. For ANSI this alternate specification of the default would be /24. For ITU the alternate specification of the default would be /14.                                                                           |
|                           | <b>linkset</b>        | Specifies the linkset.                                                                                                                                                                                                                              |
|                           | <i>ls-name</i>        | Name of the previously created linkset.                                                                                                                                                                                                             |
|                           | <b>priority</b>       | (Optional) Configure route priority.                                                                                                                                                                                                                |
|                           | <i>priority-value</i> | Priority of the route to the destination. Valid range is 1 through 9. The default is 5. The smaller the number the higher the priority. Two routes to the same destination using two different linksets but equal priority form a combined linkset. |
|                           | <b>qos-class</b>      | (Optional) Specifies the QoS class assigned to the destination.                                                                                                                                                                                     |
|                           | <i>class</i>          | QoS class. Valid range is 1 through 7.                                                                                                                                                                                                              |

**Defaults** The default *priority-value* is 5.

**Command Modes** Route-table submode

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(1)MB      | This command was introduced. |

**Usage Guidelines**

For ITU networks, the mask must be 7.255.7 if the default 3-8-3 bit point code format is used.

For ANSI networks the mask must be 255.255.255 if the default 8-8-8 bit point code format is used.

You must specify either *mask* or *//length*.

A lower number in the *priority-value* means the route has a higher priority.

Use of priority value 9 is not recommend. This value should be reserved for dynamic routes created when summary routing is enabled. See the Configuring Summary Routing and ANSI Cluster Routing chapter for an explanation of summary routing.

A QoS class is assigned on a destination point code basis. All routes to a specific dpc will have the same QoS class. When creating multiple routes to the same destination point code, the same QoS class must be specified for the dpc on each **update route** command. If the QoS class value is changed on a route for a dpc, the QoS class for all the routes to that the dpc is changed. Omitting a QoS class value for a route to a dpc removes the QoS class from all existing routes to that dpc.

To preserve the priority of an existing route when adding or modifying the QoS class, the priority specified on the existing route must be specified on the modified route. If the priority is omitted the priority of the modified route will be changed to the default priority of 5.

## Examples

The following two examples are both acceptable ways to create a route to destination 1.50.2 using linkset nyc and default priority:

```
update route 1.50.2 255.255.255 linkset nyc
```

```
update route 1.50.2/24 linkset nyc
```

The following example creates a route to destination 1.50.3 using linkset washington with priority 3:

```
update route 1.50.3 255.255.255 linkset washington priority 3
```

The following example creates a combined linkset:

```
update route 1.50.3 255.255.255 linkset philly priority 3
```

The following two examples show that the lower *priority-value* sets a higher priority for the route. In the examples, LSA is the primary route to 1.1.1 and LSC is the alternate route to 1.1.1:

```
update-route 1.1.1/14 linkset LSA priority 1
```

```
update route 1.1.1/14 linkset LSC priority 9
```

The following example creates a route to destination 1.50.3 using linkset washington with qos-class 2:

```
update-route 1.50.3 255.255.255 linkset washington priority 3 qos-class 2
```

The following examples create routes to destination 1.50.3 with qos-class 3. LSA is the primary route and LSC is the alternate route to 1.50.3:

```
update route 1.50.3 255.255.255 linkset LSA priority 1 qos-class 3
```

```
update route 1.50.3 255.255.255 linkset LSC priority 9 qos-class 3
```



### Note

In this example it is important to note that if the qos-class 3 parameter was omitted from alternate route LSC, qos functionality would be disabled for destination 1.50.3. If some other qos-class was specified on the alternate route LSC instead of qos-class 3, the qos-class specified on alternate route LSC would be assigned to both the primary route LSA and the alternate route LSC.

In the following example the second statement modifies an existing route to destination 1.50.3 using linkset washington and priority 3 with qos-class 2:

```
update-route 1.50.3 255.255.255 linkset washington priority 3
```

```
update route 1.50.3 255.255.255 linkset washington priority 3 qos-class 2
```



### Note

In this example it is important to note that if the priority 3 parameter is omitted when adding the qos-class 2 parameter, the priority of the route will be changed to the default priority of 5.

## Related Commands

| Command                | Description                              |
|------------------------|------------------------------------------|
| <b>cs7 route-table</b> | Specifies a route table for an instance. |
| <b>show cs7 route</b>  | Displays the ITP routing table.          |

# variant

To specify which of the SS7 variations the CS7 profile is running, use the **variant** CS7 profile configuration command. To remove the specification from the configuration use the **no** form of the command.

```
variant {ansi | china | itu | ttc}
```

```
cs7 variant {ansi | china | itu | ttc}
```

## Syntax Description

|              |                                                                    |
|--------------|--------------------------------------------------------------------|
| <b>ansi</b>  | American National Standards Institute (ANSI) SS7 protocol variant. |
| <b>china</b> | CHINA SS7 protocol variant.                                        |
| <b>itu</b>   | International Telecommunications Union (ITU) SS7 protocol variant. |

## Defaults

No default behavior or values

## Command Modes

Global configuration

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Examples

The following example indicates that the ANSI variant of SS7 is being used:

```
cs7 profile SAAL  
variant ansi
```

## Related Commands

| Command            | Description                                                     |
|--------------------|-----------------------------------------------------------------|
| <b>cs7 profile</b> | Defines a profile that you can apply to all links in a linkset. |
| <b>hsl</b>         | Configure CS7 link profile parameters for HSL.                  |
| <b>mtp2</b>        | Configures CS7 link profile parameters for MTP2.                |

# wait-timeout

To configure the amount of time an ITP Group member waits after bootup to establish communication with its peer, before it assumes it is operating independently, use the **wait-timeout** group configuration submode command. To reset the peer wait time-out period to its default setting, use the **no** form of this command.

**wait-timeout** *seconds*

**no wait-timeout**

|                           |                |                                                                                                                                      |
|---------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax Description</b> | <i>seconds</i> | The number of seconds an ITP group member will wait to establish communication with a peer. Valid values are 45 through 300 seconds. |
|---------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------|

|                 |             |
|-----------------|-------------|
| <b>Defaults</b> | 60 seconds. |
|-----------------|-------------|

|                      |                     |
|----------------------|---------------------|
| <b>Command Modes</b> | Group configuration |
|----------------------|---------------------|

| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|------------------------|----------------|------------------------------|
|                        | 12.2(25)SW1    | This command was introduced. |

|                         |                                                                                                                                                                                                                                                                                                                          |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Usage Guidelines</b> | For most situations the default value of 60 seconds is an adequate amount of time for an ITP Group member to establish communication with its peer, assuming the peer is present, initialized, and there is an operational communication link between ITPs.                                                              |
|                         | This command only affects the amount of time an ITP Group member will wait to establish communication with its peer after bootup, before it assumes it is operating independently. The ITP will always attempt to establish communication with its peer on a periodic basis when communication has not been established. |

|                 |                                                                                       |
|-----------------|---------------------------------------------------------------------------------------|
| <b>Examples</b> | The second line in the following example sets the wait-timeout period to 120 seconds: |
|                 | <pre>cs7 group ITP1 333 wait-timeout 120</pre>                                        |

| <b>Related Commands</b> | <b>Command</b>   | <b>Description</b>      |
|-------------------------|------------------|-------------------------|
|                         | <b>cs7 group</b> | Specifies an ITP group. |



## ITP Debug Commands

---

- `debug cs7 cdr`
- `debug cs7 group chkpt`
- `debug cs7 group mgmt`
- `debug cs7 group mtp3ctrl`
- `debug cs7 group transport`
- `debug cs7 gsm-map`
- `debug cs7 m2pa`
- `debug cs7 m3ua`
- `debug cs7 mapua`
- `debug cs7 mlr`
- `debug cs7 monitor`
- `debug cs7 mtp2`
- `debug cs7 mtp3`
- `debug cs7 mtp3 paklog`
- `debug cs7 nso`
- `debug cs7 nso chkpt`
- `debug cs7 offload mtp3`
- `debug cs7 sccp`
- `debug cs7 sgmp`
- `debug cs7 smpp`
- `debug cs7 snmp`
- `debug cs7 sua`
- `debug cs7 tcap`
- `debug redundancy inter-device`



### Note

Enabling debugging during periods of heavy traffic can cause link failure.

# debug cs7 cdr

To display debug messages for CDR, use the **debug cs7 cdr** command in privileged EXEC mode. To disable the display, use the no form of the command.

**debug cs7 cdr** { **all** | **error** | **event** | **rx** | **test** *duration speed* | **tx** }

**no debug cs7 cdr** { **all** | **error** | **event** | **rx** | **test** *duration speed* | **tx** }

| Syntax Description |                 |                                                                              |
|--------------------|-----------------|------------------------------------------------------------------------------|
|                    | <b>all</b>      | CDR All Debug.                                                               |
|                    | <b>error</b>    | CDR Error Debug.                                                             |
|                    | <b>event</b>    | CDR Event Debug.                                                             |
|                    | <b>rx</b>       | CDR Receive Debug.                                                           |
|                    | <b>test</b>     | CS7 CDR Test Traffic <<ALLOW FOR EFT OR REMOVE?>>                            |
|                    | <i>duration</i> | Duration, in seconds, in the range 1 to 3600 seconds.                        |
|                    | <i>speed</i>    | Speed, measured in CDRs per seconds, in the range 1 to 5000 CDRs per second. |
|                    | <b>tx</b>       | CDR Transmit Debug.                                                          |

**Defaults** No default behavior or values

**Command Modes** Privileged EXEC

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Related Commands | Command                    | Description                                 |
|------------------|----------------------------|---------------------------------------------|
|                  | <b>cs7 cdr destination</b> | Specifies a call data record destination.   |
|                  | <b>cs7 cdr service</b>     | Specifies a call data record (CDR) service. |



# debug cs7 group chkpt

To display ITP Group checkpointing activity, use the **debug cs7 group chkpt** command in privileged EXEC mode. To disable debug, use the **no** form of the command.

**debug cs7 group chkpt** [*instance*] {**all** | **error** | **events** | **packet**} [**verbose**]

**no debug cs7 group chkpt** [*instance*] {**all** | **error** | **events** | **packet**} [**verbose**]

| Syntax Description |                                                  |
|--------------------|--------------------------------------------------|
| <i>instance</i>    | Limit debug output to a particular ITP instance. |
| <b>all</b>         | Display all Group Checkpointing activity.        |
| <b>error</b>       | Display Group Checkpointing errors.              |
| <b>events</b>      | Display Group Checkpointing events.              |
| <b>packet</b>      | Display Group Checkpointing messages.            |
| <b>verbose</b>     | Generate detailed debug output.                  |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(23)SW | This command was introduced. |

**Examples** The following example displays ITP Group checkpointing events:

```
Router# debug cs7 group chkpt event
cs7 group chkpt event:
00:07:59: CS7 CHKPT: starting bulk sync process for instance 0
00:07:59: CS7 CHKPT: start of bulk sync for route table for inst 0
00:07:59: CS7 CHKPT: end of bulk sync for route table for inst 0
00:07:59: CS7 CHKPT: bulk sync complete for instance 0
00:07:59: CS7 CHKPT: ending bulk sync process for instance 0
00:16:36: CS7 CHKPT: link linkset_01(0) TLAC Failed TRUE
00:16:36: CS7 CHKPT: link linkset_01(0) CO buffering TRUE
00:16:36: CS7 CHKPT: link linkset_01(0) TLAC Link Available FALSE
00:16:36: CS7 CHKPT: updated dest 3.4.5/24 stat: INACC rsc: 0 QoS: ALL
00:16:36: CS7 CHKPT: link linkset_01(0) SLT remove
00:16:36: CS7 CHKPT: link linkset_01(0) CO buffering FALSE
00:16:36: CS7 CHKPT: link linkset_01(0) TLAC Link Available FALSE
```

The following example displays ITP Group checkpointing messages:

```
Router# debug cs7 group chkpt packet
cs7 group chkpt packet:
00:02:03: CS7 CHKPT PKT: sending TPRC_Sync instance 0 - 0
00:02:03: CS7 CHKPT PKT: sending Linkset_Upd linkset_01 81F7B3C0
00:02:03: CS7 CHKPT PKT: sending Route_Upd - dpc: 3.4.5/24 ls: linkset_01 stat: avail
00:02:03: CS7 CHKPT PKT: sending Bulk_Sync_Complete - inst 0
```

## debug cs7 group chkpt

```

00:02:08: CS7 CHKPT PKT: sending TPRC_Sync instance 0 - 2
00:02:08: CS7 CHKPT PKT: sending Link_Loc_Inhibit linkset_01(0) FALSE
00:02:08: CS7 CHKPT PKT: sending Link_Rem_Inhibit linkset_01(0) FALSE
00:02:08: CS7 CHKPT PKT: sending Link_Upd_Available linkset_01(0) FALSE
00:02:08: CS7 CHKPT PKT: sending Link_Loc_Inhibit linkset_01(1) FALSE
00:02:08: CS7 CHKPT PKT: sending Link_Rem_Inhibit linkset_01(1) FALSE
00:02:08: CS7 CHKPT PKT: sending Link_Upd_Available linkset_01(1) FALSE
00:02:09: CS7 CHKPT PKT: sending Link_Upd_TLAC_Fail linkset_01(1) FALSE
00:02:09: CS7 CHKPT PKT: sending Link_Upd_Available linkset_01(1) TRUE
00:02:10: CS7 CHKPT PKT: sending Link_Upd_TLAC_Fail linkset_01(0) FALSE
00:02:10: CS7 CHKPT PKT: sending Link_Upd_Available linkset_01(0) TRUE

```

### Related Commands

| Command          | Description                                       |
|------------------|---------------------------------------------------|
| <b>cs7 group</b> | Specifies an ITP group and enables group submode. |

# debug cs7 group mgmt

To display ITP Group management activity, use the **debug cs7 group mgmt** command in privileged EXEC mode. To disable debug, use the **no** form of this command.

**debug cs7 group mgmt** { **all** | **client** | **error** | **events** | **packet** | **state** } [**verbose**]

**no debug cs7 group mgmt** { **all** | **client** | **error** | **events** | **packet** | **state** } [**verbose**]

| Syntax Description | <b>all</b>     | Display all Group Management activity.      |
|--------------------|----------------|---------------------------------------------|
|                    | <b>client</b>  | Display RF client activity.                 |
|                    | <b>error</b>   | Display Group Management errors.            |
|                    | <b>events</b>  | Display Group Management events.            |
|                    | <b>packet</b>  | Display Group Management messages.          |
|                    | <b>state</b>   | Display Group Management state transitions. |
|                    | <b>verbose</b> | Generate detailed debug output.             |

|          |                                |
|----------|--------------------------------|
| Defaults | No default behavior or values. |
|----------|--------------------------------|

|               |                 |
|---------------|-----------------|
| Command Modes | Privileged EXEC |
|---------------|-----------------|

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(23)SW | This command was introduced. |

|          |                                                                                                              |
|----------|--------------------------------------------------------------------------------------------------------------|
| Examples | The following example displays all ITP Group management activity:<br>Router# <b>debug cs7 group mgmt all</b> |
|----------|--------------------------------------------------------------------------------------------------------------|

| Related Commands | Command          | Description                                       |
|------------------|------------------|---------------------------------------------------|
|                  | <b>cs7 group</b> | Specifies an ITP group and enables group submode. |

# debug cs7 group mtp3ctrl

To display distributed MTP3 control debug messages, use the **debug cs7 group mtp3ctrl** command in privileged EXEC mode. To disable debug, use the **no** form of the command.

**debug cs7 group mtp3ctrl**

**nodedebug cs7 group mtp3ctrl**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(23)SW     | This command was introduced. |

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Examples</b> | <p>The following command enables debug messages for distributed mtp3 control messages exchanged between peers</p> <pre>Router# debug cs7 group mtp3ctrl 1d03h: CS7 GRP API: DLINK_MTP3_MGMT_LSAC_EVENT recd for ls sunset(1):0 1d03h: CS7 GRP API: Recv LSAC Link Ev link sunset 1 event_id: signaling_link_failed from: LSAC to: TLAC 1d03h: CS7 GRP API: DLINK_MTP3_MGMT_LSAC_EVENT recd for ls sunset(1):0 1d03h: CS7 GRP API: Recv LSAC Link Ev link sunset 1 event_id: signaling_link_failed from: LSAC to: TLAC 1d03h: CS7 GRP API: DLINK_MTP3_MGMT_MSG recd for ls sirius(1):0 on DDT Ctrl 1d03h: CS7 GRP API: DLINK_MTP3_MGMT_MSG recd for ls vega(1):0 on DDT Ctrl 1d03h: CS7 GRP API: DLINK_MTP3_MGMT_LSAC_EVENT recd for ls sunset(1):0 1d03h: CS7 GRP API: Recv LSAC Link Ev link sunset 1 event_id: signaling_link_failed from: LSAC to: TLAC</pre> |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                         |                |                                                   |
|-------------------------|----------------|---------------------------------------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b>                                |
|                         | cs7 group      | Specifies an ITP group and enables group submode. |

# debug cs7 group transport

To display ITP Group transport activity, use the **debug cs7 group transport** command in privileged EXEC mode. To disable debug, use the **no** form of this command.

**debug cs7 group transport** {**error** | **events** | **packet** [*linkset*]} [**verbose**]

**no debug cs7 group transport** {**error** | **events** | **packet** [*linkset*]} [**verbose**]

| Syntax Description | <b>error</b>   | Display Group Management errors.           |
|--------------------|----------------|--------------------------------------------|
|                    | <b>events</b>  | Display Group Management events.           |
|                    | <b>packet</b>  | Display Group Management messages.         |
|                    | <i>linkset</i> | Limit packet debug output to this linkset. |
|                    | <b>verbose</b> | Generate detailed debug output.            |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(23)SW | This command was introduced. |

**Examples** The following example displays all ITP Group management activity:

```
Router# debug cs7 group transport events
```

| Related Commands | Command          | Description                                       |
|------------------|------------------|---------------------------------------------------|
|                  | <b>cs7 group</b> | Specifies an ITP group and enables group submode. |

# debug cs7 gsm-map

To display debug messages for Cisco MAP, use the **debug cs7 gsm-map** command in privileged EXEC mode.

