AT&T

4ESS™ SWITCH

Product Release Document
4E17 Release 1 Generic

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Document No.: AT&T 234-090-171AC   Issue Number: 1   Date: Sept 1992

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About This Document

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1. Purpose

1.01   The purpose of the Product Release Document (PRD) is to provide customers
with information pertaining to the new features that are introduced in the *4ESS*™
switch. A PRD is written to cover the features introduced in quarterly generic releases
and full generic releases. This particular PRD provides information pertaining to the new
features included in the 4E17 Release 1 generic.

2. Scope

2.01   The Product Release Document provides customers with information not covered
in other *4ESS* switch documentation. It is not a replacement for other
documentation such as Standard AT&T Practices, Task Oriented Practices (TOP),
Maintenance Reference Handbooks, etc., that support the *4ESS* switch. The
information in this document is intended only for the introduction of the new 4E17
Release 1 features, not the long-term maintenance. Since other documentation is used
for the operation and maintenance of features after their introduction into the *4ESS*
switch, this PRD will not be reissued.

3. Intended Audience

3.01 This document is intended for people involved in testing, provisioning, maintenance, administration, and technical support of the *4ESS* switch. Feature managers, Integrated Test Network (ITN) personnel, field support, Technical Control Center (TCC), Product Engineering Control Center (PECC), and National Electronics System Assistance Center (NESAC) personnel are examples of some of the people who will use the PRD.

4. How to Use This Document

4.01 The 4E17 Release 1 generic contains 37 new features. Each chapter in this document provides information on one of these features. The chapters are arranged in numerical order according to feature number. The chapter titles are also the feature names.

4.02 The following is a list of the chapters contained in this document with a brief description of the feature covered in that chapter:

Chapter 1: *Software Reengineering Feature (059)*

The following software changes were made by this feature:

- All the software pertaining to the Peripheral Unit Control (PUC) and Mass Announcement System (MAS) frames was removed. (These frames are being removed in the 4E17 Release 1 generic.)

- The call register was grown from 128 to 256 words.

- The Stable Call Accumulating Register (SCAR) was removed.

- The formatter was modified to combine Transaction Capability Application Part (TCAP) Automatic Message Accounting (AMA) events. Instead of processing AMA data from the Network Control Point (NCP) as multiple events, the formatter will now process several consecutive events for the same call as one combined event.

- A new Trunk Subgroup block item was created to save 1A Processor real time.

Chapter 2: *Digital Signal Zero-A Link Interface Feature (081)*

This feature replaces the physical 56-kbps Signaling System No. 7 (SS7) links with 64-kbps links.

Chapter 3: *Performance Measurements (PFMS) Feature (082)*

This feature provides additional performance measurements pertaining to the Common Channel Signaling (CCS) network.

Chapter 4: *Preventive Cyclic Retransmission (PCR) on Signaling System 7 Links Feature (083)*

The Preventive Cyclic Retransmission feature provides a level 2 error correction method for long delay links, such as satellite links.

Chapter 5: *Recent Change of Protocol Timers and Parameters Feature (094/3190)*

This feature makes it possible to change the values of protocol timers and thresholds for the CCS7/SS7 Message Transfer Part (MTP) and the Signaling Connection Control Part (SCCP) using the AT&T 3B20D computer Database Management System (DMS) Recent Change forms.

Chapter 6: *Message Transfer Part Local Access and Transport Area Routing Feature (106/129J)*

This feature, which will not be used by all *4ESS* switches in the network, introduces the use of Alias Originating Point Codes (AOPCs) to route signaling information between Local Access and Transport Areas (LATAs) through an Interexchange Carrier (IEC). Although no new services are provided by this feature, it allows the Common Network Interface (CNI) to provide correct inter-LATA routing for Network Interconnect (NI) architectures.

Chapter 7: *SAFER Final Handling Announcements Feature—Part 2 (127b/3287)*

This feature provides the *4ESS* switch with the capability to play a customized announcement when final handling treatment is required on a Split Access Flexible Egress Routing (SAFER) call.

Chapter 8: *Command-Initiated Link Fault Sectionalization (CI-LFS) Feature (136)*

This feature provides maintenance personnel with the capability to manually perform tests of link facilities in order to sectionalize faults.

Chapter 9: *CCITT7 Overlap Signaling Feature (144a)*

Overlap address signaling is a CCITT signaling procedure that can be used to initiate call setup when the Initial Address Message (IAM) has incomplete address information.

Chapter 10: *Processor Outage (PRO) Feature (151a/3186)*

The Processor Outage feature provides a new method for recovering SS7 links from a processor outage condition and makes improvements in SS7 link availability and 3B20D computer real-time usage.

Chapter 11: *Completion of Transmission Path Feature (156)*

This feature eliminates the possibility of fraudulent use of the network by delaying the completion of the transmission path on data calls until the answer indication is received.

Chapter 12: *Handling Confusion Messages Feature (157)*

The Handling Confusion Messages feature allows a network switching element to notify other network switching elements when unrecognized Integrated Services Digital Network User Part (ISUP) messages are received. When the *4ESS* switch receives an unrecognized message on a call, it immediately sends back a confusion message (CFN) to the switch that sent the message. The sending of confusion messages helps traffic engineers detect and clear network problems.

Chapter 13: *Routing Based on Speech and 3.1-kHz Bearer Capability Feature (158)*

This is a feature that enables *4ESS* switches to differentiate between the routing of voice calls and the routing of 3.1-kHz audio calls.

Chapter 14: *Operations, Administration, and Maintenance Enhancements Feature (160)*

This feature provides operations personnel with new measurements that report irregular messages in the ISUP protocol and the capability to trap the irregular messages.

Chapter 15: *Emergency Alternate Routing (EAR) Feature (165)*

The Emergency Alternate Routing feature allows a business customer to redirect traffic from a primary location to an alternate location when the primary location is unable to receive calls.

Chapter 16: *Interchangeable Numbering Plan Area (INPA) Codes Feature (176/3026 and 3564)*

This feature provides the *4ESS* switch with the capability to distinguish between different numbering plans that may use the same format.

Chapter 17: *Egress Data Recording Feature (186a/3049)*

This feature provides the *4ESS* switch with the capability to send the identification of a direct-connect egress trunk and the egress (outpulsed) digits from the terminating switch to the recording switch in the AT&T Switched Network (ASN).

Chapter 18: *D-Channel Node Capacity Increase Feature (189/3083)*

This feature increases the memory size, call capacity, and real time of the CNI D-Channel node thereby allowing the *4ESS* switch to accommodate new ISDN features and applications.

Chapter 19: *Recording Capacity Improvement Feature (194/3085)*

This feature increases the AMA recording capacity of the Attached Processor System (APS) by deferring the formatting of certain call event data from peak load times to times when the processor is lightly loaded.

Chapter 20: *Intelligent Call Processing (ICP) Caller Information Forwarding (CINFO) Service Feature (208/3112)*

Intelligent Call Processing is an Advanced 800 service platform that supports cooperative call processing features between the AT&T network and a customer premises data base. The CINFO feature is one of the initial features supported on the ICP. It delivers Caller Entered Digits (CED) or Customer Data Base Provided Digits, which are collected in the AT&T network, to an ISDN Primary Rate Interface customer termination.

Chapter 21: *Modified Trunk Subgroup Data (MTD) Feature (211/0140)*

The MTD feature provides the *4ESS* switch with a near real-time monitoring mechanism for traffic on selected trunk subgroups (TSGs). This feature allows the Regional Network Management System (RNMS) to designate an additional 255 TSGs on which data can be collected. A modified set of the collected TSG data can be transmitted to direct-connect customers who need an on-line "picture" of their traffic.

Chapter 22: *D-Channel Node Layer 2 Error Handling Enhancement Feature (217a/3107)*

This feature changes the method the *4ESS* switch has been using to handle Layer 2 data link errors to the method recommended in the CCITT standards.

Chapter 23: *ISDN H_0 Channel Encoding Enhancement Feature (217b/3105)*

This feature changes the encoding of the H_0 Channel Identification information element (IE) to the method recommended in the CCITT standards.

Chapter 24: *AT&T 3B20D Computer SCSI Disk—Software Feature (219b)*

This feature accomplishes the second phase (software phase) of the conversion to 600 MByte Small Computer Systems Interface (SCSI) disks. The first phase was the installation of the 600 MByte SCSI disk drives during the 4E16 Release 2 generic. This phase changes the volume table of contents (VTOC) to utilize the full capacity of the SCSI disks.

Chapter 25: *Small Scale Adjunct Feature (221a)*

The Small Scale Adjunct (SSA) feature, an interim feature architecture that supports three post-answer call redirection features, was introduced in the *4ESS* switch in the 4E16 Release 4 generic. The SSA feature is included in the 4E17 Release 1 generic because a new method is being used in this generic release to identify SSA trunks.

Chapter 26: *Software Reengineering—Using Extended Call Store Feature (222)*

This feature makes additional program store memory available by moving some existing program store data to the Extended Call Store frame.

Chapter 27: *Software/Hardware Inhibits Feature (267)*

This feature provides the capability to limit CNI and Interprocess Message Switch (IMS) recovery actions in the 3B20D computer when hardware or software problems occur.

Chapter 28: *TCAP Parameter Tag Code Expansion Feature (284/3370)*

This feature increases the length of the TCAP parameter tags from 2 bytes to 4 bytes in order to meet the demand for new parameters to improve and expand customer features.

Chapter 29: *International 800 (I800) Network Routing Number (NRN) Exhaust Feature (294a/3332)*

This feature, which increases the number of Inbound I800 customer records that can be supported by the 196 NRN plan, was added to the *4ESS* switch in the 4E16 Release 3 generic. The 4E17 Release 1 generic contains Recent Change enhancements that give the *4ESS* switch the capability to turn off DEF screening for all 196 NRNs.

Chapter 30: *Network Switch Number (NSN) Expansion for RTNR Network Feature (303/3352)*

This feature increases the number of supported Network Switch Numbers from 151 to 167.

Chapter 31: *Alternate Signaling Transport Network (ASTN) 56-Kbps Capacity Increase Feature (306/3368)*

This feature upgrades the existing Alternate Signaling Transport Network (ASTN) with Link Access Procedure Balanced (LAPB) 56-kbps F-links. Implementing this feature provides additional signaling backup for services that rely on large TCAP messages.

Chapter 32: *Resize Number of Switches Count Feature (3213)*

This feature decreases the size of the number of switches count field in the Initial Address Message (IAM) Routing Information Indicator (RII) parameter.

Chapter 33: *Alternate Destination Routing 2 (ADR2) Feature (334/3446)*

The ADR2 feature allows the Centralized Alternate Destination Call Redirection (CADCR) and Ring No Answer (RNA) features to work on the No. 2 Direct Services Dialing (DSD) Network Control Point (NCP).

Chapter 34: *Change Under Minimum Billable Call Duration (UMCD) Threshold Feature (3448)*

This feature allows the under minimum billable call duration (UMCD) threshold to be changed to a value of less than 2 seconds.

Chapter 35: *Automatic Number Identification Table Expansion Feature (3460)*

This feature increases the number of allowable entries in the common platform adjunct trigger table from 140,000 to 256,000.

Chapter 36: *PAV/ANI Tables Expansion of PCP Release 2 Feature (349/3497)*

This feature increases the number of Automatic Number Identifications (ANIs) in the Positive Call Processing (PCP) Subscription and also increases the number of subaccount billing ANIs with preassigned values in the Direct Link Node (DLN).

Chapter 37: *Class of Service Expansion Feature (3534)*

This feature expands the ability of the *4ESS* switch to identify the type of service requested on international calls.

4.03 A list of abbreviations and acronyms, and their definitions, is included at the end of this document.

5. Product Safety Labels

5.01 There are three types of admonishments used in AT&T documentation: DANGER, WARNING, and CAUTION. This document contains admonishments in the form of CAUTIONS. A CAUTION indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided.

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Software Reengineering Feature (059)

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Software Reengineering Feature (059)

1

1. General

1.01 The Software Reengineering feature contains five subfeatures that are needed to accommodate the new 4E17 features. The subfeatures are as follows:

- Peripheral Unit Controller—Mass Announcement System Removal
- Call Register—Call Register Annex Restructure
- Stable Call Accumulating Register Restructure
- Combining TCAP AMA Events
- Call Code in Trunk Subgroup Characteristics

2. Peripheral Unit Controller—Mass Announcement System Removal

Feature Description

2.01 In generic 4E17, there is a change in the way the *4ESS*™ switch provides customer announcements. The Peripheral Unit Controller (PUC)—Mass Announcement System (MAS) is being removed from the *4ESS* switch during the generic 4E16 time frame as a prerequisite to the generic 4E17 retrofit. Barge-in announcements are used temporarily until the Service Circuit System is available. Because PUC and MAS have been removed, all software structures related to PUC and MAS are not included in generic 4E17. The procedures for PUC and MAS removal are

included in Task Oriented Practice (TOP) AT&T 234-153-040, *4ESS™ Switch, PUC, MAS, TMS, and TSI, Growth/Degrowth*. This removal allows for recovery of large amounts of call store and program store in the announcement handling (AH) and fault recovery functional areas. The planning and scheduling for this process is covered in AT&T 234-185-016, *4ESS™ Switch, Generic Retrofit and ODA Update Planning and Scheduling Guide, 4E16 to 4E17*.

Call Flow (Not affected)

Provisioning

2.02 For the PUC and MAS removal, the MAS hardware is being removed but the barge-in capability and the software structures needed to support the barge-in capability remain.

A. Office Data Assembler Forms Affected

2.03 The Office Data Assembler (ODA) forms affected by this feature are listed in Table 1-A.

Table 1-A. ODA Forms Affected

Form	Changes to Form
C1	PUC and MAS have been removed from the UNITYPE field.
C2	MNTR, PLBK, and RECT have been removed from the SC field.
D2	The traffic numbers of MAS*BIBP trunks have been assigned starting with traffic number 1. The base number of the trunk subgroup is still zero, but there is no trunk assigned to traffic number zero.
C4	The MAU and MAS entries have been removed from the EQU TYPE field.
401E	The MAS*RECT, MAS*PLBK, and MAS*MNTR service circuits have been removed.

Table 1-A. ODA Forms Affected (Contd)

Form	Changes to Form
403D 403E 403F 403G 403V	The DUP call type has been removed from these forms.
406C	A new field (CCPAS) has been added to this form to specify the amount of memory required for engineering customer calls to public announcement system capability. Currently, the amount of engineered memory is driven by the highest member number on ODA Form 408F. Since the Form 408F is being deleted and this information is still needed, a CCPAS field has been added to this form. See Figure 1-1. Population rules: Valid entries for CCPAS are blank or 1 to 8.
406E	This form contains dial-up port client data. The CTYPE entry of VSS (Voice Storage System) is no longer allowed. Values 00001 to 99999 are removed from the DUPID field.
407C	PUC has been removed from the UNITYPE field.
407D	PUC has been removed from the UNITYPE field and Table A.
407I 407L 407M	PUC and MAS have been removed from the UNITYPE field and the tables.
407N	This form has been deleted for the PUC unit assignment.
408A	This form has been deleted. It was used for MAS Announcement playback information.

Table 1-A. ODA Forms Affected (Contd)

Form	Changes to Form
408c	Fields PCHAN, PDN, FRING, and both MEMNs have been deleted. The VSS and direct producer inputs are removed from the Service Identification (SID) field. A TYPE field has been added to this form to specify whether the announcement is barge-in or provided by the SCS frame. A new field, UFH, (Figure 1-2) is added to this form to specify whether to use final handling. This field is used only for the Public Announcement System (PAS) vacant code announcement and the PAS inactive announcement. Two new fields, STRTT and STOPT, have been added to this form. These fields populate the new STRTT and STOPT items in XL4MASDATA. The ANNUM field continues to be used to specify the announcement number; however, the upper limit has been changed from 512 to 511 (ANNUM+IAID ANNUM=0 and IAID=0 are invalid).

Population Rules are as follows:

- Valid entries for TYPE are BI and SCS.

- Valid entries for UFH are blank, N, or Y.

- If SID is not equal to 9999901 or 9999902, then UFH must be blank.

- Valid entries for ANNUM are 1 to 511.

- ANNUM must be less than the value entered in the CCPAS field on 406C multiplied by 64.

- The only valid entry for VSSID is zeros.

- Valid entries for SID when TYPE is SCS are 0000000 to 9990000, 9999901 and 9999902.

- Valid entries for STRTT are blank or 0 to 23 to specify the hour, and 0 to 59 to specify the minute.

- Valid entries for STOPT are blank or 0 to 23 to specify the hour, and 0 to 59 to specify the minute.

Table 1-A. ODA Forms Affected (Contd)

Form	Changes to Form
408D	The VSSID (Voice Storage System Identity) field is always zero. The VSS and direct producer inputs are removed from the SID field. The SID entries of 0000000 to 9990000, 9999901 and 9999902 are for use with SCS. The CTN field is added to this form to specify the cut-through number. CTN is blank or a 10-digit number.
408E	The VSS and direct producer inputs are removed from the SID field. The SID entries of 0000000 to 9990000, 9999901 and 9999902 are for use with SCS.
408F	This form has been deleted. It was used to populate the OD4MAMNUSE structure.

```
BLCNT    ___ .        CAD    ..    DSIGFNUM  _____   CAD __
3    7   14  16              80    3       10   14 18      80

CAPACITY _____      CAD    ___   DSTSTP  __  .. .     CAD __
3       7  14 19            80    3    8   14  17          80

CCISOSO  _____      CAD    ___   DXL   _____        CAD
3       9  14 17             80    3 5   14  17           80

CCPAS              CAD             EIARB   ___  ..      CAD __
3   7   14         80              3   7   14  17          80

CNIINBF  _____       CAD    ___   HIRCB  __           CAD _
3       9  14 18             80    3    7   14            80
```

Figure 1-1. ODA Form 406C

```
4ESS 408c TG-4:            PAS ANNOUNCEMENT
4E17>                           4 ESS
                     4E17 AND LATER GENERIC PROGRAMS


                     ESS UNIT _____  _____  _____

FORM CODE  8C                      VSSID 00000  SID _  _____
           1  2                            4    8   10      16

TYPE _____ , UFH ___   LENGTH _____   PLAYS _____
18  21 23 25       27          33  35           37  38

ANSWR  ___      ANNUM _____
       42             48   50

CAREA  ___,     CPOS ___    ANSEP  _____
       52            54            57  58

SSI  _____    SAN _____                       CAD __
     60   63        65   68                               80

START  DATE

STRTM  _____        STRTD _____    STRTY _____
18   22 24   25              26  27          28   29

STRTT _____ : _____ STOPT _____ : ___   AD __
      40 41 42 43         45  46 47  48      80

                SPECIAL  HANDLING

ADSI  _____     ADFHT _____    ANNUM _____         AD __
18  21 23   24           26  28          34  36              80
```

Figure 1-2. ODA Form 408C

B. Recent Change Forms Affected

2.04 The Recent Change forms affected by this feature are listed in Table 1-B.

Table 1-B. Recent Change Forms Affected

Form	Changes to Form
300 301 302 303 304	The DUP calltype has been removed from these forms.
601 602 603	These forms are used for dial-up port client data. The CTYPE entry of VSS (Voice Storage System) is no longer allowed. The values of 00001 to 99999 have been removed from the DUPID field.
604 605 606	These forms define PAS announcements. The TYPE field has new entries. A new field, UFH, is added to Forms 604 and 605 to specify whether to use final handling. A typical location for the UFH field is shown in Figure 1-3. The Voice Storage System Identity (VSSID) field is always zero. The VSS and direct producer inputs have been removed from the SID field. The SID entries of 0000000 to 9990000, 9999901 and 9999902 are used with SCS. The SSTRTT and SSTOPT field names have been changed to STRTT and STOPT, respectively. The STRTT and STOPT fields populate the STRTT and STOPT items in XL4MASDATA. The ASTOPT, PDN, PCHAN, FRING, and both MEMN fields have been removed. The STANDBY header has also been removed. The population rules for these forms are as follows: ■ Valid entries for TYPE are BI and SCS. ■ Valid entries for UFH are blank, N, or Y. ■ If SID is not equal to 9999901 or 9999902, then UFH must be blank. ■ ANNUM must be less than the value contained in OD4NUMMAPT multiplied by 64. ■ The upper range for ANNUM is changed from 512 to 511. ■ The only valid entry for VSSID is zeros.

Table 1-B. Recent Change Forms Affected (Contd)

Form	Changes to Form
607 608	These forms are used with PAS with Televote. The VSSID field is now blank or zeros. The VSS and direct producer inputs have been removed from the SID field. The SID entries of 0000000 to 9990000, 9999901 and 9999902 are for use with the Simplex Controller Section.
610 611 612	These forms are used for PAS with cut-through. The only valid entry for the VSSID field is zeros. The VSS and direct producer inputs have been removed from the SID field. The SID entries of 0000000 to 9990000, 9999901 and 9999902 are for use with SCS. The CTN entry now populates the CTN item in the HT4CUTTHRU translator.
700 701	PUC and MAS entries have been removed from the UTYN and SUBMEM fields.

```
# Form 604      ADD A PAS ANNOUNCEMENT
  4E17>


RC:PAS;NEW;OPT(ANN);__: TYPE __' UFH   ' VSSID __'  SID __'

ORNU _____'

START TIME

   STRTI ___:___'

STOP TIME

   STOPT ___:___'

LENGTH ___'  PLAYS ___'

ANSWR ___'  ANNUM __.'

CAREA ___'  CPOS ___' ANSEP __ '
```

Figure 1-3. Recent Change Form 604

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C. Verify Forms Affected

2.05 The Verify forms affected by this feature are listed in Table 1-C.

Table 1-C. Verify Forms Affected

Form	Changes to Form
1f, 11b	The MAS*RECT, MAS*PLBK, and MAS*MNTR service circuits have been removed.
11d	Outgoing Signaling Characteristic (OSC) values of MASMNTR, MASPLBK, and MASRECT have been removed.
3a, 3b, 3c, 3d, 3e, 3f, 3g, 3v, 3w, 3z, 3ab, 13f, 13m	The DUP calltype has been removed.
16a, 6a	The CTYPE entry of VSS has been removed. Values 00001 to 99999 have been removed from the DUPID field.
16d, 6f	For the input message, the MEMN option has been removed. The only valid input for VSSID is zero. For SID, the direct producer range of inputs is removed; VSS is replaced by SCS. For the output message, the TYPE field output is either BI or SCS. A new field, UFH, has been added to the output message. This field contains N or Y when SID is 9999901 or 9999902; otherwise, it is blank. See Figure 1-4. The SSTRTT and SSTOPT field names are changed to STRTT and STOPT, respectively. The STRTT and STOPT fields are populated from the STRTT and STOPT items in XL4MASDATA. The ASTOPT, PDN, PCHAN, FRING, STRTM, STRTD, STRTY, STOPM, STOPD, STOPY, ASTOPM, ASTOPD, ASTOPY, and both MEMN fields have been removed. The time and date headers have also been removed.
6e	The MEMN and PLAYBACK CHANNELS fields have been removed.
6g	The MEMN field has been removed from the cut-through output message.
6h	The MEMN field has been removed from the televote output message.

```
OUTPUT:                    VERIFY 6f


VER:PASANN(OPT,ANN);----:


TYPE---,   UFH - ,  VSSID -----,  SID -------,


STRTT --:--,  STRTM --,  STRTD --,  STRTY --,


STOPT --:--,


LENGTH ___,      PLAYS --,   ANSEP ---,


ANSWR -,      ANNUM ---,
```

Figure 1-4. Verify Form 6f

Recording (Not affected)

Network Management

2.06 There are six network management PIDENTS affected by this feature. They involve changes in the following:

■ Redefining items and changing calls to new subroutines

■ Redefining the location for retrieving cut-through numbers.

Maintenance/Troubleshooting

2.07 With the removal of the PUC and MAS hardware, both the MAS announcement status table and the MAS announcement registers are deleted. The MAS announcement phasing table, however, is not deleted. The phasing table layouts are changed and the phasing table is used by the Improved Service Announcement and Information Collection (ISAIC) MAS Replacement feature.

2.08 Routines are deleted from the audit system that result in the deletion of audits 64, 66, 67, 68, 69, 70, and 71. The deleted routines are as follows:

■ Mutilation Detection (MD) routines that validate PUC and MAS related structures

■ Analysis and neutralization routines that correct PUC and MAS related structures

■ Printing routines and administrative items and tasks for the PUC and MAS feature.

2.09 All diagnostics and fault recognition logic associated with the PUC and MAS hardware are deleted. A number of ODA, Recent Change, and Verify forms are also affected.

Transition Considerations

2.10 The Peripheral Unit Controller (PUC)—Mass Announcement System (MAS) is being removed from the *4ESS* switch during the generic 4E16 time frame as a prerequisite to the generic 4E17 retrofit. Barge-in announcements are used temporarily until the Service Circuit System is available. Because PUC and MAS have been removed, all software structures related to PUC and MAS are not included in generic 4E17. The procedures for PUC and MAS removal are specified in Task Oriented Practice (TOP) AT&T 234-153-040, *4ESS™ Switch, PUC, MAS, TMS, and TSI, Growth/Degrowth*. The planning and scheduling for this process is covered in AT&T 234-185-016, *4ESS™ Switch, Generic Retrofit and ODA Update Planning and Scheduling Guide, 4E16 to 4E17*.

Input/Output Manual Pages (Not affected)

3. Call Register—Call Register Annex Restructure

Feature Description

3.01 To provide for new improvements, new register usage techniques, and additional space, the call register has been grown from 128 to 256 words. The Integrated Services Digital Network (ISDN) protocols Q.931, Integrated Services Digital Network User Part (ISUP), International ISDN User Part (INUP), and Direct Services Dialing (DSD) capability have created the flexibility to pass a large variety of information in the network. Systems Engineering has used this flexibility to create new features that generate, pass, and receive a variety of information. For example, a large increase has occurred in the generation of number information in recent generics. Examples of this would be numbers for credit card, subaccount, commercial credit card, and personal identification number.

3.02   The Call Register (CR), the Trunk Maintenance Register (TMR), and the dummy TMR have been increased from 128 words to 256 words. The CR annex (CRANX) is deleted and its ISDN data is stored in the CR in an area called CR ISDN Block (CRIB). The CRIB is a fixed size block of the CR. The message size is the major factor in determining CRIB size (87 words). The size of the CRIB is determined in the CPREGE library. Eight words of data that used to be stored in the Stable Call Accumulating Register (SCAR) are now stored in the CR.