**debug cs7 gsm-map** [**all** | **api** | **cache** | **error** | **info** | **packet**]

## Syntax Description

|               |                                                        |
|---------------|--------------------------------------------------------|
| <b>all</b>    | Enables all debugs.                                    |
| <b>api</b>    | Debugs API events.                                     |
| <b>cache</b>  | State machine events for specific application context. |
| <b>error</b>  | Debugs error events.                                   |
| <b>info</b>   | Display informational events.                          |
| <b>packet</b> | Displays packet tracing.                               |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

## Examples

The following is sample output from the **debug cs7 gsm-map**:

```
*Mar  5 00:32:02.657: %SYS-5-CONFIG_I: Configured from console by console
mica#
*Mar  5 00:32:13.507: CS7 MAP: auth_req: IMSI=102030405060708,nReq=5,fresh=T
*Mar  5 00:32:13.511: CS7 MAP: cfg: local addr=9193924477,cache
size=65535,max_ret=5,ttl=604800
*Mar  5 00:32:13.511: CS7 MAP: cfg: reuse=0, inv.timer=10, restoreData=Not active code 0
*Mar  5 00:32:13.511: CS7 MAP: cache entry not found for IMSI 102030405060708
*Mar  5 00:32:13.511: CS7 MAP: MAP Dialog 0x81A72040 created, TC DlgID 0x00000003
*Mar  5 00:32:13.511: CS7 MAP: Send Begin, DlgID 0x00000003, Context 14, Version 2
*Mar  5 00:32:13.511: CS7 MAP: Send Invoke, InvID 0x01, SendAuthenticationInfo (56)
*Mar  5 00:32:13.511: CS7 MAP:
*Mar  5 00:32:13.511: 04 08 01 02 03 04 05 06 07 F8
*Mar  5 00:32:13.511:
*Mar  5 00:32:13.535: CS7 MAP: Recv End, DlgID 0x00000003
*Mar  5 00:32:13.535: CS7 MAP: Recv Result Last, DlgID 0x00000003, InvID 0x01,
SendAuthenticationInfo (56)
*Mar  5 00:32:13.535: CS7 MAP:
*Mar  5 00:32:13.535: 30 6C 30 22 04 10 00 00 00 00 00 00 00 00 00 00
*Mar  5 00:32:13.535: 00 00 00 00 00 00 04 04 01 23 45 67 04 08 89 AB
*Mar  5 00:32:13.535: CD EF FE DC BA 98 30 22 04 10 A2 36 9F 2A F6 08
*Mar  5 00:32:13.539: CA 30 08 54 4A 70 8C 97 CD 8F 04 04 A3 15 DA 4D
*Mar  5 00:32:13.539: 04 08 7F A3 07 DF F6 88 F0 E8 30 22 04 10 99 1D
*Mar  5 00:32:13.539: EF 19 7A 00 63 F0 FF 3A DF 99 35 90 69 E2 04 04
*Mar  5 00:32:13.539: 98 3E AA 7E 04 08 F3 AB AE 1F 01 E6 65 01
*Mar  5 00:32:13.539:
```

```

*Mar 5 00:32:13.539: CS7 MAP: cache entry not found for IMSI 102030405060708
*Mar 5 00:32:13.539: CS7 MAP: cache 0x814C7F54 created for IMSI 102030405060708
*Mar 5 00:32:13.539: CS7 MAP: requested 5 Fresh triplet(s) from cache 0x814C7F54
*Mar 5 00:32:13.539: CS7 MAP: cache 0x814C7F54 clear
*Mar 5 00:32:13.539: CS7 MAP: cache 0x814C7F54 added triplet, num_set 1
*Mar 5 00:32:13.539: CS7 MAP: cache 0x814C7F54 added triplet, num_set 2
*Mar 5 00:32:13.539: CS7 MAP: cache 0x814C7F54 added triplet, num_set 3
*Mar 5 00:32:13.539: CS7 MAP: requested 5 Fresh triplet(s) from cache 0x814C7F54
*Mar 5 00:32:13.539: CS7 MAP: got triplet from cache 0x814C7F54 with use_count 0, nUsed 1
*Mar 5 00:32:13.543: CS7 MAP: got triplet from cache 0x814C7F54 with use_count 0, nUsed 2
*Mar 5 00:32:13.543: CS7 MAP: got triplet from cache 0x814C7F54 with use_count 0, nUsed 3
*Mar 5 00:32:13.543: CS7 MAP: cache 0x814C7F54 found for IMSI 102030405060708, fresh 0,
stale 0
*Mar 5 00:32:13.543: CS7 MAP: cache 0x814C7F54 delete
*Mar 5 00:32:13.543: CS7 MAP: auth_result = 0, num_triplets = 3
*Mar 5 00:32:13.543: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 01 23 45 67 89 AB CD
EF FE DC BA 98 00
*Mar 5 00:32:13.543: A2 36 9F 2A F6 08 CA 30 08 54 4A 70 8C 97 CD 8F A3 15 DA 4D 7F A3 07
DF F6 88 F0 E8 00
*Mar 5 00:32:13.543: 99 1D EF 19 7A 00 63 F0 FF 3A DF 99 35 90 69 E2 98 3E AA 7E F3 AB AE
1F 01 E6 65 01 00
*Mar 5 00:32:13.547: CS7 MAP: MAP Dialog 0x81A72040 freed, TC DlgID 0x00000003

```

**Related Commands**

| Command         | Description                                                                                                             |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| gsm-authent-vlr | Enables authent-vlr submode for provisioning parameters specific to the Process_Obtain_Authentication_Sets_VLR service. |

# debug cs7 m2pa

To display debug messages for M2PA, use the **debug cs7 m2pa** EXEC command.

**debug cs7 m2pa** {**cong** | **error** | **l3api** | **packet** | **peer** | **sctp**} *linkset slc*



## Note

Enabling debug during high traffic can cause the link to fail.

## Syntax Description

|                |                                   |
|----------------|-----------------------------------|
| <b>cong</b>    | Debugs Congestion Control events. |
| <b>error</b>   | Debugs Error events.              |
| <b>l3api</b>   | Debugs M2PA Layer 3 API events.   |
| <b>packet</b>  | Debugs M2PA Packet tracing.       |
| <b>peer</b>    | Debugs M2PA Peer events.          |
| <b>sctp</b>    | Debugs M2PA SCTP events.          |
| <i>linkset</i> | Linkset                           |
| <i>slc</i>     | Signalling link selector value    |

## Defaults

No default behavior or values.

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |



# debug cs7 m3ua

To display debug messages for M3UA, use the **debug cs7 m3ua** EXEC command.

```
debug cs7 m3ua [all | congestion | error | l3api | mgmt {api | state {as-name ASname | asp-name
ASPname} | pointcode {dpc pointcode}} | packet {short} {asp-name ASPname} | sctp
{asp-name ASPname} | timer {as-name ASname}]
```



## Note

Enabling debug during high traffic can cause the link to fail.

## Syntax Description

|                   |                                         |
|-------------------|-----------------------------------------|
| <b>all</b>        | Enables all debugs.                     |
| <b>api</b>        | Debugs API events.                      |
| <b>as-name</b>    | Specify an AS.                          |
| <i>ASname</i>     | AS name.                                |
| <b>asp-name</b>   | Specify an ASP                          |
| <i>ASPname</i>    | AS P name.                              |
| <b>congestion</b> | Debugs Congestion Control events        |
| <b>dpc</b>        | Specify a point code.                   |
| <b>error</b>      | Debugs Error events.                    |
| <b>l3api</b>      | Debugs M3UA Layer 3 API events.         |
| <b>mgmt</b>       | Debugs Management events.               |
| <b>packet</b>     | Packet tracing                          |
| <b>point-code</b> | Point code                              |
| <i>point-code</i> | Point code                              |
| <b>sctp</b>       | SCTP API events.                        |
| <b>state</b>      | State machine events.                   |
| <b>timer</b>      | AS timer events.                        |
| <b>short</b>      | Truncate displayed payload at 32 bytes. |

## Defaults

No default behavior or values.

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

# debug cs7 mapua

To display debug messages for Cisco MAP User API, use the **debug cs7 mapua** command in privileged EXEC mode.

**debug cs7 mapua** [**all** | **api** | **error** | **packet**] *mapua-name*

## Syntax Description

|                   |                                          |
|-------------------|------------------------------------------|
| <b>all</b>        | Display all debugs.                      |
| <b>api</b>        | Display RADIUS API events.               |
| <b>error</b>      | Display error events.                    |
| <b>packet</b>     | Display packet events.                   |
| <i>mapua-name</i> | Name associated with the MAPUA instance. |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

## Examples

The following is sample output from the **debug cs7 mapua** command:

```
*Jan 1 00:50:25.483: CS7 MAPUA: rcv access-request client
(10.128.128.3:32880)->mapua(10.128.128.2:1812)
*Jan 1 00:50:25.483: CS7 MAPUA: udp packet rcv (104)
*Jan 1 00:50:25.483: 01 09 00 68 D0 C6 E5 2A C7 B3 9B 76 F0 56 B0 27
*Jan 1 00:50:25.483: AC 01 32 10 01 05 72 6F 6E 02 12 50 DD 93 C3 BB
*Jan 1 00:50:25.483: 44 C2 54 3A F0 27 C0 F7 B8 E5 7C 20 0B 6C 6F 63
*Jan 1 00:50:25.487: 61 6C 68 6F 73 74 05 06 00 00 00 01 1A 2C 00 00
*Jan 1 00:50:25.487: 00 09 01 26 6D 61 70 3A 67 65 74 2D 61 75 74 68
*Jan 1 00:50:25.487: 69 6E 66 3D FF FF 01 02 0F 33 31 30 32 36 30 39
*Jan 1 00:50:25.487: 39 30 30 30 30 30 30 31
*Jan 1 00:50:25.487:
*Jan 1 00:50:25.487: CS7 MAPUA: type (user-name) length=5
*Jan 1 00:50:25.487: CS7 MAPUA: unsupported attribute: type (2) len
(18)
*Jan 1 00:50:25.487: CS7 MAPUA: type (nas-identifier) length=11
*Jan 1 00:50:25.487: CS7 MAPUA: unsupported attribute: type (5) len (6)
*Jan 1 00:50:25.487: CS7 MAPUA: type (vendor-specific) length=44
vendorId=9
*Jan 1 00:50:25.487: CS7 MAPUA: vendorType (cisco-vsa-generic)
vendorLength=38
*Jan 1 00:50:25.487: CS7 MAPUA: authentication identifier=9
*Jan 1 00:50:25.487: CS7 MAPUA: imsiLen=15 imsi=310260990000001
*Jan 1 00:50:25.487: CS7 MAPUA: salt=FFFF reqTriplets=2 freshTriplets=T
*Jan 1 00:50:25.487: CS7 MAPUA: MAP authentication procedures invoked
```

# Related Commands

| Command   | Description                                                                    |
|-----------|--------------------------------------------------------------------------------|
| cs7 mapua | Specifies the name, protocol, and local port number for the MAP Proxy feature. |

# debug cs7 mlr

To display debug messages for Multi-layer routing, use the **debug cs7 mlr** command in privileged EXEC mode.

**debug cs7 mlr table** [**all** | **error** | **info** | **packet**] [**verbose** [*paklen*]]

## Syntax Description

|                |                                                               |
|----------------|---------------------------------------------------------------|
| <b>all</b>     | Enables all debugs.                                           |
| <b>error</b>   | Debugs error events.                                          |
| <b>info</b>    | Display informational events.                                 |
| <b>packet</b>  | Displays packet events.                                       |
| <b>verbose</b> | Display detailed information.                                 |
| <i>paklen</i>  | Number of bytes of TCAP message to display. The default is 0. |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Examples

The following is sample output from the **debug cs7 mlr** command:

```
Router#debug cs7 mlr
*Mar 1 02:08:11.600: CS7 MLR PACKET: Packet 815448A8 received for SCCP MLR processing
*Mar 1 02:08:11.600: CS7 MLR INFO: Primary CdPA GT trigger match on 9991117770
*Mar 1 02:08:11.600: CS7 MLR INFO: mlr_parse_itu_tcap_msg: TC_DLG_BEGIN Tag Decoded
*Mar 1 02:08:11.600: CS7 MLR INFO: mlr_get_tcap_invoke_opCode: Operation Code Decoded
[0x2E]
*Mar 1 02:08:11.604: CS7 MLR INFO: Attempting rule match in ruleset ruleset-5
*Mar 1 02:08:11.604: CS7 MLR INFO: Rule 10 matches input packet
*Mar 1 02:08:11.604: CS7 MLR INFO: Result AS voting-as1 selected
*Mar 1 02:08:11.604: CS7 MLR INFO: MLR SCCP RC=Route to MLR destination for packet
815448A8
*Mar 1 02:08:11.604: CS7 MLR INFO: SCCP route_to_dest RC=0
*Mar 1 02:08:11.604: CS7 MLR INFO: cs7_mlr_process_sccp_data RC=Return, no error
```

The following is sample output from the **debug cs7 mlr** command with the **packet** and **verbose** keywords:

```
Router#debug cs7 mlr error verbose
00:32:06: CS7 MLR ERROR: mlr_get_sms_moForwardSm_parameters: invalid
TP-DA length of 21 digits in SMS-SUBMIT
00:32:06: Error detected in TCAP message (length=92) at offset 71
(0x47):
00:32:06: 0x62524803 0xD200D36B 0x1E281C06 0x07001186
00:32:06: 0x05010101 0xA011600F 0x80020780 0xA1090607
00:32:06: 0x04000001 0x0015026C 0x2BA12902 0x01010201
```

```
00:32:06: 0x2E302184 0x06910429 0x00080082 0x06910419
00:32:06: 0x52243804 0x0F118515 0x81810000 0x000A0000
00:32:06: 0x00000BC0 0x000FF054 0x1E251D90
```

## Related Commands

| Command       | Description                                                                             |
|---------------|-----------------------------------------------------------------------------------------|
| cs7 mlr table | Specifies the name of the multi-layer SMS routing table and enables CS7 MLR table mode. |

# debug cs7 monitor

To enable the display of CS7 Monitor debugging information, use the **debug cs7 monitor** command in privileged EXEC mode. To disable the display of CS7 Monitor debugging information, use the **no** form of this command.

**debug cs7 monitor {error | event | packet | socket}**

**no debug cs7 monitor {error | event | packet | socket}**

## Syntax Description

|               |                          |
|---------------|--------------------------|
| <b>error</b>  | CS7 Monitor error debug  |
| <b>event</b>  | CS7 Monitor event debug  |
| <b>packet</b> | CS7 Monitor packet debug |
| <b>socket</b> | CS7 Monitor socket debug |

## Defaults

Debugging of the CS7 Monitor is not enabled.

## Command Modes

Privileged EXEC

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

## Usage Guidelines

Each TCP packet contains a 10-byte TCP-header and 4-byte CRC field.

```
4-byte signature      /* always 0xAAAA */
1-byte version        /* always 0x01 */
2-byte length         /* Length of packet including TCP-header/CRC */
2-byte sequenceNumber /* Sequence number identifier for TCP packet */
1-byte MSU count      /* Number of MSUs bundled in the packet */
```

Each bundled MSU contains a 14-byte MSU-header.

```
2-byte length         /* Length of MSU including MSU-header */
4-byte interfaceId    /* Interface identifier */
1-byte slot           /* e.g. Serial <slot>/<port>/<unit>:<channel> */
1-byte port
1-byte unit
1-byte channel
8-byte timestamp      /* Timestamp (seconds since 0000 UTC 1 Jan 1900) */
```

At the end of each TCP packet is a 4-byte CRC field.

## debug cs7 mtp2

To display debug messages for MTP2, use the **debug cs7 mtp2** EXEC command. The **debug cs7 mtp2** command is not available on the Cisco 7507 or Cisco 7513 platforms.

```
debug cs7 mtp2 {aerm | all | cong | error | iac | l3api | lsc | msu | rcv | suerm | timers | txc} serial  
interface
```

**Note**

Enabling debug during high traffic can cause the link to fail.

**Syntax Description**

|                  |                                                   |
|------------------|---------------------------------------------------|
| <b>aerm</b>      | Debugs Alignment Error Rate Monitor events.       |
| <b>all</b>       | Enables all MTP2 debugs.                          |
| <b>cong</b>      | Debugs Congestion Control events                  |
| <b>error</b>     | Debugs Error events.                              |
| <b>iac</b>       | Debugs Initial Alignment Control events.          |
| <b>l3api</b>     | Debugs MTP2 Layer 3 API events.                   |
| <b>lsc</b>       | Debugs Link State Control events.                 |
| <b>msu</b>       | Debugs MSU messages. Use during low traffic only. |
| <b>rcv</b>       | Debugs Reception Control events.                  |
| <b>suerm</b>     | Debugs Signal Unit Error Rate Monitor events.     |
| <b>timers</b>    | Debugs timer events.                              |
| <b>txc</b>       | Debugs Transmission Control events.               |
| <b>serial</b>    | Serial interface.                                 |
| <i>interface</i> | Interface number.                                 |

**Defaults**

No default behavior or values.

**Command History**

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

**Usage Guidelines**

The **debug cs7 mtp2** command is not available on the Cisco 7507 or Cisco 7513 platforms.

## debug cs7 mtp3

To display debug messages for ITP MTP3, use the **debug cs7 mtp3** EXEC command. To disable debug, use the **no** form of this command.

```
debug cs7 mtp3 [destination ss7-access-list-num] [error linkset] [l2api linkset]
[mgmt {error error} | {event event} | {packet point-code [in | out]}]
```

```
no debug cs7 mtp3 [destination ss7-access-list-num] [error linkset] [l2api linkset]
[mgmt {error error} | {event event} | {packet point-code [in | out]}]
```



### Note

Enabling debug during high traffic can cause the link to fail.

### Syntax Description

|                            |                                                     |
|----------------------------|-----------------------------------------------------|
| <b>destination</b>         | DPC status changes.                                 |
| <i>ss7-access-list-num</i> | SS7 Access list number. Range is 2700 through 2999. |
| <b>error</b>               | Error events.                                       |
| <i>linkset</i>             | Linkset name.                                       |
| <b>l2api</b>               | MTP3-Layer2 API events.                             |
| <i>linkset</i>             | Linkset name.                                       |
| <b>mgmt</b>                | MTP3 MGMT Debug options.                            |
| <b>error</b>               | MTP3 MGMT errors                                    |



---

**error**

- **all** All management events
- **llsc** Link Set Control
- **lsac** Link Activity Control
- **lsda** Data Link Allocation
- **lsla** Link Activation
- **lslr** Link Restoration
- **rcat** Route Set Congestion Test Control
- **rsrt** Route Set Test Control
- **rtac** Transfer Allowed Control
- **rtcc** Transfer Controlled Control
- **rtpc** Transfer Prohibited Control
- **rtre** Transfer Restricted Control
- **slm** All Link Management errors
- **sltc** Signalling Link Test Control
- **srn** All Route Management errors
- **stm** All Traffic Management errors
- **tcbe** Changeback Control
- **tcoc** Changeover Control
- **tcrc** Controlled Rerouting Control
- **tfrc** Forced Rerouting Control
- **tlac** Link Availability Control
- **tpre** Signaling Point Restart
- **trcc** Signaling Route Congestion Control
- **tsfc** Signaling Traffic Control
- **tsrc** Signaling Routing Control

---

**event**

MTP3 MGMT events.

---

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>event</i>      | <ul style="list-style-type: none"> <li>• ALL All management errors</li> <li>• LLSC Link Set Control</li> <li>• LSAC Link Activity Control</li> <li>• LSDA Data Link Allocation</li> <li>• LSLA Link Activation</li> <li>• LSLR Link Restoration</li> <li>• RCAT Route Set Congestion Test Control</li> <li>• RSRT Route Set Test Control</li> <li>• RTAC Transfer Allowed Control</li> <li>• RTCC Transfer Controlled Control</li> <li>• RTPC Transfer Prohibited Control</li> <li>• RTRC Transfer Restricted Control</li> <li>• SLM All Link Management errors</li> <li>• SLTC Signalling Link Test Control</li> <li>• SRM All Route Management errors</li> <li>• STM All Traffic Management errors</li> <li>• TCBC Changeback Control</li> <li>• TCOC Changeover Control</li> <li>• TCRC Controlled Rerouting Control</li> <li>• TFRC Forced Rerouting Control</li> <li>• TLAC Link Availability Control</li> <li>• TPRC Signaling Point Restart</li> <li>• TRCC Signaling Route Congestion Control</li> <li>• TSFC Signaling Traffic Control</li> <li>• TSRC Signaling Routing Control</li> </ul> |
| <b>packet</b>     | MTP3 MGMT MSUs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>point-code</i> | Point Code.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>in</b>         | ITP MTP3 MGMT packet level debugging incoming.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>out</b>        | ITP MTP3 MGMT packet level debugging outgoing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

**Defaults**

No default behavior or values.

**Command History**

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(1)MB | This command was introduced. |

# debug cs7 mtp3 paklog

To send selected message signaling units (MSU) to an appropriate monitoring tool (chosen by user) , use the **debug cs7 mtp3 paklog EXEC** command.

```
debug cs7 mtp3 paklog access-list-number [linkset-name] [incoming] [outgoing]
                        [number-of-packets] [verbose]
```

```
no debug cs7 mtp3 paklog access-list-number [linkset-name] [incoming] [outgoing]
                        [number-of-packets] [verbose]
```



## Note

Enabling debug during high traffic can cause the link to fail.

## Syntax Description

|                           |                                                                                                                                                                                                          |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>access-list-number</i> | Integer in the range 2700 to 2999, corresponding to an existing CS7 access list number, used to select packets for logging.                                                                              |
| <i>linkset-name</i>       | (Optional) An existing CS7 linkset for which packet debugging is intended. If no linkset is specified packet debugging is implemented on all linksets.                                                   |
| <b>incoming</b>           | (Optional) Perform debugging on incoming MSUs. If neither <b>incoming</b> nor <b>outgoing</b> is specified, debugging is performed on both incoming and outgoing MSUs.                                   |
| <b>outgoing</b>           | (Optional) Perform debugging on outgoing MSUs. If neither incoming nor outgoing is specified, debugging is performed on both incoming and outgoing MSUs.                                                 |
| <i>number-of-packets</i>  | (Optional) Maximum number of MSUs to copy out via UDP. Valid range is 1 to 1000000 packets. If no number is specified, all MSUs matching the access list will be sent out until the debug is turned off. |
| <b>verbose</b>            | (Optional) Display information to the console concerning the message being logged. It is recommended that the verbose display be used with low traffic rates only.                                       |

## Defaults

If no linkset is specified packet debugging is implemented on all linksets.

If neither **incoming** nor **outgoing** is specified, debugging is performed on both incoming and outgoing MSUs.

If no *number-of-packets* is specified, all MSUs matching the access list will be sent out until the debug is turned off.

Verbose display is disabled.

## Command History

| Release   | Modification                 |
|-----------|------------------------------|
| 12.2(4)MB | This command was introduced. |

**Usage Guidelines**

You must configure the **cs7 paklog** command before enabling the **debug cs7 mtp3 paklog** command. If you do not, the following error message will be displayed:

```
%Error: paklog debug will not work without configuring 'cs7 paklog'.
```

**Examples**

In the following example, debugging is turned on for the linkset named `to_chicago` for all MSUs matching access list 2700:

```
debug cs7 mtp3 paklog 2700 to_chicago
```

The following is sample output from the **debug cs7 mtp3 paklog** command with the verbose display:

```
router# debug cs7 mtp3 paklog 2700 to_chicago verbose
```

```
16:10:44: CS7 PAKLOG Data:<135> April 23 14:33
MainITP:00003852,msu=B2001AEE00C0EE0011201112
16:10:44: CS7 PAKLOG DEBUG: sent 110 bytes to 10.4.0.90 on port 5514
16:10:44: CS7 PAKLOG Data:<135> April 23 14:33
MainITP:00003853,msu=B200C0EE001AEE0021201112
16:10:44: CS7 PAKLOG DEBUG: sent 110 bytes to 10.4.0.90 on port 5514
```

The following is sample output from the **show debug** command after the ITP packet logging facility has been configured and **debug cs7 mtp3 paklog** enabled for access list 2700.

Examples for linksets named `to_hurricane` and `to_fastnet`:

```
CS7 MTP3 (to_hurricane):
  MTP3 incoming paklog debugging is on, acl=2700, MSUs=infinite
  MTP3 outgoing paklog debugging is on, acl=2700, MSUs=infinite

CS7 MTP3 (to_fastnet):
  MTP3 incoming paklog debugging is on, acl=2700, MSUs=infinite
  MTP3 outgoing paklog debugging is on, acl=27
```

Verbose examples for linksets named `to_okracoke` and `to_okracoke2`:

```
CS7 MTP3 (to_okracoke):
  MTP3 verbose incoming paklog debugging is on, acl=2700, MSUs=infinite
  MTP3 verbose outgoing paklog debugging is on, acl=2700, MSUs=infinite

CS7 MTP3 (to_okracoke2):
  MTP3 verbose incoming paklog debugging is on, acl=2700, MSUs=infinite
  MTP3 verbose outgoing paklog debugging is on, acl=2700, MSUs=infinite
```

Examples with a specific number of MSU:

```
CS7 MTP3 (to_okracoke2):
  MTP3 incoming paklog debugging is on, acl=2701, MSUs=100
  MTP3 outgoing paklog debugging is on, acl=2700, MSUs=100
```

# debug cs7 nso

To display all the ITP Non-Stop Operation (NSO) events or errors, use the **debug cs7 nso** command in privileged EXEC mode.

```
debug cs7 nso {all | client | error | event | packet | state} [verbose]
```

## Syntax Description

|                |                                            |
|----------------|--------------------------------------------|
| <b>all</b>     | Display all NSO activity.                  |
| <b>client</b>  | Display NSO RF client activity.            |
| <b>error</b>   | Display NSO errors.                        |
| <b>event</b>   | Display NSO events.                        |
| <b>packet</b>  | Display NSO control messages.              |
| <b>state</b>   | Display NSO state transitions.             |
| <b>verbose</b> | (Optional) Generate detailed debug output. |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(23)SW | This command was introduced. |

## Examples

The following example displays all NSO activity in the verbose format:

```
Router# debug cs7 nso error verbose
```

## Related Commands

| Command | Description                          |
|---------|--------------------------------------|
| cs7 nso | Enable ITP Non-Stop Operation (NSO). |

# debug cs7 nso chkpt

To display all the ITP Non-Stop Operation (NSO) checkpointing activity, use the **debug cs7 nso chkpt** command in privileged EXEC mode.

**debug cs7 nso chkpt** [*instance-number*] {**all** | **client** | **error** | **event** | **packet**} [**verbose**]

## Syntax Description

|                        |                                                     |
|------------------------|-----------------------------------------------------|
| <i>instance-number</i> | Limit debug output to a particular ITP instance.    |
| <b>all</b>             | Display all activity related to NSO checkpointing.  |
| <b>client</b>          | Display NSO checkpointing facility client activity. |
| <b>error</b>           | Display NSO checkpointing errors.                   |
| <b>event</b>           | Display NSO checkpointing events.                   |
| <b>packet</b>          | Display NSO checkpointing messages.                 |
| <b>verbose</b>         | (Optional) Generate detailed debug output.          |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(23)SW | This command was introduced. |

## Examples

The following example displays all NSO checkpointing activity for instance 2 in the verbose format:

```
Router# debug cs7 nso chkpt 2 error verbose
```

## Related Commands

| Command | Description                          |
|---------|--------------------------------------|
| cs7 nso | Enable ITP Non-Stop Operation (NSO). |

# debug cs7 offload mtp3

To display debug messages for the ITP MTP3 Offload feature, use the **debug cs7 offload mtp3** EXEC command. To disable debug, use the **no** form of this command.

```
debug cs7 offload mtp3 {error error} | {event event}
```

```
nodebug cs7 offload mtp3
```



## Warning

Enabling debug during high traffic can cause the link to fail.

## Syntax Description

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>error</b>       | MTP3 offload errors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>event</b>       | MTP3 offload events.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <i>error/event</i> | Event or Error can be monitored for the following functions: <ul style="list-style-type: none"> <li>• <b>ALL</b> All RP errors.</li> <li>• <b>DWNLD</b> Configuration and status messages from RP to LC.</li> <li>• <b>GNRL</b> RP general</li> <li>• <b>IPC</b> IPC</li> <li>• <b>LCMSG</b> Control messages from RP to LC</li> <li>• <b>MTP3_MGMT</b> MTP3 MGMT event messages from RP to LC.</li> <li>• <b>RPMSG</b> Control messages from RP to LC.</li> <li>• <b>UPLD</b> Statistics and accounting messages from LC to RP.</li> </ul> |

## Defaults

No default behavior or values.

# debug cs7 sccp

To display debug messages for ITP SCCP, use the **debug cs7 sccp** EXEC command. To disable debug, use the **no** form of this command.

```
debug cs7 sccp [{error error} | {event event} | gtt-accounting | map-table | {packet [verbose]
[bytes] [packets]}]
```

```
no debug cs7 sccp
```



## Warning

Enabling debug during high traffic can cause the link to fail.

## Syntax Description

|              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>error</b> | SCCP errors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <i>error</i> | Valid errors include: <ul style="list-style-type: none"> <li>• <b>ALL</b> All SCCP errors</li> <li>• <b>BCST</b> SCMG - Broadcast</li> <li>• <b>CSCC</b> SCMG - Coordinated state change</li> <li>• <b>GTT</b> Global Title Translation</li> <li>• <b>L3API</b> SCCP-MTP3 API events</li> <li>• <b>LBCS</b> SCMG - Local broadcast</li> <li>• <b>SCLC</b> Connectionless Control</li> <li>• <b>SCMG</b> All Management components</li> <li>• <b>SCOC</b> Connection Control</li> <li>• <b>SCRC</b> Routing Control</li> <li>• <b>SLCC</b> SCMG - Local SCCP &amp; nodal congestion</li> <li>• <b>SPAC</b> SCMG - SP allowed control</li> <li>• <b>SPCC</b> SCMG - SP congested control</li> <li>• <b>SRCC</b> SCMG - Remote SCCP &amp; nodal congestion</li> <li>• <b>SRTC</b> SCMG - SCCP restart control</li> <li>• <b>SSAC</b> SCMG - Subsystem allowed control</li> <li>• <b>SSPC</b> SCMG - SP prohibited control</li> <li>• <b>SSTC</b> SCMG - Subsystem test control</li> <li>• <b>SUA-API</b></li> <li>• <b>TCAP-API</b></li> </ul> |
| <b>event</b> | SCCP events.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



|                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>event</i>          | Valid events include: <ul style="list-style-type: none"> <li>• <b>ALL</b> All SCCP events</li> <li>• <b>BCST</b> SCMG - Broadcast</li> <li>• <b>CSCC</b> SCMG - Coordinated state change</li> <li>• <b>GTT</b> Global Title Translation</li> <li>• <b>L3API</b> SCCP-MTP3 API events</li> <li>• <b>LBCS</b> SCMG - Local broadcast</li> <li>• <b>SCLC</b> Connectionless Control</li> <li>• <b>SCMG</b> All Management components</li> <li>• <b>SCOC</b> Connection Control</li> <li>• <b>SCRC</b> Routing Control</li> <li>• <b>SLCC</b> SCMG - Local SCCP &amp; nodal congestion</li> <li>• <b>SPAC</b> SCMG - SP allowed control</li> <li>• <b>SPCC</b> SCMG - SP congested control</li> <li>• <b>SPPC</b> SCMG - SP prohibited control</li> <li>• <b>SRCC</b> SCMG - Remote SCCP &amp; nodal congestion</li> <li>• <b>SRTC</b> SCMG - SCCP restart control</li> <li>• <b>SSAC</b> SCMG - Subsystem allowed control</li> <li>• <b>SSTC</b> SCMG - Subsystem test control</li> <li>• <b>SUA-API</b></li> <li>• <b>TCAP-API</b></li> </ul> |
| <b>gtt-accounting</b> | SCCP GTT Linkset Accounting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>map-table</b>      | SCCP MAP Table Updates                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>packet</b>         | SCCP packet tracing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>verbose</b>        | Display all bytes in the packet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <i>bytes</i>          | Number of bytes, 1 through 200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>packets</i>        | Number of packets, 0 through 200. 0 = Unlimited (default).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

**Defaults**

No default behavior or values.

# debug cs7 sgmp

To display debug messages for SGMP, use the **debug cs7 sgmp** EXEC command.

**debug cs7 sgmp {all | congestion | error | event | mgmt {api | state} | packet [short] | sctp | timer}**



## Note

Enabling debug during high traffic can cause the link to fail.

## Syntax Description

|                   |                                        |
|-------------------|----------------------------------------|
| <b>all</b>        | Enable all debugs.                     |
| <b>api</b>        | Management API events.                 |
| <b>congestion</b> | Congestion Control events              |
| <b>error</b>      | Error events.                          |
| <b>event</b>      | SGMP Events                            |
| <b>mgmt</b>       | Management events.                     |
| <b>packet</b>     | SGMP packet tracing to the mated SG.   |
| <b>sctp</b>       | SGMP SCTP API events for the mated SG. |
| <b>state</b>      | SGMP management state machine events.  |
| <b>timers</b>     | SGMP timer events.                     |

## Defaults

No default behavior or values.

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

# debug cs7 smpp

To display debug messages for SMPP, use the **debug cs7 smpp** command in privileged EXEC mode. To disable the display, use the no form of the command.