3.03   The ISDN protocols have a limit for the maximum size of a message (272 bytes in ISUP, 256 bytes in Q.931).

3.04   This restructure also includes changing the CR seize macro to a subroutine and adding space in the front of the CR for an additional timer and states. This is done partially in preparation for the 1B Processor.

3.05   Certain features and improvements in the 4E17 generic require that the CR grow from 128 to 256 words. Growing the CR also affects the TMR and the Non-Call Associated Temporary (NCAT) Signaling Connection register. The TMR has grown to 256 words. The size of the NCAT Register (NR) is already 256 words, but the format of the last 128 words has been changed to match the new CR format.

3.06   The new strategy for using the CR ensures that the CR lasts for several future generics. The ISDN protocols have created the flexibility to pass a large variety of information in the network, and Systems Engineering has used this flexibility to create new features that create, pass, and receive a variety of information.

3.07   In preparation for the 1B Processor and other features, the block words 0-7 of the CR are increased to 0-9 to add another timer (one word) and to allow for another service circuit state. This area is common with the TMR which is also affected. Some other fields have also been moved to create this bigger block in the beginning of the CR/TMR.

Call Flow (Not affected)

Provisioning

3.08   The CR annex has been removed. The information previously contained in this structure is moved to the CR. The Trunk Maintenance Register is related in size to the CR; therefore, it also has increased in size. For several structures, the size of the

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CR has been increased from 128 to 256 words, and the alignment variable has been changed to 256. The structures affected are as follows:

- OD4MINCR, OD4NUMCR, OD4MAXCR
- OD4MINTMR, OD4NUMTMR, OD4MAXTMR
- OD4MINDTMR, OD4NUMDTMR, OD4MAXDTMR.

3.09 Several additional structures and associated symbols have been removed.

A. ODA Forms Affected

3.10 The CRANNEX field has been removed from the 406C from.

Recording (Not affected)

Network Management (Not affected)

Maintenance/Troubleshooting

A. System Integrity

3.11 The new 128 words of the TMR and dummy TMR will not be used in the near future; therefore, only the current 128 words are printed by the AUDIT_PRINT routine. In order to save time, this routine has been modified to scan only the first 128 word for printing.

3.12 Audits 93 and 94 have been removed from AUDSMDS6. A special action routine, an analysis, link lists, and subroutines associated with CRANX have been eliminated. All subcatalogs and text phrases associated with the CRANX have been deleted from the input and output.

Transition Considerations

A. Turn On/Off Mechanism

3.13 This feature is turned on automatically by software deployment.

Input/Output Manual Pages (Not affected)

4. Stable Call Accumulating Register Restructure

Feature Description

4.01 To save 1A Processor call store, program store, and real time, the Stable Call Accumulating Register (SCAR) has been deleted. Automatic Message Accounting (AMA) data is now stored in the CR during the setup state and then sent to the 3B Processor at "out complete time" in a new event. Post setup AMA data is sent to the 3B Processor in events when the data is available.

Call Flow (Not affected)

Provisioning

4.02 The SCAR has been removed. The information previously contained in this structure is moved to the CR. The Trunk Maintenance Register is related in size to the CR; therefore, it also has increased in size. For several structures, the size of the CR has been increased from 128 to 256 words, and the alignment variable has been changed to 256. The structures affected are as follows:

- OD4MINSCAR, OD4NUMSCAR, OD4MAXSCAR

- OD4MINTMR, OD4NUMTMR, OD4MAXTMR

- OD4MINDTMR, OD4NUMDTMR, OD4MAXDTMR.

4.03 Several additional structures together with associated symbols have been removed.

A. ODA Forms Affected

4.04 The SCAR field has been removed from the 406C form.

Recording

4.05 Since the SCAR no longer exists, the entire SCARPRIM PIDENT is deleted. This includes several subroutines.

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4.06 The layout of the AMA part of the CR is in BILLIB. The names of the items do not change, and they are still prefixed with BR4_S. Much of the data that used to be in the SCAR is now in the AMA part of the CR. This data is either already stored in the CR or it is available from another location when it is needed. Instead of reading or writing data from or to the SCAR, AMA reads or writes data from or to the AMA part of the CR.

Network Management (Not affected)

Maintenance/Troubleshooting

4.07 Audits 81, 82, and 83 have been removed from AUDSMDS6, and all AI's and AII's associated with the SCAR are deleted from the audit system libraries. Several routines related to SCAR have been eliminated.

Transition Considerations

A. Turn On/Off Mechanism

4.08 This feature is turned on automatically by software deployment.

Input/Output Manual Pages (Not affected)

5. Combining TCAP AMA Events

Feature Description

5.01 When Transaction Capabilities Application Part (TCAP) signaling is used for Software Defined Network (SDN) Direct Services Dialing Capability (DSDC) records, most of the AMA data from the Network Control Point (NCP) is received at the same time, but is sent to the 3B Processor in multiple events. The formatter has been modified so that if it gets several consecutive events for the same call, it processes them as one combined event. This saves 3B Processor real time because the event overhead is reduced, that is, the formatter gets the recording register address only once.

Call Flow (Not affected)

Provisioning (Not affected)

Recording

5.02 The formatter has been modified so that if it gets several consecutive events for the same call, it processes them as one combined event. This saves 3B Processor real time because the formatter gets the recording register address only once and, as a result, the event overhead is reduced.

Network Management (Not affected)

Maintenance/Troubleshooting (Not affected)

Transition Considerations (Not affected)

Input/Output Manual Pages (Not affected)

6. Call Code in Trunk Subgroup Characteristics

Feature Description

6.01 To determine the call code of a record, the 1A Processor code looks at several Trunk Subgroup (TSG) block items. This feature creates a new TSG block item that is populated during the ODA development and is based on other TSG block items. The rules for populating this TSG block item are such that the AMA code does not need to look at any other ODA data to determine the call code, thus saving 1A Processor real time.

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Call Flow (Not affected)

Provisioning

6.02 A new field, XL4TS_CCODE, is populated internally by recent change. Since this is done internally, the recent change forms are not affected.

Recording

6.03 In the 4E17 generic, the rules for populating the TSG block are such that the AMA code can determine the call code without looking at other ODA data. In previous generics, the DETERMINE_CALLCODE subroutine switched on the Far End Network Class (FENCLASS) in the TSG block and then did FENCLASS specific code to determine the call code. DETERMINE_CALLCODE has been changed to switch on a new TSG block field, XL4TS_CCODE, instead of XL4TS_CLASS. The values of XL4TS_CCODE are determined so that the DETERMINE_CALLCODE subroutine does not have to check any other TSG block data.

Network Management (Not affected)

Maintenance/Troubleshooting (Not affected)

Transition Considerations

A. Turn On/Off Mechanism

6.04 This feature is turned on automatically by software deployment.

Input/Output Manual Pages (Not affected)

Digital Signal Zero-A Link Interface Feature (081)

2

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Digital Signal Zero-A Link
Interface Feature (081)

2

1. Feature Description

1.01　The Digital Signal Zero-A (DS0-A) Link Interface feature provides a new link interface board for Local Exchange Carrier (LEC) Signaling System No. 7 (SS7) data rates. The physical 56-kbps SS7 links will be replaced with 64-kbps links. The additional 8-kbps capacity will be used to perform facility maintenance, thus allowing a maintenance center to sectionalize faults on connecting link circuits.

1.02　Presently, the link interface is composed of the Link Interface (LI) TN916 (LEC only) circuit pack, the Digital Service Adapter (DSA) TF9, and the Data Service Unit (DSU)/Channel Service Unit (CSU). Implementation of this feature eliminates the need for DSU/CSU and DSA TF9. The DS0-A signal makes a direct connection to a DS0 data port in the channel bank or T1 multiplexer. In addition, each DS0-A link interfaces with the Building Integrated Timing Supply (BITS) composite clock signal. Figures 2-1 and 2-2 illustrate two configurations of the new interface link.

DS0-A Signal

1.03　The supervisory (control) bit in the DS0-A format is used to indicate the presence of either SS7 data (bit 8 = 1) or network control codes (bit 8 = 0). The supervisory bit identifies the remaining 7 bits as a control code. This code is used to test the digital channel (through the activation of loopbacks, for example) or to indicate the state of the DS0-A facility equipment.
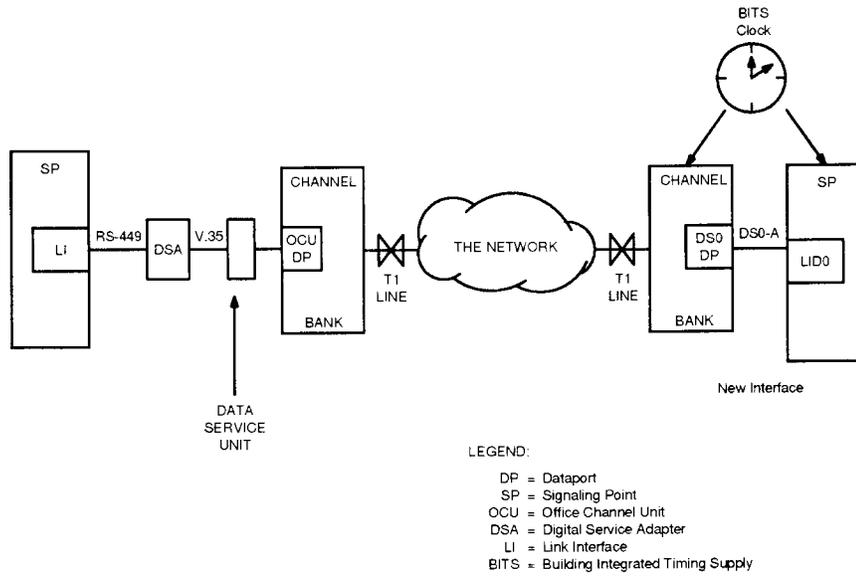
Figure 2-1. Interface to the SS7 Signaling Link

1. LOCAL DS0 LINK INTERFACE LOOPBACK
2. DS0 DATAPORT "LINE" LOOPBACK
3. DS0 DATAPORT "DROP" LOOPBACK
4. DS0 DATAPORT "LINE" LOOPBACK
5. DS0 DATAPORT "DROP" LOOPBACK
6. LATCHING NETWORK ELEMENT INTERFACE LOOPBACK
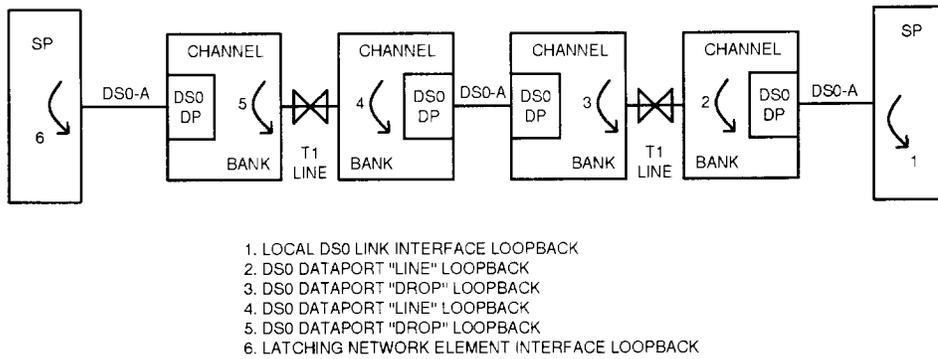
tpa 786412/01

Figure 2-2. DS0-A to DS0-A Interface

2. Call Flow (Not affected)

3. Provisioning

Physical Requirements

3.01 The new DS0-A interface link circuit pack LID0 (TN1669) plugs into the current link interface slot. It is also compatible with all common existing node equipment.

Synchronization

3.02 The following two levels of bit synchronization are required for digital transmission:

■ Both the transmitter and receiver operate at the same 64-kbps rate (must be able to recognize the start and end of each bit).

■ The transmitter and receiver achieve proper alignment by identifying the beginning and end of a byte.

3.03 Synchronization is provided via a composite clock signal (64-kHz, 5/8 duty cycle, Bipolar Return-To-Zero). Each eighth pulse violates the bipolar rule. Therefore, the basic waveform provides the bit clock information while the bipolar violation provides the byte clock information. The data is transmitted at the leading edge of the bit clock and is sampled by the receiver at the trailing edge of the bit clock.

Composite Clock

3.04 The composite clock signal is transmitted over a balanced wire pair to the receiving equipment in the office.

3.05 The BITS provides an external composite clock signal from which the bit and byte clock signals are derived. Each link interface receives a single composite clock input and derives the bit and byte clock signals internally.

3.06 The two configurations that distribute the composite clock signal to the DS0-A Link Interface are as follows:

■ Directly from the composite clock generator as illustrated in Figure 2-3

■ From a timing distributor [for example, the AT&T Synchronization Distribution Expander (SDE)] as illustrated in Figure 2-4.
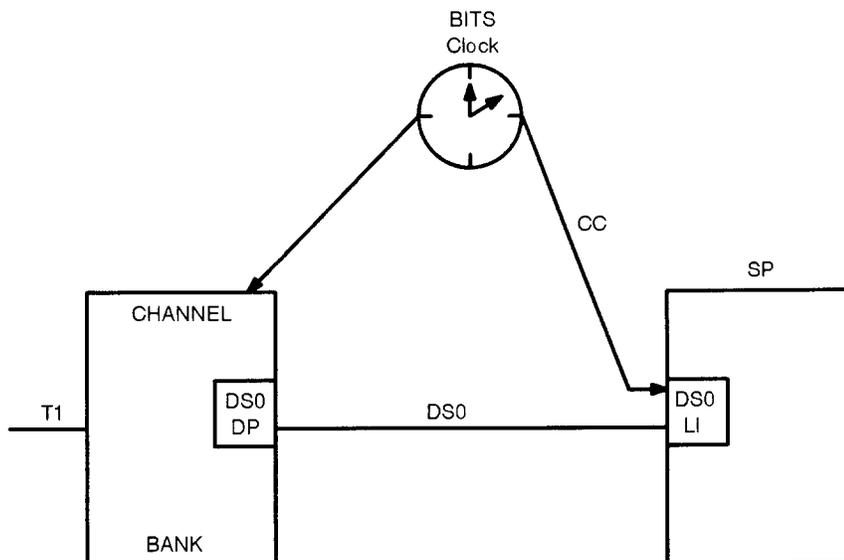
Figure 2-3. Composite Clock Distribution from BITS
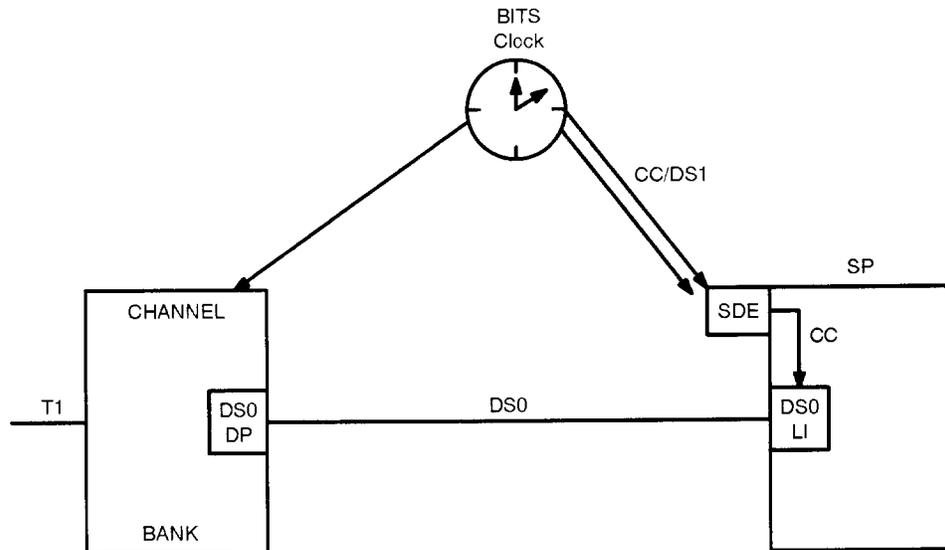
Figure 2-4. SDE Composite Clock Distribution

Recent Change and Verify

3.07 The maintenance craft access the Common Network Interface (CNI) Database Management System (DMS) to grow a new link node or change an existing link node. This growth or change affects two internal SP data bases — Equipment Configuration and Link Node.

A. Equipment Configuration Data

3.08 Craft personnel use the Maintenance Cathode Ray Tube (MCRT) terminal to call up Display Page 199, which is used to invoke recent change and verify in the Equipment Configuration Data (ECD).

▧▷ NOTE:
Refer to Task Oriented Practice (TOP) AT&T 234-153-055, *4ESS™ Switch, Common Network Interface, Growth/Degrowth* for detailed procedures to log onto DMS and to access the Unit Control Block (UCB) Form Display Page 199.

B. Link Node Data

3.09 After updating the UCB Form, craft personnel must identify the FACILITY ACCESS TYPE and the LINK INTERFACE TYPE using the DMS (lkdata) Form (Figure 2-5). Valid entries for FACILITY ACCESS TYPE are as follows:

- **ds0a** (LID0 DS0-A equipped links)

- **Modem** (non-DS0-A equipped links).

3.10 Valid entries for the LINK INTERFACE TYPE field (which identifies the link interface hardware board) are as follows:

- **li** (nonencrypted Link Interfaces)

- **li4s** and **lid0**.

LINK INTERFACE TYPE is set to **lid0** for LID0 links. Refer to TOP AT&T 234-153-055 for detailed information to populate office-dependent link data files.

```
***** CNI DATA MANAGEMENT SYSTEM ***** DATE:  04/18/91  TIME:  12:27 *****
FUNCTION:  lkdata  ACTION:  add  ORDER:12Y041891001      OFFICE:  NPVLILIH2MD

                              LINK INFORMATION

                    ITEM:              001
                    GROUP - MEMBER:    36 - 04
                    LINK TYPE ID:      ccs7


LINK SPEED            56000          TRANSMISSION MEDIUM     terrestrial
ENCRYPTED            no             MATE GROUP - MEMBER     36 - 04
FAR END FUNCTION     32767          FACILITY ACCESS TYPE    ds0a
FAR END CLLI         chcgilclms2    COMBINED LINK SET       254
LINK SET             003            LINK INTERFACE TYPE     lid0
SIGNALING LINK CODE  15             FAR END POINT CODE      254259001
LINK TYPE            a              LINKSET ASSOCIATED PC   000000000
ERROR CORRECTION MODE   basic       MAJOR STATE             unequipped
```

Figure 2-5. Sample DMS (lkdata) Form

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Hardware Dependencies

7.01 This feature requires a new link interface circuit pack—LID0 (TN1669). In addition, a composite clock signal must be connected to each link node that is equipped with the new link interface circuit pack.

Turn On/Turn Off Mechanism

7.02 This feature is turned on by hardware and software deployment.

8. Input/Output Manual Pages (Not affected)

Performance Measurements (PFMS) Feature (082)

3

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Performance Measurements (PFMS) Feature (082)

3

1. Feature Description

1.01 The Performance Measurement (PFMS) feature for the *4ESS*™ switch is a report of eight performance measurements. The PFMS feature is the collecting and reporting of a set of measurements related to the performance of the processors and equipment-handling messages transmitted and received by the Common Channel Signaling (CCS) network. These measurements, which are used for CCS network planning, design, engineering and performance, involve processor real time, buffer occupancy and utilization, and system delays.

1.02 Refer to the AT&T 256-090-171, *Common Network Interface (CNI) Manual,* for a high-level description of measurements and associated reports.

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting

Measurements

6.01 Associated with the eight new counts in the PFMS are the measurement types defined as follows:

■ Interprocess Message Switch (IMS) user node (IUN): a per-node measurement originating in a ring node other than a ring peripheral controller

■ Link Node 7 (LN7): a per-link measurement originating in a link node supporting Signaling System No. 7 (SS7) link

■ Node Processor (NP): a per-node measurement originating in any ring node.

6.02 The following lists the eight PFMS requirements with their descriptions:

■ TDPRCNG0

This is the time, in milliseconds, the node spent in the normal no-overload state.

■ TDPRCNG1

This is the time, in milliseconds, the node spent in the first level of overload. USER1 interrupt (link data available) operates in a clocked schedule mode for small scale integration (SSI) IUNs. The clocked schedule has the effect of reducing overhead (thus freeing real time) at the expense of increased delays. In this mode, the interrupt remains turned off except when enabled by the overload monitor control mechanism.

■ TDPRCNG2

This is the time, in milliseconds, the node spent in the second level of overload. Both USER1 and End-of-Message interrupts operate in a clocked schedule mode for SSI IUNs.

■ TPROCOTG (LN7)

This is the cumulative duration of node processor outage (processor outage refers to an out-of-service node processor). This count, measured in milliseconds, is a CNI accumulation of IMS measurements OOSAUT, OOSCFGT, and OOSMNT.

OOSAUT (NP) is the duration of automatic out-of-service. This is the cumulative time a node is in this state.

OOSCFGT (NP) is the duration of out-of-service due to ring configuration. This is the cumulative total time a node is in this state.

OOSMNT (NP) is the duration of manual out-of-service. This is the cumulative total time a node is in this state.

■ MSUSAMPL (LN7)

This is the number of message signal units (MSUs) sampled for link output delay. Link output delay is the interval beginning when the message has been placed in the outgoing signaling link transmission buffer, and ending when the last bit of the message has been transmitted on the outgoing signaling link.

During each 10-second time interval, every SS7 link node samples the first outgoing MSU at the time it is placed in the link interface (LI) transmit buffer. If an MSU is not transmitted during the interval, no action is taken. A 10-second interval where no sample is taken is counted as 0; otherwise, the interval is counted as 1. The collected 5-minute value is always 30 or less.

■ OCCUPMSU (LN7)

This is the link transmission buffer average occupancy based on 10-second scans. Occupancy is defined as the buffer contents, measured in MSUs, immediately before a sampled MSU is placed in the buffer for transmission on the link. At the time of sampling, the LI transmit buffer content (cotb) is measured in bytes and added to the cumulative byte total (cumbyt), to be reset every 5 minutes. The average occupancy, measured in MSUs, is obtained by dividing the cumulative byte total by the number of MSUs sampled (MSUSAMPL) multiplied by the average message length. It is calculated by:

$$\textbf{OCCUPMSU} = cumbyt \ / \ \textbf{MSUSAMPL} \ * \ (average\ message\ length)$$

The average message length is calculated by dividing the bytes transmitted (BYMSUX) by the MSUs transmitted (MGMSUX) during a standard measurement interval. It is calculated by:

$$average\ message\ length = \textbf{BYMSUX} \ / \ \textbf{MGMSUX}$$

The reported average occupancy is rounded off to the nearest larger integer.

■ ZPEAKOCC (LN7)

This is the link transmission buffer peak occupancy, measured in MSUs, based on 10-second scans. This is obtained by dividing the largest value of cotb (maxcotb) by the average message length. It is calculated by:

ZPEAKOCC = maxcotb / average message length

A maxcotb is determined for each desired time interval.

■ LINKDLAY (LN7)

This is the average link output delay, measured in milliseconds, for sampled MSUs. This is calculated during report generation with the following algorithm:

LINKDLAY = N*W*(byte emission time)

N is a multiplication factor to adjust the header bytes on the link in comparison with the header bytes waiting in the link transmission buffer. It is calculated by:

N = (average message length + 6) / (average message length + 5)

W is the average number of message bytes waiting in the link transmit buffer. It is calculated by:

W = cumbyt / MSUSAMPL

Byte emission time is 0.143 milliseconds, the time required to transmit all bits of a byte on a 56-kbps link.

7. Transition Consideration

A. Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

Preventive Cyclic Retransmission (PCR) on Signaling System 7 Links Feature (083)

4

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Preventive Cyclic Retransmission (PCR) on Signaling System 7 Links Feature (083)

4

1. Feature Description

1.01 The Preventive Cyclic Retransmission (PCR) feature is a level 2 error correction method for Signaling System 7 (SS7) links. Currently, the *4ESS*™ switch uses Basic Error Correction (BEC) for all links, and the BEC will continue to be provided.

1.02 The PCR method is provided for long delay links, such as satellite links. The PCR method is now available for long distance links that use terrestrial facilities. The PCR method contrasts the BEC in that it is a noncompelled, positive-acknowledgment, cyclic-retransmission, forward error correcting system.

2. Call Flow

2.01 The PCR method requires that an acknowledgment be returned from the receiving end. A signal unit which has been transmitted is retained at the transmitting signaling link station in a buffer which contains all unacknowledged signal units. As these are acknowledged, they are removed from the buffer. If a signal unit does not receive acknowledgment of transmission, they are retransmitted. During the period when there are no new signal units to be transmitted, all the signal units that have not been positively acknowledged are retransmitted cyclically. When the buffer is full of unacknowledged signal units, real-time traffic is interrupted, and the retained signal units are retransmitted cyclically until the number of unacknowledged signal units is reduced.

3. Provisioning

3.01 Customers can change from BEC to the PCR method of error correction without disruption of traffic on the unaffected link sets in the system. Traffic is allowed while one active link is equipped for BEC and the second link in the same link set is equipped for PCR. This configuration is considered temporary, and the signaling point should proceed to transition the other link or links in the link set as soon as convenient.

3.02 The PCR feature requires the following changes:

■ Changes to the AT&T 3B20D computer Unit Control Block (UCB), Pack Code (PC), and Member Value (MV) in the Equipment Configuration Data Base (ECD)

■ Changes to the Data Management System for the lkdata timers page and link information page.