**debug cs7 smpp** {all | api | error | info | rx | tx}

**no debug cs7 smpp** {all | api | error | info | rx | tx}

| Syntax Description |  |                                           |
|--------------------|--|-------------------------------------------|
| <b>all</b>         |  | Enables all SMPP debugs.                  |
| <b>api</b>         |  | Debugs SMPP and UCP API events.           |
| <b>error</b>       |  | Debugs SMPP and UCP error events.         |
| <b>info</b>        |  | Debugs SMPP and UCP informational events. |
| <b>rx</b>          |  | Debugs SMPP and UCP receive events.       |
| <b>tx</b>          |  | Debugs SMPP and UCP transmit events.      |

**Defaults** No default behavior or values.

**Command Modes** Privileged EXEC

| Command History | Release    | Modification                 |
|-----------------|------------|------------------------------|
|                 | 12.2(25)SW | This command was introduced. |

| Related Commands | Command      | Description                      |
|------------------|--------------|----------------------------------|
|                  | cs7 sms smpp | Configures SMS SMPP connections. |

# debug cs7 snmp

To display debug messages for SNMP, use the **debug cs7 snmp** privileged EXEC command.

```
debug cs7 snmp {itp-acl | itp-act itp-gact | itp-grt | itp-gsccp | itp-gsp | itp-gsp2 | itp-rt | itp-sccp
                | itp-sp | itp-sp2 | itp-traps | itp-xua}
```

## Syntax Description

|                  |                                                                                               |
|------------------|-----------------------------------------------------------------------------------------------|
| <b>itp-acl</b>   | Display debugging information about CISCO-ITP-ACL-MIB: Access Lists for ITP.                  |
| <b>itp-act</b>   | Display debugging information about CISCO-ITP-ACT-MIB: Accounting for ITP.                    |
| <b>itp-gact</b>  | Display debugging information about CISCO-ITP-GACT-MIB                                        |
| <b>itp-grt</b>   | Display debugging information about CISCO-ITP-GRT-MIB                                         |
| <b>itp-gsccp</b> | Display debugging information about CISCO-ITP-GSCCP-MIB                                       |
| <b>itp-gsp</b>   | Display debugging information about CISCO-ITP-GSP-MIB                                         |
| <b>itp-gsp2</b>  | Display debugging information about CISCO-ITP-GSP2-MIB                                        |
| <b>itp-rt</b>    | Display debugging information about CISCO-ITP-RT-MIB: Route Table for ITP.                    |
| <b>itp-sccp</b>  | Display debugging information about CISCO-ITP-SCCP-MIB: Signaling Connection Control for ITP. |
| <b>itp-sp</b>    | Display debugging information about CISCO-ITP-SP-MIB: Signaling Point for ITP.                |
| <b>itp-sp2</b>   | Display debugging information about CISCO-ITP-SP2-MIB.                                        |
| <b>itp-traps</b> | Display debugging information about ITP traps.                                                |
| <b>itp-xua</b>   | Display debugging information about CISCO-ITP-XUA-MIB                                         |

## Defaults

No default behavior or values.

# debug cs7 sua

To display debug messages for SUA, use the **debug cs7 sua** EXEC command.

```
debug cs7 sua [all | congestion | error | mgmt {api | state {as-name ASname | asp-name
ASPname} | pointcode {dpc pointcode}} | packet {short} {asp-name ASPname} | sccp | sctp
{asp-name ASPname} | timer {as-name ASname}]
```



## Note

Enabling debug during high traffic can cause the link to fail.

## Syntax Description

|                   |                                         |
|-------------------|-----------------------------------------|
| <b>all</b>        | Enables all debugs.                     |
| <b>api</b>        | API events.                             |
| <b>as-name</b>    | Specify an AS.                          |
| <i>ASname</i>     | AS name.                                |
| <b>asp-name</b>   | Specify an ASP                          |
| <i>ASPname</i>    | AS P name.                              |
| <b>congestion</b> | Debugs Congestion Control events.       |
| <b>dpc</b>        | Specify a point code.                   |
| <b>error</b>      | Debugs Error events.                    |
| <b>mgmt</b>       | Debugs Management events.               |
| <b>packet</b>     | Packet tracing.                         |
| <b>pointcode</b>  | Point code.                             |
| <i>pointcode</i>  | Point code.                             |
| <b>sccp</b>       | SUA SCCP API events.                    |
| <b>sctp</b>       | SCTP API events.                        |
| <b>short</b>      | Truncate displayed payload at 32 bytes. |
| <b>state</b>      | State machine events.                   |
| <b>timer</b>      | AS timer events.                        |

## Defaults

No default behavior or values.

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB5 | This command was introduced. |

# debug cs7 tcap

To display debug messages for Cisco TCAP, use the **debug cs7 tcap** command in privileged EXEC mode.

**debug cs7 tcap** [**all** | **api** | **error** | **info** | **packet** [**verbose**] | **state**]

## Syntax Description

|                |                                  |
|----------------|----------------------------------|
| <b>all</b>     | Display all debugs.              |
| <b>api</b>     | Display API events.              |
| <b>error</b>   | Display error events.            |
| <b>info</b>    | Display informational events.    |
| <b>packet</b>  | Display packet tracing.          |
| <b>verbose</b> | Display detailed packet tracing. |
| <b>state</b>   | Display state machine tracing.   |

## Defaults

No default behavior or values.

## Command Modes

Privileged EXEC

## Command History

| Release    | Modification                 |
|------------|------------------------------|
| 12.2(4)MB7 | This command was introduced. |

## Examples

The following is sample output from the **debug cs7 tcap** command:

```
*Mar 11 18:58:27.177: CS7 TCAP State: New Dialogue state -> IDLE, tid[10]
*Mar 11 18:58:27.177: CS7 TCAP State: New Transaction state -> IDLE, tid[10]
*Mar 11 18:58:27.177: CS7 TCAP State: New operation Invoke state -> IDLE, iid[1] tid[10]
*Mar 11 18:58:27.181: CS7 TCAP State: Invoke state -> OP_SENT,class[1],iid[1],tid[10]
*Mar 11 18:58:27.181: CS7 TCAP State: Dialogue state -> IS, tid[10]
*Mar 11 18:58:27.181: CS7 TCAP State: Transaction state -> IS, tid[10]
*Mar 11 18:58:27.181: CS7 TCAP Pkt: SCCP SEND_DATA called (by MAP user layer)
*Mar 11 18:58:27.181: CS7 TCAP Pkt: data address [0x814BE510],data size [0x3C]
*Mar 11 18:58:27.185: CS7 TCAP Pkt: Calling address:
    ai  [92] np [01] es [02] ssn [07] tt [00] noa [04] pc [0.0.0]
    gtd [0x814BE4B9], gt  [1939294477|000A92]
    Called address:
    ai  [92] np [06] es [01] ssn [06] tt [00] noa [04] pc [0.0.0]
    gtd [0x814BE48D], gt  [01020304050607F8]
*Mar 11 18:58:27.185: CS7 TCAP Pkt: SCCP SEND_DATA returned without error
*Mar 11 18:58:27.189: %CS7SCCP-5-SCCPPCUNAV: SCCP failed to translate: DPC=1.1.1 is not
available.
LS=NONE OPC=1.6.6 GTI=4 TT=0 NP= 6 NAI= 4 GTA=102030405060708
*Mar 11 18:58:27.189: CS7 TCAP Info: SCCP freeing TCAP data buffer routine called with
data ptr = 814BE510
```

# debug redundancy inter-device

To display Redundancy Facility (RF) activity between devices, use the **debug redundancy inter-device** command in privileged EXEC mode. To disable debug, use the **no** form of the command.

**debug redundancy inter-device**

**no debug redundancy inter-device**

|                           |                                            |
|---------------------------|--------------------------------------------|
| <b>Syntax Description</b> | This command has no arguments or keywords. |
|---------------------------|--------------------------------------------|

|                 |                                |
|-----------------|--------------------------------|
| <b>Defaults</b> | No default behavior or values. |
|-----------------|--------------------------------|

|                      |                 |
|----------------------|-----------------|
| <b>Command Modes</b> | Privileged EXEC |
|----------------------|-----------------|

|                        |                |                              |
|------------------------|----------------|------------------------------|
| <b>Command History</b> | <b>Release</b> | <b>Modification</b>          |
|                        | 12.2(23)SW     | This command was introduced. |

|                 |                                                             |
|-----------------|-------------------------------------------------------------|
| <b>Examples</b> | The following example displays RF activity between devices: |
|-----------------|-------------------------------------------------------------|

```
Router# debug redundancy inter-device
00:00:24: REDUNDANCY INTERDEV: SCTP event: RF_INTERDEV_SCTP_EVENT
00:00:24: REDUNDANCY INTERDEV: SCTP signal: SCTP_ASSOC_FAILED
00:00:24: REDUNDANCY INTERDEV: event: RF_INTERDEV_EVENT_PLAT_PNC state:
RF_INTERDEV_STATE_PNC_NO_PLAT -> RF_INTERDEV_STATE_PNC_NO_PLAT
00:00:24: REDUNDANCY INTERDEV: SCTP event: RF_INTERDEV_SCTP_EVENT
00:00:24: REDUNDANCY INTERDEV: SCTP signal: SCTP_ASSOC_TERMINATE
00:00:24: REDUNDANCY INTERDEV: SCTP error: Invalid association ID
00:00:32: REDUNDANCY INTERDEV: SCTP event: RF_INTERDEV_SCTP_EVENT
00:00:32: REDUNDANCY INTERDEV: SCTP signal: SCTP_ASSOC_UP
00:00:32: REDUNDANCY INTERDEV: event: RF_INTERDEV_EVENT_PLAT_PC state:
RF_INTERDEV_STATE_PNC_NO_PLAT -> RF_INTERDEV_STATE_PC_NO_PLAT
00:00:32: REDUNDANCY INTERDEV: event: RF_INTERDEV_EVENT_PLAT_ACT state:
RF_INTERDEV_STATE_PC_NO_PLAT -> RF_INTERDEV_STATE_ACT
```

|                         |                |                                  |
|-------------------------|----------------|----------------------------------|
| <b>Related Commands</b> | <b>Command</b> | <b>Description</b>               |
|                         | redundancy     | Enables inter-device redundancy. |

■ debug redundancy inter-device





# ITP System Messages

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This document lists and describes Cisco ITP system messages. The system software sends these messages to the console (and, optionally, to a logging server on another system) during operation. Not all system messages indicate problems with your system. Some are purely informational, and others may help diagnose problems with communications lines, internal hardware, or the system software.

This document includes ITP system messages only. For a complete list of all IOS system messages, please refer to the Cisco IOS Software System Messages document at <http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123sup/123sems/index.htm>

## How This Manual Is Organized

The messages are organized according to the particular system facility that produces the messages. The facility sections appear in alphabetical order, and within each facility section, messages are listed alphabetically by mnemonic. The messages are described in the following sections:

- How to Read System Messages
- CS7ADDRBL Messages
- CS7CDR Messages
- CS7CHKPT Messages
- CS7GROUP Messages
- CS7HSL Messages
- CS7M2PA Messages
- CS7MAPUA Messages
- CS7MLR Messages
- CS7MONITOR Messages
- CS7MTP2 Messages
- CS7MTP3 Messages
- CS7NSO Messages
- CS7PING Messages
- CS7RF Messages



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- CS7ROUTE Messages
- CS7SCCP Messages
- CS7SMS Messages
- CS7TCAP Messages
- CS7XUA Messages
- DCS7 Messages

## How to Read System Messages

System messages begin with a percent sign (%) and are structured as follows:

%FACILITY-SUBFACILITY-SEVERITY-MNEMONIC: Message-text

FACILITY is a code consisting of two or more uppercase letters that indicate the facility to which the message refers. A facility can be a hardware device, a protocol, or a module of the system software.

SEVERITY is a single-digit code from 0 to 7 that reflects the severity of the condition. The lower the number, the more serious the situation.

MNEMONIC is a code that uniquely identifies the error message.

Message-text is a text string describing the condition. This portion of the message sometimes contains detailed information about the event, including terminal port numbers, network addresses, or addresses that correspond to locations in the system memory address space. Because the information in these variable fields changes from message to message, it is represented here by short strings enclosed in square brackets ([ ]). A decimal number, for example, is represented as [dec].

## CS7ADDRTBL Messages

### Explanation

#### Error Message

%CS7ADDRTBL-5-DBCHANGED: Notice: The Address Table may have changed while reading. Operation aborted.

**Explanation** While attempting to read, copy, or save an address table, another process modified the table.

**Recommended Action** Repeat the last operation and avoid making configuration changes until complete.

#### Error Message

%CS7ADDRTBL-3-IFSERR: Internal File System Error:

**Explanation** An error occurred while trying to load/parse a CS7 Address Table.

**Recommended Action** This problem is probably due to a corrupt or invalid file format.

**Error Message**

%CS7ADDRDTBL-5-LOADCOMPLETE: NOTICE: Address-Table [chars] loaded from [chars].

**Explanation** An address-table has finished loading.

**Recommended Action** No action is required.

**Error Message**

%CS7ADDRDTBL-5-SLAVETIMEOUT: NOTICE: Address-Table loader timeout waiting on config sync to slave.

**Explanation** The IOS High Availability sync to the slave did not complete in an expected window

**Recommended Action** Reboot slave and if problem persists contact Cisco TAC.

**Error Message**

%CS7ADDRDTBL-5-SYNCCOMplete: NOTICE: Address-Table [chars] loaded on slave.

**Explanation** An address-table has been synchronized on the slave processor.

**Recommended Action** No action is required.

**Error Message**

%CS7ADDRDTBL-5-SYNCFail: NOTICE: Address-Table [chars] failed on slave.

**Explanation** An address-table has failed to be synchronized on the slave processor.

**Recommended Action** See the slave log for failure reason and contact TAC for assistance.

## CS7CDR Messages

**Error Message**

%CS7CDR-5-CDRHASRSRC: Notice: CDR Destination [chars] has changed from no resources available to resources available.

**Explanation** The CDR destination may have had a disk that is full, but that condition has cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7CDR-5-CDRNORSRC: Notice: CDR Destination [chars] has reported no resources available to store records.

**Explanation** The CDR destination may have a disk that is full.

**Recommended Action** No action is required.

**Error Message**

%CS7CDR-5-CDRSERCONGEST: Notice: CDR Service [chars] has reached its congestion threshold.

**Explanation** The CDR destinations within the service are not acking the records fast enough

**Recommended Action** No action is required.

**Error Message**

%CS7CDR-5-CDRSERQFULL: Notice: CDR Service [chars] has reached its max queue size.

**Explanation** The CDR destinations within the service are not acking the records fast enough

**Recommended Action** No action is required.

**Error Message**

%CS7CDR-5-CDRSTATCHG: [chars] changed state from [chars] to [chars]

**Explanation** A CDR Destination changed state

**Recommended Action** No action is required.

## CS7CHKPT Messages

**Error Message**

%CS7CHKPT-3-INTERR: [chars]

**Explanation** An internal software error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7CHKPT-3-INVALIDINSTANCE: Invalid instance ([int])

**Explanation** A reference to an undefined variant instance was detected.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7CHKPT-3-MSGERR: [chars]

**Explanation** A Checkpointing message error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7CHKPT-3-NOMEMORY: Insufficient memory for [chars]

**Explanation** The requested memory allocation failed because of a low memory condition

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce other system activity. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7CHKPT-5-NORCVBUF: No buffer for received checkpointing message

**Explanation** A buffer to hold a received Checkpointing message was not available.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7CHKPT-3-SYNCERR: [chars]

**Explanation** A Checkpointing synchronization error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7CHKPT-5-SYNCFailure: ITP sync failure, peer reset

**Explanation** A failure occurred while synchronizing information to the High Availability peer.

**Recommended Action** No action required.

## CS7GROUP Messages

**Error Message**

%CS7GROUP-3-DLINKMSG: NULL

**Explanation** An internal software error in ITP Group message handling has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7GROUP-3-FSMERR: [chars] event in [chars] state

**Explanation** An unexpected condition was encountered in the Group finite state machine.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7GROUP-3-INITERR: NULL

**Explanation** An internal software error in ITP Group initialization has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7GROUP-3-INTERR: NULL

**Explanation** An internal software error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7GROUP-3-INVALIDINSTANCE: Invalid instance ([int])

**Explanation** A reference to an undefined variant instance was detected.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7GROUP-3-NEGOERR: Unexpected negotiation condition - state: [chars], peer state: [chars]

**Explanation** An unexpected condition was encountered in Group role negotiation.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7GROUP-3-NOMEMORY: Insufficient memory for [chars]

**Explanation** The requested memory allocation failed because of a low memory condition

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce other system activity. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7GROUP-5-NOTICE: NULL

**Explanation** Communicating Group information to the user.

**Recommended Action** No action is required.

## CS7HSL Messages

**Error Message**

%CS7HSL-4-BADSTATE\_ERROR: ([chars]): State = [chars], size = [dec]

**Explanation** This message indicates a SSCF-NNI is in not in a state for receiving packets. The message will display more specific information about the problem location.

**Recommended Action** Check the endpoint that the router is communicating with for proper configuration and operation.

**Error Message**

%CS7HSL-3-NOINIT: Could not initialize HSL on the [chars] interface ([chars])

**Explanation** Software could not initialize the interface for HSL.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7HSL-3-NOSSCFDB: No interface information provided for processing

**Explanation** Software requires the interface information for continued processing.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7HSL-3-NOSWIDB: No interface information provided for processing

**Explanation** Software requires the interface information for continued processing.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7HSL-3-NOVARIANT: Must configure CS7 variant before NNI on the interface

**Explanation** User may not configure NNI on the interface before CS7 variant.

**Recommended Action** Configure CS7 variant first, then add NNI on the interface.

**Error Message**

%CS7HSL-4-PKTSIZE\_ERROR: ([chars]):State = [chars] size = [dec]

**Explanation** This message indicates a SSCF-NNI is receiving invalid sized packets. The message will display more specific information about the problem location.

**Recommended Action** Check the endpoint that the router is communicating with for proper configuration and operation.

**Error Message**

%CS7HSL-4-PROTOCOL\_ERROR: ([chars]): State = [chars], status = [dec]

**Explanation** This message indicates a SSCF-NNI is receiving mal-formed packets. The message will display more specific information about the problem location.

**Recommended Action** Check the endpoint that the router is communicating with for proper configuration and operation.

## CS7M2PA Messages

**Error Message**

%CS7M2PA-3-DESTADDRACT: Destination IP Address [IP\_address] active for linkset:slc [chars]:[dec]

**Explanation** The specified destination IP address can be used by Stream Control transmission Protocol associations.

**Recommended Action** No action is required.



**Error Message**

%CS7M2PA-3-DESTADDRINA: Destination IP Address [IP\_address] inactive for linkset:slc [chars]:[dec]

**Explanation** The specified destination IP address cannot be used by Stream Control transmission Protocol associations.

**Recommended Action** An destination IP address used to support a Stream Control Transmission Protocol association has failed. The association will remain active if other destination IP addresses are available. Determine the reason why this destination address failed and take appropriate action to rectify the failure.

**Error Message**

%CS7M2PA-5-LISTENFAILURE: Could not post listen for local peer port [int]

**Explanation** Software failed to post listen for the specified local peer

**Recommended Action** This can occur due to several reasons. Possibilities are: maximum number of local peers already created, invalid local peer parameters, local peer port is already in use, resources unavailable, etc. Peer links using this local peer will be unavailable. Problem determination should be performed for the above possibilities.

**Error Message**

%CS7M2PA-3-NEWIPADDR: New IP address ([IP\_address]) on [chars] conflicts with cs7 local-peer [dec] local-ip [IP\_address] definition.

**Explanation** The new IP address on the interface conflicts with the local peer configuration and may cause link failure.

**Recommended Action** Local and remote peer parameters must be re-configured to use the new IP address.

**Error Message**

%CS7M2PA-3-NOENQUEUE: Could not enqueue event to [chars] event queue.

**Explanation** An internal software error occurred.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7M2PA-3-NOMEMORY: Insufficient memory for [chars]

**Explanation** The requested memory allocation failed because of a low memory condition

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce other system activity. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7M2PA-3-NOPAKBUFFER: Could not get a [chars] packet buffer

**Explanation** Software failed to obtain a packet buffer from the global buffer pool

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce the number of CS7 interfaces. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7M2PA-3-NOPROC: Could not create [chars] process

**Explanation** Insufficient internal resources available to create process.

**Recommended Action** This problem is due to an internal software error. Check available memory capacity on router. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7M2PA-3-NOPTR2PEER: No CS7 M2PA Peer Link information

**Explanation** Software requires the M2PA link information for continued processing.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

## CS7MAPUA Messages

**Error Message**

%CS7MAPUA-5-AUTHNOCLIENT: Client ([IP\_address]:[dec]) unavailable for authentication

**Explanation** An authentication request failed because a map client defined with the ip and port could not be found.

**Recommended Action** Verify the client is defined with the correct ip and port parameters.

**Error Message**

%CS7MAPUA-5-AUTHREQNOATTR: Authen request for client ([IP\_address]:[dec]) missing ([chars]) attribute

**Explanation** An authentication request failed because the request was missing required attributes.

**Recommended Action** Verify the sender of the authentication request supports the required attributes.

**Error Message**

%CS7MAPUA-5-AUTHREQPAKDROPP: Authentication request packet dropped for ip = [IP\_address] port = [dec]

**Explanation** An authentication request was dropped because a map user defined with the ip and port could not be found or the map user is shutdown.

**Recommended Action** Verify the map user is defined with the correct ip and port parameters. Verify the map user is not shutdown.

**Error Message**

%CS7MAPUA-5-AUTHRESPDROPP: Authentication response dropped, bad [chars] descriptor

**Explanation** An authentication response was dropped because the descriptor associated with the authentication response was invalid

**Recommended Action** This problem could be caused by the deleting of the map user while there was outstanding authentication requests. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MAPUA-5-CLRMAPUA: MAPUA stats cleared by [chars]

**Explanation** MAPUA stats cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MAPUA-3-NOBUF: No event buffers ([chars])

**Explanation** The software did not have enough available memory to perform a required action.

**Recommended Action** If condition persists, it may be necessary to increase memory configuration.

**Error Message**

%CS7MAPUA-5-NOSOCKET: A socket could not be opened for MAP user ([IP\_address]:[dec])

**Explanation** The software failed to open a socket for the specified MAP user.

**Recommended Action**

## CS7MLR Messages

### Error Message

%CS7MLR-3-GTTTRIGGERDISABLED: MLR [chars] GT trigger disabled: GTI=[dec] TT=[dec]  
NP=[dec] NAI=[dec] GTA=[chars]

**Explanation** A primary multi-layer routing global title trigger has been disabled.

**Recommended Action** This message informs the operator that the specified multi-layer routing trigger is no longer operational. If this was not the expected result of an issued command, contact a technical support representative for assistance.

### Error Message

%CS7MLR-3-GTTTRIGGERENABLED: MLR [chars] GT trigger enabled: GTI=[dec] TT=[dec]  
NP=[dec] NAI=[dec] GTA=[chars]

**Explanation** A primary multi-layer routing global title trigger has been enabled.

**Recommended Action** This message informs the operator that the specified multi-layer routing trigger is operational. If this was not the expected result of an issued command, contact a technical support representative for assistance.

### Error Message

%CS7MLR-7-INTERR: Internal Software Error Detected: [chars]

**Explanation** An internal software error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

### Error Message

%CS7MLR-3-SSNTRIGGERDISABLED: MLR [chars] PC/SSN trigger disabled: PC=[chars]  
SSN=[dec]

**Explanation** A primary multi-layer routing PC-SSN trigger has been disabled.

**Recommended Action** This message informs the operator that the specified multi-layer routing trigger is no longer operational. If this was not the expected result of an issued command, contact a technical support representative for assistance.

**Error Message**

%CS7MLR-3-SSNTRIGGERENABLED: MLR [chars] PC/SSN trigger enabled: PC=[chars]  
SSN=[dec]

**Explanation** A primary multi-layer routing PC-SSN trigger has been enabled.

**Recommended Action** This message informs the operator that the specified multi-layer routing trigger is operational. If this was not the expected result of an issued command, contact a technical support representative for assistance.

## CS7MONITOR Messages

**Error Message**

%CS7MONITOR-6-CONNECTED: [chars] ([IP\_address]/[dec] -> [IP\_address]/[dec])

**Explanation** Report active session connection.

**Recommended Action** No action is required.

**Error Message**

%CS7MONITOR-3-CS7VARIANT: CS7 variant has already been configured (CS7 monitor cannot be configured).

**Explanation** The CS7 monitor feature cannot be configured if the ITP is already configured for CS7 routing.

**Recommended Action** Remove CS7 variant configuration and re-configure as monitor.

**Error Message**

%CS7MONITOR-6-DISCONNECTED: [chars] ([IP\_address]/[dec] -> [IP\_address]/[dec])

**Explanation** Report disconnect of session connection.

**Recommended Action** No action is required.

**Error Message**

%CS7MONITOR-3-ENCAPSFAILURE: Interface [chars] could not be configured for monitoring.

**Explanation** The interface encapsulation command for cs7monitor failed.

**Recommended Action** No action is required.

**Error Message**

%CS7MONITOR-3-ERROR: [chars]

**Explanation** Report internal error.

**Recommended Action** If problem persists call your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%CS7MONITOR-3-MAXSS7: Maximum SS7 interfaces ([dec]) already configured on the port adapter.

**Explanation** Each port adapter supports a limited number of SS7 interfaces. Configuring this interface for monitoring will exceed the maximum allowed number for the port adapter.

**Recommended Action** Configure monitoring on a different port adapter.

**Error Message**

%CS7MONITOR-3-NOTSUPPORTED: Interface [chars] is not supported for monitoring

**Explanation** The interface is not supported by the CS7 Monitor.

**Recommended Action** No action is required.

**Error Message**

%CS7MONITOR-6-TCPCONGESTION: [dec]/[IP\_address]/[dec] -> congestion [chars]

**Explanation** Report congestion onset/abatement on TCP connection.

**Recommended Action** No action is required.

**Error Message**

%CS7MONITOR-6-TCPCONNECTED: [dec]/[IP\_address]/[dec]

**Explanation** Report active TCP session connection.

**Recommended Action** No action is required.

**Error Message**

%CS7MONITOR-6-TCPFAILURE: [dec]/[IP\_address]/[dec] -> [chars] (errno=[dec])

**Explanation** Report failure of TCP session connection.

**Recommended Action** No action is required.

## CS7MTP2 Messages

### Error Message

%CS7MTP2-3-ENCAPSFailure: Interface [chars] could not be configured for MTP2.

**Explanation** The interface encapsulation command for MTP2 failed.

**Recommended Action** No action is required.

### Error Message

%CS7MTP2-3-INVALIDPORT: Could not initialize MTP2 ([chars] cannot support SS7)

**Explanation** Software could not initialize the interface for MTP2 because of hardware limitations for SS7 support.

**Recommended Action** This problem is due to a hardware limitation for SS7 support.

### Error Message

%CS7MTP2-3-MAXSS7: Maximum SS7 interfaces ([dec]) already configured on the port adapter.

**Explanation** Each port adapter supports a limited number of SS7 interfaces. Configuring this interface for MTP2 will exceed the maximum allowed number for the port adapter.

**Recommended Action** Configure MTP2 on a different port adapter.

### Error Message

%CS7MTP2-3-MULTITIMESLOT: [chars] uses [dec] timeslots (multiple timeslots not supported)

**Explanation** User may not configure MTP2 encap on channelized interfaces that are using multiple timeslots.

**Recommended Action** Configure channelized interface to use one timeslot only.

### Error Message

%CS7MTP2-3-NOINIT: Could not initialize MTP2 on the [chars] interface ([chars])

**Explanation** Software could not initialize the interface for MTP2.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP2-3-NOMTP2SB: No CS7 MTP2 interface information

**Explanation** Software requires the MTP2 interface information for continued processing.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP2-3-NOPAKBUFFER: Could not get a [chars] packet buffer for [chars]

**Explanation** Software failed to obtain a packet buffer from the interface buffer pool.

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce the number of CS7 interfaces. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7MTP2-3-NOPAKIFINPUT: Packet does not contain input interface information

**Explanation** Software requires the input interface information for continued processing.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP2-3-NOPOWERON: PowerOn failed for the [chars] interface

**Explanation** Software failed to powerOn the MTP2 interface

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP2-3-NOPTR2CCB: No CS7 MTP2 link information

**Explanation** Software requires the MTP2 link information for continued processing.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP2-3-NOSS7: SS7 is not supported on the [chars] interface.

**Explanation** SS7 is not supported on the interface.

**Recommended Action** No action is required.



**Error Message**

%CS7MTP2-3-NOSWIDB: No interface information provided for processing

**Explanation** Software requires the interface information for continued processing.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP2-3-NOVARIANT: Must configure CS7 variant before MTP2 encap on the interface

**Explanation** User may not configure MTP2 encap on the interface before CS7 variant.

**Recommended Action** Configure CS7 variant first, then add MTP2 encap on the interface.

**Error Message**

%CS7MTP2-3-NOXMITQ: Failed to create transmitQ elements for [chars]

**Explanation** Software failed to create a pool of transmitQ elements for the interface.

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce the number of CS7 interfaces. If this message persists, call your technical support representative for assistance.

## CS7MTP3 Messages

**Error Message**

%CS7MTP3-5-ACTDEACTLINK: Link [dec] linkset [chars] [chars] is in progress

**Explanation** The link activation or deactivation procedure has started.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-ACTDEACTLINKSET: Linkset [chars] [chars] is in progress

**Explanation** Activation or deactivation of links in the linkset has started.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-ADJRBEGN: Adjacent SP restart beginning for linkset [chars]

**Explanation** Adjacent SP restart processing has been initiated on behalf of the node adjacent to the specified linkset.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-ADJRCANC: Adjacent SP restart cancelled for linkset [chars]

**Explanation** Adjacent SP restart was cancelled because there are no active links to the adjacent linkset.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-ADJRDSBL: Adjacent SP restart disabled for linkset [chars]

**Explanation** Adjacent SP restart processing has been disabled for the node adjacent to the specified linkset.

**Recommended Action** Adjacent SP restart processing has been disabled by the configuration. If the adjacent node is restart capable, reconfigure the router to enable restart processing for the adjacent node.

**Error Message**

%CS7MTP3-5-ADJRENDS: Adjacent SP restart ending for linkset [chars]

**Explanation** Adjacent SP restart processing has completed on behalf of the node adjacent to the specified linkset.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-BADCLUSTERMSG: [chars] received from [chars] with non-zero member part in destination [chars]

**Explanation** The received cluster management message is badly formatted. It has a non-zero member part.

**Recommended Action** Verify adherence to ANSI standard on adjacent point.

**Error Message**

%CS7MTP3-5-BADMSG: [chars] received for route ([chars] [chars]) but cluster route is [chars]

**Explanation** The received message would cause the cluster route to become more restrictive than the member route.

**Recommended Action** Verify cluster and member route status on adjacent point are consistent

**Error Message**

%CS7MTP3-5-BUFPKDROP: Buffered packets for transmit exceeds maximum ([dec])

**Explanation** When one MTP3 link goes down, MTP3 buffers the transmit packets for that link to another link; however, MTP3 must limit the total number of buffered packets to prevent using up all of the packet buffer resources. When the number of buffered packets exceeds the maximum limit, MTP3 will drop the packets rather than buffer.

**Recommended Action** The user may increase the buffered packet threshold using the buffered-packet-threshold config command. However, increasing this threshold may allow MTP3 to use up all packet buffer resources and cause buffer failures for other processes in the router.

**Error Message**

%CS7MTP3-3-CBDROP: Packets dropped during changeback to [chars] [dec] dropped = [dec] congestion = [dec]

**Explanation** The software attempted a changeback procedure to the indicated link. Some packets were dropped during the changeback due to congestion.

**Recommended Action** Increase the congestion threshold for the specified link.

**Error Message**

%CS7MTP3-3-CBLINKS: Exceeded number of alternate links ([dec]) for changeback to [chars]

**Explanation** The software attempted a changeback procedure to the indicated linkset. The maximum number of alternate links from which messages will be diverted has been exceeded.

**Recommended Action** Reduce the number of alternate links defined for the linkset.

**Error Message**

%CS7MTP3-3-CBLINKSETS: Exceeded number of alternate linksets ([dec]) for changeback to [chars]

**Explanation** The software attempted a changeback procedure to the indicated linkset. The maximum number of alternate linksets from which messages will be diverted has been exceeded.

**Recommended Action** Reduce the number of alternate linksets defined for the linkset.

**Error Message**

%CS7MTP3-5-CLRACCESSVIO: Access-violations accounting database cleared by [chars]

**Explanation** Access-violations accounting database database has been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLRACCT: MTP3 real-time accounting database cleared by [chars]

**Explanation** The MTP3 real-time accounting database has been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLRACCTCHKPT: MTP3 checkpointed accounting database cleared by [chars]

**Explanation** The MTP3 checkpointed accounting database has been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLRALL: All real-time accounting and statistics cleared by [chars]

**Explanation** All real-time accounting and statistics have been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLRALLCHKPT: All accounting and statistics cleared including all checkpoint databases by [chars]

**Explanation** All accounting and statistics cleared including all checkpoint databases have been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLRDYNRT: Dynamic routes for [chars] cleared by [chars]

**Explanation** MTP3 dynamic route entries have been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLREVENTHIS: MTP3 event-history cleared by [chars]. Event history max = [dec]

**Explanation** MTP3 event-history have been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLRGTT: SCCP GTT real-time accounting database cleared by [chars]

**Explanation** SCCP GTT real-time accounting database database has been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLRGTTCHKPT: SCCP GTT checkpointed accounting database cleared by [chars]

**Explanation** SCCP GTT checkpointed accounting database has been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CLRSTAT: Link statistics for [chars] [chars] cleared by [chars]

**Explanation** Link statistics have been cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-CNVTNOALIAS: Unable to convert PC [chars], no alias defined for instance [dec]

**Explanation** MTP3 is attempting to convert a packet from one instance to another but is unable to convert a point code in the message using the point code conversion table. Since MTP3 cannot convert the point code it will drop the packet.

**Recommended Action** The user can configure an alias point code for the PC in the specified instance using the **cs7 pc-conversion** command

**Error Message**

%CS7MTP3-5-DESTSTATUS: Destination [chars] is [chars]

**Explanation** There was a change in the accessibility status of the destination due to a change in the status of a route to that destination.

**Recommended Action** The **show cs7 route** command should be used to determine the reason why a destination became inaccessible.

**Error Message**

%CS7MTP3-6-GROUPROLE: MTP3 Mgmt state is '[chars]'

**Explanation** The ITP belongs to an ITP Group and has changed MTP3 management state within the group.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-HA\_QUIECE: Quiece [chars] links for switchover type [dec]

**Explanation** MTP3 links are being quieced due to an RSP switchover

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-HA\_UNQUIECE: Unquiece [chars] links for switchover type [dec]

**Explanation** MTP3 links are being unquieced due to an RSP switchover

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-3-IFSERR: Cannot load route table - ifs\_copy\_file failed to load '[chars]'

**Explanation** IOS failed to access the specified url for the route table.

**Recommended Action** Verify the url is correct and accessible

**Error Message**

%CS7MTP3-3-INHIB: Link [dec] in linkset [chars] [chars] inhibited

**Explanation** The specified link was either locally or remotely inhibited. Only signalling traffic between the two adjacent nodes will be transported on this link.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-3-INHIBDENY: Inhibit denied on link [dec] in linkset [chars]

**Explanation** Either a local or remote inhibit requested was denied. Inhibit requests are denied when there are no alternative links that can carry the traffic.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-3-INHIBTIMEO: [chars] request timeout on link [dec] in linkset [chars]

**Explanation** The inhibit or uninhibit request timed out while waiting for an acknowledgement from the remote end.

**Recommended Action** For inhibit request, increase the T14 timer value and re-issue the **cs7 inhibit** command. For uninhibit request, increase the T12 timer value and re-issue the **cs7 uninhibit** command.