These changes are made at the time of installation of hardware, and reference should be made to Task Oriented Practice (TOP) AT&T 234-153-055, *4ESS™ Switch, Common Network Interface, Growth/Degrowth.* Figure 4-1 is an example of a screen for the PCR user interface. The new data items for this screen are the error correction method and the transmission medium. The two values that can be accepted for the error correction mode are pcr and basic (basic is BEC).

```
***** CNI DATA MANAGEMENT SYSTEM ***** DATE:  04/18/91   TIME:  12:27 *****
FUNCTION:  lkdata  ACTION:  add  ORDER:12Y041891001      OFFICE:  NPVLILIH2MD

                              LINK INFORMATION

                   ITEM:                001
                   GROUP - MEMBER:      36 - 04
                   LINK TYPE ID:        ccs7


LINK SPEED         56000          ┌────────────────────────────────────┐
                                  │TRANSMISSION MEDIUM        satellite│
                                  └────────────────────────────────────┘
                                   MATE GROUP - MEMBER        36 - 04
ENCRYPTED          no              FACILITY ACCESS TYPE       modem
FAR END FUNCTION   32767
FAR END CLLT       chcgilclms2     COMBINED LINK SET          254
                                   LINK INTERFACE TYPE        LI4S
LINK SET           003
SIGNALING LINK CODE 15             FAR END POINT CODE         254259001
LINK TYPE          a               LINKSET ASSOCIATED PC      000000000
┌───────────────────────────┐     MAJOR STATE               unequipped
│ERROR CORRECTION MODE   pcr│
└───────────────────────────┘
```

Figure 4-1. PCR User Interface

3.03 Some of the timers presently (before PCR feature) have values set for BEC, and these timers need to be changed to support PCR. Reference should be made to TOP AT&T 234-153-055 for procedures for changing timers for the PCR feature.

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Hardware Dependencies

7.01 The installation of the PCR feature in the Common Network Interface (CNI) will require new interface hardware when converting from the BEC method to the PCR method. The new hardware needed for PCR is the LI4S (TN1316) board. There are two applique boards that can be used to support the PCR feature. One is the APA13B board, and the other is a V.35PADBB (982YB) board. If an office uses the APA13B board, the ring cabinet must be deep enough to support the 5.5-inch applique board which is attached in the backplane. However, for offices whose backplane is not deep enough to support the 5.5-inch applique board, the V.35PADBB board can be used. If an office uses the APA13B interface adaptor, cable ED-3F004-31,G72 is needed to connect to the 56-kbps data set. The V.35PADBB (982YB) interface adaptor needs cable ED-3F064-37,G73 to connect to the 56-kbps data set. Also, the V.35PADBB board requires a power supply interface cable, ED-3F064-37,G74.

Turn On/Turn Off Mechanism

7.02 The PCR feature is turned on after growth procedure is complete. Reference should be made to TOP AT&T 234-153-055 for installation procedures.

8. Input/Output Manual Pages (Not affected)

Recent Change of Protocol Timers and Parameters Feature (094/3190)

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Recent Change of Protocol Timers and Parameters Feature (094/3190)

5

1. Feature Description

1.01 This feature gives the *4ESS*™ switch the capability to change the values of protocol timers and thresholds for the Common Channel Signaling System 7 (CCS7)/Signaling System 7 (SS7) Message Transfer Part (MTP) and the Signaling Connection Control Part (SCCP). Changes are made using the AT&T 3B20D computer Database Management System (DMS) Recent Change forms. The Network Services Division (NSD) and the International Switching Center (ISC) have ranges and default values for protocol timers and thresholds. If necessary, customers can change the default values within the range of the recommended values. Prior to this feature, the values of protocol timers and thresholds could only be changed by putting the new values in the network file and initializing the Common Network Interface (CNI) Ring.

1.02 Changing parameters using the DMS Recent Change forms has the following advantages over the network file:

■ Changing the values of protocol timers and thresholds without reinitializing or rebooting the CNI: With the network file, a CNI had to be initialized to activate any changes that were made to the previous values. When changes were needed more frequently because of network interconnections or where different default values were provided, unnecessary system downtime resulted.

■ Checking the syntax and range of timer and threshold values for errors: The 3B20D computer DMS Recent Change program provides range checks to ensure that the timer and threshold values are within the recommended ranges.

■ Providing an easier and more effective change mechanism: With the network file, the customer had to be familiar with the UNIX* system and know the exact location and the format of the file in order to make the proper changes. This feature eliminates the possibility of corrupting the network file and increases the availability of the CNI Ring. User interface is the standard Recent Change and Verify interface.

Protocol Timers and Thresholds

1.03 The CCS7 and the International Telegraph and Telephone Consultative Committee (CCITT) have certain recommended values and ranges for a number of timers and thresholds. The timer and threshold values are set to the ISC default for the CCITT Q.703, Q.704, and Q.707 links. For NSD offices, the timer and threshold values are set to the NSD default. Tables 5-A through 5-L give the default values of the protocol timers and thresholds that are used in NSD offices. Since customer environments differ, protocol timers and thresholds may have to be changed to fit the environment. The customer at the ISC is responsible for changing and verifying the values of the CCITT protocol timers and thresholds. Changing timers (T7 and T9) that are not currently being used, as indicated in Table 5-C and Table 5-I, is not permitted.

1.04 Protocol timers and thresholds are contained in a CNI Worklist. As required, the CNI will provide modifications to the Worklist for changing certain timer and threshold values. The 3B20D computer DMS Recent Change program uses the values from this CNI Worklist to change, add, and verify timer and threshold values on a per-office, per-link, or per-linkset basis as appropriate. After changing the values of the affected timers and/or thresholds using the necessary Recent Change forms, the CNI will change the parameter values in the 1A Processor memory to the values specified in the DMS. As appropriate, these values are sent to the nodes. Figures 5-1 through 5-20 show sample DMS Recent Change forms that are used to add, change, and verify protocol timers and thresholds.

1.05 All new thresholds must be validated so that a new threshold is not allowed if its value is greater than the next higher threshold or less than the next lower threshold. The first abatement level threshold should not be less than 200. For example, if a "discard" threshold (n) is changed, the new discard level cannot be greater than the "abatement" threshold (n+1) or less than the "onset" threshold (n).

---

* UNIX is a registered trademark of UNIX System Laboratories, Inc.

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Generic Retrofit

7.01 The CNI retrofit process will populate the new Recent Change data file with the values from the network file. If the values are not specified in the network file, the default values will be used. If the values of the parameters in the network file are out of range, the retrofit will fail.

Turn On/Turn Off Mechanism

7.02 This feature is turned on by the 3B20D computer DMS CNI Ring Recent Change and Verify forms. Refer to Figures 5-1 through 5-20 for sample Recent Change and Verify screens. To activate the DMS and access the function to be performed via the Recent Change and Verify terminal, do the following:

Step	At screen prompt, enter:
1	**RCV:DMS<CR>**
2	Login ID
3	Password
4	Desired command: **rc**
5	Function to be performed: **timers**

8. Input/Output Manual Pages (Not affected)

Table 5-A. T1.111.3 Timers

ID	Description	Recommended Range (Seconds)	NSD Default (Seconds)	DMS Units	Unit
Per-Office and Per-Linkset Timers					
T1	Aligned/ready	13 to 30	13.0	650	20 ms
T2	Not aligned	5.0 to 14	11.8	590	20 ms
T3	Aligned	5.0 to 14	11.8	590	20 ms
T4N	Normal prove-in	$2.3 \pm 10\%$	2.3	115	20 ms
T4E	Emergency prove-in	$0.6 \pm 10\%$	0.6	30	20 ms
T5	Local congestion	0.08 to 0.12	0.08	4	20 ms
T6	Remove congestion	3.0 to 6.0	3.0	150	20 ms
T7	Excessive delay of acknowledgement	0.5 to 2.0	1.0	50	20 ms

Table 5-B. T1.111.3 Threshold

ID	Description	Recommended Range (su)(Note)	NSD Default (su)
Per-Office, Per-Link, and Per-Linkset Threshold			
-	Signal Unit Error Rate Monitor (SUERM)	64 to 192	192

Note: su = signaling unit

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Table 5-C. T1.111.4 Timers

ID	Description	Recommended Range (Seconds)	NSD Default (Seconds)	DMS Units	Unit
Per-Office and Per-Linkset Timers					
T1	Delay to avoid message missequencing on changeover	0.5 to 1.2	0.5	500	1 ms
T2	Waiting for changeover acknowledgement	0.7 to 2.0	0.7	700	1 ms
T3	Time-controlled diversion—delay to avoid missequencing on changeback	0.5 to 1.2	0.5	500	1 ms
T4	Waiting for changeback acknowledgement (first attempt)	0.5 to 1.2	0.5	500	1 ms
T5	Waiting for changeback acknowledgement (second attempt)	0.5 to 1.2	0.5	500	1 ms
T6	Delay to avoid message missequencing on controlled rerouting	0.5 to 1.2	5	5	100 ms
T12	Waiting for uninhibited acknowledgement	0.8 to 1.5	0.8	800	1 ms
T13	Waiting for force uninhibit	0.8 to 1.5	0.8	800	1 ms
T14	Waiting for inhibited acknowledgement	2.0 to 3.0	2.0	2000	1 ms
T15	Waiting for repeat signaling route set congestion test	2 to 3	3	3	1 sec
T17	Delay to avoid oscillation of initial alignment failure and link restart	0.8 to 1.5	0.8	800	1 ms
T19	Failed link craft referral timer	180 to 600	180	180000	1 ms
Per-Office Only Timers					
T7	Waiting for signaling data link connection acknowledgement (not used)	–	–	–	–
T8	Transfer-prohibited inhibited timer	0.8 to 1.2	0.8	800	1 ms
T9	Not used	–	–	–	–
T10	Waiting to repeat signaling-route-set-test message	30 to 60	30	30	1 sec
T11	Transfer-restricted timer	30 to 90	30	30	1 sec
T16	Waiting for route set congestion status update	1.4 to 2.0	1.4	1400	1 ms
T18	Transfer cluster-restricted timer	30 to 90	30	30	1 sec
T20	Waiting to repeat local inhibit test	90 to 120	120	120000	1 ms
T21	Waiting to repeat remote inhibit test	90 to 120	120	120000	1 ms

Table 5-D. T1.111.7 Timers

ID	Description	Recommended Range (Seconds)	NSD Default (Seconds)	DMS Units	Unit
		Per-Office and Per-Linkset Timers			
T1	Supervision timer for signal link test acknowledgement message (equal to or greater than T6 of T1.111.3)	4.0 to 12	10	10	1 sec
T2	Interval timer for sending signaling link test messages	30 to 90	30	30	1 sec

Table 5-E. T1.111.4 Link Congestion Control Thresholds (Transmission)

Description	NSD Default (Octets)
Per-Office and Per-Linkset Thresholds	
Abatement threshold level 1	820
Level 1 onset threshold	3072
Level 1 discard threshold	6042
Abatement threshold level 2	7680
Level 2 onset threshold	8295
Level 2 discard threshold	10855
Abatement threshold level 3	10855
Level 3 onset threshold	10956
Level 3 discard threshold	11571

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Table 5-F. T1.112.4 Timers

ID	Description	Recommended Range (Seconds)	NSD Default (Seconds)	DMS Units	Unit
Per-Office Timers					
T(stat.info)	Delay between requests for subsystem information	30 to 90	30	30	1 sec
T(coord.chg)	Wait for grant for subsystem to go out of service	30 to 90	30	30	1 sec
T(ignore SST*)	Delay for subsystem between receiving grant to go out of service and actually going out of service	30 to 90	30	30	1 sec
T(rtg.stat.info)	Delay between requests for subsystem routing status information	30 to 90	30	30	1 sec

* Signaling System Test

Table 5-G. CCITT Q.703 Timers

ID	Description	Recommended Range (Seconds)	ISC Default (Seconds)	DMS Units	Unit
Per-Office, Per-Link, and Per-Linkset Timers					
T1	Aligned/ready	4.0 to 50	45	2250	20 ms
T2	Not aligned	5.0 to 150	41	2050	20 ms
T3	Aligned	1.0 to 1.5	1.5	75	20 ms
T4N	Normal prove-in	7.5 to 9.5	8.2	410	20 ms
T4E	Emergency prove-in	0.4 to 0.6	0.5	25	20 ms
T5	Local congestion	0.08 to 0.12	0.12	6	20 ms
T6	Remove congestion	3.0 to 6.0	3.0	150	20 ms
T7	Excessive delay of acknowledgement	0.5 to 2.0	2.0	100	20 ms

Table 5-H. CCITT Q.703 Threshold

ID	Description	Recommended Range (su)(Note)	NSD Default (su)
Per-Office, Per-Link, and Per-Linkset Threshold			
-	Signal Unit Error Rate Monitor (SUERM)	64 to 192	192

Note: su = signaling unit

Table 5-I. CCITT Q.704 Timers

ID	Description	Recommended Range (Seconds)	ISC Default (Seconds)	DMS Units	Unit
		Per-Office and Per-Linkset Timers			
T1	Delay to avoid message missequencing on changeover	0.5 to 1.2	0.8	800	1 ms
T2	Waiting for changeover acknowledgement	0.7 to 2.0	1.4	1400	1 ms
T3	Time-controlled diversion—delay to avoid missequencing on changeback	0.5 to 1.2	0.8	800	1 ms
T4	Waiting for changeback acknowledgement (first attempt)	0.5 to 1.2	0.8	800	1 ms
T5	Waiting for changeback acknowledgement (second attempt)	0.5 to 1.2	0.8	800	1 ms
T6	Delay to avoid message missequencing on controlled rerouting	0.5 to 1.2	0.8	8	100 ms
T12	Waiting for uninhibited acknowledgement	0.8 to 1.5	1.0	1000	1 ms
T13	Waiting for force uninhibit	0.8 to 1.5	1.0	1000	1 ms
T14	Waiting for inhibited acknowledgement	2.0 to 3.0	3.0	3000	1 ms
T15	Waiting for repeat signaling route set congestion test	2.0 to 3.0	3.0	3	1 sec
T17	Delay to avoid oscillation of initial alignment failure and link restart	0.8 to 1.5	1.0	1000	1 ms
T19	Failed link craft referral timer	180 to 600	180	180000	1 ms
		Per-Office Only Timers			
T7	Waiting for signaling data link connection acknowledgement (not used)	–	–	–	–
T8	Transfer-prohibited inhibited timer	0.8 to 1.2	0.8	800	1 ms
T9	Not used	–	–	–	–
T10	Waiting to repeat signaling-route-set-test message	30 to 60	30	30	1 sec
T11	Transfer-restricted timer	30 to 90	30	30	1 sec
T16	Waiting for route set congestion status update	1.4 to 2.0	1.4	1400	1 ms
T18	Not applicable	–	–	–	–
T20	Not applicable	–	–	–	–
T21	Waiting to restart traffic routed through adjacent signaling point	30 to 60	30	30000	1 ms
T22	Waiting to repeat local inhibit test	180 to 360	180	180000	1 ms
T23	Waiting to repeat remote inhibit test	180 to 360	180	180000	1 ms
T24	Stabilizing timer after removal of local processor outage	0.5 to 1.0	0.5	500	1 ms

Table 5-J. CCITT Q.707 Timers

ID	Description	Recommended Range (Seconds)	ISC Default (Seconds)	DMS Units	Unit
	Per-Office and Per-Linkset Timers				
T1	Supervision timer for signal link test acknowledgement message (equal to or greater than T6 of T1.111.3)	4.0 to 12	4.0	4	1 sec
T2	Interval timer for sending signaling link test messages	30 to 90	30	30	1 sec

Table 5-K. CCITT Q.704 Link Congestion Control Thresholds (Transmission)

Description	ISC Default (Octets)
Per-Office and Per-Linkset Thresholds	
Abatement threshold level 1	1600
Level 1 onset threshold	3200
Level 1 discard threshold	12000

Table 5-L. CCITT Q.714 Timers

ID	Description	Recommended Range (Seconds)	NSD Default (Seconds)	DMS Units	Unit
	Per-Office Timers				
T(stat.info)	Delay between requests for subsystem information	30 to 90	30	45	1 sec
T(coord.chg)	Wait for grant for subsystem to go out of service	30 to 90	30	30	1 sec
T(ignore SST*)	Delay for subsystem between receiving grant to go out of service and actually going out of service	30 to 90	30	90	1 sec

* Signaling System Test

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS     ACTION: CHG     ORDER: 63y999999999  OFFICE: WNVLILAA44T


              PROTOCOL TIMERS AND PARAMETERS


              ITEM          001
              LINKID        ccs7
              SCOPE         one_lk
              GROUP-MEMBER  00-06
              TIMER         t1.111.3


T1   650    UPDATE(y/n)    yes     T2    590    UPDATE(y/n)    yes
T3   590    UPDATE(y/n)    yes     T4N   115    UPDATE(y/n)    yes
T4E  30     UPDATE(y/n)    yes     T5    4      UPDATE(y/n)    yes
T6   150    UPDATE(y/n)    yes     T7    50     UPDATE(y/n)    yes


          SUERM    192     UPDATE(y/n)    yes
```

Figure 5-1. Changing Values for CCS7 T1.111.3 Timers—One Link

Note: This screen changes and verifies values for CCS7 T1.111.3 timers for a particular link. The **UPDATE** field is always **yes**. Table 5-A gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS     ACTION: ADD     ORDER: 63y999999999  OFFICE: WNVLILAA44T


              PROTOCOL TIMERS AND PARAMETERS


              ITEM          001
              LINKID        ccs7
              TIMER         t1.111.3


T1   ----    UPDATE(y/n)    ---     T2    ----    UPDATE(y/n)    ---
T3   ----    UPDATE(y/n)    ---     T4N   ----    UPDATE(y/n)    ---
T4E  ----    UPDATE(y/n)    ---     T5    ----    UPDATE(y/n)    ---
T6   ----    UPDATE(y/n)    ---     T7    ----    UPDATE(y/n)    ---


          SUERM    ----     UPDATE(y/n)    ---


              SCOPE         -------
          GROUP-MEMBER      -------
```

Figure 5-2. Adding Values for CCS7 T1.111.3 Timers

Note: This screen adds values for CCS7 T1.111.3 timers. The **UPDATE** field specifies if the user wants to leave the value as is on the disk. The scope can be **one_lk, one_ls**, or **all**. Table 5-A gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS     ACTION: CHG     ORDER: 63y999999999   OFFICE: WNVLILAA44T

                      PROTOCOL TIMERS AND PARAMETERS

                      ITEM        001
                      LINKID      ccs7
                      SCOPE       one_ls
                      LINKSET     002
                      TIMER       t1.111.4

  T1   500    UPDATE(y/n)   yes       T2   700     UPDATE(y/n)   yes
  T3   500    UPDATE(y/n)   yes       T4   500     UPDATE(y/n)   yes
  T5   500    UPDATE(y/n)   yes       T6   5       UPDATE(y/n)   yes
  T12  800    UPDATE(y/n)   yes       T13  800     UPDATE(y/n)   yes
  T14  2000   UPDATE(y/n)   yes       T15  3       UPDATE(y/n)   yes
  T17  800    UPDATE(y/n)   yes       T19  180000  UPDATE(y/n)   yes
```

Figure 5-3. Changing Values for CCS7 T1.111.4 Timers—One Linkset

Note: This screen changes and verifies values for CCS7 T1.111.4 timers for a particular linkset. The update value is always **yes**. Table 5-C gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS     ACTION: ADD     ORDER: 63y999999999   OFFICE: WNVLILAA44T

                      PROTOCOL TIMERS AND PARAMETERS

                      ITEM        001
                      LINKID      ccs7
                      TIMER       t1.111.4

  T1   ----   UPDATE(y/n)   ----      T2   ----    UPDATE(y/n)   ----
  T3   ----   UPDATE(y/n)   ----      T4   ----    UPDATE(y/n)   ----
  T5   ----   UPDATE(y/n)   ----      T6   ----    UPDATE(y/n)   ----
  T12  ----   UPDATE(y/n)   ----      T13  ----    UPDATE(y/n)   ----
  T14  ----   UPDATE(y/n)   ----      T15  ----    UPDATE(y/n)   ----
  T17  ----   UPDATE(y/n)   ----      T19  ----    UPDATE(y/n)   ----

                      SCOPE       -------
                      LINKSET     ----
```

Figure 5-4. Adding Values for CCS7 T1.111.4 Timers

Note: This screen adds values for CCS7 T1.111.4 timers. The **UPDATE** field specifies if the user wants to leave the value as is on the disk for the linkset. The scope can be **one_ls** or **all_dls**. Table 5-C gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS     ACTION: CHG     ORDER: 63y999999999  OFFICE: WNVLILAA44T


              PROTOCOL TIMERS AND PARAMETERS

                   ITEM        001
                   LINKID      ccs7
                   SCOPE       one_ls
                   LINKSET     002
                   TIMER       T1.111.7


          T1    10        UPDATE(y/n)    yes
          T2    30        UPDATE(y/n)    yes
```

Figure 5-5. Changing CCS7 T1.111.7 Timers—One Linkset

Note: This screen changes and verifies values for CCS7 T1.111.7 timers for a particular linkset. The
UPDATE field is always **yes**. Table 5-D gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS     ACTION: ADD     ORDER: 63y999999999  OFFICE: WNVLILAA44T

              PROTOCOL TIMERS AND PARAMETERS

                   ITEM        001
                   LINKID      ccs7
                   TIMER       t1.111.7

          T1    ----      UPDATE(y/n)    ---
          T2    ----      UPDATE(y/n)    ---

                   SCOPE       -------
```

Figure 5-6. Adding CCS7 T1.111.7 Timers

Note: This screen adds values for CCS7 T1.111.7 timers. The **UPDATE** field specifies if the user wants to
leave the value as is on the disk. The scope can be **one_ls** or **all_dls** if the office is attached to an
ISC. Table 5-D gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: CHG     ORDER: 63y999999999  OFFICE: WNVLILAA44T


                      PROTOCOL TIMERS AND PARAMETERS

                   ITEM          001
                   LINKID        ccs7
                   SCOPE         one_ls
                   LINKSET       002
                   TIMER         threshold


        ABATEMENT LVL1    820          UPDATE(y/n)    yes
        ONSET LVL1        3072         UPDATE(y/n)    yes
        DISCARD LVL1      6042         UPDATE(y/n)    yes
        ABATEMENT LVL2    7680         UPDATE(y/n)    yes
        ONSET LVL2        8295         UPDATE(y/n)    yes
        DISCARD LVL2      10855        UPDATE(y/n)    yes
        ABATEMENT LVL3    10855        UPDATE(y/n)    yes
        ONSET LVL3        10956        UPDATE(y/n)    yes
        DISCARD LVL3      11571        UPDATE(y/n)    yes
```

Figure 5-7. Changing CCS7 Threshold Timers—One Linkset

Note: This screen changes and verifies values for CCS7 threshold timers for a particular linkset. The UPDATE field is always **yes**. Table 5-E gives a description of these threshold timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: ADD     ORDER: 63y999999999  OFFICE: WNVLILAA44T
                      PROTOCOL TIMERS AND PARAMETERS
                   ITEM          001
                   LINKID        ccs7
                   TIMER         threshold
        ABATEMENT LVL1    - - - - -        UPDATE(y/n)    - - -
        ONSET LVL1        - - - - -        UPDATE(y/n)    - - -
        DISCARD LVL1      - - - - -        UPDATE(y/n)    - - -
        ABATEMENT LVL2    - - - - -        UPDATE(y/n)    - - -
        ONSET LVL2        - - - - -        UPDATE(y/n)    - - -
        DISCARD LVL2      - - - - -        UPDATE(y/n)    - - -
        ABATEMENT LVL3    - - - - -        UPDATE(y/n)    - - -
        ONSET LVL3        - - - - -        UPDATE(y/n)    - - -
        DISCARD LVL3      - - - - -        UPDATE(y/n)    - - -

                   SCOPE         - - - - - - -
                   LINKSET       - - -
```

Figure 5-8. Adding CCS7 Threshold Timers

Note: This screen adds values for CCS7 threshold timers. The UPDATE field specifies if the user wants to leave the value as is on the disk. The scope can be **one_ls** or **all_ls**. Table 5-E gives a description of these threshold timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: CHG    ORDER: 63y999999999  OFFICE: WNVLILAA44T

                    PROTOCOL TIMERS AND PARAMETERS
                        ITEM            001
                        LINKID          ccs7
                        SCOPE           all

                        TIMER           office
T8    800               UPDATE(y/n)  yes    T10   30         UPDATE(y/n)  yes
T11   30                UPDATE(y/n)  yes    T16   1400       UPDATE(y/n)  yes
T18   30                UPDATE(y/n)  yes    T20   120000     UPDATE(y/n)  yes

                        T21  120000         UPDATE(y/n)  yes

T(stat.info)   30   UPDATE(y/n)  yes    T(coord.chg)   30  UPDATE(y/n)  yes
T(ignore SST)  30   UPDATE(y/n)  yes    T(rtg.info)    30  UPDATE(y/n)  yes
```

Figure 5-9. Changing Office Timers—Non-ISC Offices

Note: This screen changes and verifies office timers for non-ISC offices. The **UPDATE** field is always **yes**. The only valid scope is **all**. Timers T8, T10, T11, T16, T18, T20, and T21 are T1.111.4 per-office-only timers. Timers T(stat.info), T(coord.chg), T(ignore SST), and T(rtg.info) are T1.112.4 per-office timers. See Table 5-C (T1.111.4) and Table 5-F (T1.112.4) for a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: ADD    ORDER: 63y999999999  OFFICE: WNVLILAA44T

                    PROTOCOL TIMERS AND PARAMETERS
                        ITEM            001
                        LINKID          ccs7
                        TIMER           office
T8    -----             UPDATE(y/n)  ---    T10   -----      UPDATE(y/n)  ---
T11   -----             UPDATE(y/n)  ---    T16   -----      UPDATE(y/n)  ---
T18   -----             UPDATE(y/n)  ---    T20   -----      UPDATE(y/n)  ---

                        T21      -----      UPDATE(y/n)  ---

T(stat.info)   --   UPDATE(y/n)  ---    T(coord.chg)   --  UPDATE(y/n)  ---
T(ignore SST)  --   UPDATE(y/n)  ---    T(rtg.info)    --  UPDATE(y/n)  ---
```

Figure 5-10. Adding Office Timers—Non-ISC Offices

Note: This screen adds office timers for non-ISC offices. The **UPDATE** field specifies that this particular timer is not to be changed. Timers T8, T10, T11, T16, T18, T20, and T21 are T1.111.4 per-office-only timers. Timers T(stat.info), T(coord.chg), T(ignore SST), and T(rtg.info) are T1.112.4 per-office timers. See Table 5-C (T1.111.4) and Table 5-F (T1.112.4) for a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS     ACTION: CHG     ORDER: 63y999999999  OFFICE: WNVLILAA44T


                 PROTOCOL TIMERS AND PARAMETERS


                 ITEM        001
                 LINKID      ccitt7
                 SCOPE       all