**Error Message**

%CS7MTP3-5-INNI: Received [chars] message with incorrect NI - OPC = [chars] NI = [dec] on link [chars] [dec]

**Explanation** Received a message with incorrect network indicator.

**Recommended Action** This can occur due to several reasons. Possibilities are : the linkset has become congested and a changeover has occurred, causing buffered messages to be transmitted on another link, or the link is not configured correctly. If a changeover has occurred, then no action is required. For all other possibilities, the configuration should be verified and problem determination should take place.

**Error Message**

%CS7MTP3-5-INOPC: Received [chars] message from incorrect - OPC = [chars] SLC = [dec] message received on ls = [chars] slc = [dec] expected on ls = [chars]

**Explanation** Received either a MTP3 management message or a signalling link test message with an incorrect OPC. For example, a message was received from OPC 1.1.1. However, the link that received the message was configured in a linkset expecting traffic from OPC 2.2.2. The received OPC was configured as the adjacent point-code for a different linkset in the signalling point

**Recommended Action** Verify the configuration of the linksets at this node and the originating node.

**Error Message**

%CS7MTP3-5-INS LC: Received [chars] message with an incorrect SLC value - OPC = [chars] SLC = [dec] message received on ls = [chars] slc = [dec]

**Explanation** Received either a MTP3 management message or a signalling link test message with an incorrect SLC value. For example, a message was received from SLC value of 5. However, the link that received the message was configured with SLC value 1.

**Error Message**

%CS7MTP3-7-INTERR: Internal Software Error Detected: [chars]

**Explanation** An internal software error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTs. If you find none, write a DDTs for this problem.

**Error Message**

%CS7MTP3-5-INVH0H1: Received MTP3 message with invalid H0H1: SI: [dec] H0: [dec] H1: [dec] from [chars]

**Explanation** The ITP received an MTP3 message that is not supported.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-ISOLATED: MTP3 node has been isolated for instance [dec]

**Explanation** The MTP3 node has been isolated. If the node remains isolated after an automatic attempt to uninhibit inhibited links, a full restart procedure will be performed.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-3-LINKCONG: Link [dec] in linkset [chars] is in congestion level [dec]

**Explanation** A link has become congested

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-3-LINKINTERR: Link Internal error - [chars] [chars] [dec] [hex]

**Explanation** An internal software error occurred.

**Recommended Action** Copy the message exactly as it appears, and report it your technical support representative.



**Error Message**

%CS7MTP3-5-LINKNOCONG: Link [dec] in linkset [chars] has cleared congestion

**Explanation** A link has abated congested

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-3-LINKNOTUP: Link [dec] in linkset [chars] failed. Reason=[chars]

**Explanation** A link in a linkset is no longer active. Link restoration/activation procedures will be initiated.

**Recommended Action** No action is required. Link should return to active state once changeover is complete. If the serial interface does not automatically recover, issue the **clear interface** command for the serial link. If that does not help, perform physical line diagnostics.

**Error Message**

%CS7MTP3-3-LINKSETREMOTE: Linkset [chars] received remote processor [chars] indication

**Explanation** A remote processor outage or remote processor recovered indication was received on one of the links in the linkset.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-3-LINKSETSTATE: Linkset [chars] is [chars]

**Explanation** If the linkset is unavailable, it indicates that there are no active links in the linkset. This may be a transient condition if the links are attempting recovery. If the linkset is available, it indicates that there is at least one link in the active state.

**Recommended Action** If the linkset is unavailable, check the status of the links in the linkset. Also look up the reason code provided in the link inactive message and take appropriate action to rectify the deactivation.

**Error Message**

%CS7MTP3-6-LINKSUPDOWN: [chars]

**Explanation** All links on the specified VIP have been activated or deactivated. This event can be triggered by two means. Either the user issued a test CLI, or the CS7 software automatically shut/started the links. To determine if this event was invoked by the CS7 software, look for a CS7 messages preceeding this one, which will provide the reason for the action. If no message is found, it implies that a user issued the test cs7 CLI command to shut/start the links. If the links were shut, the state of the affected links will be displayed as sys-shut when the **show cs7 linkset** command is issued.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-3-LINKTESTFAIL: Link test failed on link [dec] linkset [chars]  
Reason=[chars]

**Explanation** Signaling link test has failed on the specified link. Link restoration/activation procedures will be initiated.

**Recommended Action** This can occur due to several reasons. Possibilities are: mismatch in point code definitions on either STP, quality of transmission line, memory corruption in either STP (local or remote), etc. Problem determination should be performed for the above possibilities. Link testing can be disabled in the link configuration sub-mode.

**Error Message**

%CS7MTP3-5-LINKUPDOWN: Link [dec] in linkset [chars] is [chars]

**Explanation** The link is either available, unavailable or down.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-7-LSACINTERR: Internal Software Error Detected: [chars] LS [chars] [dec]  
[chars] [dec] [chars] [chars] [dec]

**Explanation** An internal software error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7MTP3-5-MAXDYN: Maximum ([dec]) dynamic route table entries exceeded

**Explanation** The system could not create a dynamic route table entry, or x-list member for ANSI, because the total number is at the maximum allowed.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-4-NOBSNT: Timeout waiting for BSNT on link [dec] in linkset [chars]

**Explanation** A response to the BSNT request was not received from MTP2 during changeover.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP3-3-NOBUF: No event buffers ([chars])

**Explanation** The software did not have enough available memory to perform a required action.

**Recommended Action** If condition persists, it may be necessary to increase memory configuration.

**Error Message**

%CS7MTP3-2-NOCLS: An internal software error occurred.

**Explanation** An internal software error occurred.

**Recommended Action** Copy the error message exactly as it appears on the console or in the system log. Research and attempt to resolve the error using the Output Interpreter <https://www.cisco.com/cgi-bin/Support/OutputInterpreter/home.pl>. Also perform a search of the Bug Toolkit <http://www.cisco.com/cgi-bin/Support/Bugtool/home.pl>. If you still require assistance, open a case with the Technical Assistance Center via the Internet [http://www.cisco.com/cgi-bin/front.x/case\\_tools/caseOpen.pl](http://www.cisco.com/cgi-bin/front.x/case_tools/caseOpen.pl), or contact your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%CS7MTP3-3-NOINSTANCE: No CS7 MTP3 instance information

**Explanation** Software requires the MTP3 instance information to perform this operation.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP3-3-NOLINK: No CS7 MTP3 link information

**Explanation** Software requires the MTP3 link information to perform this operation.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP3-3-NOLINKSET: An internal software error occurred.

**Explanation** An internal software error occurred.

**Recommended Action** Copy the error message exactly as it appears on the console or in the system log. Research and attempt to resolve the error using the Output Interpreter <https://www.cisco.com/cgi-bin/Support/OutputInterpreter/home.pl>. Also perform a search of the Bug Toolkit <http://www.cisco.com/cgi-bin/Support/Bugtool/home.pl>. If you still require assistance, open a case with the Technical Assistance Center via the Internet [http://www.cisco.com/cgi-bin/front.x/case\\_tools/caseOpen.pl](http://www.cisco.com/cgi-bin/front.x/case_tools/caseOpen.pl), or contact your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%CS7MTP3-3-NOMEM: No memory is available

**Explanation** The software did not have enough available memory to perform a required action.

**Recommended Action** Reduce other system activity to ease memory demands. If condition persists, it may be necessary to increase memory configuration.

**Error Message**

%CS7MTP3-5-NONADJSIG: Received [chars] message from non adjacent node OPC = [chars]

**Explanation** Received either a MTP3 management message or a signalling link test message from a non adjacent node.

**Recommended Action** This can occur due to several reasons. Possibilities are : the linkset has become congested and a changeover has occurred, causing buffered messages to be transmitted on another link, or the link is not configured correctly. If a changeover has occurred, then no action is required. For all other possibilities, the configuration should be verified and problem determination should take place.

**Error Message**

%CS7MTP3-3-NOPAK: No packet parameter provided

**Explanation** Software requires a packet parameter to perform this operation.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP3-4-NORETRIEVE: Timeout waiting for message to be retrieved on link [dec] in linkset [chars]

**Explanation** A response to the retrieve request was not received from MTP2 during changeover.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP3-3-NOROUTETABLE: No route table

**Explanation** No mtp3 route table could be loaded due to an internal error.

**Recommended Action** Verify provisioning of the route table. A load command with a valid url must be present

**Error Message**

%CS7MTP3-7-NOTFR: Restricted destination [chars] changed to available

**Explanation** The system is not configured to allow restricted destinations. The specified restricted destination is being changed to available.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7MTP3-6-NSOINPROG: CS7 NSO in progress for instance [dec]

**Explanation** Non Stop Operation has performed a failover to the Standby RSP. Link recovery is in progress for this instance.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-6-NSOLINK: CS7 NSO Recived link status from slot [dec] for instance [dec]  
[chars] [dec]

**Explanation** The link status for the indicated link required to perform Non Stop Operation has been received. When the link status is receive for all links in the instance, Non satop operation will proceed.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-6-NSOPROCEED: CS7 NSO Proceeding for instance [dec]

**Explanation** Non Stop Operation has performed a failover to the Standby RSP. The Standby RSP is now ready to proceed with normal link managment operations for links within this instance.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-6-NSORESsync: CS7 NSO Resync request received from VIP in slot [dec]

**Explanation** Non Stop operation is in process. The VIP in slot [dec] is ready to be resynchronized with the RSP.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-6-NSOSTANDBY: CS7 NSO is in STANDBY for instance [dec]

**Explanation** Non Stop Operation will be attempted for this instance in the event of a Primary RSP failure

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-6-NSOTIMEOUT: CS7 NSO Timeout for instance [dec]

**Explanation** Non Stop Operation has performed a failover to the Standby RSP. The Standby RSP has timed out while attempting to perform non-stop operation on one or more links in the instance. The affected links will be restarted. The Standby RSP is ready to begin normal link management operations for links within this instance.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-PAKLOGCOMP: CS7 Paklog facility for linkset [chars] has completed.

**Explanation** The maximum amount of paklog messages for the linkset has been reached.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-QOSPAKDROP: Packets dropped due to QoS class [dec] link unavailable

**Explanation** MTP3 is attempting to forward packets that have been marked for a specific QoS class. When the outbound linkset does not have any links available that support the marked QoS class, MTP3 tries to forward the packets over the default class (class 0) links. If QoS class 0 links are not available, MTP3 will drop the packets.

**Recommended Action** The **show cs7 accounting access-violations** command can be used to determine the origin and destination point codes of the dropped packets. A link can be unavailable for a QoS class for several reasons. Possibilities are: link or linkset is shut down, link failure, QoS class not assign to link. For all other possibilities, the configuration should be verified and problem determination should take place.

**Error Message**

%CS7MTP3-5-REMCONG: Destination [chars] is in congestion status [dec]

**Explanation** Remote congestion status for this destination changed due to received TFC or due to routeset congestion test procedure.

**Recommended Action** Investigate destination network element for cause of local link congestion.

**Error Message**

%CS7MTP3-4-RETRIEVE: Message retrieved after timeout on link [dec] in linkset [chars]

**Explanation** A retrieved message was received from MTP2 after the timer expired.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7MTP3-5-ROUTETABLELOADED: Route table '[chars]' has been loaded from '[chars]'

**Explanation** Route table has been successful loaded

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-RSRTBEGN: MTP3 full restart beginning for instance [dec]

**Explanation** MTP3 full restart processing has been initiated.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-RSRTCONT: MTP3 restart continuing for Instance [dec]

**Explanation** MTP3 restart has detected a sufficient number of available links to continue with the restart.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-RSRTENDS: MTP3 full restart completed for instance [dec]

**Explanation** MTP3 full restart processing has completed.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-RSRTFRST: MTP3 full restart is disabled for instance [dec]

**Explanation** The MTP3 fast restart option has been configured. This option bypasses the normal MTP3 full restart processing.

**Recommended Action** Reconfigure the router to disable the fast restart option and restart the router.

**Error Message**

%CS7MTP3-5-RSRTNOACT: Expected links in linkset [chars] are not active instance [dec]

**Explanation** The expected number of links in the linkset did not become available during the link activation phase of the MTP3 restart procedure.

**Recommended Action** Check that the links that are expected to become available during MTP3 restart are able to become available at layer 2. Links that are not expected to become available should be administratively shutdown.

**Error Message**

%CS7MTP3-5-RSRTNOTRA: No TRA received from the adjacent node on linkset [chars] instance [dec]

**Explanation** The ITP expected to receive a TRA message from the adjacent node.

**Recommended Action** Check that the adjacent node is restart capable. If the adjacent node is not restart capable, reconfigure the ITP to disable adjacent restart for the concerned linkset.

**Error Message**

%CS7MTP3-5-RSRTSEND: MTP3 restart has entered the send status phase for instance [dec]

**Explanation** MTP3 restart has entered the send status phase. TFP and TFR signals are sent to adjacent nodes during the send status phase.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-RSRTT18: MTP3 restart T18 Expired instance [dec]

**Explanation** A sufficient number of TRAs were not available to proceed with a normal MTP3 restart.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-RSRTT22: MTP3 restart T22 Expired instance [dec]

**Explanation** A sufficient number of links were not available to proceed with a normal MTP3 restart.

**Recommended Action** No action is required.



**Error Message**

%CS7MTP3-5-RSRTT23: MTP3 restart T23 Expired instance [dec]

**Explanation** MTP3 restart did not receive an expected TRA from every adjacent node

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-RSRTTIMO: MTP3 restart terminating before send status completed for instance [dec]

**Explanation** MTP3 restart timeout out while in the send status phase.

**Recommended Action** Verify that the MTP3 timers T22, T23, and T24 have been configured to appropriate values. Increase the timer values as required.

**Error Message**

%CS7MTP3-5-RSRTXTRA: MTP3 restart expected TRAs have been received for instance [dec]

**Explanation** MTP3 restart has received a TRA for every active linkset and is continuing with the restart.

**Recommended Action** No action is required.

**Recommended Action**

**Error Message**

%CS7MTP3-6-SRTFAILTMR: CS7 Signaling Route Test (SRT) FAILED (timer expiration) to: [chars] from: [chars] sls: [dec]

**Explanation** TTC Signaling Route Test was performed and failed

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-6-SRTPASS: CS7 Signaling Route Test (SRT) PASSED to: [chars] from: [chars] sls: [dec]

**Explanation** TTC Signaling Route Test was performed and succeeded

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-6-SRTRESP: CS7 Signaling Route Test (SRT) request received, response sent to: [chars] from: [chars] sls: [dec]

**Explanation** TTC Signaling Route Test request was received and an SRTA acknowledgement was sent in response

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-TFRINVALID: Received TFR from [chars], TFR option is off

**Explanation** The use of TFR messages is a National Option and this node is configured to not use TFRs.

**Recommended Action** If TFRs should be used in this network, the option can be turned on with the command **cs7 national-options TFR**. If TFRs should not be used, the adjacent node may be misconfigured.

**Error Message**

%CS7MTP3-5-UNEXPECTRA: An unexpected TRA was received on linkset [chars]

**Explanation** A TRA message was received on the linkset but the linkset is not configured to perform an adjacent SP restart.

**Recommended Action** Verify that the adjacent node is restart capable. If the adjacent node is restart capable, reconfigure the router to enable restart processing for the adjacent node. If the adjacent node is not restart capable, then investigate why it is sending a TRA message on the linkset.

**Error Message**

%CS7MTP3-5-UNEXPECTRW: An unexpected TRW was received on linkset [chars]

**Explanation** A TRW message was received on the linkset but the linkset is not configured to perform an adjacent SP restart.

**Recommended Action** Verify that the adjacent node is restart capable. If the adjacent node is restart capable, reconfigure the router to enable restart processing for the adjacent node. If the adjacent node is not restart capable, then investigate why it is sending a TRWE message on the linkset.

**Error Message**

%CS7MTP3-3-UNINHBNOTP: Uninhibit is not possible on link [dec] in linkset [chars]

**Explanation** Uninhibit is not possible on the link since the remote SP is not accessible. This could be due to the fact that the link has failed.

**Recommended Action** Restart the failed link.

**Error Message**

%CS7MTP3-5-UNINHIB: Link [dec] in linkset [chars] [chars] uninhibited

**Explanation** The specified link was either locally or remotely uninhibited. Normal traffic will now be transported on this link.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-UNOPC: Received [chars] message from undefined - OPC = [chars] SLC = [dec] message received on ls = [chars] slc = [dec]

**Explanation** Received either a MTP3 management message or a signalling link test message with an undefined OPC. For example, a message was received from OPC 1.1.1. However, the link that received the message was configured in a linkset expecting traffic from OPC 2.2.2. The received OPC has not been defined as the adjacent point-code for any other linkset configured for this signalling point.

**Recommended Action** Verify the configuration of the linksets at this node and the originating node.

**Error Message**

%CS7MTP3-5-UNSIO: Received [chars] message with unsupported SIO: [dec] on link [chars] [dec]

**Explanation** Received a message with unsupported service indicator octet.

**Recommended Action** No action is required.

**Error Message**

%CS7MTP3-5-UNSLC: Received [chars] message with an undefined SLC value - OPC = [chars] SLC = [dec] message received on ls = [chars] slc = [dec]

**Explanation** Received either a MTP3 management message or a signalling link test message with an unknown SLC value. For example, a message was received from SLC value of 5. However, the link that received the message was configured with SLC value 1. The linkset on which the packet was received does not have a link configured with the received SLC value.

**Recommended Action**

## CS7NSO Messages

**Error Message**

%CS7NSO-5-CONFIGINOPER: ITP NSO is going inoperative due to a configuration change. Reset of standby is required.

**Explanation** ITP NSO is now inoperative because it has been disabled in the configuration. This causes a reset of the Standby unit.