                 TIMER       office

T8    800         UPDATE(y/n)  yes     T10  30          UPDATE(y/n)  yes
T11   30          UPDATE(y/n)  yes     T16  1400        UPDATE(y/n)  yes
T21   3000        UPDATE(y/n)  yes     T22  180000      UPDATE(y/n)  yes
T23   180000      UPDATE(y/n)  yes     T24  500         UPDATE(y/n)  yes
T(stat.info)  45  UPDATE(y/n)  yes     T(coord.chg) 30  UPDATE(y/n)  yes
T(ignore SST) 90  UPDATE(y/n)  yes
```

Figure 5-11. Changing Office Timers—ISC Offices

Note: This screen changes office timers for ISC offices. The **UPDATE** field specifies that this particular timer is not to be changed. Timers T8, T10, T11, T16, T21, T22, T23, and T24 are CCITT Q.704 per-office-only timers. Timers T(stat.info), T(coord.chg), and T(ignore SST) are CCITT Q.714 per-office timers. See Table 5-I (Q.704) and Table 5-L (Q.714) for a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS     ACTION: ADD     ORDER: 63y999999999  OFFICE: WNVLILAA44T


                 PROTOCOL TIMERS AND PARAMETERS


                 ITEM        001
                 LINKID      ccitt7
                 TIMER       office

T8    ------      UPDATE(y/n)  ---     T10  ------      UPDATE(y/n)  ---
T11   ------      UPDATE(y/n)  ---     T16  ------      UPDATE(y/n)  ---
T21   ------      UPDATE(y/n)  ---     T22  ------      UPDATE(y/n)  ---
T23   ------      UPDATE(y/n)  ---     T24  ------      UPDATE(y/n)  ---
T(stat.info)  --- UPDATE(y/n)  ---     T(coord.chg) --- UPDATE(y/n)  ---
T(ignore SST) --- UPDATE(y/n)  ---
```

Figure 5-12. Adding Office Timers—ISC Offices

Note: This screen adds office timers for ISC offices. The **UPDATE** field specifies that this particular timer is not to be changed. Timers T8, T10, T11, T16, T21, T22, T23, and T24 are CCITT Q.704 per-office-only timers. Timers T(stat.info), T(coord.chg), and T(ignore SST) are CCITT Q.714 per-office timers. See Table 5-I (Q.704) and Table 5-L (Q.714) for a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: CHG      ORDER: 63y999999999  OFFICE: WNVLILAA44T


                    PROTOCOL TIMERS AND PARAMETERS


                    ITEM       001
                    LINKID     ccitt7
                    SCOPE      one_ls
                    LINKSET    022
                    TIMER      q.704


T1    800   UPDATE(y/n)   yes       T2    1400    UPDATE(y/n)   yes
T3    800   UPDATE(y/n)   yes       T4    800     UPDATE(y/n)   yes
T5    800   UPDATE(y/n)   yes       T6    8       UPDATE(y/n)   yes
T12   1000  UPDATE(y/n)   yes       T13   1000    UPDATE(y/n)   yes
T14   3000  UPDATE(y/n)   yes       T15   3       UPDATE(y/n)   yes
T17   1000  UPDATE(y/n)   yes       T19   180000  UPDATE(y/n)   yes
```

Figure 5-13. Changing Values for CCITT7 Q.704 Timers—One Linkset

Note: This screen changes and verifies values for CCITT7 Q.704 timers for a particular linkset. The UPDATE field is always **yes**. Table 5-I gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: ADD      ORDER: 63y999999999  OFFICE: WNVLILAA44T


                    PROTOCOL TIMERS AND PARAMETERS


                    ITEM       001
                    LINKID     ccitt7
                    TIMER      q.704

T1    ------   UPDATE(y/n)   ---    T2    ------   UPDATE(y/n)   ---
T3    ------   UPDATE(y/n)   ---    T4    ------   UPDATE(y/n)   ---
T5    ------   UPDATE(y/n)   ---    T6    ------   UPDATE(y/n)   ---
T12   ------   UPDATE(y/n)   ---    T13   ------   UPDATE(y/n)   ---
T14   ------   UPDATE(y/n)   ---    T15   ------   UPDATE(y/n)   ---
T17   ------   UPDATE(y/n)   ---    T19   ------   UPDATE(y/n)   ---


                    SCOPE      -------
                    LINKSET    ----
```

Figure 5-14. Adding Values for CCITT7 Q.704 Timers

Note: This screen adds values for CCITT7 Q.704 timers. The UPDATE field specifies if the user wants to leave the value as is on the disk. Table 5-I gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS    ACTION: CHG    ORDER: 63y999999999  OFFICE: WNVLILAA44T

                  PROTOCOL TIMERS AND PARAMETERS

                  ITEM          001
                  LINKID        ccitt7
                  SCOPE         one_lk
                  GROUP-MEMBER  60-11
                  TIMER         q.703

 T1   2250   UPDATE(y/n)   yes      T2   2050   UPDATE(y/n)   yes
 T3   75     UPDATE(y/n)   yes      T4N  410    UPDATE(y/n)   yes
 T4E  25     UPDATE(y/n)   yes      T5   6      UPDATE(y/n)   yes
 T6   150    UPDATE(y/n)   yes      T7   100    UPDATE(y/n)   yes


            SUERM   192    UPDATE(y/n)   yes
```

Figure 5-15. Changing Values for CCITT7 Q.703 Timers—One Link

Note: This screen changes and verifies values for CCITT7 Q.703 timers for a particular link. The **UPDATE** field is always **yes**. Table 5-G gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS    ACTION: ADD    ORDER: 63y999999999  OFFICE: WNVLILAA44T

                  PROTOCOL TIMERS AND PARAMETERS

                  ITEM          001
                  LINKID        ccitt7
                  TIMER         q.703

 T1   -----   UPDATE(y/n)   ---      T2   ----   UPDATE(y/n)   ---
 T3   ----    UPDATE(y/n)   ---      T4N  ----   UPDATE(y/n)   ---
 T4E  ----    UPDATE(y/n)   ---      T5   ----   UPDATE(y/n)   ---
 T6   ----    UPDATE(y/n)   ---      T7   ----   UPDATE(y/n)   ---


            SUERM   ----    UPDATE(y/n)   ---
                    SCOPE         --------
            GROUP-MEMBER          --------
```

Figure 5-16. Adding Values for CCITT7 Q.703 Timers

Note: This screen adds values for CCITT7 Q.703 timers. The **UPDATE** field specifies if the user wants to leave this value as is on the disk. The scope can be **one_lk, one_ls,** or **all_ilk**. Table 5-G gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: CHG     ORDER: 63y999999999  OFFICE: WNVLILAA44T


              PROTOCOL TIMERS AND PARAMETERS


              ITEM         001
              LINKID       ccitt7
              SCOPE        one_ls
              LINKSET      022
              TIMER        q.707


       T1    4            UPDATE(y/n)     yes
       T2    30           UPDATE(y/n)     yes
```

Figure 5-17. Changing CCITT7 Q.707 Timers—One Linkset

Note: This screen changes and verifies values for CCITT7 Q.707 timers for a particular linkset. The **UPDATE** field specifies if the user wants to leave this value as is on the disk for each linkset in an office. Table 5-J gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91   TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: ADD     ORDER: 63y999999999  OFFICE: WNVLILAA44T


              PROTOCOL TIMERS AND PARAMETERS


              ITEM         001
              LINKID       ccitt7
              TIMER        q.707


       T1    ----         UPDATE(y/n)     ----
       T2    ----         UPDATE(y/n)     ----


              SCOPE        -------
              LINKSET      -------
```

Figure 5-18. Adding CCITT7 Q.707 Timers

Note: This screen adds values for CCITT7 Q.707 timers for one linkset. The **UPDATE** field specifies if the user wants to leave the value as is on the disk for the linkset. Table 5-J gives a description of these timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: CHG      ORDER: 63y999999999  OFFICE: WNVLILAA44T


                  PROTOCOL TIMERS AND PARAMETERS

                     ITEM        001
                     LINKID      ccitt7
                     SCOPE       one ls
                     LINKSET     022
                     TIMER       threshold

          ABATEMENT LVL1     1600        UPDATE(y/n)    yes
          ONSET LVL1         3200        UPDATE(y/n)    yes
          DISCARD LVL1       12000       UPDATE(y/n)    yes
```

Figure 5-19. Changing CCITT7 Threshold Timers—One Linkset

Note: This screen changes and verifies values for CCITT7 threshold timers for a particular linkset. The UPDATE field is always **yes**. Table 5-K gives a description of these threshold timers.

```
****** CNI DATA MANAGEMENT SYSTEM ***** DATE: 10/29/91    TIME: 13:30 ******
FUNCTION: TIMERS      ACTION: ADD      ORDER: 63y999999999  OFFICE: WNVLILAA44T


                  PROTOCOL TIMERS AND PARAMETERS

                     ITEM        001
                     LINKID      ccitt7
                     TIMER       threshold

          ABATEMENT LVL1     - - - - -       UPDATE(y/n)    - - -
          ONSET LVL1         - - - - -       UPDATE(y/n)    - - -
          DISCARD LVL1       - - - - -       UPDATE(y/n)    - - -


                     SCOPE       - - - - - -
                     LINKSET     - - - - - -
```

Figure 5-20. Adding Values for CCITT7 Threshold Timers

Note: This screen adds values for CCITT7 threshold timers. The UPDATE field specifies if the user wants to leave the value as is on the disk. The scope can be **all_dls** or **all_ils**. Table 5-K gives a description of these threshold timers.

Message Transfer Part Local Access and Transport Area Routing Feature (106/129J)

6

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Message Transfer Part Local Access and Transport Area Routing Feature (106/129J)

6

1. Feature Description

1.01 The Message Transfer Part (MTP) Local Access and Transport Area (LATA) Routing feature uses Alias Originating Point Codes (AOPCs) to route signaling information between LATAs through an Interexchange Carrier (IEC). Not all offices in the AT&T network will use this feature. Although no new services are provided by the MTP LATA feature, it allows the Common Network Interface (CNI) to provide correct inter-LATA routing for Network Interconnect (NI) architectures.

1.02 MTP LATA Routing uses more than one PC assigned to a single IEC toll switch for inter-LATA routing. This provides the capability to associate different PCs with different LATAs, allowing circuit- or call-associated Common Channel Signaling System 7 (CCS7) messages to be routed via the Signaling Point of Interface (SPOI) in each LATA. The SPOI is a legal and logical separation point where a Local Exchange Carrier (LEC) signaling link meets an IEC signaling link. Each LATA is associated with one SPOI.

1.03 AOPCs assigned to the toll switch are used for NI messages only. AOPCs are completely transparent to other switches in the IEC network and to all Signal Transfer Points (STPs) except its home and gateway STP pairs.

1.04 The MTP LATA Routing feature provides the capability to recent change AOPCs. The Alias Point Code Table is added to the existing office identification data structure and is saved in the same disk file.

1.05 The total number of near-end PCs (true and alias) required in a toll switch is equal to the maximum number of LATAs (served by a single LEC STP) containing end offices to which that toll switch has trunks.

2. Call Flow (Not affected)

3. Provisioning

Office Data Administration

3.01 The Originating PC (OPC) is currently stored at **4XL_OFC_OPC** in the AT&T
Communications Interface (ACI) translations area. The seven AOPCs will be
placed immediately after the OPC (Figure 6-1).

```
                         |---------------------------------|
                 4628    |                                 |
                         |          UNASSIGNED SPACE        |
                 5094    |                                 |
                         |---------------------------------|
    4XL_OFC_OPC   5095   |Office Origination Point Code|
                         |---------------------------------|
       4XL_APC_1  5096   |       Alias Point Code 1         |
                         |---------------------------------|
       4XL_APC_2  5097   |       Alias Point Code 2         |
                         |---------------------------------|
       4XL_APC_3  5098   |       Alias Point Code 3         |
                         |---------------------------------|
       4XL_APC_4  5099   |       Alias Point Code 4         |
                         |---------------------------------|
       4XL_APC_5  5100   |       Alias Point Code 5         |
                         |---------------------------------|
       4XL_APC_6  5101   |       Alias Point Code 6         |
                         |---------------------------------|
       4XL_APC_7  5102   |       Alias Point Code 7         |
                         |---------------------------------|
                         |                                 |
```

Figure 6-1. ACI Translations Area for AOPCs

Recent Change and Verify

A. AT&T 3B20D Computer

3.02 To add AOPCs to an office, a recent change is performed via the Database Management System (DMS) Form *ofdata* (Figure 6-2). This step must be performed **before** any recent changes are input to the 1A Processor. The AOPCs must:

- Be valid

- Be unique

- Have the same network ID, cluster, and region as the OPC

- Not reside in the 1A Processor while being deleted or changed from a non-zero value.

```
***** CNI DATA MANAGEMENT SYSTEM ***** DATE:  04/18/91  TIME:  12:27 *****
FUNCTION:  ofdata  ACTION:  add  ORDER:12Y041891001     OFFICE: NPVLILIH2MD

           CNI OFFICE IDENTIFICATION AND POSITION

           LOCAL POINT CODE      254254008
           LOCAL CLLI            npvlilih2md
           ISC W/CCIT7           yes
           INTL POINT CODE       20011

              ALIAS POINT CODE LIST

     APC1  254254001    APC2  254254002    APC3  254254003

     APC4  254254004    APC5  254254005    APC6  254254006

                 APC7  254254007
```

Figure 6-2. DMS Form — ofdata

B. 1A Processor

3.03 The second step involves 1A Processor recent changes using the following forms:

Table 6-A. Office Data Assembler (ODA) Recent Change Forms

Recent Change Form	Use
100	Add new two-way Trunk Subgroups (TSGs)
101	Add new one-way incoming TSGs
102	Add new one-way outgoing TSGs
107	Change the characteristics of existing two-way TSGs
108	Change the characteristics of existing one-way incoming TSGs
109	Change the characteristics of existing one-way outgoing TSGs
203	Add Common Channel Signaling (CCS) trunks to a TSG
208	Change trunk characteristics

C. Population and Retrofit Rules

3.04 The AOPC will always be in the AT&T format. The new 3-bit TSG block item **XL4TS_AOPCI** will index to the PCs in ACI translations. The results are as follows:

■ If an AOPC is entered that matches the OPC (ODA Form 406C), the form will fail.

■ When an AOPC is entered on the TSG forms, the ACI translations area of OPCs (starting with **4XL_AOPC_1** and ending with **4XL_AOPC_7**) is searched for a match.

■ If a match is found, its index into the OPC table is stored in the **XL4TS_AOPCI** corresponding to the TSG entered on the form.

■ If no match is found, a search is performed for an unassigned entry (starting with **4XL_AOPC_1** and ending with **4XL_AOPC_7**) with the following results:

— If an unassigned entry is found, its index into the the OPC table is stored in the **XL4TS_AOPCI** corresponding to the TSG entered on the form.

— If an unassigned entry is not found, the form will fail.

3.05 The steps are performed in reverse order to change or delete an AOPC. First, one or more recent changes are performed to remove the AOPC from the 1A Processor. Then, the AOPC is removed from the 3B20D computer via the DMS. If the steps are not performed in this order, the 3B20D computer recent change will fail.

3.06 The AOPCs in the ACI translations area *must* be preserved across retrofits in the order they are created.

Forms Requirements

A. ODA

3.07 The new field AOPC is being added to ODA Forms 401A (Figure 6-3), 401B, and 401C.

```
ESS 401A TC-4           TWO-WAY TRUNK SUBGROUP CHARACTERISTICS
                                    4 ESS
                          4E17 AND LATER GENERIC PROGRAMS
                        ESS UNIT __ _____

                            BTFN    TOWN    ST     BL     FBS     NBS
FORM CODE  _1A_          TSG ____   ____   ____   ____   ____   ____
           1   2             4   7   8 11  12 13  14 15  16 18  19 21
                                                                        CAD
FENCLASS _____ ,     FENID _____ , TFC __ , TSGBBC ___ , PCF _____ , DPC _____  ___
22      29 30      35    37 42       50            60          65 68       70 78   80

AOPC _____ ,                                                                ___
22   25 30       38                                                               80
```

Figure 6-3. ODA Form 401A

3.08 The 3B20D computer recent change requires that the network ID, cluster, and region match. Therefore, valid entries are as follows:

■ Network ID = AT&T (254)

■ Cluster (CLU) and Region (REG) = Same as the switch

■ Member (MEM) = 001 – 255.

3.09 No more than seven unique AOPC values may exist in the 401A, 401B, and 401C records.

B. Recent Change

3.10   The new AOPC field is being added to Recent Change Forms 100 (Figure 6-4),
101, 102, 106, 107, 108, 109, 203, and 208. If any trunks are assigned to a TSG
when its AOPC is being changed or deleted, the form will fail.

3.11   If the AOPC is not zero and is being changed or deleted, all TSGs must be
searched to see if another **XL4TS_AOPCI** exists that matches the one being
changed or deleted. This results in one of the following:

- If a match is found, complete the change or deletion.

- If a match is not found, zero out the AOPC in the ACI translations area (one of
  4XL_AOPC_1 through **4XL_AOPC_7**) corresponding to the **XL4TS_AOPCI** (the
  HT4TSG entry being changed or deleted).

```
# FORM 100            ADD A NEW TWO WAY TRUNK SUBGROUP
  4E17

RC:TSG;NEW;OPT(TWOWAY),____:                     TFN TOWN ST BL FBS NBS

ORNU _____,                         TSG ____ ____ __ __ ____ ____,
PCF ____, [AOPC         ] DPC _____,

FENCLASS _____, FENID ____,     TFG _, TSGBBC _, VDCAP _____, DATAF _,

QTFN ____, TOT _____, SAT _,    DOM _____, ADC _, IT _,
```

Figure 6-4.   Recent Change Form 100

C. Verify

3.12   The new field AOPC is being added to Verify Forms 1a (Figure 6-5), 1b, 1c, and
11d. Valid entries are the same as specified for the ODA forms.

```
OUTPUT:                 VERIFY 1a


VER:TSG,OPT(TWOWAY):            BTFN    TOWN      SI  BL  FBS   NBS
                               TSG ----    ----      --  --  ---   ---
PCF ----  [AOPC ---------,]    DPC --------------------,

FENCLASS -------, FENID -----, TFG -, TSGBBC -, VDCAP -----, DATAF -,
```

Figure 6-5.   Verify Form 1a

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

SAFER Final Handling Announcements Feature—Part 2 (127b/3287)

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SAFER Final Handling Announcements Feature—Part 2 (127b/3287)

7

1. Feature Description

1.01 This feature provides the *4ESS*™ switch with the capability to play a customized announcement when final handling treatment is required on a Split Access Flexible Egress Routing (SAFER) call.

1.02 The Final Handling Announcement (FHA) that is normally played for a SAFER call depends on the domain class of the Multiple Routing Treatment (MRT) table at the Originating AT&T Switch (OAS). Some domain classes and the default announcement that is played are listed below:

Domain Class	Default
None	NCA
DOM	NCA
ITRP	INC
INTL	INC
NSR	NCA
ATNS	NCA
GSDN	NCA
APN	NCA

For most domain classes, a common egress no circuits announcement (NCA) is played. Two international domain classes, ITRP and INTL, however, default to an international no circuit (INC) announcement.

1.03 A customized announcement can be specified for each MRT entry using a Recent Change (RC) form. The customized announcement, which is supplied by the Service Circuit System (SCS), will override the default announcement normally used for the domain class.

2. Call Flow (Not affected)

3. Provisioning

Population and Retrieval

3.01 A new field, Multiple Routing Treatment Final Handling Treatment (MRTFHT), has been added to Office Data Assembler (ODA) Form 403P, RC Form 321, and Verify Form 3o to support the customized announcements. Figures 7-1, 7-2, and 7-3, show where the MRTFHT field appears on these forms.

```
 FORM CODE 3P  __              MRT1 ____,   DOMCLASS ____,   MRTFHT____,
               1  2                    4   7           9   12         13   15


 ORDER  PERCENT  ERC    CALLTYP   CALLDATA      AD1     AD2     CHI    DESEP    DNST   CAD

 __,    ___,     __,    _____,   _____,      ____,   ____,   ____,  ____,   ____,   __
 17     19 21    23     25  27   29     42     49 52   54  59  66 69  71 73   74 79   80