**Recommended Action** No action is required.

**Error Message**

%CS7NSO-5-CONFIGOPER: ITP NSO is going operative due to a configuration change

**Explanation** ITP NSO is now operative because it has been enabled in the configuration.

**Recommended Action** No action is required.

**Error Message**

%CS7NSO-3-INITERR: [chars]

**Explanation** An internal software error in ITP NSO initialization has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7NSO-3-INTERR: [chars]

**Explanation** An internal software error in ITP NSO has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7NSO-3-IPCERROR: [chars] [chars]

**Explanation** An error has occurred establishing an interprocess communication channel between the active system and the standby system.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7NSO-3-MSGERR: [chars]

**Explanation** An internal software error in ITP NSO message handling has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7NSO-3-NOEVENTQELEM: No NSO event queue elements

**Explanation** An element for queueing an internal NSO event was not available.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7NSO-3-NOMEMORY: Insufficient memory for [chars]

**Explanation** The requested memory allocation failed because of a low memory condition

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce other system activity. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7NSO-3-NOMSGQLEM: No NSO message queue elements for received message

**Explanation** An element for queueing a received NSO message was not available.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

## CS7PING Messages

**Error Message**

%CS7PING-3-CONTEXT: Q.755 Test: [chars] context

**Explanation** Internal software error

**Recommended Action** If problem persists call your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%CS7PING-6-DUP: Test Q.755 [chars]: duplicate test request ignored

**Explanation** An attempt was made to start a second traffic test between signalling points. Only a single MTP traffic way be started between a pair of signalling points.

**Recommended Action** Wait till existing test has completed or issue command to cancel current test prior to stating new test

**Error Message**

%CS7PING-3-FAIL: Q.755 Test [chars]: cannot create [chars]

**Explanation** Software could not allocate resources required to run requested traffic test.

**Recommended Action** Retry request.

**Error Message**

%CS7PING-3-FSM: Test Q.755 [chars]: fsm error ([chars]/[chars]/[dec])

**Explanation** An internal software error occurred.

**Recommended Action** Stop the running traffic test with 'ping cs7 stop x.x.x'

**Error Message**

%CS7PING-3-INTERN: Test Q.755 [chars]: internal error ([chars]/[chars])

**Explanation** An internal software error occurred.

**Recommended Action** Stop the running traffic test with 'ping cs7 stop x.x.x' command

**Error Message**

%CS7PING-3-NOPAK: Test Q.755 [chars]: no packet buffer ([chars]/[chars])

**Explanation** Software could not find a packet buffer to send a message.

**Recommended Action** Stop the running traffic test with 'ping cs7 stop x.x.x'.

**Error Message**

%CS7PING-6-NORSP: [chars]: No response from target node.

**Explanation** The node timed out while waiting for a response from the target node.

**Recommended Action** Ensure that the target node is reachable.

**Error Message**

%CS7PING-6-RTT: Test Q.755 [chars]: MTP Traffic test rtt [dec]/[dec]/[dec]

**Explanation** The MTP Traffic test to the specified point code has completed.

**Recommended Action** No action is required.

**Error Message**

%CS7PING-3-SEND: Test Q.755 [chars]: failed to send [chars] message

**Explanation** Software could not allocate resources required to run requested traffic test.

**Recommended Action** Retry request.

**Error Message**

%CS7PING-4-SEQ: Test Q.755 [chars]: received sequence [dec], expected [dec]

**Explanation** Traffic test verification received an out of sequence packet.

**Recommended Action** Verify network topology and configuration.

**Error Message**

%CS7PING-6-STAT: Test Q.755 [chars]: MTP Traffic test [dec]% successful ([dec]/[dec])

**Explanation** The MTP Traffic test to the specified signalling point has completed.

**Recommended Action** No action is required.

**Error Message**

%CS7PING-6-TERM: Test Q.755 [chars]: MTP Traffic test terminated.

**Explanation** Q.755 traffic test terminated.

**Recommended Action** No action is required.

**Error Message**

%CS7PING-6-TURN: Q.755 Test [chars]: MTP Traffic test requested

**Explanation** A remote signalling point requested a MTP traffic test

**Recommended Action** No action is required.

## CS7RF Messages

**Recommended Action****Error Message**

%CS7RF-3-BADCLIENT: Unknown RF client [int]

**Explanation** An RF message was received from an unknown RF client.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7RF-3-INTERR: NULL

**Explanation** An internal software error in ITP NSO has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7RF-3-MSGERR: NULL

**Explanation** An internal software error in ITP RF message handling has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7RF-3-NOMEMORY: Insufficient memory for [chars]

**Explanation** The requested memory allocation failed because of a low memory condition

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce other system activity. If this message persists, call your technical support representative for assistance.

## CS7ROUTE Messages

**Error Message**

%CS7ROUTE-3-BADLS: Error in route table file, line [dec], byte [dec]: no linkset with index [dec]

**Explanation** Error in route table

**Recommended Action** Correct the error in the route table file

**Error Message**

%CS7ROUTE-3-DUPLS: Error in route table file, line [dec], byte [dec]: linkset number defined twice

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file



**Error Message**

%CS7ROUTE-3-INFO: Error in route table file, line [dec], byte [dec]: expected info element

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-INFOLS: Error in route table file, line [dec], byte [dec]: expected linkset index

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-INSERT: Error loading route table file, line [dec]: cannot insert route [chars]/[dec]

**Explanation** Internal error inserting node into rtree

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7ROUTE-3-INSINFO: Error loading route table file, line [dec]: cannot activate route [chars]/[dec] linkset [chars] priority [dec]

**Explanation** Error in route table

**Recommended Action** Correct the error in the route table file

**Error Message**

%CS7ROUTE-3-LSIND: Error in route table file, line [dec], byte [dec]: linkset index too high

**Explanation** Attempt to load more than 1024 linkset definitions

**Recommended Action** ITP configuration is too big

**Error Message**

%CS7ROUTE-3-LSNUM: Error in route table file, line [dec], byte [dec]: expected linkset number

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-MASK: Error in route table file, line [dec], byte [dec]: invalid mask length [dec]

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-NOLS: Error in route table file, line [dec], byte [dec]: linkset [chars] does not exist

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-NOMASK: Error in route table file, line [dec], byte [dec]: expected mask

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-NOPRIO: Error in route table file, line [dec], byte [dec]: expected priority

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-NOQOS: Error in route table file, line [dec], byte [dec]: expected QoS value

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-PC: Error in route table file, line [dec], byte [dec]: linkset [chars] does not exist

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-PRIO: Error in route table file, line [dec], byte [dec]: invalid priority [dec]

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-QOS: Error in route table file, line [dec], byte [dec]: invalid QoS value [hex]

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file

**Error Message**

%CS7ROUTE-3-RECORD: Error in route table file, line [dec]: expected L/R record

**Explanation** Syntax error in route table

**Recommended Action** Correct the syntax error in the route table file.

## CS7SCCP Messages

**Error Message**

%CS7SCCP-5-BADGT: SCCP MGMT received message with invalid routing indicator. LS=[chars] DPC=[chars] OPC=[chars] GTI=[dec] RI=[dec]

**Explanation** SCCP MGMT received a message that was not supported.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-CLRGTTMEAS: Global GTT measurements were cleared by [chars]

**Explanation** The SCCP global GTT measurements were cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-GTTIFSPARSE: GTT file parse error: [chars]

**Explanation** A syntax or semantic error occurred while trying to read in the GTT config

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-GTTIFSPARSEWARN: NOTICE: GTT file parse warning: [chars]

**Explanation** A syntax or semantic error occurred while trying to read in the GTT config

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-GTTREPFALL: GTT Replace of file:[chars] failed. Previous database retained.

**Explanation** The file specified in the error failed to be bulk loaded to the ITP. Probably the result of a bad or corrupt file.

**Recommended Action** re-issue the **cs7 gtt replace-db** command with a valid file free of errors.

**Error Message**

%CS7SCCP-5-GTTTBL\_LOAD\_BEGIN: GTT load of [chars] begins.

**Explanation** The load process of reading a GTT table into main memory has begun.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-GTTTBL\_LOAD\_END: GTT load of [chars] has completed

**Explanation** The load process of reading a GTT table into main memory has finished.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-GTTTBL\_SAVE\_BEGIN: GTT save to [chars] has begun

**Explanation** The save process of a GTT table has begun.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-GTTTBL\_SAVE\_END: GTT save to [chars] has completed

**Explanation** The save process of a GTT table has completed.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-HOPCNT: SCCP received message with hop counter expired.  
 LS=[chars] MSG\_TYPE=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars]  
 GTA=[chars]

**Explanation** SCCP received a message with an expired hop counter.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-3-IFSERR: Cannot load gtt configuration - ifs\_copy\_file failed to load  
 '[chars]'

**Explanation** IOS failed to access the specified url for the gtt configuration.

**Recommended Action** Verify the url is correct and accessible

**Error Message**

%CS7SCCP-7-INTERR: Internal Software Error Detected: [chars]

**Explanation** An internal software error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTS. If you find none, write a DDTS for this problem.

**Error Message**

%CS7SCCP-5-INV\_GTI: SCCP received message with invalid Global Title Indicator.  
 LS=[chars] DPC=[chars] OPC=[chars] GTI=[dec] RI=[dec]

**Explanation** SCCP received message with an invalid or not supported Global Title Indicator.

**Recommended Action** Notify originator of message to correct the invalid or unsupported message.

**Error Message**

%CS7SCCP-5-INVMSGTYPE: SCCP received message for GTT of an invalid type.  
 LS=[chars] DPC=[chars] OPC=[chars] Type=[dec] Class=[chars]

**Explanation** SCCP received a message for GTT that was not supported.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-MTP3FAIL: MTP3 was unable to route the message, PC=[chars] SSN=[dec].  
 LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars] GTA=[chars]

**Explanation** MTP3 failed to route the message due to user misconfiguration or software error

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-NIMISMATCH: SCCP received msu with wrong network ind. in Called Party.  
 LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars] GTA=[chars]  
 NI=[dec]

**Explanation** SCCP received a message which contain a unsupported network indicator.

**Recommended Action** Notify originator of message to send supported network indicator in SCCP Called Party

**Error Message**

%CS7SCCP-5-NOAPPGRPMEM: SCCP translated message to app-group with no available members.  
 LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars] GTA=[chars]  
 SSN=[chars] AppGrp=[chars]

**Explanation** SCCP received a message that translated to a application group with no available members.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-NOCLDSSN: SCCP received message with no called party SSN present.  
 LS=[chars] MSG\_TYPE=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars]  
 GTA=[chars]

**Explanation** SCCP received a message that did not contain a SSN where it was required.

**Recommended Action** Verify that the source of the MSU is sending properly formatted messages.

**Error Message**

%CS7SCCP-5-NOSELECT: SCCP received message for which no selector is defined.  
 LS=[chars] MSG\_TYPE=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars]  
 GTA=[chars]

**Explanation** No matching selector entry was found in the CS7 GTT Selector table for the given translation.

**Recommended Action** Use the **cs7 gtt selector** command to add the referenced selector to the database.

**Error Message**

%CS7SCCP-5-NOTRANS: SCCP received message with no translation for GTA.  
 LS=[chars] MSG\_TYPE=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars]  
 GTA=[chars]

**Explanation** No matching GTA entry was found in the CS7 GTT GTA table for the given translation.

**Recommended Action** Use the **cs7 gtt gta** command to add the referenced GTA into to the table under the appropriate selector.

**Error Message**

%CS7SCCP-5-REASSUNSUPP: SCCP received message requiring reassembly.  
 LS=[chars] OPC=[chars] DPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars]  
 GTA=[chars] RI=[dec] SSN=[chars]

**Explanation** SCCP received a message that requires reassembly, which is not supported.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-SCCPRPTTERM: NOTICE: report terminated due to DB change

**Explanation** The last show command for SCCP/GTT related data was prematurely terminated because  
 a config change occurred during the reports execution

**Recommended Action** re-issue the SCCP/GTT show command that was terminated

**Error Message**

%CS7SCCP-5-SCCPAVL: SCCP at [chars] is available.

**Explanation** A SSA (subsystem available) message was received for SCCP. GTT translations destined for the SP will be processed

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-SCCPCONVFAIL: SCCP failed conversion to alternate instance.  
 LS=[chars] MSG\_TYPE=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars]  
 GTA=[chars]

**Explanation** SCCP received a message which was GT translated to an alternate instance. During the instance conversion a failure occurred.

**Recommended Action** Check the configuration of alias point-codes for the desired conversion

**Error Message**

%CS7SCCP-5-SCCPGTTDBCHANGED: SCCP GTT database changed during read

**Explanation** A read of cs7:ggt-tables/ggt\_default was aborted because the GTT database changed during the read.

**Recommended Action** Retry the read or save that was aborted. Do not make make GTT changes while the read or save is in progress

**Error Message**

%CS7SCCP-5-SCCPGTTREPSYNCFAIL: GTT config sync to slave failed

**Explanation** A failure has occurred while trying to copy the GTT running config to the slave processor

**Recommended Action** reset the slave processor and verify the GTT config is copied over after reset

**Error Message**

%CS7SCCP-5-SCCPGTTSYNC\_BEGIN: GTT config sync to slave has begun. GTT config commands are currently disabled.

**Explanation** An information message indicating that the GTT tables have begun the sync process to the slave RP. During this process no GTT config commands can be executed.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-SCCPGTTSYNC\_END: GTT config sync to slave has completed. GTT config commands are enabled.

**Explanation** An information message indicating tha the GTT tables have been copied to the slave RP sucessfully

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-SCCPNOMAP: SCCP failed to translate, no MAP entry.  
CDPA PC=[chars] SSN=[dec] LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars]  
NAI=[chars] GTA=[chars]

**Explanation** No mathcing GTT MAP enrty was found for the CdPA PC/SSN

**Recommended Action** Configure the PC/SSN in the GTT MAP table

**Error Message**

%CS7SCCP-5-SCCPPCCONG: SCCP failed to translate: DPC=[chars] is congested.  
LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars] GTA=[chars]

**Explanation** Translation resulted in new PC, but the PC is congested.

**Recommended Action** Check traffic load and distribution to given MAP



**Error Message**

%CS7SCCP-5-SCCPPCUNAV: SCCP failed to translate: DPC=[chars] is not available.  
LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars] GTA=[chars]

**Explanation** Translation resulted in new PC, but the PC is not available.

**Recommended Action** Ensure MTP3 has available route to the PC.

**Error Message**

%CS7SCCP-5-SCCPSSCONG: SSN is congested for the translated node, CDPA PC=[chars]  
SSN=[dec].  
LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars] GTA=[chars]

**Explanation** Translation resulted in new PC/SSN, but the SSN is congested.

**Recommended Action** Check traffic load and distribution to given MAP

**Error Message**

%CS7SCCP-5-SCCPSSUNAV: SSN is not available for the translated node, CDPA  
PC=[chars] SSN=[dec].  
LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars] GTA=[chars]

**Explanation** Translation resulted in new PC/SSN, but the SSN is unavailable.

**Recommended Action** Check the MAP's subsystem status

**Error Message**

%CS7SCCP-5-SCCPUNAV: SCCP is not available on CDPA PC=[chars] SSN=[dec].  
LS=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars] GTA=[chars]

**Explanation** Translation resulted in new PC/SSN, but a UPU has been received for the MAP.

**Recommended Action** Check the MAP's subsystem status

**Error Message**

%CS7SCCP-5-SSA: Subsystem [dec] at [chars] is available.

**Explanation** A subsystem available message was received for the specified SS.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-SSP: Subsystem [dec] at [chars] is not available.

**Explanation** A subsystem prohibited message was received for the specified SS.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-UNEQUIPSS: SCCP received message for invalid or unequipped SSN.  
 LS=[chars] OPC=[chars] DPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars]  
 GTA=[chars] RI=[dec] SSN=[chars]

**Explanation** SCCP received a message that was not supported.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-UNQUALIFIED: SCCP received message which caused an unqualified error.  
 LS=[chars] MSG\_TYPE=[chars] OPC=[chars] GTI=[dec] TT=[dec] NP=[chars] NAI=[chars]  
 GTA=[chars]

**Explanation** SCCP received a message which produced an unqualified internal software error.

**Recommended Action** Contact Cisco technical support.

**Error Message**

%CS7SCCP-5-UPU: SCCP at [chars] is unavailable.

**Explanation** A UPU (user part unavailable) message was received for the specified SP. GTT translations destined for the SP will fail.

**Recommended Action** No action is required.

**Error Message**

%CS7SCCP-5-UPU\_NOT\_EQP: No SCCP at [chars].

**Explanation** A UPU (user part unavailable) message with cause code of <<missing text>>

**Recommended Action** No action is required.

## CS7SMS Messages

**Error Message**

%CS7SMS-7-INTERR: Internal Software Error Detected: [chars]

**Explanation** An internal software error has occurred.

**Recommended Action** Report this occurrence to Engineering. Use Topic to search for a similar DDTs. If you find none, write a DDTs for this problem.

**Error Message**

%CS7SMS-3-MSCPROXYADDRFAIL: SMS GSMMAP msc-proxy-addr lookup failed. MSC PC [chars] is not defined in msc-proxy-addr table.

**Explanation** A SMS GSMMAP MSC proxy address lookup has failed.

**Recommended Action** This message informs the operator that the specified calling address MSC PC was not found in the SMS GSMMAP msc-proxy-addr table. Therefore, the MO-ForwardSM could not be built. Define this MSC PC in the msc-proxy-addr table to resolve this issue.

**Error Message**

%CS7SMS-3-SESSACTIVE: SMS [chars] session active, [chars] [IP\_address]:[dec]

**Explanation** An SMS SMPP or UCP session has become active.

**Recommended Action** This message informs the operator that the specified SMPP or UCP session is now operational. No operator action is required.