 __,    ___,     __,    _____,   _____,      ____    ____,   ____,  ____,   ____,   __

 __,    ___,     __,    _____,   _____,      ____    ____,   ____,  ____,   ____,   __
```

Figure 7-1. ODA Form 403P

```
RC:CODECRP;CHG;OPT(MRT),____:          MRTI ____,   DOMCLASS ____,  MRTFH1____,

ORNU ____,   ACTION ____,


PERCENT  ERC   CALLTYP   CALLDATA        AD1      AD2      CHI     DESEP    DNST

____,    __,   ____,     _____,       ____,    ____,    __,     ___,     ___,

____,    __,   ____,     _____,       ____,    ____,    __,     __,      ___,

____,    __,   ____,     _____,       ____,    ____,    __,     __,      ___,
```

Figure 7-2. RC Form 321

```
OUTPUT:                                 VERIFY 3o

VER:CODECRP;OPT (MRT):                  MRTI ____,   DOMCLASS ____,  MRTFH1____,


PERCENT  ERC   CALLTYP   CALLDATA        AD1      AD2      CHI     DESEP    DNST

____,    __,   ____,     _____,       ____,    ____,    __,     ___,     ___,

____,    __,   ____,     _____,       ____,    ____,    __,     ___,     ___,

____,    __,   ____,     _____,       ____,    ____,    __,     ___,     ___,
```

Figure 7-3. Verify Form 3o

3.02 The announcement to be played, if the last entry pointed to by Multiple Routing Treatment Index (MRTI) does not complete the call, is entered in the MRTFHT field. The following are valid entries for the MRTFHT field:

AR	T	BT	NCA	VCA	ROA
EA1-EA7	SP1	SP2	HW	MCA	NCC
NWC	OOB	NCD	INC	IVC	IFF
SNA	VMA	OTS	STO	NWN	DNN
TDN	INF	NCB	WAT	LSA	OOA
LDV	LOB	UNN	S01-S19	DOO	ISB
E01-E20	R01-R10	I01-I30	blank		

Only one MRTFHT can be associated with a given MRTI.

3.03 On RC Form 321, the ACTION field must equal C (Change) in order to change the MRTFHT field.

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment. Not all switches in the network need to be in generic 4E17 Release 1 before this feature can be activated.

8. Input/Output Manual Pages (Not affected)

Command-Initiated Link Fault Sectionalization (CI-LFS) Feature (136)

8

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Command-Initiated Link Fault Sectionalization (CI-LFS) Feature (136)

8

1. Feature Description

1.01 The Command-Initiated Link Fault Sectionalization (CI-LFS) feature provides the capability for maintenance personnel to manually test Digital Signal Zero (DS0)-A equipped Signaling System 7 (SS7) link facilities via a maintenance terminal. The purpose of this is to sectionalize faults on a signaling data link. This feature can also be used in the initial evaluation of links before putting them into service. The signaling point (SP) initiating the LFS test procedures must have a DS0-A interface. The far-end SP may have any type of standardized link interface (V.35 or DS0-A).

1.02 During CI-LFS testing, loopback command sequences are sent to various elements in the link to set up a loopback. A test pattern is sent toward the loopback point, and the returning test pattern is evaluated for errors. There are three requirements for the SP performing CI-LFS as follows:

■ Must be equipped with a DS0-A interface

■ Have the Signaling Data Link Test Capabilities on Message Transfer Part (MTP) level 1.

■ Provide the maintenance personnel with an interface to perform CI-LFS tests via commands from an on-site maintenance terminal or a remote maintenance terminal [such as the Switching Control Center System (SCCS)].

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting

DS0-A to DS0-A Signaling Link

6.01 When the CI-LFS procedure is installed at a SP, then a signaling link with a DS0-A interface at both ends can be tested completely from end to end and in either direction as shown in Figure 8-1. Figure 8-1 also lists the loopback tests performed in this arrangement.
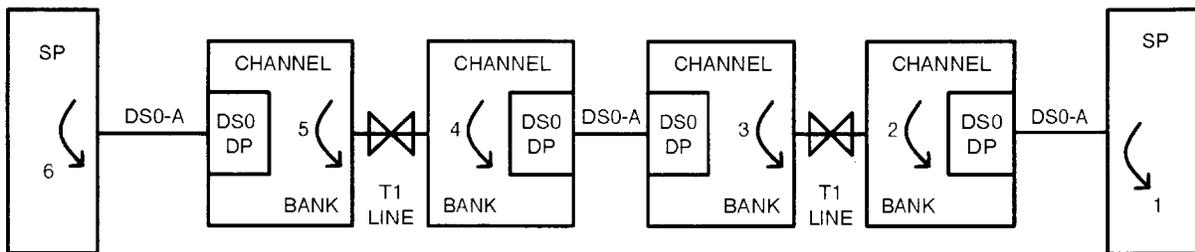
1. LOCAL DS0 LINK INTERFACE LOOPBACK
2. DS0 DATAPORT "LINE" LOOPBACK
3. DS0 DATAPORT "DROP" LOOPBACK
4. DS0 DATAPORT "LINE" LOOPBACK
5. DS0 DATAPORT "DROP" LOOPBACK
6. LATCHING NETWORK ELEMENT INTERFACE LOOPBACK

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Figure 8-1. Loopbacks on DS0-A to DS0-A Signaling Links

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DS0-A to a V.35 Signaling Link

6.02 When the CI-LFS procedure is installed at a SP, then a signaling link with a DS0-A interface at one end and a V.35 interface at the other can be tested from end to end or up to the remote link interface as shown in Figure 8-2. Figure 8-2 also lists the loopback tests performed in this arrangement.

1. LOCAL DS0 LINK INTERFACE LOOPBACK
2. DS0 DATAPORT "LINE" LOOPBACK
3. DS0 DATAPORT "DROP" LOOPBACK
4. DS0 DATAPORT "LINE" LOOPBACK
5. OFFICE CHANNEL UNIT (OCU) LOOPBACK
6. CHANNEL LOOPBACK
7. DATA SERVICE UNIT LOOPBACK
8. REMOTE LINK INTERFACE LOOPBACK
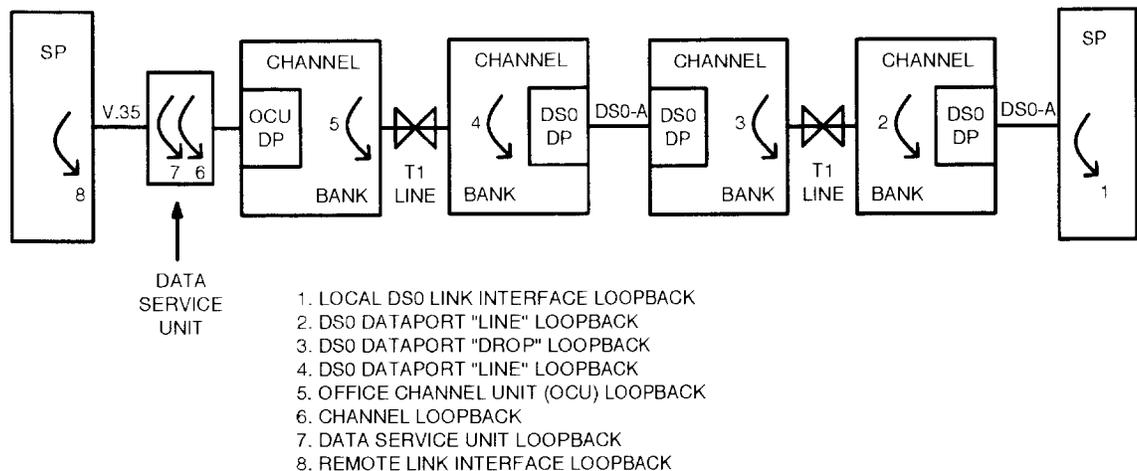
Figure 8-2. Loopbacks on DS0-A to V.35 Signaling Links

6.03 The following requirements must be followed for tests using the CI-LFS:

■ Before running a CI-LFS test of a link, the maintenance personnel must coordinate the CI-LFS tests with the maintenance personnel at the far end of the link. This will prevent both ends from initiating a CI-LFS test and receiving erroneous results. The CI-LFS tests must be run from one end of the link at a time.

■ When CI-LFS tests are performed to find a hard failure of a facility component, a completely failed facility section, the short default 15-second CI-LFS test should be run. If there is more than one bit error for a short test, the CI-LFS test should be rerun to verify the results.

■ When using CI-LFS to test an Office Channel Unit (OCU), if the initial attempt to test the OCU using the latching loopback fails, the CI-LFS test of the OCU should be reattempted using the nonlatching loopback of the OCU. The reason for reattempting the test using the nonlatching instead of the latching loopback is that the profile of the SS7 link's transmission equipment may not accurately represent

the actual OCU on the link. This check will help the maintenance personnel troubleshoot the OCU to determine whether the OCU is faulty or if the wrong OCU type was entered into the SS7 link's transmission equipment profile.

■ If the capability exists to run CI-LFS tests from either end of a signaling link, the maintenance personnel, upon finding a failure by testing in one direction on the link, should run the CI-LFS test from the other end of the link to sectionalize the fault to the correct facility section. With CI-LFS, the maintenance personnel at both ends of the link will need to coordinate the testing and verification of a failure. Verification of the failure should be performed before maintenance personnel are sent to repair the failed facility section.

■ When the failure on the link has been sectionalized, maintenance personnel should be sent to repair the failed facility section.

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on by software deployment after installation of DS0-A hardware.

8. Input/Output Manual Pages

8.01 There are five new input commands required for this feature. The messages and a brief explanation of each are as follows:

(A) EXC:LFS - This command allows maintenance personnel to initiate a CI-LFS test on a specific link, either a single loopback test or multiple loopback tests.

(B) EXC:LID0 - This command allows the maintenance personnel to perform a local loopback test of the DS0-A link interface or to operate in the remote loopback mode (the SS7 level 2 data received by the DS0-A link interface will be retransmitted back onto the SS7 link). This command also allows the removal of the loopback of the DS0-A link interface if the loopback was initiated either through an input command (such as the EXC:LID0 command) or through latching loopback codes received in the incoming bit stream.

(C) OP:LFS - This command allows the maintenance personnel to obtain the intermediate results of active CI-LFS tests initiated from the near end without interrupting the tests in progress. This input command has one required field containing the specific signaling link, range of links, or all links where CI-LFS tests are in progress. If the CI-LFS test has been running for less than 5 minutes, then the results will be flagged with an asterisk.

(D) STOP:LFS - This command allows maintenance personnel to stop an in-progress CI-LFS test initiated from the near end and report the results. This input command has one required field containing the specific signaling link, range of links, or all links where CI-LFS tests are in progress.

(E) ABORT:LFS - This command allows maintenance personnel to abort an in-progress CI-LFS test initiated from the near end and reports only the reason for terminating the test. This input command has one required field containing the specific signaling link, range of links, or all links where CI-LFS tests are in progress.

8.02 There are two new output messages, EXC LFS and REPT LFS. These messages acknowledge the CI-LFS initiation command and report the results of the CI-LFS tests. The existing OP SLK output message has been updated. The following is a description of the output messages:

(A) On receiving the CI-LFS initiation command (EXC:LFS), the EXC LFS output message will provide the user with an acknowledgement indicating that the command is accepted or rejected. The following are the possible reasons for rejection:

- Local link equipment failure
- Near end not equipped with a DS0-A SS7 link interface
- Test already in progress, near end initiated
- Test already in progress, LID0 remotely looped back
- Link not out-of-service
- Other.

(B) REPT LFS - This output message is generated in response to the OP:LFS, STOP:LFS, ABORT:LFS input messages or following the completion of the CI-LFS test. The REPT LFS output message reports the following information:

- Identity of the link
- Multiple mode test
- Number of loopback points
- Identity of the loopback point
- Disposition of test for each loopback point tested:
  — passed
  — failed due to threshold exceeded
  — failed due to multiple slips

— terminated with a reason code (range time expired, manual request, and automatic due to critical link restore).

For the dispositions listed, the following test results are included;

— bit errors

— errored seconds

— duration of test.

■ Wrong facility component loopbacked

■ Loopback failed

■ Slip prevents resynchronization to test pattern

■ Removal of loopback failed

■ Maintenance personnel aborted test

■ Other.

The SP reports the results of all manually-initiated LFS tests to the maintenance interfaces upon test completion.

8.03 The output of the OP:SLK command has been updated to include three new test states which are substates of existing minor states [Available/Manual Out Of Service (AVL/MOOS) and Unavailable/Test (UNA/TEST] indicating a CI-LFS test is in progress or that a CI-LFS test failed. The following are the three test states:

(A) A test state to indicate that a manual CI-LFS test is in progress and was initiated from the near end; the mnemonic for this state is Manual CI-LFS (MLFS).

(B) A test state to indicate that a CI-LFS test is in progress and was initiated from the far end; the mnemonic for this state is Remote CI-LFS (RLFS).

(C) A test state to indicate that the CI-LFS test initiated from the near end failed; the mnemonic for this state is Failed LFS (FLFS). Whether an CI-LFS test passes or fails, the link must remain in its present state. Therefore, the minor state would remain in the AVL/MOOS or the UNA/TEST state. When a CI-LFS fails, the link is marked, that is, all ones are transmitted on the link.

CCITT7 Overlap Signaling Feature (144a)

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CCITT7 Overlap Signaling
Feature (144a)

9

1. Feature Description

1.01 Overlap address signaling is an International Telegraph and Telephone Consultative Committee 7 (CCITT7) signaling procedure that can be used to initiate call setup using incomplete address information from an Initial Address Message (IAM). The IAM is followed by additional address information in Subsequent Address Messages (SAMs) or Subsequent Address Message With One Signal (SAO).

1.02 This feature converts overlap signaling to en-bloc signaling. An office will collect the complete address, IAM, SAMs or SAOs, and then route the call.

2. Call Flow (Not affected)

3. Provisioning

Population Rules for Office Data Administration (ODA) Forms

3.01 A new field, **OVLP**, is being added to ODA Forms 401A, 401B, and 401C, and Recent Change Forms 100, 101, 107, and 108. The format is as follows:

$$\underset{48}{\text{OVLP}\_\_,}$$

This field indicates whether or not overlap signaling is allowed. The **SPARE4** field will no longer be used.

3.02 Valid entries for the **OVLP** field are described in Table 9-A.

Table 9-A. Valid Entries for OVLP

Entry	Description
Blank	Prohibits overlap signaling
N	Prohibits overlap signaling
Y	Allows overlap signaling

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

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7. Transition Considerations

Turn On/Turn Off Mechanism

7.01   Overlap signaling is allowed on a Trunk Subgroup (TSG) basis. For the 4E17 generic release, the **OVLP** field is being added to the appropriate trunking Recent Change and ODA forms. Table 9-B lists the appropriate Recent Change and ODA forms.

Table 9-B. Recent Change and ODA Forms to Activate Feature

Type of Trunk	Recent Change Form	ODA Form
2-way	100 - new 2-way trunk subgroup 107 - change 2-way trunk subgroup	401A
1-way in	101 - new 1-way in trunk subgroup 108 - change 1-way in trunk subgroup	401B

8. Input/Output Manual Pages

8.01   The **VER:CCDADC:ABC** input manual page and **VER:CODEGRP:CCD** output manual page are being revised to include the **OVLP** field.

Processor Outage (PRO) Feature (151a/3186)

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Processor Outage (PRO) Feature (151a/3186)

10

1. Feature Description

1.01 The Processor Outage (PRO) feature provides a graceful recovery of Signaling System 7 (SS7) links from a PRO by implementing protocol standards as established by American National Standards Institute (ANSI) and the International Telegraph and Telephone Consulative Committee (CCITT).

1.02 The procedure used before the PRO feature was to break the link on recovery from a PRO condition regardless of the outage duration. This recovery method required a substantial amount of recovery time to realign the link. The PRO feature uses a method that does not break the link and provides recovery from a processor outage condition based on the duration of the actual processor outage.

1.03 PRO durations are classified as either short PRO or long PRO. A short PRO is a condition that exists for a time less than T1 seconds (before timer T1 expires). A long PRO is a condition that exists for a time greater than T1 seconds (after timer T1 expires). T1 is the level 3 T1 timer value, which is defined as the delay to avoid message mis-sequencing on changeover.

2. Call Flow

Call Flow Key Points

2.01 Processor outage procedures are initiated for the condition in which signaling messages can no longer be transferred or received at a level higher than Message Transfer Part (MTP) level 2.

Call Flow Diagram

2.02 The signaling point in the processor outage condition is referred to as the Status Indication Processor Outage (SIPO) Transmitting End (STE). The signaling point receiving the SIPOs from the STE is referred to as the SIPO Receiving End (SRE). Figure 10-1 is a flow diagram of a processor outage initiation and recovery. When a processor outage condition occurs on the STE, level 2 begins sending SIPOs. As shown in Figure 10-1, a number of events takes place after the processor outage; however, the STE continues to send SIPOs until the processor outage condition ceases. The SRE responds to the SIPOs with Fill In Signaling Units (FISUs) until the processor outage condition ceases, and no more SIPOs are received.

SIPO TRANSMISSION END	SIPO RECEIVING END

PROCESSOR OUTAGE

1. Sequence numbers must be updated to reflect the last MSU accepted by level 2 and delivered to level 3

2. L3 initiates TCC, starts timer T1; L2 stops timers T5, 6, 7; discards incoming MSUs

3. L2 sends continuous SIPOs

RECOVERY PRIOR TO T1 EXPIRY

1. STE L3 stops TCC, timer T1

2. First FISU/MSU sent must ACK the last MSU accepted by level 2 and delivered to level 3 (BSNT=FSNX-1)

3. Resume normal operation (Sending MSU/FISU)

Expiry timer T1, Complete TCC if possible, LONG PRO

PROCESSOR RECOVERED

1. L3 commands L2 to flush the RTB, TB, RB, and all messages in any intermediate buffers for transmission or local delivery

2. From a check FISU, extract the BSNR and set, FSNL=FSNT=FSNF-1=BSNR, and start sending FISUs

3. L2 notifies L3 of the completion of the buffer clearing

4. L3 commands L2 to resume normal operation

5. L2 responds to L3 that normal operation has resumed

Flow labels (center): SIPO, FISU, SU #, SIPO, FISU, FISU, FISU/MSU

1. L2 informs L3 of SIPO condition

2. L3 initiates TCC, Starts timer T1

3. L2 stops timers T5, 6, 7

4. Start sending continuous FISUs

- If the SU is a FISU/MSU, then SHORT PRO

1. SRE L3 stops TCC, timer T1

2. Set pointer RTB to the last MSU ACK by the STE

3. L3 commands L2 to resume normal operation

Expiry timer T1, complete TCC if possible, LONG PRO

1. L2 informs L3 of PRO recovery

2. L3 commands L2 to flush RTB

3. the first checked FISU, extract the BSNR and set, FSNL=FSNT=FSNF-1=BSNR

4. L2 notifies L3 of the completion on the buffer clearing

5. L3 commands L2 to resume normal operation

6. L2 responds to L3 that normal operation has resumed

Legend:
ACK	- Acknowledge	L1,2,3-	Level 1, 2 ,3
BSNR	- Backward Sequence Number Received	MSU	- Message Signaling Unit
BSNT	- BSN transmitted	PRO	- Processor Outage
FISU	- (Fill In) Signaling Unit	RB	- Receiving Buffer
FSNF	- Forward Sequence Number of the oldest MSU in the RTB	RTB	- Retransmission Buffer
		SIPO	- Status Indication "Processor Outage"
FSNL	- Forward Sequence Number of the last MSU entered into RTB	SRE	- SIPO Receiving End
		STE	- SIPO Transmission End
FSNT	- Forward Sequence Number of the last MSU transmitted	SU	- Signal Unit
		TB	- Transmission Buffer
FSNX	- FSN expected	TCC	- Time Controlled Changeover

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Figure 10-1. Processor Outage Flow Diagram

2.03 Figure 10-2 is a simplified state transition diagram for dual processor outages.
Dual processor outages occur when both ends of the concerned link enter the
processor outage state and both sides are sending and receiving SIPOs. Figure 10-3
presents the dual processor outage stages or events. The length of time of the
processor recovery in relation to the T1 timer determines whether the processor outage
was of a short or long duration. If the processor recovered before the expiration of T1
timer, the processor outage was of a short duration. The expiration or unavailability of
T1 timer makes the recovery procedure that of a long duration processor outage.
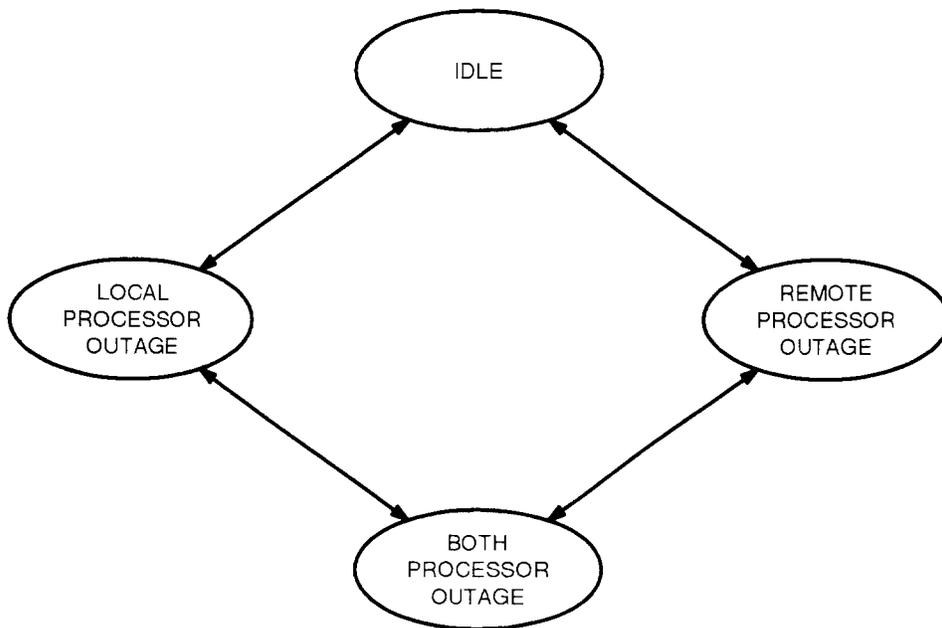
Figure 10-2. State Transition Diagram for Processor Outage

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Figure 10-3. Dual Processor Outage

3. Provisioning

Office Data Administration

3.01 The Processor Outage procedure is a self-contained, self-recovery procedure distributed among processors and processes in the AT&T 3B20D computer and Common Network Interface (CNI) ring.

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

7.01 The following are transition considerations for the Processor Outage feature:

■ Each link node in the Common Channel Signaling System 7 (CCS7)/CCITT7 signaling networks can only use one SIPO procedure at a time (two procedures cannot be used on a link node at the same time).

■ The new SIPO procedure can be deployed on a link-by-link basis on a switching or signaling system. This will result in different SIPO procedures being used on link nodes within a signaling point and/or between adjacent signaling points.

■ When the new SIPO procedure is introduced to a switching or signaling system, it must co-exist with the existing "break the link on recovery" procedure in the same system.

■ If the STE has the "break the link" SIPO procedure and the SRE has the new SIPO procedure, the STE will "break the link" on recovery, regardless of the duration of the outage. The SRE with the new procedure will stop its procedure as soon as the link is broken and wait for completion of the link prove-in procedure from the STE before service is resumed.

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- If the STE has the new SIPO procedure and the SRE has the "break the link" procedure or the old procedure that did not "break the link", the link will not be broken by STE on recovery. However, when the traffic is resumed the link may be broken where level 2 protocol dictates.

- The CNI application is responsible for keeping track of which link node has which SIPO procedure.

Turn On/Turn Off Mechanism

7.02 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

Completion of Transmission Path Feature (156)

11

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Completion of Transmission Path Feature (156)

11

1. Feature Description

1.01 This feature eliminates possible fraudulent use of the network by delaying the completion of the transmission path until the answer indication is received. Prior to this feature, the possibility existed that users could make data calls and pass data between the receipt of the Address Complete Message (ACM) and the Answer Message (ANM). By disconnecting the call prior to receiving answer, users could pass data through the network and not be billed for the call. (An AMA record is generated when ANM is received.) By waiting until ANM is received to complete the transmission path on data calls, this possible fraudulent use of the network is eliminated.

1.02 This feature allows Integrated Services Digital Network (ISDN) User Part (ISUP) outgoing calls to set up the transmission path at a different time from the receipt of the ACM. A pre-ACM Call Progress (CPG) message also causes the transmission path to be set up if it is indicated that there is interworking or that inband information may be available. For data calls, however, the setup of the transmission path is delayed until ANM is received, as long as the setup has not been requested by a previous CPG or ACM message.

1.03 Changes are introduced in this feature for the Local Exchange Carrier (LEC) only portion of the ISUP outgoing trunk handler that handles setup of the transmission path.

2. Call Flow

Cut-Through Procedures at Tandem Exchange

2.01 The transmission path is completed in both directions for all calls, upon the receipt of a CPG message, with one of the following:

■ The interworking indicator, bit I, of the backward call indicator (BCI) parameter coded "interworking encountered"

■ A CPG message with the user-network interaction indicator, bit H, of the optional backward call indicator (OBCI) parameter coded "user-network interaction occurs, cut-through of bearer channel in both directions."

Figure 11-1 shows a transmission completion path for all calls with an unexpected case where User Network Interaction (UNI) occurs or interworking is encountered, and CPG is sent from the terminating end.

If a CPG message causing cut-through is received before an ACM at an exchange, the ACM timer remains on awaiting an ACM. On receipt of an ACM after the transmission path has been completed in both directions, the existing procedures, with the exception of cut-through, are followed.

2.02 For the setting of the information transfer capability field of the user service information (USI) parameter of "speech" or "3.1-kHz audio", the transmission path is completed in both directions on receipt of the first of either an ACM or ANM, unless a previous CPG message has already triggered the cut-through. Figure 11-2 shows a transmission path completion for 3.1-kHz audio and speech calls on a normal call setup where the first backward message received is the ACM. Figure 11-3 shows a transmission path completion for calls on a normal call setup with fast connect, where the first backward message received is an ANM.

2.03 For the setting of the information transfer capability field of the USI parameter of "unrestricted digital information" or "restricted digital information", the transmission path is completed in both directions on the receipt of the ACM but only if it contains one of the following:

■ An "interworking encountered" coding in the interworking indicator, bit I, of the BCI parameter

■ The user-network interaction indicator, bit H, of the OBCI parameter coded "user network interaction occurs, cut-through of bearer channel in both directions."

This occurs unless a previous CPG has already triggered the cut-through. Otherwise, completion of transmission path occurs at the receipt of the ANM. Figure 11-4 shows the transmission completion path for calls with normal call setup but with no interworking encountered and with no UNI occurring.

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Figure 11-5 shows the transmission completion path for calls with normal call setup but with interworking encountered and with UNI occurring.

2.04 A message that may trigger a cut-through, that is, an ACM, ANM, or a CPG with an indication of interworking or user-network interaction, is never sent until all continuity checks on previous circuits or the outgoing circuit for the call connection are successfully completed. If one of these messages is received before the completion of the continuity check, the call is terminated (Final Handling Code 1497) with cause value "temporary failure", which is consistent with current practices on receipt of an ACM under similar circumstances.

2.05 In the event that the toll fraud feature is turned on at the originating access tandem for the outgoing trunk group, the toll fraud feature takes precedence over the new cut-through requirements.

2.06 At an interworking exchange where the incoming circuit is not Common Channel Signaling System 7 (CCS7) supported but the outgoing circuit is, a CPG with an indication of "interworking encountered" or "user-network interaction", received before an ACM, causes a cut-through with no other change in the usual message sequence for nontest calls. For test calls, a CPG received prior to an ACM with an indication of "interworking encountered" or "user-network interaction" is disregarded.

2.07 At an interworking exchange where the incoming circuit is not CCS7 supported but the outgoing circuit is, completion of the transmission path is delayed for a data call until the receipt of an ANM, unless an ACM with "interworking encountered" or "user-network interaction" indication causes cut-through of the transmission path, or a previous CPG has already triggered the cut-through. The path is cut through at the interworking exchange upon the receipt of an ACM, regardless of its coding, for a 3.1-kHz audio or speech call.
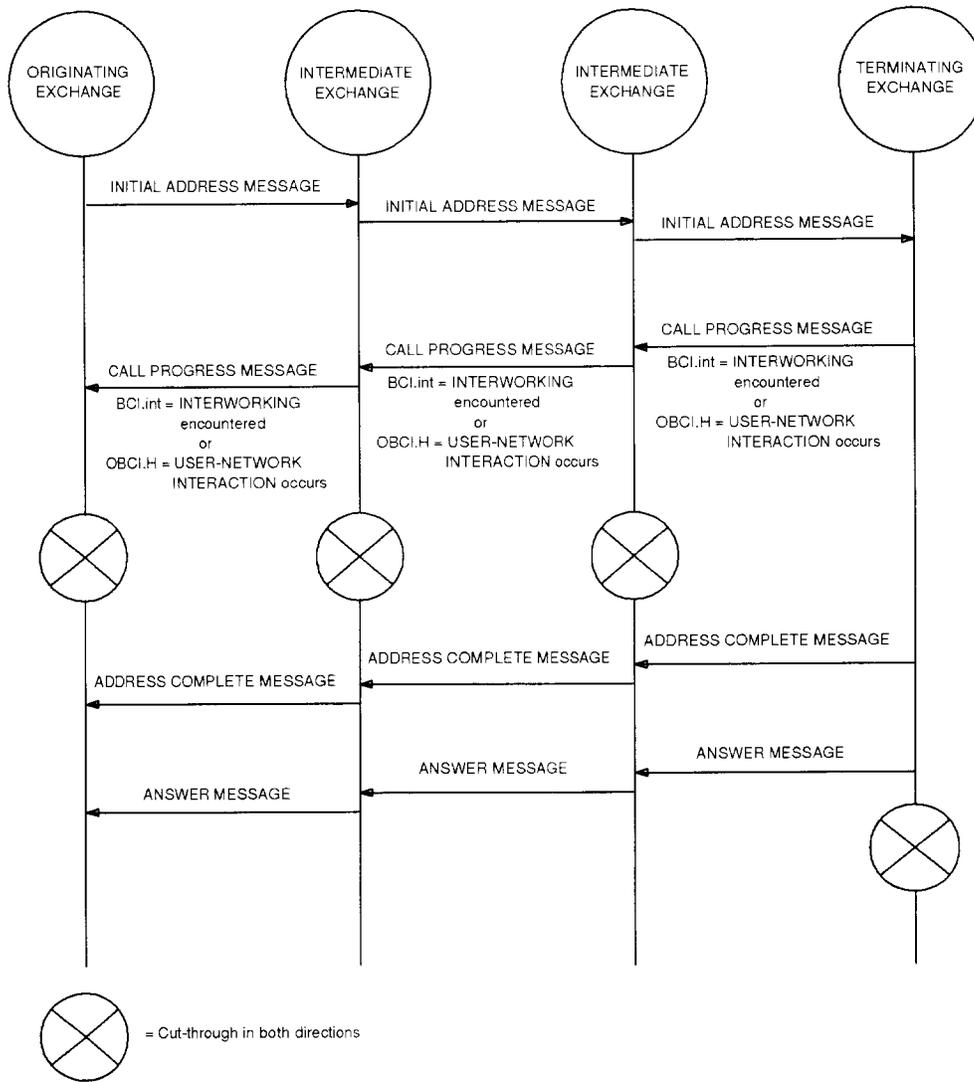
Figure 11-1. Completion of Transmission Path for All Calls—Unexpected Case: UNI Occurs or Interworking is Encountered, and CPG is Returned

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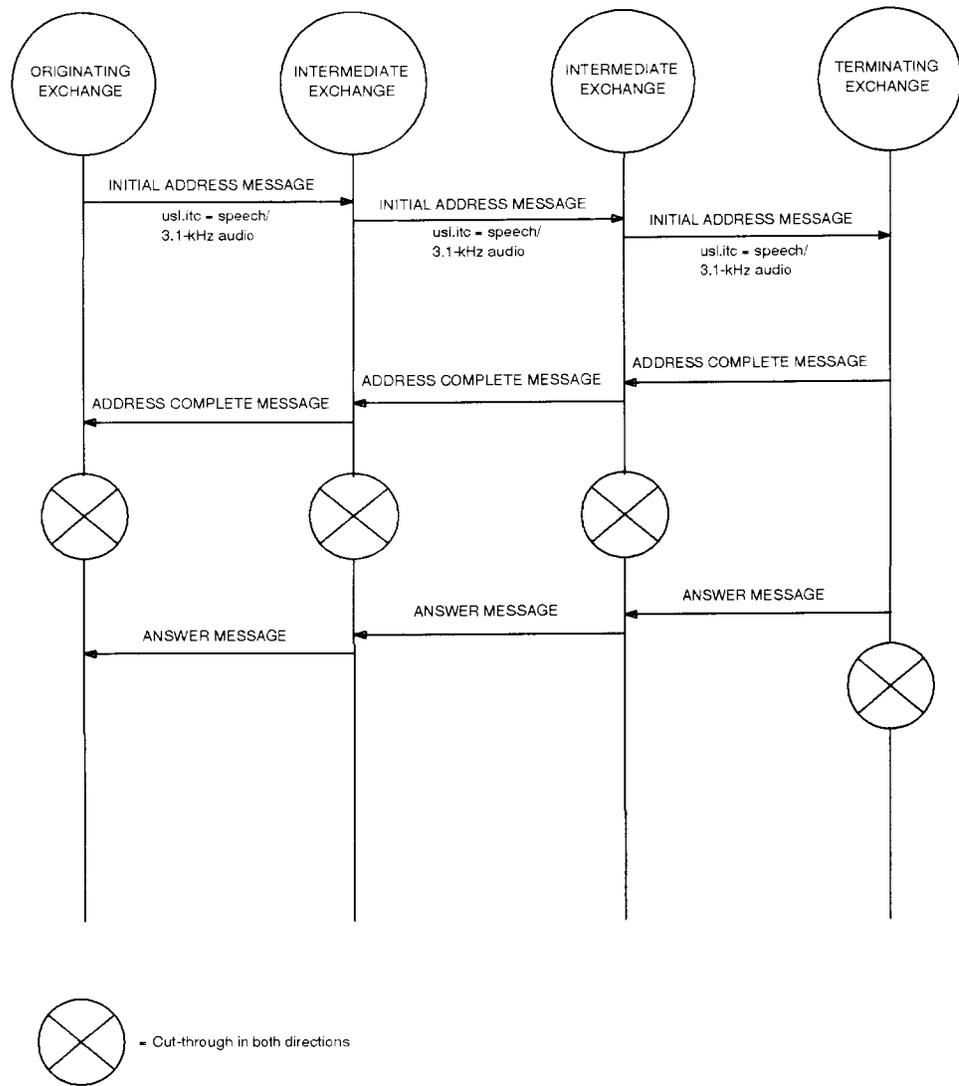
Figure 11-2. Completion of Transmission Path for 3.1-kHz Audio and Speech
Calls—Normal Call Setup: First Backward Message is ACM
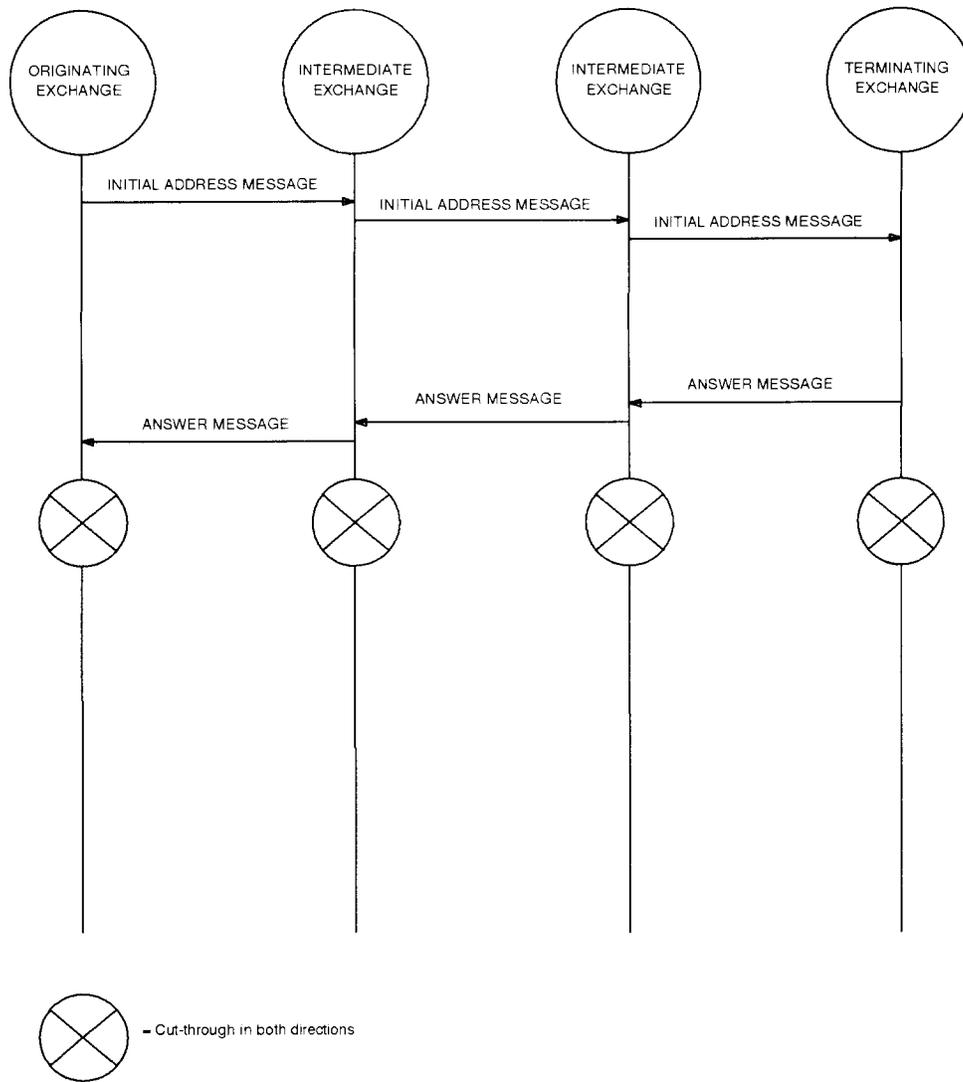
Figure 11-3. Completion of Transmission Path for All Calls—Normal Call Setup: Fast Connect, First Backward Message is ANM
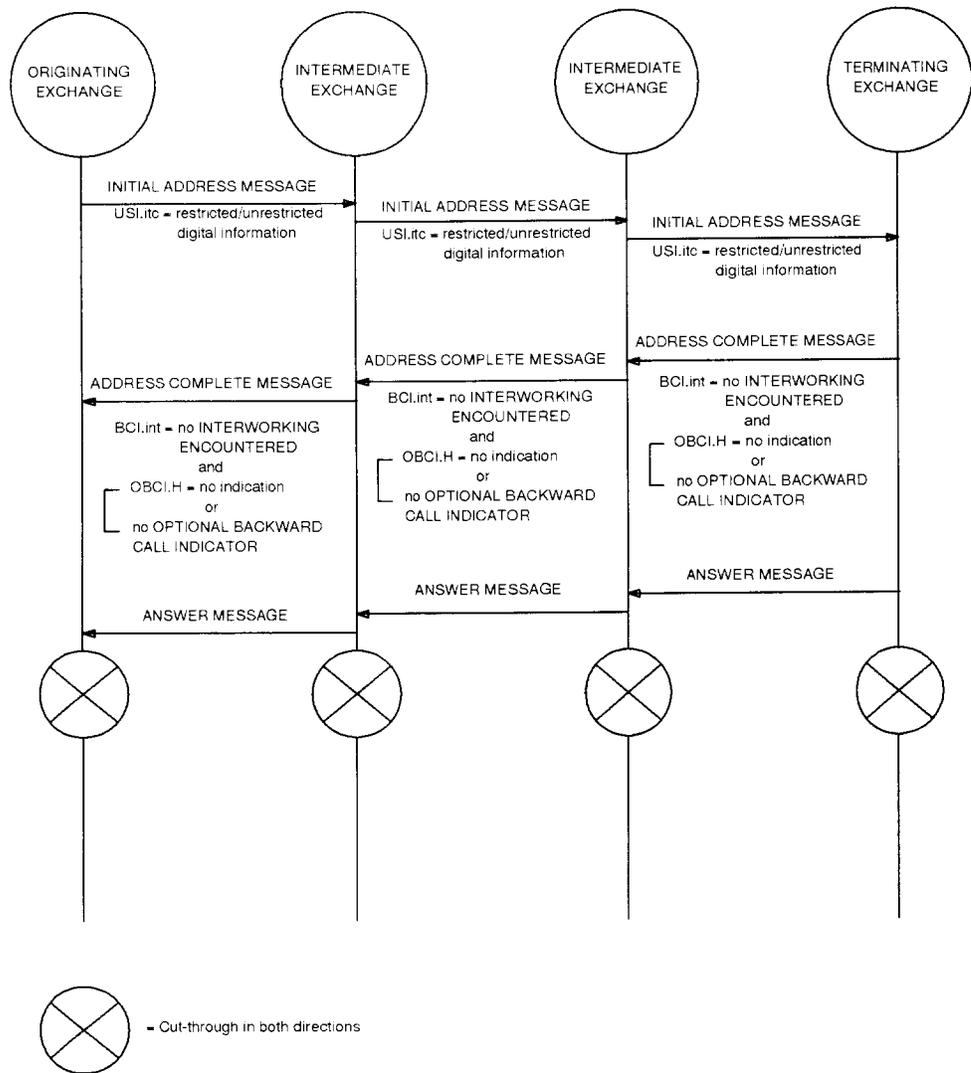
Figure 11-4. Completion of Transmission Path for All Calls—Normal Call Setup: No Interworking Encountered and No UNI Occurs
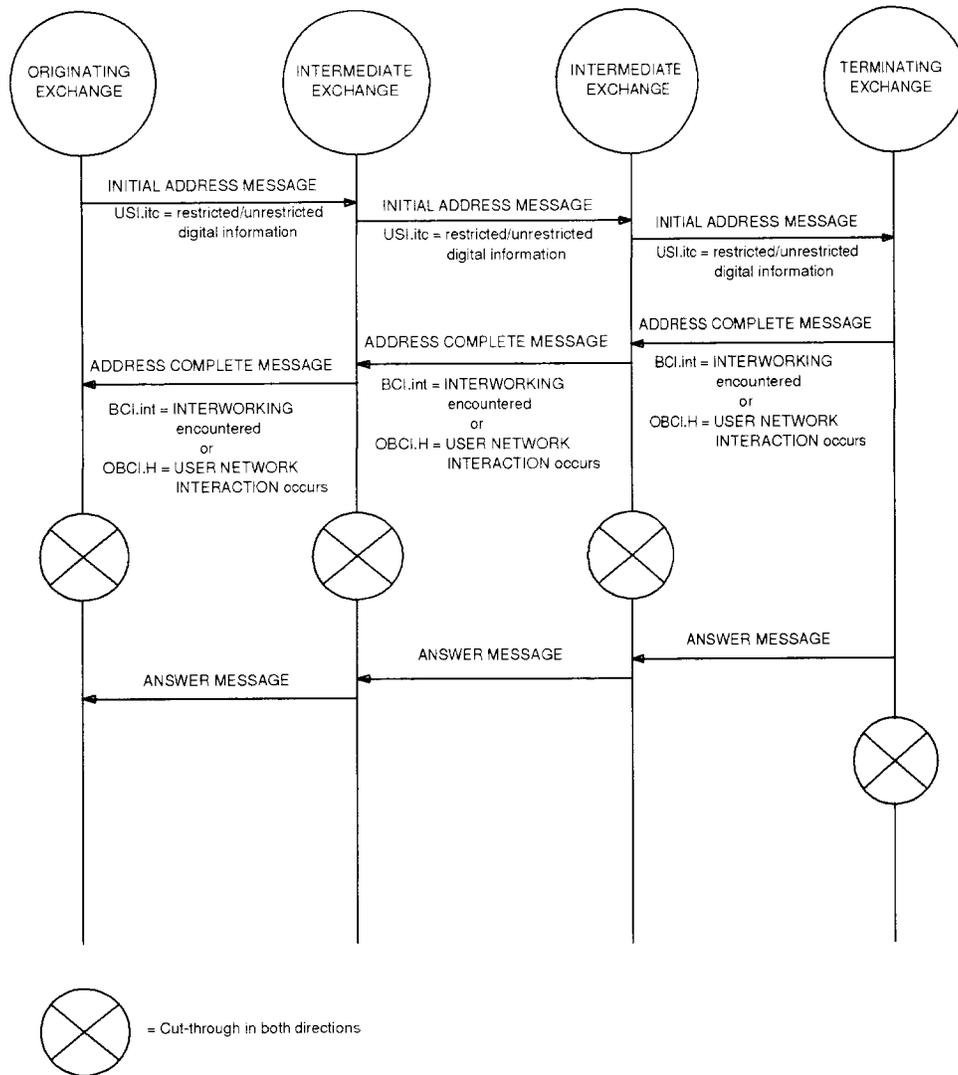
Figure 11-5. Completion of Transmission Path for Data Calls—Normal Call Setup:
UNI Occurs or Interworking is Encountered, and ACM is Returned

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3. Provisioning

3.01 This feature specifies when a transmission path should be connected for a call.
Since a call register is held until answer for some data calls, an Office Data Assembler (ODA) defined timer is defined for this feature. The timer value as used by ISUP is stored in 10-millisecond increments as opposed to other existing Wait For Answer Timers (WFATs) that treat the data in 10-second increments. The OD4WFATCTP word is populated from the WFATCTP field on the ODA 406Z form. The structure specifies the timer value for CTPTIME, and this word is populated from the WFATCTP field. If the WFAT times out, the call is failed with Final Handling Code 1498. If the field is blank, binary zero is stored. See Figure 11-6.

	CTPTIME

23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
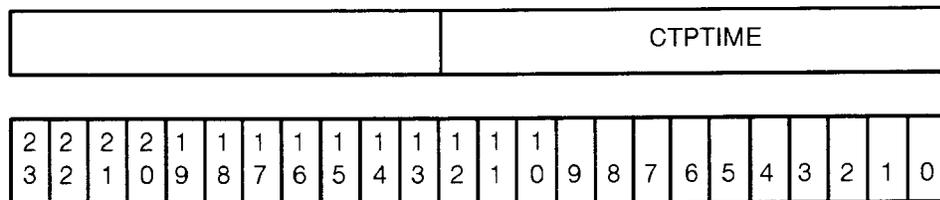
All items are prefixed with OD4.

Figure 11-6. ODA Defined Timer

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting

Measurements

6.01 At MSC 17, OMS 0, there are two new counts (TF4CTPCRSMC0 and TF4CTPCRRMC0). These counts are concerned with the seizure and release of the call register for data calls that do not require cut-through. The count TF4CTPCRSMC0 is pegged upon receiving ACM for data calls. The count TF4CTPCRRMC0 is pegged when an ANM is received, and when a time-out occurs while waiting for ANM. These new counts have no affect on existing counts.

Call Irregularities

6.02 Final handling code numbers and failure summaries are listed in Table 11-A. The handling of these failures is covered in the generic 4E17 version of AT&T 234-010-315, *Domestic Call-Irregularity Maintenance Reference Handbook, 4ESS™ Switch.*

Table 11-A. Final Handling Code Failures

FH Code	Failure and Handling Method
1497	**Last Normal Condition** - IAM message was sent on ISUP outgoing trunk.
	Irregular Condition - A CPG message requiring cut-through was received on an ISUP outgoing trunk, and a Voice Path Assurance (VPA) test did not pass, or a continuity message has not been sent. This condition can occur only at a LEC switch.
	Handling - On the outgoing trunk, a release message is sent with cause temporary failure (value = 41).
1498	**Last Normal Condition** - The IAM and COT messages were sent, and the Voice Path Assurance test passed. An ACM has also been received.
	Irregular Condition - An ISUP outgoing trunk timed out while waiting for an ANM on a data call that has not been cut-through. This condition can occur only at a LEC switch.
	Handling - The outgoing trunk or incoming trunk is cleared by the sending of a release sequence.

7. Transition Considerations

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

Handling Confusion Messages Feature (157)

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Handling Confusion Messages
Feature (157)

12

1. Feature Description

1.01 This feature allows the network switching elements to notify each other when unrecognized Integrated Services Digital Network (ISDN) User Part (ISUP) messages are received. When the *4ESS*™ switch receives an unrecognized message on a call, it immediately sends back a confusion (CFN) message to the switch that sent the message. A count of the number of confusion messages sent and received is kept by the *4ESS* switch, and a trunk block indicator allows or disallows the sending of confusion messages. This feature provides improved troubleshooting capabilities by alerting traffic engineers that the *4ESS* switch is receiving or sending confusion messages, indicating that incoming or outgoing messages are not being recognized by a local or remote switch.

1.02 The feature is allowed on Local Exchange Carrier (LEC) ISUP trunks and AT&T Local Carrier Connecting (LCC) trunks (Network Interconnect).

2. Call Flow

2.01 The purpose of generating a CFN message is to indicate to a sending switch that it sent a message that was not recognized by a receiving *4ESS* switch. A CFN message is generated when a *4ESS* switch receives an unrecognized message, but a confusion message is not generated when the switch receives unrecognized parameters or parameter values. A CFN message can be sent either in the forward or backward direction, but it can never be relayed at an access tandem switch. Also, a CFN message is never sent in response to a received CFN message.

2.02 If a CFN message needs to be sent, the sending is controlled by a new trunk block bit, send confusion (SCFN). For End Office or Tandem Connecting (ETC), Other Carrier Connecting (OCC), or Local Carrier Connecting (LCC) trunks, the default for SCFN is set to allow the sending of CFN messages. For other types of trunks, the default for SCFN indicates not to send a CFN message. The unrecognized message is always discarded at the receiving switch.

2.03 The definition of "unrecognized" includes all messages that are not implemented plus all network specific messages at the LEC or AT&T Network Interconnect (NI) boundary. The network specific messages are those messages encoded with 1111 in the upper bits of the message type octet.

2.04 The CFN message includes the cause indicators' parameters with a cause value of "message type nonexistent or not implemented" (value 97), and location of "local local network" (value 0010), followed by a diagnostic field containing the message type code of the received message. For a LCC type of trunk, location is set to "transit network" (value 0011). The priority of CFN in the message transfer part service information octet is set to 1. When a CFN message is sent or received, two new office counts are pegged. These are scheduled on an hourly report.

3. Provisioning

3.01 A new trunk block bit SCFN (send confusion) has been defined that determines if received confusion messages are counted and if CFN messages are to be sent when an unimplemented message is received. ODA Forms 401A, 401B, and 401C and Recent Change Forms 100, 101, 102, 107, 108, and 109 populate the SCFN field. If SCFN is populated with a "blank" or "N", then the CFN message is not sent. If SCFN is populated with a "Y", then the CFN message is sent.

3.02 The retrofit rules default SCFN to send a CFN message value when the type of trunk is ETC, OCC, or LCC. Therefore, this feature is turned on automatically for all LEC intra-LATA and NI boundary trunks and for all AT&T NI boundary trunks. For all other types of trunks, the SCFN default is not to send a confusion message (value = 0).

3.03 The SCFN field is present on the following Recent Change forms and related trunk subgroups:

■ Form 100 Adding a new two-way trunk subgroup

■ Form 101 Adding a new one way incoming trunk subgroup

■ Form 102 Adding a new one-way outgoing trunk subgroup

■ Form 107 Changing the characteristics of an existing two-way trunk subgroup

■ Form 108 Changing the characteristics of an existing one-way incoming trunk subgroup

■ Form 109 Changing the characteristics of an existing one-way outgoing trunk subgroup.

The following Verify forms include the SCFN field as output:

■ Form 1a VER:TSG for two-way trunk subgroups

■ Form 1b VER:TSG for one-way incoming trunk subgroup

■ Form 1c VER:TSG for one-way outgoing trunk subgroups

■ Form 11d VER:TSGLIST.

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting

Measurements

6.01 Two new AT&T 3B20D computer measurements, CFNIN and CFNOUT, are reported once every hour with a count of the CFN messages received and sent respectively. See Figure 12-1. These counts are expected to be zero most of the time because a peg count occurs only if the switch receives or sends a CFN message. If the CFNIN count is nonzero, then a distant switch is receiving a message it does not know how to interpret and, as a result, it sends a CFN message to the local originating switch.

If the CFNOUT count is nonzero, then the local switch is receiving a message it does not know how to interpret; as a result, the distant switch receives a confusion message from the local switch. These counts are pegged on the direct link node and printed in a new hourly 3B Processor measurement report (AISUPHR). This report can also be demanded via the existing OP:SMR mechanism. There is no impact for this feature on existing counts.