**Error Message**

%CS7SMS-3-SESSBINDFAIL: SMS [chars] session failed, [chars] [IP\_address]:[dec], reason:[chars]

**Explanation** An SMS SMPP or UCP session activation attempt has failed.

**Recommended Action** This message informs the operator that the specified SMPP or UCP session could not be activated. Modify the local or remote configuration to resolve the connectivity issue.

**Error Message**

%CS7SMS-3-SESSCONNECTFAIL: SMS connection attempt failed, ip=[IP\_address] port=[dec], reason:[chars]

**Explanation** An SMS SMPP or UCP session connection attempt has failed.

**Recommended Action** This message informs the operator that the specified SMPP or UCP session could not be activated. Modify the local or remote configuration to resolve the connectivity issue.

**Error Message**

%CS7SMS-3-SESSINACTIVE: SMS [chars] session inactive, [chars] [IP\_address]:[dec]

**Explanation** An SMS SMPP or UCP session has become inactive.

**Recommended Action** This message informs the operator that the specified SMPP or UCP session is no longer operational. If this event was not expected, check the remote application and network for connectivity issues.

## CS7TCAP Messages

### Error Message

%CS7TCAP-5-CLRTCAP: TCAP stats cleared by [chars]

**Explanation** TCAP stats cleared.

**Recommended Action** No action is required.

## CS7XUA Messages

### Error Message

%CS7XUA-5-ASPSTATE: ASP [chars] is [chars] in AS [chars]

**Explanation** An ASP entered or exited active state in an AS.

**Recommended Action** No action is required.

### Error Message

%CS7XUA-5-ASROUTESTATUS: Route [chars] in AS route [chars] is [chars]

**Explanation** An AS Route changed status.

**Recommended Action** No action is required.

### Error Message

%CS7XUA-5-ASSTATE: AS [chars] is [chars]

**Explanation** An AS entered or exited active state.

**Recommended Action** No action is required.

### Error Message

%CS7XUA-5-CLRASEVENT: AS event tables for [chars] cleared by [chars]

**Explanation** AS event tables cleared.

**Recommended Action** No action is required.

### Error Message

%CS7XUA-5-CLRASPEVENT: ASP event tables for [chars] cleared by [chars]

**Explanation** ASP event tables cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-CLRASPSTAT: ASP statistic tables for [chars] cleared by [chars]

**Explanation** ASP statistic tables cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-CLRASRTEVENT: AS route events for [chars] cleared by [chars]

**Explanation** AS route events cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-CLRASRTSTAT: AS route statistic tables for [chars] cleared by [chars]

**Explanation** AS route statistic tables cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-CLRASSTAT: AS statistic tables for [chars] cleared by [chars]

**Explanation** AS statistic tables cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-CLRPCEVENTS: Point code events cleared by [chars]

**Explanation** Point code events cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-CLRPCSTATS: Point code statistics cleared by [chars]

**Explanation** Point code statistics cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-CLRSGMATESTAT: SG mate statistics cleared by [chars]

**Explanation** SG mate statistics cleared.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-3-ENQUEUEFAIL: Could not enqueue event to [chars] event queue.

**Explanation** An internal software error occurred.

**Recommended Action** This problem is due to an internal software error. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7XUA-3-LISTFAIL: List [chars] operation failed for [chars]

**Explanation** A list operation failed, probably due to memory corruption

**Recommended Action** This problem is due to an internal software error. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7XUA-3-NOMEMORY: Insufficient memory for [chars]

**Explanation** The requested memory allocation failed because of a low memory condition

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce other system activity. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7XUA-3-NOPAKBUFFER: Could not get a [chars] packet buffer

**Explanation** Software failed to obtain a packet buffer from the global buffer pool

**Recommended Action** This problem is probably due to a lack of memory in the router. Either add more memory or reduce the number of CS7 interfaces. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7XUA-3-NOPROC: Could not create [chars] process

**Explanation** Insufficient internal resources available to create process.

**Recommended Action** This problem is due to an internal software error. Check available memory capacity on router. If any of these messages recur, call your technical support representative for assistance.

**Error Message**

%CS7XUA-3-NOTIMPLEMENTED: [chars] not implemented

**Explanation** The requested function is not implemented

**Recommended Action** This function is intended for a future release. Call your technical support representative for assistance.

**Error Message**

%CS7XUA-3-PROTOCOLERROR: [chars] error message with error code [chars] for ASP [chars]

**Explanation** A protocol error message was sent or received

**Recommended Action** This problem is due to an internal software error or an incompatibility with an M3UA or SUA peer. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7XUA-3-RTREEFAIL: Radix tree [chars] operation failed for [chars]

**Explanation** A radix tree operation failed, probably due to memory corruption

**Recommended Action** This problem is due to an internal software error. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7XUA-5-SCTPCONGESTABATE: [chars]([chars]) Level [dec] -> Level [dec]

**Explanation** An ASP or SG Mate has transitioned to a lower level of congestion.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-SCTPCONGESTONSET: [chars]([chars]) Level [dec] -> Level [dec]

**Explanation** An ASP or SG Mate has transitioned to a higher level of congestion.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-3-VARIABLEWRAP: [chars] wrapped

**Explanation** The value of a variable exceeded its maximum size

**Recommended Action** This problem is due to an internal software error. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7XUA-3-WAVLFAIL: AVL [chars] operation failed for [chars] [chars]

**Explanation** An AVL tree operation failed, probably due to memory corruption

**Recommended Action** This problem is due to an internal software error. If this message persists, call your technical support representative for assistance.

**Error Message**

%CS7XUA-5-XUAPCSSNSTATUS: XUA PC [chars] SSN [dec] is [chars]

**Explanation** An XUA PC/SSN combination changed status.

**Recommended Action** No action is required.

**Error Message**

%CS7XUA-5-XUAPCSTATUS: XUA PC [chars] is [chars]

**Explanation** An XUA PC or changed status.

**Recommended Action** No action is required.

## DCS7 Messages

**Error Message**

%DCS7-3-DATAINCON: [chars] RC=[dec]. Configuration information is inconsistent with RSP on VIP slot [dec]

**Explanation** RSP was unable to send configuration or status information update to the specified VIP, due to an internal software error.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.



**Error Message**

%DCS7-3-DCS7BADXDRIPC: Invalid IPC/XDR. IPC len/XDRs len [dec]/[dec]. IPC at [hex]

**Explanation** An internal software error occurred.

**Recommended Action** Copy the message exactly as it appears, and report it your technical support representative.

**Error Message**

%DCS7-3-DCS7BADXDRTYPE: Invalid XDR type. Type [dec]. XDR at [hex]

**Explanation** An internal software error occurred.

**Recommended Action** Copy the message exactly as it appears, and report it your technical support representative.

**Error Message**

%DCS7-3-DCS7DISABLE: Fatal error, slot [dec]: [chars] RC=[dec]

**Explanation** An internal software error has occurred because of an IPC problem between the LC and the RP.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-3-DCS7IPCERR: IPC error: [chars] [dec] [hex]

**Explanation** CS7 encountered an error with the IPC component for the specified slot. This may cause the configuration and status on the VIP to be inconsistent with the RSP. This is an internal software error.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-4-DCS7MSG: Invalid message received. Type [dec], field [chars], value [hex], length [dec]

**Explanation** An internal software error occurred.

**Recommended Action** Copy the message exactly as it appears, and report it to your technical support representative.

**Error Message**

%DCS7-2-DCS7\_OVERLENGTH\_XDR: Overlength DCS7 XDR message - len [dec] > [dec] from [chars]

**Explanation** An internal software error occurred preventing the sending of an DCS7 XDR message.

**Recommended Action** Copy the message exactly as it appears, and report it to your technical support representative.

**Error Message**

%DCS7-1-DCS7PERMMDIS: MTP3 offload has been permanently disabled on VIP [dec]

**Explanation** CS7 has exhausted all error recovery procedures on the specified VIP. All MTP3 links on the VIP have been shut down.

**Recommended Action** Investigate the cause of errors and correct them if possible. To re-enable the links and MTP3 offload on the VIP, issue the **cs7 offload mtp3 slot restart** command. Inform your support representative of this occurrence.

**Error Message**

%DCS7-4-DCS7RATE: [chars] rate limit status [dec]

**Explanation** An internal software error occurred.

**Recommended Action** Copy the message exactly as it appears, and report it to your technical support representative.

**Error Message**

%DCS7-1-DCS7RELDVIP: CS7 is reloading microcode on VIP in slot [dec]. Reason: [chars]

**Explanation** If the reason is fatal errors, it means CS7 has exhausted all error recovery procedures on the specified VIP. The IOS image will be reloaded on the VIP by simulating an OIR remove and insert.

**Recommended Action** Copy the error message exactly as it appears on the console or in the system log. Research and attempt to resolve the error using the Output Interpreter <https://www.cisco.com/cgi-bin/Support/OutputInterpreter/home.pl>. Also perform a search of the Bug Toolkit <http://www.cisco.com/cgi-bin/Support/Bugtool/home.pl>. If you still require assistance, open a case with the Technical Assistance Center via the Internet [http://www.cisco.com/cgi-bin/front.x/case\\_tools/caseOpen.pl](http://www.cisco.com/cgi-bin/front.x/case_tools/caseOpen.pl), or contact your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%DCS7-4-DCS7RESTART: Restarting MTP3 offload on VIP [dec] due to fatal error

**Explanation** MTP3 offload has been restarted on the VIP due to a fatal error reported in an earlier error message. All links on the VIP will be shut and re-started after the CS7 configuration has been downloaded to the VIP.

**Recommended Action** Issue CS7 show commands on the RSP to determine the current status. Inform your support representative of this occurrence.

**Error Message**

%DCS7-3-DCS7SEQ: Out of sequence. State [dec] Rcvd [dec]

**Explanation** The line card has received an out-of-sequence IPC from the RP.

**Recommended Action** Copy the message exactly as it appears, and report it to your technical support representative.

**Error Message**

%DCS7-1-DCS7SYNC: MTP3 offload configuration is incorrect on VIP in slot [dec]

**Explanation** CS7 has detected a loss of MTP3 configuration or status update message on the specified VIP. This indicates that the MTP3 data on the VIP (e.g. route, link, linkset etc) is inconsistent with the master copy on the RSP.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-3-DCS7XDRLLEN: Invalid XDR length. Type [dec][chars]. XDR/buffer len [dec] / [dec]

**Explanation** An internal software error occurred.

**Recommended Action** Copy the message exactly as it appears, and report it your technical support representative.

**Error Message**

%DCS7-5-INFO: [chars] [dec] [hex] [hex]

**Explanation** This is an informational message. If it occurs frequently, it can indicate a problem.

**Recommended Action** Monitor the system resources and status. If the message appears frequently, copy the message exactly as it appears, and report it your technical support representative.

**Error Message**

%DCS7-5-INFOG: [chars] [dec] [hex] [hex]

**Explanation** This is an informational message. If it occurs frequently, it can indicate a problem.

**Recommended Action** Monitor the system resources and status. If the message appears frequently, copy the message exactly as it appears, and report it your technical support representative.

**Error Message**

%DCS7-3-INTERR: Internal error - [chars] [dec] [hex]

**Explanation** An internal software error occurred.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-3-INTERRF: Internal error - [chars] [dec] [hex]

**Explanation** An internal software error occurred.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-3-INTERRG: Internal error - [chars] [dec] [hex]

**Explanation** An internal software error occurred.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-3-INTERRM: Internal error - [chars] [dec] [hex]

**Explanation** An internal software error occurred.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-3-INVALIDSTATE: Internal state error [chars] Slot [dec] Flags [hex]

**Explanation** An internal software error occurred. Linecard is in incorrect state

**Recommended Action** Copy the message exactly as it appears, and report it to your technical support representative.

**Error Message**

%DCS7-2-LCINITFAIL: Linecard could not initialize DCS7 forwarding

**Explanation** Initialization of the line card for distributed CS7 failed. This is most likely due to insufficient memory on the line card.

**Recommended Action** Reduce other system activity to ease memory demands. If conditions warrant, upgrade to a larger memory configuration.

**Error Message**

%DCS7-5-MTP3OFFLDBEG: MTP3 offload activation on VIP slot [dec] is in progress

**Explanation** MTP3 offload has been enabled on the VIP.

**Recommended Action** No action is required.

**Error Message**

%DCS7-6-MTP3OFFLDRESP: MTP3 offload has been [chars] on VIP slot [dec]. [chars]

**Explanation** MTP3 offload has been enabled on the VIP.

**Recommended Action** No action is required.

**Error Message**

%DCS7-2-NODEST: An internal software error occurred.

**Explanation** An internal software error occurred.

**Recommended Action** Copy the error message exactly as it appears on the console or in the system log. Research and attempt to resolve the error using the Output Interpreter <https://www.cisco.com/cgi-bin/Support/OutputInterpreter/home.pl>. Also perform a search of the Bug Toolkit <http://www.cisco.com/cgi-bin/Support/Bugtool/home.pl>. If you still require assistance, open a case with the Technical Assistance Center via the Internet [http://www.cisco.com/cgi-bin/front.x/case\\_tools/caseOpen.pl](http://www.cisco.com/cgi-bin/front.x/case_tools/caseOpen.pl), or contact your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%DCS7-2-NOHWIDB: An internal software error occurred.

**Explanation** An internal software error occurred.

**Recommended Action** Copy the error message exactly as it appears on the console or in the system log. Research and attempt to resolve the error using the Output Interpreter <https://www.cisco.com/cgi-bin/Support/OutputInterpreter/home.pl>. Also perform a search of the Bug Toolkit <http://www.cisco.com/cgi-bin/Support/Bugtool/home.pl>. If you still require assistance, open a case with the Technical Assistance Center via the Internet [http://www.cisco.com/cgi-bin/front.x/case\\_tools/caseOpen.pl](http://www.cisco.com/cgi-bin/front.x/case_tools/caseOpen.pl), or contact your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%DCS7-3-NOMEM: Malloc Failure. [chars]

**Explanation** A memory shortage has caused an internal software error.

**Recommended Action** Copy the message exactly as it appears, and report it to your technical support representative.

**Error Message**

%DCS7-2-NOROUTE: An internal software error occurred.

**Explanation** An internal software error occurred.

**Recommended Action** Copy the error message exactly as it appears on the console or in the system log. Research and attempt to resolve the error using the Output Interpreter <https://www.cisco.com/cgi-bin/Support/OutputInterpreter/home.pl>. Also perform a search of the Bug Toolkit <http://www.cisco.com/cgi-bin/Support/Bugtool/home.pl>. If you still require assistance, open a case with the Technical Assistance Center via the Internet [http://www.cisco.com/cgi-bin/front.x/case\\_tools/caseOpen.pl](http://www.cisco.com/cgi-bin/front.x/case_tools/caseOpen.pl), or contact your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%DCS7-2-NOROUTETABLE: An internal software error occurred.

**Explanation** An internal software error occurred.

**Recommended Action** Copy the error message exactly as it appears on the console or in the system log. Research and attempt to resolve the error using the Output Interpreter <https://www.cisco.com/cgi-bin/Support/OutputInterpreter/home.pl>. Also perform a search of the Bug Toolkit <http://www.cisco.com/cgi-bin/Support/Bugtool/home.pl>. If you still require assistance, open a case with the Technical Assistance Center via the Internet [http://www.cisco.com/cgi-bin/front.x/case\\_tools/caseOpen.pl](http://www.cisco.com/cgi-bin/front.x/case_tools/caseOpen.pl), or contact your Cisco technical support representative and provide the representative with the gathered information.

**Error Message**

%DCS7-3-OFFLDNOACK: [chars] MTP3 offload command acknowledgement not received from VIP [dec]

**Explanation** An enable/disable MTP3 offload command was not acknowledged by the specified VIP. The system will resend the command. The VIP offload operation may not be operating as expected.

**Recommended Action** Issue CS7 show commands to determine the status. If condition is unacceptable, issue the **cs7 offload mtp3 slot restart** command. Inform your support representative of this occurrence

**Error Message**

%DCS7-3-OOSEQ: Sequence error encountered on Slot [dec] - VIP Expected [dec], received [dec]

**Explanation** The CS7 software on the VIP encountered loss of message(s) from the RSP. This indicates the configuration and status on the VIP may be out of sync with that on the RSP. The configuration will be reloaded on the VIP.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-3-RSPIPCERR: IPC error. [chars] RC = [hex]

**Explanation** CS7 encountered an error with the IPC component on the RSP. This will prevent exchange of configuration and status information between the RSP and the VIP. This is an internal software error.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-5-SLMOFFLDALL: SLM offload [chars] on all VIP's is in progress

**Explanation** SLM offload has been enabled or disabled on all the VIP's.

**Recommended Action** No action is required.

**Error Message**

%DCS7-1-SLMOFFLDVIP: SLM offload has been [chars] on VIP slot [dec]. [chars]

**Explanation** SLM offload has been enabled or disabled on the VIP.

**Recommended Action** No action is required.

**Error Message**

%DCS7-3-VIPERR: [chars]. VIP in slot [dec]

**Explanation** CS7 encountered an abnormal error related to the speicified VIP. This will prevent exchange of configuration and status information between the RSP and the VIP. This is an internal software error.

**Recommended Action** No action is required. The ITP will automatically perform error recovery and re-start the links on the VIP. Issue CS7 show commands on the RSP to determine the current status. Copy the error message exactly as it appears on the console or in the system log, contact your Cisco technical support representative, and provide the representative with the gathered information.

**Error Message**

%DCS7-2-XDRINIT: Error initializing DCS7 xdr chunks

**Explanation** Initialization of the DCS7 xdr chunks could not be accomplished because of a low memory condition.

**Recommended Action** Reduce other system activitiy to ease memory demands. If conditions warrant, upgrade to a larger memory configuration.