```
M 24  RING REPT AISUPHR            STARTED
        ISDN USER PART PROTOCOL REPORT


        REPORTING OFFICE: NPVLILIH2MD          REPORT INTERVAL : HOURLY
        CURRENT GENERIC: XDINR 4AP(11)3A.03        AUTOMATIC REPORT
        DATE: 02/14/92,  TIME:  15:00:00
        REPORT PERIOD (NWT): 02/14/92, 14:00:00  THRU  02/14/92, 14:59:59
        DATA COVERAGE: 003/003


        TOTAL     UUIDROPPED      ATPDROPPED  CSIN  CSOUT  CFNIN  CFNOUT
        0         0               0           0     0      70     70
        09/14/92   15:04:36  #012346

M 24  RING REPT SMR   AISUPHR          COMPL
        09/14/92   15:04:37  #012347
```

Figure 12-1. Example of 3B Processor Measurement Report

7. Transition Considerations

Dependencies on Network Components

7.01 The *4ESS* switch must install a new load (generic 4E17).

Turn On/Off Mechanism

7.02 The new trunk block bit SCFN (send confusion) determines if received CFN messages are counted and if CFN messages are to be sent when an unimplemented message is received. Recent Change Forms 100, 101, 102, 107, 108, and 109 populate the SCFN field. If SCFN is populated with a "blank" or "N", then the CFN message is not sent. If SCFN is populated with a "Y", then the CFN message is sent.

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7.03 The retrofit rules default SCFN to send a CFN message when the type of trunk is ETC, OCC, or LCC. Therefore, this feature is turned on automatically for all LEC intra-LATA and NI boundary trunks and all AT&T NI boundary trunks. For all other types of trunks, the SCFN default is not to send a CFN message (value = 0).

Transition Between Generics

7.04 No transition is necessary between generics. Software handles all transition activity. One transition is during the period where the DLN is on 4AP11, while the 1A Processor is still on generic 4E16. This transition is handled in a way that causes the 3B Processor DLN to peg the CFN message received count and drop the CFN message without sending it to the 1A Processor.

7.05 Another transition occurs when a 4E16 generic *4ESS* switch receives a CFN message from a 4E17 generic *4ESS* switch. The 4E16 generic DLN treats the CFN message as an unknown message and passes it to the 1A Processor. The 1A Processor then ignores the unknown message while pegging counts for ISUP unknown messages and ISUP messages ignored. These messages are included in the existing OP:RINGMNTR output message.

8. Input/Output Manual Pages (Not affected)

Routing Based on Speech and 3.1–kHz Bearer Capability Feature (158)

13

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Routing Based on Speech and 3.1–kHz Bearer Capability Feature (158)

13

1. Feature Description

1.01 Prior to this feature, the speech and 3.1-kHz audio values of the information transfer capability of the Bearer Capability [now referred to as the User Service Information (USI)] parameter in an Initial Address Message could not be distinguished when routing calls. Calls with information transfer capability coded "speech" allow certain treatments such as Time Assignment Speech Interpolation (TASI) and Low Bit Rate Voice (LBRV) encoding. However, these treatments do not ensure the integrity of the bit stream, which could obstruct the quality of voiceband data traffic such as facsimiles and modems. On the other hand, the 3.1-kHz audio calls apply to voiceband data where it is important to maintain the integrity of the bit stream. Therefore, TASI and LBRV encoding are no longer permitted on trunks that carry voiceband data.

1.02 This feature allows the Local Exchange Carrier (LEC) network to differentiate the routing of voice calls from the routing of 3.1-kHz audio calls. This is accomplished by a new manual subsequent digit treatment, V31K, that is used to route calls based on the information transfer capability of the Bearer Capability.

1.03 Calls with information transfer capability of 3.1-kHz audio (10000) on an Integrated Services Digital Network User Part (ISUP) incoming trunk and incoming voice calls on multifrequency trunks should only be routed over 3.1-kHz audio, 56-kbps, or 64-kbps trunks. If the information transfer capability of the USI is coded "speech" (00000) on an ISUP incoming trunk, the outgoing call may be routed over a speech trunk. The requirements specify that a speech call can be routed over a 3.1-kHz, 56-kbps, or 64-kbps trunk, but a 3.1-kHz audio call cannot be routed over a speech trunk.

1.04 At an access tandem, the information transfer capability in the USI is coded "3.1-kHz audio" if one of the following two conditions occurs:

- Incoming call is a voice call, the incoming trunk is multifrequency, and the outgoing trunk is ISUP

- Incoming and outgoing trunks are ISUP, and a 3.1-kHz call is received.

2. Call Flow

2.01 A new field in the Call Register determines routing when the manual subsequent digit treatment is V31K. This field is initialized for all calls to indicate "3.1 kHz". The ISUP incoming trunk handler sets this new field to indicate "speech" when the information transfer capability field in the Bearer Capability parameter indicates "speech."

2.02 With this feature, the ISUP outgoing trunk handler populates the information transfer capability in the Bearer Capability parameter based on the following:

- If the incoming trunk is multifrequency and the call is a voice call, the information transfer capability is set to "3.1 kHz."

- If the incoming trunk is ISUP, then it copies the information transfer capability received on the incoming trunk to the information transfer capability sent on the outgoing trunk.

2.03 When routing the call, if a manual subsequent digit treatment of V31K is encountered by translations, the call will be routed based on the new Call Register field that indicates that the call is a speech or 3.1-kHz call. All 3-digit translation routines will handle the new manual subsequent digit type of V31K.

3. Provisioning

3.01 Since the purpose of this feature is to route calls differently based on whether the calls are speech or 3.1 kHz, different Routing Data Blocks (RDBs) need to be defined for these different calls. Using the manual subsequent digit type V31K, speech calls will point to RDBs that can include trunks that allow TASI and LBRV in addition to 3.1-kHz, 56-kbps, or 64-kbps trunks. The 3.1-kHz calls, however, will point to RDBs that include trunks that do not allow TASI and LBRV.

Office Data Administration

3.02 The Office Data Assembler (ODA)/Recent Change and Verify (RC/V) has created a new manual subsequent digit treatment, V31K, that is used to route speech and 3.1-kHz audio calls over different trunks.

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on by using either of the following ODA or 1A Processor Recent Change forms:

- ODA Forms: 403D, 403E, 403F, 403G, 403K, 403L, 403M, 403N, 403V

- Recent Change Forms: 300, 301, 302, 303, 304, 313, 314, 315, 316.

7.02 If the **CALLTYP** field is SDX, SD1, SD2, or SD3 on any of these ODA or Recent Change forms, the Additional Data 1 (**AD1**) field can be populated with **V31K**. When a V31K type of subsequent digit entry is used, index "0" is interpreted as 3.1 kHz, and index "1" is interpreted as normal speed.

7.03 The following Verify forms are affected by this feature:

- Input Forms: 13a, 13b

  V31K is a valid input in the **ST1** and **ST2** fields.

- Input Forms: 13f, 13g, 13m

  V31K is a valid input in the **AD1** field.

- Output Forms: 3a, 3b, 3c, 3d, 3e, 3f, 3g, 3i, 3j, 3k, 3l, 3n, 3v, 3w, 3z, 3ab

  V31K may be a valid output in the **AD1** field if the **CALLTYP** field is SDX, SD1, SD2, or SD3.

8. Input/Output Manual Pages (Not affected)

Operations, Administration, and Maintenance Enhancements Feature (160)

14

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Operations, Administration, and Maintenance Enhancements Feature (160)

14

1. Feature Description

1.01 The Operations, Administration and Maintenance Enhancements (OA&M) feature provides new measurements for supporting the Integrated Services Digital Network (ISDN) User Part (ISUP) and message processing irregularity and trouble event trapping. The new measurements alert operations personnel to trouble conditions involving the protocol. Some of the trouble conditions detected are loss of User-to-User Information (UUI), loss of Access Transport Parameter (ATP), and messages generated with a case parameter containing a "cause = protocol error". These measurements are the only means maintenance personnel have of being alerted to these trouble conditions.

1.02 Once the maintenance personnel have identified that a trouble condition exists, additional information about the trouble may be needed for trouble sectionalization. A trapping capability in this feature provides the necessary output information in real time about an irregularity or message that would not normally be kept by the 4ESS™ switch. Trap messages are generated only when the trapping capability has been enabled. Usually, the trapped events are irregularities or troubles that are measured but are not always reported to the maintenance personnel in real time. To obtain this information, a "Message-Processing and Irregularity and Trouble Event Trap" is required. This trap allows the user to specify a particular event trap to obtain data about message processing irregularities or trouble events detected in the 4ESS switch.

2. Call Flow

2.01 This feature supports the Local Exchange Carrier (LEC) as well as the toll switch that provides measurements and call irregularity traps to support ISUP. For details about the new measurements and traps, refer to "Maintenance and Troubleshooting" in this chapter.

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting

6.01 Some of the trouble conditions detected by this feature are measurements which are the only means maintenance personnel have of being alerted, on line, to the trouble conditions. The following measurements are provided:

(a) A count of ATP dropped due to message length considerations

(b) A count of UUI dropped due to message length considerations

(c) A count of any ISUP message received with cause=protocol error class. Cause=protocol error class is identified by the class field (bits 5 through 7) of the cause value being coded 110

(d) A count of any ISUP message sent with cause=protocol error class

(e) A count of ATP dropped due to parameter length considerations

(f) A count of UUI dropped due to parameter length considerations

(g) A count of ATP dropped due to internal loss

(h) A count of UUI dropped due to internal loss.

6.02 This feature contains eight new measurements that alert personnel to trouble conditions. Four of the measurements are pegged in the direct link node (DLN) and appear on a new 3B Processor measurement report. The other four counts are pegged in the 1A Processor and appear in a 1A Processor report (Measurement Subclass 45 Output Measurement Set 6).

3B Processor Measurements

6.03 The 3B Processor measurements are described below and include measurements to Drop ATP For Message Length Violation, Drop UUI For Message Length Violation, Cause Value Received Within Protocol Error, and Cause Value Sent Within Protocol Error.

Drop ATP For Message Length Violation

6.04 An ATP parameter is dropped when the maximum message length of 272 bytes is exceeded. The new measurement for reporting the dropping of this parameter, ATPDROPPED, occurs on the 3B Processor measurement report (Figure 14-1). The report is scheduled automatically once every hour. Most of the time, the ATP dropped count is expected to be zero because a message is not supposed to exceed 272 bytes. If, however, the count exceeds zero, it indicates that the switch is building a message that is greater than the 272-byte limit and that the ATP parameter is being dropped in order to shrink the message below the 272-byte limit. This feature has no impact on existing counts.

Drop UUI For Message Length Violation

6.05 A UUI parameter is dropped when the maximum message length of 272 bytes is exceeded. The new measurement for reporting the dropping of this parameter, UUIDROPPED, occurs on the 3B Processor measurement report (Figure 14-1). The report is scheduled automatically once every hour. Most of the time, the UUI dropped count is expected to be zero because a message is not supposed to exceed 272 bytes. If, however, the count exceeds zero, it indicates that the switch is building a message that is greater than the 272-byte limit and that the UUI parameter is being dropped in order to shrink the message below the 272-byte limit. This feature has no impact on existing counts.

Cause Value Received Within Protocol Error Measurement

6.06 A new measurement, CSIN, reports when an ISUP message containing the cause parameter with a cause value within the protocol error class is received. This count, CSIN, occurs on the 3B Processor measurement report (Figure 14-1), and the report is scheduled automatically once every hour. Most of the time, this count is expected to be low because these are counts of errors that should not normally occur. The protocol error class deals with messages and parameters that are nonexistent or not implemented and invalid parameter contents. It is possible, however, that these

counts may increase when another switch upgrades to a new software package, especially if this new package includes new messages or parameters not implemented by an existing software package.

6.07 There is an interaction of the CSIN and the confusion message counts (CFNIN). Since one of the protocol errors is a nonexistent or unimplemented message type, which is always received in a confusion message, the confusion message received count is also pegged.

Cause Value Sent Within Protocol Error Measurement

6.08 A new measurement, CSOUT, reports when an ISUP message containing the cause parameter with a cause value within the protocol error class is sent. This count, CSOUT, occurs on the 3B Processor measurement report (Figure 14-1), and the report is scheduled automatically once every hour. Most of the time, this count is expected to be low because these are counts of errors that should not normally occur. The protocol error class deals with messages and parameters that are nonexistent or not implemented and invalid parameter contents. It is possible, however, that these counts may increase when another switch upgrades to a new software package, especially if this new package includes new messages or parameters not implemented by an existing software package.

6.09 There is an interaction between the CSOUT and the confusion message count CFNOUT. Since one of the protocol errors is a nonexistent or unimplemented message type, which is always sent in a confusion message, the confusion message sent count (CFNOUT) is also pegged. This is indicated in the 3B Processor measurement report under the CFNOUT heading. (See Figure 14-1.)

6.10 For details about the CNI report mechanism, refer to AT&T Practices 234-100-120AC, *Common Channel Signaling Systems, Common Network Interconnect (CNI), 4ESS™ Switch System Description Manual.*

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```
M 24  RING REPT SMR AISUPHR            STARTED
      ISDN USER PART PROTOCOL REPORT


      REPORTING OFFICE: NPVLILIH2MD          REPORT INTERVAL: HOURLY
      CURRENT GENERIC: XDINR 4AP(11)3A.03         AUTOMATIC REPORT
      DATE: 02/14/92.  TIME: 14:00:00
      REPORT PERIOD (NWT): 02/14/92, 15:00:00  THRU  02/14/92, 14:59:59
      DATA COVERAGE: 003/003


      TOTAL  UUIDROPPED ATPDROPPED CSIN  CSOUT  CFNIN  CFNOUT
        0         0          0       0     0      0       0
      09/14/92  15:04:36  #012346

M 24  RING REPT SMR AISUPHR            COMPL
      09/14/92    15:04:37  #012347
```

Figure 14-1. Example of 3B Processor Measurement Report

6.11 The report can also be requested on the 3B Processor maintenance channel by entering the **OP:SMR AISUPHR** command.

1A Processor Measurements

6.12 The 1A Processor measurements are described below and include measurements for ATP and UUI length and internal length violations.

Drop ATP For Parameter Length Violation

6.13 An ATP parameter is dropped when received in an ISUP message because it exceeds the ATP parameter maximum 129-byte length (not including the parameter ID and length). The new count (PL4ATPTHMC18) appears on Measurement Subclass 45 Output Measurement Set 6 under the ATP heading. The feature has no impact on existing counts. (See Figure 14-2.)

Drop UUI For Parameter Length Violation

6.14 A UUI parameter is dropped when received in an ISUP message because it exceeds the UUI parameter maximum 129-byte length (not including parameter ID and length). The new UUI count (PL4UUILTHMC18) appears on Measurement Subclass 45 Output Measurement Set 6 under the UUI heading. The feature has no impact on existing counts. (See Figure 14-2.)

Drop ATP For Internal Length Violation

6.15 An ATP parameter is dropped when trying to send an ISUP message because an internal message buffer length is exceeded. The new count (PL4ATPILSMC18) appears on Measurement Subclass 45 Output Measurement Set 6 under the ATP INT heading. The feature has no impact on existing counts. (See Figure 14-2.)

Drop UUI For Internal Length Violation

6.16 A UUI parameter is dropped when trying to send an ISUP message because an internal message buffer length is exceeded. The new count (PL4UUIILSMC18) appears on Measurement Subclass 45 Output Measurement Set 6 under the UUI INT heading. The feature has no impact on existing counts. (See Figure 14-2.)

```
OMS    6    ISUP    UUI    AND    ATP    DROPPED


       UUI    UUI INT    ATP    ATP INT
        0        0        0        0
```

Figure 14-2. MSC 45 SCGA, CNI and CCIS Total Office Performance Measurements

Call Irregularities

6.17 Two final handling codes apply to this feature. Final Handling Codes 67 and 68 describe the dropping of UUI and ATP parameters when they exceed the 129-byte maximum parameter length. The parameters can be trapped using the measurement subclass trap index. Final handling code numbers and failure summaries are listed in Table 14-A. The detailed handling of these failures is covered in the generic 4E17 version of AT&T 234-010-315, *Domestic Call-Irregularity Maintenance Reference Handbook, 4ESS™ Switch.*

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Table 14-A. Final Handling Code Failures

FH Code	Failure and Handling Method
67	**Last Normal Condition** - An incoming ISUP trunk received one of the following ISUP messages: IAM, ACM, ANM, CPG, REL. **Irregular Condition** - The UUI must be dropped due to UUI length violation (greater than 129 bytes not including the parameter ID and length) on a message being received. **Handling** - Maintenance personnel are alerted to irregularities and trouble conditions using dump trap data which include: CIC and trunk group/member that received or attempted to send the ISUP message with UUI, UUI length, the ISUP message type, and the call state at the time the UUI was dropped. In addition, the PL4UUILTHMC18 count is pegged. The processing continues.
68	**Last Normal Condition** - An ISUP trunk received one of the following ISUP messages: IAM, ACM, ANM, CPG, REL. **Irregular Condition** - The ATP must be dropped due to ATP length violation (greater than 129 bytes not including the parameter ID and length) on a message being received. **Handling** - Maintenance personnel are alerted to irregularities and trouble conditions using dump trap data which include: CIC and trunk group/member that received the ISUP message with ATP, ATP length, the ISUP message type, and the call state at the time the ATP was dropped. In addition, the PL4ATPLTHMC18 count is pegged. The processing continues.

6.18 The measurements and call irregularity messages alert maintenance personnel to the irregularities and trouble conditions that are measured but not always reported to the maintenance personnel in real time. To isolate and sectionalize a trouble, a user activated Message-Processing Irregularity and Trouble Event Trap is provided for the 1A Processor to collect and report detailed data on specific message processing irregularities or trouble events detected in the switch. The trapping capability provides the necessary output information in real time about an irregularity or message that would not normally be kept by the *4ESS* switch.

6.19 Trap messages are generated only when the trapping capability has been enabled. The switch traps the events and displays data for UUI or ATP dropped due to ISUP maximum length violations. The data displayed includes CIC and trunk group/member that received the ISUP message with UUI or ATP, UUI length, ATP length, the ISUP message type, and the call state at the time the UUI or ATP was dropped. The switch may provide information which maintenance personnel can use to

sectionalize troubles or trace call processing events within the switch. An example of a "sanity test" of this feature would be to input ISUP test signaling messages with abnormally long ATP parameters (greater than 131 octets including the parameter name and length indicator) and to activate the event trap for the ATP dropped. It could then be verified that the ATP was dropped and that the event trap had been activated properly.

6.20 The existing 1A Processor final handling trap capability is used. An example of trapping the UUI dropped due to ISUP maximum length violations, which uses Final Handling Code 67, is as follows:

MON:IAOFC,NEW:FHC 67!

For additional information about this message refer to the **MON:IAOFC** input message in the *4ESS* switch input/output message manual. For additional information about trapping capabilities refer to AT&T 234-103-018, *Call Irregularity Raw Data Trap Technical Operation Center Network Maintenance, 4ESS™ Switch.*

7. Transition Considerations

7.01 This feature is turned on automatically through software deployment. In one transition case, the direct link node is on 4AP11 while the 1A Processor is still on generic 4E16. Another case is when a generic 4E17 switch receives data from a generic 4E16 switch. In both cases, however, the transition is handled without problems because the 3B Processor pegs the new counts and outputs the counts in an hourly report. The counts never interface with the 1A Processor.

8. Input/Output Manual Pages (Not affected)

Emergency Alternate Routing (EAR) Feature (165)

15

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Emergency Alternate Routing (EAR) Feature (165)

15

1. Feature Description

1.01 This feature ensures the survivability of a business customer's communications. In the event of a natural disaster or a threat to the location of a business, calls can be redirected to a secondary location. The Emergency Alternate Routing (EAR) feature is invoked by a Recent Change (RC) at the *4ESS*™ switch access tandem. The basis of this feature is a number substitution capability.

1.02 The EAR feature allows the redirection of calls for a predetermined group of numbers (up to 1024 numbers). The redirection takes place at the access tandem.

2. Call Flow

2.01 The call flow would normally take place in the following sequence:

(1) A business customer contracts with the Local Exchange Carrier (LEC) for this feature. At this time, the critical numbers that are to be rerouted and the alternate destination numbers at the new site are identified.

(2) When an emergency or threatened emergency occurs, a representative of the business customer calls the designated LEC work center. (The method by which security, including identification and authorization, is to be handled will be negotiated between the business customer and the LEC.)

(3) Personnel at the LEC work center issue a work order to the maintenance personnel.

(4) The maintenance personnel execute an RC to activate the feature.

(5) All calls made during the period the feature is in effect are routed to one of the alternate destination numbers.

(6) When the threat has abated, a representative of the business customer calls the work center to have the feature deactivated.

(7) Personnel at the work center issue a work order to the maintenance personnel, and an RC is invoked to restore normal call processing to the critical numbers.

Call Flow Diagram

2.02 The call flow is summarized in Figure 15-1.
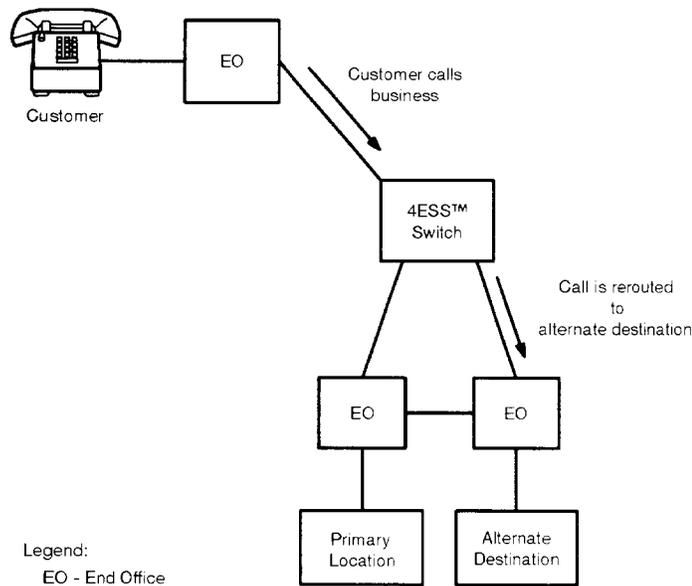
Figure 15-1. Emergency Alternate Routing

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3. Provisioning

Office Data Administration (ODA)

3.01   Procedures for communicating with customers and for activating and deactivating the EAR feature for specific customers must be worked out in advance.

3.02   The EAR feature is installed in an office at retrofit time by setting the EAR field on ODA Form 406Z to "**Y**". This field defaults to "**N**".

3.03   The primary and desired alternate destination numbers of EAR customers must be determined in advance and stored in a data base in the switch using RC Form 341 or ODA Form 4031.

3.04   A number which is to be routed to an alternate destination under EAR must belong to a code group which has an EAR call type. All code groups which include numbers for EAR customers must be identified ahead of time and given the EAR call type. Note that the EAR call type alone does not provide alternate routing capability. A number must also appear in the EAR data base before alternate routing may be activated.

3.05   The following new forms are used for the EAR feature:

(A) ODA Form 406Z

```
                        MISCELLANEOUS OFFICE DATA
                                 4ESS

                 ESS UNIT _____   _____


        FORM CODE   6Z
                    1    2

        EAR    Y '              CAD    '
        3 5    14                80
```

Figure 15-2. Data Base Form 406Z (EAR Field Shown)

(B)

ESS UNIT _____

FORM CODE 31

$\overline{1\ 2}$

PRIMNUM	**PRIMDOM**	**ALTNUM**	**AC/DEAC**	**AD**
_____,	____,	_____,	___,	__,
5 14	17 20	24 33	42 45	80
_____,	____,	_____,	___,	__,
_____,	____,	_____,	___,	__,
_____	____	_____,	___	__
_____,	____	_____,	___	__,
_____,	____,	_____,	___,	__,
_____,	____,	_____,	___,	__,
_____,	____,	_____,	___,	__,

REMARKS _____   PAGE _____ OF ___

(C) RC Form 341

RC:CODEGRP;CHG;OPT (EARDAT), _____:

ORNU _____,   ACTION __,

PRIMNUM   PRIMDOM   ALTNUM

REMARKS _____!

Figure 15-3. Recent Change Update Form 341

(D) RC Form 342

RC:CODEGRP;CHG;OPT (EAR), _____:

ORNU _____,   AC/DEAC _____,

PRIMNUM   PRIMDOM

REMARKS _____!

Figure 15-4. Recent Change Form 342

(E) Verify Message 13r

Following are the VER messages that request verification of the EAR data base:

Example: **VER:CODEGRP:LISTEAR!**
         VER:CODEGRP:EAR 3018472291!

The **VER:CODEGRP:LISTEAR!** message lists the entire customer data base.
The **VER:CODEGRP:EAR** a! lists the status of a single customer number.

(F) Verify Message 3q

This message is the output of the 13r Verify Message. Verify Message 3q is used to output customer information such as the customer's 7- or 10- digit number and the status of the customer (active or inactive).

3.06 ODA forms 403D, 403E, 403F, 403G, 403H, 403V, and 406Z are affected by the EAR feature.

3.07 RC forms 300, 301, 302, 303, 304, and 332 are affected by the EAR feature.

3.08 Verify forms 3a-3g, 3ab, 3v, 3w, 3y, 13f, and 13m are affected.

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance /Troubleshooting

New Or Changed Final Handling Codes

6.01 There are two final handling codes as follows:

- 162 - This code is returned in several circumstances of multiple number substitution in the *4ESS* switch. A call routed with EAR may fail with this code in cases of circular or chained substitution (for example, two destination numbers each alternate routed to the other).

- 553 - A call fails with this code if the EAR feature substitutes a new number which is unroutable or which translates to a call type which is not allowed for the EAR feature.

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 The EAR feature is installed in an office at **retrofit time** by setting the EAR field on ODA Form 406Z to **"Y"**. This field defaults to **"N"**. Figure 15-2 shows the EAR field.

7.02 An alternate destination number for a customer is installed by entering the customer's primary number and the corresponding alternate destination number on RC Form 341. Note that populating this form does not cause a customer's calls to the primary number to be routed to the alternate destination number. See Figure 15-4 for Form 341.

7.03 Alternate routing for a particular customer primary number is activated through the use of RC Form 342 (Figure 15-5) by doing the following:

(a) Enter the primary number and routing domain in the PRIMNUM and PRIMDOM fields

(b) Enter AC in the AC/DEAC field.

The primary number must have been previously installed for the customer on RC Form 341.

7.04 Alternate routing may be deactivated for a particular customer's primary number by entering the primary number and routing domain in the PRIMNUM and PRIMDOM fields and entering DEAC in the AC/DEAC field on RC Form 342.

⇒ **NOTE:**
It is possible for Form 342 to fail to activate or deactivate all of the alternate destination numbers specified on the form. In case of such a failure, a warning message is displayed that indicates which entries must be reentered. For example:

**RC FORM 342 DID NOT COMPLETE
REENTER DATA STARTING WITH LINE NUMBER 14**

This message indicates that data should be reentered beginning with line number 14.

7.05 A customer's number is removed from the data base by entering the primary routing number and domain with an action of "Delete" on RC Form 341. The alternate number is not entered on the form. The customer's alternate destination number cannot be active at the time of removal.

8. Input/Output Manual Pages

8.01 The messages for the EAR feature are the input message **VER:CODEGRP** and the output message **VER:CODEGRP:OPT(EAR)**.

8.02 The input message is used to request verification of the EAR information contained in the translators. The output message verifies the emergency alternate routings contained in the translators. Variable fields and system responses for the messages can be found in the following message manuals:

- AT&T IM-4A000-01, *4ESS™ Switch Input Messages*

- AT&T OM-4A000-01, *4ESS™ Switch Output Messages.*

Interchangeable Numbering Plan Area (INPA) Codes Feature (176/3026 and 3564)

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Interchangeable Numbering Plan Area (INPA) Codes Feature (176/3026 and 3564)

16

1. Feature Description

1.01 This feature provides the *4ESS*™ switch with the capability to distinguish between different numbering plans that may use the same format.

1.02 The traditional format for a publicly dialed North American Numbering Plan (NANP) number is N0/1X-NXX-XXXX, where N is any value from 2 thru 9 and X is any value from 0 thru 9. The first three digits of this number, N0/1X, are referred to as the Numbering Plan Area (NPA). These digits identify the area code of the call's destination. (The middle digit of the NPA can only be 0 or 1.) The second set of three digits, NXX, identifies a Central Office code and the last four digits, XXXX, identify the line number.

1.03 With new area codes being opened up, the supply of available NPAs is being exhausted. Bellcore plans to make additional NPAs available by changing the format of the NPA from N0/1X to NXX. Allowing the second digit of the NPA to be any value between 0 and 9 will create 640 new NPA codes.

1.04 NPA codes that can have the format NXX, as well as the traditional format N0/1X, are referred to as Interchangeable Numbering Plan Area (INPA) codes. Using the format NXX for NPA codes means the format for the NPA and Central Office codes will be the same.

1.05 This change to the NPA format affects the AT&T Switched Network (ASN) in two ways:

- First, the ASN must be able to correctly translate, route, and bill public network calls to destinations with NPAs in the new format.

- Secondly, the ASN must be able to distinguish between an NANP number and an Action Point Number (APN).

1.06 Action Point Numbers are a pool of numbers that AT&T assigns to direct-connect locations. They are used internally to route and bill calls and are also used as billing numbers for some Integrated Services Digital Network (ISDN) customers. The format of an APN number is N[2-9]X-NXX-XXXX. Although this format deviates from the traditional NANP numbering plan, the APN and NANP numbering plans do not overlap. The numbering plan can be identified by the second digit in the NPA. If the second digit is either 0 or 1, the numbering plan is NANP; if the second digit is any other number, the numbering plan is APN.

1.07 With the introduction of INPA codes, however, the numbering plan can no longer be identified from the number. A valid NANP number could be identical to a valid APN number. As a solution to this problem, this feature introduces a new data element called the Numbering Plan Type (NPT) indicator. The *4ESS* switch can use NPTs to make the distinction between numbers from different numbering plans.

1.08 An NPT will be defined for the originating number, that is, the Automatic Number Identification (ANI), terminating (routing) number, and other numbers associated with every ASN call. The NPT will be stored along with ANIs and terminating numbers and will be signaled between network elements using existing CCS7 Transaction Capabilities Application Part (TCAP) and Integrated Services Digital Network User Part (ISUP) parameters.

1.09 The original plan was for all network elements and Operation Support Systems (OSSs) in the AT&T network to be able to receive, process, and send NPTs during the 4E17 generic time frame. However, the decision was made to have a phased introduction of the INPA feature. During the 4E17 time frame (Phase 1), the *4ESS* switch, Common Platform Adjunct, and Small Scale Adjunct will be the only network elements with the capability to handle NPTs. All Trunk Subgroup (TSG) Billing Numbers (BNs) will be marked as "NANP" or "4E17".

1.10 In 4E18 (Phase 2), the NPT parameter will be set on trunk groups, and NPTs will be signaled through the network and to the Network Control Point (NCP). Also, Automatic Message Accounting (AMA) records will include the NPT, and core provisioning systems will set the NPT parameter on trunking and Global Title Translation (GTT) recent changes.

1.11 In later phases, other network elements that handle provisioning, maintenance, and billing will be upgraded to accept, store, and transmit the NPT parameter.

1.12   Although the changes have been made in the *4ESS* switch to support INPA, the INPA feature will not be enabled during the 4E17 generic time frame since not all network elements will have the capability to handle NPTs. The INPA Additions feature (3564) was developed to disable the INPA feature during the 4E17 generic time frame. The INPA Additions feature is turned on in the *4ESS* switch when the 4E17-4AP11 retrofit occurs; it is turned off with a recent change message. Turning off the INPA Additions feature turns on the original INPA feature.

⚠ CAUTION:

The INPA Additions feature should not be turned off during the 4E17 time frame.

2. Call Flow

2.01   The introduction of INPA codes and the NPT indicator will not affect the way a call is routed through the ASN. When processing calls, the *4ESS* switch will attach an NPT indicator to the originating number (ANI), terminating (routing) number, and other numbers associated with every ASN call. The NPT indicator will identify the Numbering Plan to which the number belongs, that is, APN, NANP, or International. The *4ESS* switch will propagate the NPT indicator to other network elements in the ASN using existing fields of the number parameters in the Q.931, CCS7 TCAP, and CCS7 ISUP messages.

3. Provisioning

Population and Retrieval

3.01   New fields have been added to a number of Recent Change (RC), Office Data Administration (ODA), and Verify forms to support this feature.

A. Recent Change

3.02   New fields have been added to the following RC forms:

100	108	631
101	109	645
102	622	646
107		

⚠ CAUTION:

Do NOT populate the new fields on these forms with anything other than NANP during the 4E17 generic time frame.

3.03 Two new fields, BNPT (Billing Number Numbering Plan Type) and WBNPT (WATS Billing Number Numbering Plan Type), have been added to Recent Change (RC) Forms 100, 101,107, and 108. The BNPT field identifies the numbering plan to be assigned to the Billing Number, and the WBNPT field indicates that the Billing Number is part of the North American Numbering Plan. Figure 16-1 shows where these new fields appear on the RC Form 100. The location of BNPT and WBNPT is similar on RC Forms 101, 107, and 108.

Figure 16-1. Portion of Recent Change Form 100

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3.04 The new field BNPT has been added to RC Forms 102, 109, and 622. Figures 16-2 and 16-3 show where this field appears on RC Forms 102 and 622. The location of BNPT on RC Form 109 is similar to the location on RC Form 102.

Figure 16-2. Portion of Recent Change Form 102

Figure 16-3. Recent Change Form 622

3.05 A new field, NUMPL (Numbering Plan), has been added to RC Forms 631, 645 and 646. Figures 16-4 and 16-5 show where this new field appears on RC Forms 631 and 645. The location of NUMPL on RC Form 646 is similar to the location on RC Form 645.

```
RC:SERVICE;CHC;OPT(PARAMS),    _:                          SRVC    ,
ORNU    _____,

NUMPL         ,      RTDOM ___,   RSI   ,   RSIDF___,   RSFHI   ,

LSMTX __,    LSFHT ___,

REMARKS _____            _____   _____!
```

Figure 16-4. Recent Change Form 631

```
RC:PCP;CHC;____:        CANI_____,  TOA  , ISVC ____,  NUMPL       ,

ORNU  _____,  ACTION _,

ACI _,  ACL  ,

CDS _,

FAX ____ ,  FAXPAR _,  FAXSF  ,

CDEI _,  CDI _,  FAST  ,  FRI _,  FPC __  ,

REMARKS _____          _____    _____   ____!
```

Figure 16-5. Recent Change Form 645

B. ODA

3.06 New fields have been added to the following ODA forms to support this feature:

401A	406V
401B	4065
401C	408G
406O	

⚠ **CAUTION:**

Do NOT populate the new fields on these forms with anything other than NANP during the 4E17 generic time frame.

3.07 The new fields BNPT and WBNPT have been added to ODA Forms 401A and 401B. Figure 16-6 shows where the new fields appear on ODA Form 401A. The location of BNPT and WBNPT is similar on ODA Form 401B.

Figure 16-6. Portion of ODA Form 401A

3.08 The new field BNPT has been added to ODA Forms 401C and 406O. Figures 16-7 and 16-8 show where this new field appears on these forms.

Figure 16-7. Portion of ODA Form 401C

Figure 16-8. ODA Form 406O

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3.09 The new field NUMPL has been added to ODA Forms 406V, 4065 and 408G.
Figures 16-9 and 16-10 show where this new field appears on ODA Forms 406V and 4065. The location of NUMPL on ODA Form 408G is similar to the location on ODA Form 4065.

Figure 16-9. ODA Form 406V

Figure 16-10. Portion of ODA Form 4065

C. Verify

3.10 New entries have been added to the following two Verify input messages to support this feature:

■ BNPT and WBNPT have been added to Verify input message 11d **(VER:TSGLIST:[FD1** *a*, **DT1 b])**

■ NUMPL has been added to Verify input message 16aj **(VER:PCP:CANI** *a*).

3.11 New fields have been added to the following Verify output forms to support this feature:

1a	6y
1b	6ag
1c	

3.12 The fields BNPT and WBNPT have been added to Verify Forms 1a and 1b.
Figure 16-11 shows where the new fields appear on Verify Form 1a. The location of BNPT and WBNPT is similar on Verify Form 1b.
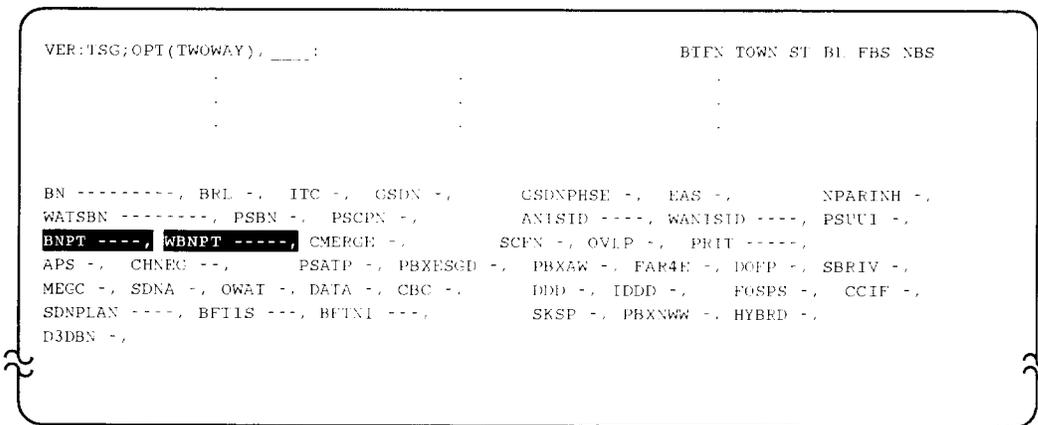
Figure 16-11. Verify Form 1a

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3.13 The field BNPT has been added to Verify Forms 1c and 6y. Figures 16-12 and 16-13 show the location of this field.

Figure 16-12. Verify Form 1c

Figure 16-13. Verify Form 6y

3.14 The field NUMPL has been added to Verify Form 6ag. Figure 16-14 shows where this field appears on the form.
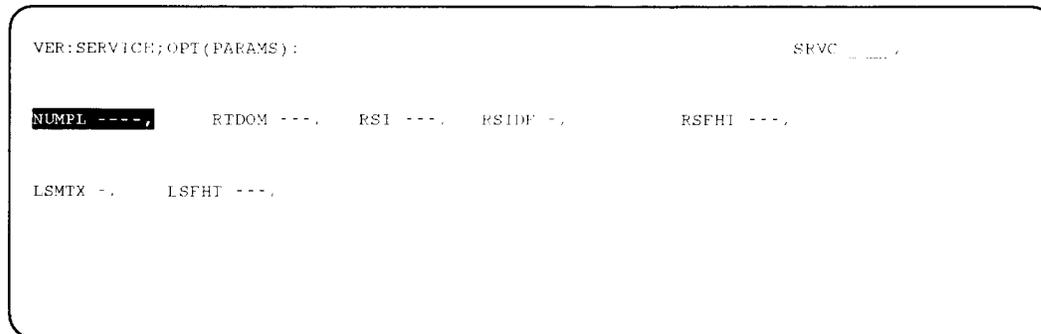
```
VER:SERVICE;OPT(PARAMS):                                    SRVC   ____ ,


NUMPL ____,      RTDOM ---,    RSI ---,    RSIDF -,      RSFHI ---,


LSMTX -,    LSFHI ---,
```

Figure 16-14. Verify Form 6ag

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 Both the INPA and INPA Additions features are turned on automatically by software deployment. Turning off the INPA Additions feature, which can be done using a recent change message, turns on the INPA feature.

⚠ **CAUTION:**
The INPA Additions feature should not be turned off during the 4E17 time frame.

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8. Input/Output Manual Pages

8.01 The following *4ESS*/APS switch input and output messages have been modified to include NPTs:

Modified Input Manual Pages:

RC:MISC;FHT,FTA
VER:GTT

⚠ **CAUTION:**
Do not use APN in either of these messages during the 4E17 generic time frame.

Modified Output Manual Pages:

RC MISC FHT FTA
VER GTT
VER GT6TRAN
VER MEMORY

Egress Data Recording Feature (186a/3049)

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Egress Data Recording Feature (186a/3049)

17

1. Feature Description

1.01 Egress data recording provides a mechanism in the *4ESS*™ switch to send the identification of a direct-connect egress trunk and the egress (outpulsed) digits from the terminating switch to the recording switch in the AT&T Switched Network (ASN). The egress trunk and egress digits information is sent through the signaling network, and the information is included in the Automatic Message Accounting (AMA) record produced for the call. The mechanism is controlled by the Customer Specific Recording feature (4E16 Release 1) and is initiated when the Call Detail Data (CDD) service option flag is set by the Network Control Point (NCP). The egress trunk and egress digits information will be made available to On-Line Call Detail Data (OCDD) customers using OCDD Phase 1.5.

1.02 OCDD makes data from the AMA records available to customers within a short time after call completion. Customers use this data for a variety of purposes including engineering access and egress capacity, service maintenance, and fraud detection. This data can also be used for call rating. To improve the usefulness of the AMA data, additional data can be appended to the AMA records to meet specific customer needs.

1.03 The appending of the additional data is triggered in the *4ESS* switch when certain OCDD flags are set by an NCP and transmitted to the switch. The flags result in the corresponding service option flags being set in the switch.

2. Call Flow

2.01 The data flow for this feature is illustrated in Figure 17-1
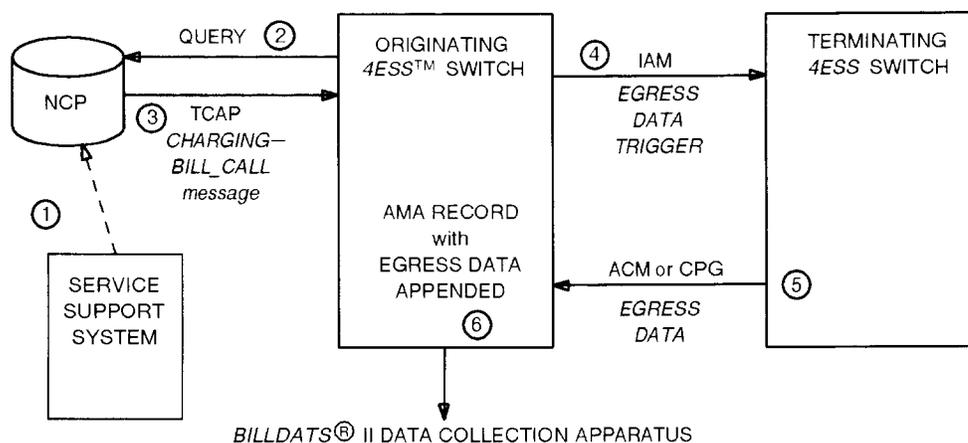
Figure 17-1. Egress Recording Data Flow

2.02 This feature is initiated when a Service Support System (SSS) loads appropriate information into an NCP for a specific customer. SSS includes Feature Routing Enhanced Dynamically (FRED), Network Support System (NSS), and Service Management System (SMS). OCDD customers supported by Positive Call Processing (PCP) will not be able to subscribe to this feature. In response to a query from a *4ESS* switch, the NCP sends back a "1" in the E bit of the Billing Options Register 1 (BOR1) semi-octet of the AT&T Common Channel Signaling System 7 (CCS7) Transaction Capabilities Application Part (TCAP) CHARGING—BILL_CALL message. For customers who have not subscribed to the feature, a zero is sent. When the switch receives a "1" in the E bit, it classifies the call as a CDD call. When a call is classified as CDD as a result of a query to a NCP data base, it is also classified as an Egress (EGR) data call. Calls classified as CDD by a query to a PCP data base are not classified as EGR data calls.

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2.03 The arrangement of all the OCDD flags is shown in Figure 17-2. The ERG flag is marked as reserved because it is not sent in the TCAP message, but is only set internally by the switch.
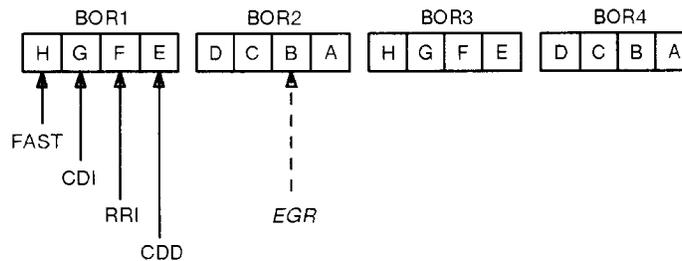
tpa 786515/01

Figure 17-2. On-Line Call Detail Data Flags from NCP Data Base

2.04 For EGR calls, the switch sets the OCDD indicator in the Forward Network Specific Information (FNSI) parameter in the Initial Address Message (IAM). When the terminating switch receives the OCDD indicator, it subsequently sends back to the originating switch information about the egress trunk, the egress digits, and the Network Switch Number (NSN), if the egress trunk is a direct-connect trunk. This data is included in the Address Complete Message (ACM), provided that the egress trunk has been determined at that time. If the final egress trunk has not been identified when the ACM is sent, no data is included in the ACM message, and a Call Progress (CPG) message is sent containing the data when the final information is available.

2.05 The originating switch receives the data and includes the egress data in a module appended to the AMA record for the call.

3. Provisioning (Not affected)

4. Recording

AMA Record Information

4.01   The following Extended Bellcore AMA Format (EBAF) modules can be appended to the AMA records:

■ Module Code 318: Trunk Data Module (egress trunk)

■ Module Code 319: Network Switch Module (egress switch)

■ Module Code 906: Digits Module (egress digits outpulsed).

4.02   Module Code 906 will record a maximum of 24 egress digits in 4E17 Release 1.

4.03   These modules have existed in the past. However, they only contained information obtained from the originating switch. With the addition of this feature, these module types can contain information obtained from an egress switch. Therefore, multiple modules (318 or 906) might be recorded. For example, the first module 318 might contain data relating to the access trunk, and the second module 318 might contain data relating to the egress trunk.

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01   This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

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D-Channel Node Capacity Increase Feature (189/3083)

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D-Channel Node Capacity Increase Feature (189/3083)

18

1. Feature Description

1.01 Due to the number of features and capabilities that were added to the D-Channel Node by prior generics, the D-Channel Node memory is exhausted. To accommodate the 4E17 and later generics, the D-Channel Node memory capacity had to be increased. This feature increases the Common Network Interface (CNI) D-Channel Node memory, call capacity, and real time. The old D-Channel Node processor has been replaced with the Intel 80386 microprocessor-based Integrated Ring Node No. 2 (IRN2) board. The IRN2 board expands the D-Channel Node capacity by increasing the number of simultaneous calls and Temporary Signaling Connections (TSCs). The growth of the D-Channel Node allows the *4ESS*™ switch to accommodate new Integrated Services Digital Network (ISDN) features and applications. With the increase in capacity, a D-Channel Node supports a single D-Channel that can be used for any mixture of applications at the full 64-kbps bandwidth.

1.02 The D-Channel Node Capacity Increase feature provides the customer with the following benefits:

■ A platform for adding new D-Channel features.

■ Increase in the number of simultaneous voice calls to 671 per D-Channel.

■ Increase in the number of simultaneous call-associated (circuit available) TSCs to 671 per D-Channel.

■ Increase in the number of simultaneous noncall-associated (no circuit available) TSCs to 839 per D-Channel; the number of user and network call reference numbers increases to 839 per link. Thus, each link is capable of handling 839 simultaneous calls.

■ Increase in the message throughput of the node to support larger customers; a Digital Signaling-3 (DS-3), which equates to 28 DS-1 bearer channels, has been added. The 4E16 generic allowed one D-Channel to signal 20 DS-1 bearer channels.

Capacity Requirements

1.03 The combined traffic capacity of voice, call-associated TSCs, and noncall-associated TSCs is limited to 2048 simultaneous calls per D-Channel Node. The customer is provided with the number of simultaneous connections supported per D-Channel and per D-Channel Node as specified in Table 18-A.

Table 18-A. D-Channel Connections

Type Connection	Number Per D-Channel	Number Per Node

Combined:
   Circuit Switched
   Circuit Available TSC
   No Circuit Available TSC
	839	2048

Circuit Switched	671	2048
Circuit Available TSC	671	2048
No Circuit Available TSC	839	2048

Message Throughput Requirements

1.04 The message throughput per D-Channel and per D-Channel Node is summarized in Table 18-B. The messages-per-second throughput requirements are as follows:

■ 200 messages (approximately 25 calls) per second, including incoming and outgoing calls.

■ 25 call attempts (incoming or outgoing) arriving within a 100-ms interval and signaled over the same D-Channel. The arrivals are preceded and followed by no other traffic within 150 ms. The 25 call attempts may occur every 4 seconds.

■ 100 consecutive call attempts as close to simultaneous as possible received by the *4ESS* switch; that is, 100 SETUP messages in 400 ms from the Customer Premises Equipment (CPE) or 100 Initial Address Messages (IAMs) in 50 ms from across the network on 8 pairs of A-links. These call attempts are preceded and followed by no other call attempts for 1 minute.

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Table 18-B. Message Throughput Per D-Channel and D-Channel Node

Throughput	Per D-Channel	Per Node
Messages per second	200	200
Call attempts/100-ms preceded and followed by 150 ms of no traffic and occurring every 4 seconds	25	25
Setups/400 ms followed by 1 minute of no new calls	100	100
IAMs/50 ms followed by 1 minute of no new calls	100	100

1.05 Since the D-Channel Node does not guarantee fair usage of call processing resources to each D-Channel on a node, messages sent from one CPE may need to be retransmitted because of a burst of messages from another CPE. When there are bursts of messages to/from another customer on the same D-Channel Node, messages may get lost. To prevent the loss of messages, the following security improvements have been made:

■ An increase in real-time capacity to allow the D-Channel Node to better handle bursts of messages

■ Additional buffer space for messages received from the CNI ring to reduce the number of messages being dropped or lost.

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected

7. Transition Considerations

Internal Transition Issue

7.01 The D-Channel Node Capacity Increase feature must be turned on via the AT&T 3B20D computer CNI Database Management System (DMS) Recent Change/Verify (RC/V) during growth. Refer to "Turn On/Turn Off Mechanism" in this chapter for procedures on how to access the 3B20D computer DMS RC/V form.

Hardware Dependency

7.02 This features requires a new IRN2 board to be installed in the CNI D-Channel Node. The IRN2 installation requirements for Network Services Division (NSD) offices are included in the Task Oriented Practice (TOP) AT&T 234-153-055AC, *4ESS™ Switch, Common Network Interface, Growth/Degrowth*. For installation in Local Exchange Carrier (LEC) offices, refer to Task Oriented Practice (TOP) AT&T 234-153-055, *4ESS™ Switch, Common Network Interface, Growth/Degrowth*.

Turn On/Turn Off Mechanism

7.03 This feature is turned on via the 3B20D computer DMS RC/V form. At the Administrative Cathode Ray Tube (ACRT), access the DMS Link Administration RC/V screen and select the function to be performed by entering the following commands:

    RCV:DMS<CR>

    lkadmn

7.04 On the "lkadmn" screen, change the **CIRCUIT CALLS** field from 512 to **671** to indicate the increase in the number of simultaneous calls per D-Channel. This field is changed from 512 to 617 only if the **LINK TYPE** is simplex. If the **LINK TYPE** is duplex, do not change the **CIRCUIT CALLS** field until the active and standby (back-up) nodes are both grown into the IRN2 node.

7.05 Figure 18-1 is a sample DMS RC/V form that is used to activate this feature. The field that is changed is highlighted on the screen.

```
***** CNI DATA MANAGEMENT SYSTEM ***** DATE:  04/18/91   TIME:   12:27 *****
FUNCTION:  lkadmn  ACTION:  chg  ORDER:  12Y041891001  OFFICE:  NPVLILIH2MD


                      LINK ADMINISTRATION

                ITEM:                 001
                GROUP - MEMBER:       32-04
                LINK TYPE ID:         dchan
                LINK:                 1i40-0


     LACID        255          BILLING NUMBER           0000000000
     LINK SPEED   64r-i/d      NUMBERING PLAN TYPE      nanp
     LINK TYPE    simplex      [CIRCUIT CALLS]          [671]
     MATE MODE    35-04        TEMP SIGNALING CONNECTIONS 000
     MATE LINK    1i40-1       FACILITY ID              000


                GCV THRESHOLD       060
                MAJOR STATE         unavailable
```

Figure 18-1. DMS Link Administration RC/V Form

8. Input/Output Manual Pages (Not affected)

Recording Capacity Improvement Feature (194/3085)

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Recording Capacity Improvement Feature (194/3085)

19

1. Feature Description

1.01 Many of the new *4ESS*™ switch features require an increased Automatic Message Accounting (AMA) recording capacity that is not being met by the existing recording software and hardware. Although there will be future expansion of the recording capacity, there are immediate needs to support 4E17 features. The Recording Capacity Improvement feature meets these immediate needs. This feature provides a new recording capability that increases the recording capacity of the AT&T 3B20 computer (Attached Processor System) to 350K records/hour during the busy hour.

1.02 The way this feature increases the recording capacity is to defer the formatting of certain records if the *4ESS* switch does not have sufficient real-time capacity to format all the call event data into AMA records. The data for calls that are not formatted is stored in a separate buffer until the load on the switch has decreased. When the load on the *4ESS* switch has decreased, the formatter processes the data that was stored in the buffer.

1.03 The 1A Processor directs the Attached Processor System (APS) to mark each AMA record as "deferrable" or "not deferrable." If an AMA record is "not deferrable," then it must be formatted and processed immediately using the existing recording processing flow. If an AMA record is deferrable, the APS may store the event data for the call in a deferred buffer on the AMA disks. As soon as APS formatter real time becomes available, the APS will retrieve call event data from the deferred buffer and format the AMA records in first-in-first-out (FIFO) order. After the deferred records have been formatted, they are processed in the same way as nondeferred records (for example, written to disk, teleprocessed, etc.).

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording

4.01 A new structure code, 09060—Deferred Formatting Tracer, was created for this feature. A tracer record is generated each day at midnight. After the tracer record is generated, all counts in the record are reset.

5. Network Management (Not affected)

6. Maintenance/Troubleshooting

6.01 In the event of an emergency, the following message will stop records from being deferred and also stop the processing of previously deferred records:

SET:AMA;CONTROL;IC:DF OFF!

After the conditions causing the emergency have been cleared, the deferring of records can be restarted using this message:

SET:AMA;CONTROL;IC:DF ON!

Measurements

6.02 The following measurements pertaining to deferred formatting will appear on the Machine Load Service Summary (MLSS) report:

- A count of the number of records that are placed in the deferred formatting buffer

- A count of the number of times the deferred formatting buffer overflows

- A count of the number of records that are not placed in the deferred formatting buffer because of buffer overflow

  ⇒ **NOTE:**
  No records are lost because of buffer overflow. The records that are not buffered get formatted immediately.

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- A count of the number of records which were never retrieved from the buffer for formatting

- A count of the number of deferred records that were taken out of the buffer and formatted.

6.03 Figure 19-1 shows a page of an MLSS report that contains deferred formatting measurements.

```
REPT:   MACHINE LOAD AND SERVICE SUMMARY        MLSS      OFFICE:
PERIOD:                              PAGE 5 OF 5            DATE:


BILLING SERVICE


  LINE      ITEM   INS  SVC   * CCSCAP  CCS     COUNT    %OCC  *   HT   OVFL
  - - - - - - - - - - - - -   - - -   - - -   - - - - - - - - - - - - - - - -

  500  TOT CALLLS
  501  ANI FLRS
  502  COP
  503  OPER Q
  504  Q>5 SEC
  505  DP MFR Q
  506  AMA EBAF MODULES
  507  AMA BILLING RCDS
  508  AMA RCDS DEFR                        M1794                 M1809
  509  AMA DEFR BUF FULL                    M1854


BILLING INFORMATION
          CALLTYPE    PEGCNT   CALLTYPE   PECCNT   CALLTYPE   PEGCNT


  520   INC1O1C      !        ATTERM      !        TACV
  521   PBEAV        !        ATTORIC     !        SMPRT
  522   PBEAD        !        STNPD       !        ASANT
  523   BSDN         !        DA3DCTS     !        SSANT
  524   DSDC         !        DA7DCTS     !        ICTONATI
  525   TELECON      !        INWACD      !        SSP/800
  526   CICR         !        INWTOD      !        TIMECHNC
  527   DAV          !        OUTWATS     !        NEW TOLI
  528   INWSTAT      !        SWATS       !        NEW SPEC
  529   ATTCAMA      !        EA800       !        NEW OTHER
  530   NATTCAMA     !        NILDS       !        NEW MISC
  531   MEG          !        HROFL       !        NEW IL
  532   SDNORG       !        CSDCIA      !
  533   CMCO         !        OACV        !
```

Figure 19-1. Example of Machine Load Service Summary Report

6.04 The Recording Capacity Improvement feature will trigger alarms when the following events occur:

- When the deferred formatting buffer reaches 70% capacity, a minor alarm is triggered.

- When the deferred formatting buffer reaches 90% capacity, a major alarm is triggered.

- When the deferred formatting buffer reaches 100% capacity, a critical alarm is triggered.

6.05 The alarms will be downgraded as follows:

- The critical alarm will be downgraded if the deferred formatting buffer occupancy falls below 97%.

- The major alarm will be downgraded if the deferred formatting buffer occupancy falls below 87%.

- The minor alarm will be downgraded if the deferred formatting buffer occupancy falls below 65%.

7. Transition Considerations

Hardware Dependencies

7.01 This feature requires the installation of the Small Computer Systems Interface (SCSI) disks.

Turn On/Turn Off Mechanism

7.02 When the 3B20 computer retrofit occurs, the Recording Capacity Improvement feature is not activated.

⚠ CAUTION:
Do not activate this feature until after the 4E17 generic retrofit occurs. The deferred formatting measurements require a new version of the On-Site Operations Report (OSOR) which is installed with the 4E17 generic release.

7.03 To activate this feature, perform the following steps:

(1) Enter the following message at the 3B20 computer Maintenance Cathode Ray Tube (MCRT) Terminal:

SET:AMA;CONTROL;IC:DF ON!

(2) Enter the following message to assign a partition to the disk:

SET:AMA;CONFIG;DF:PART *a,* **EQUIP!**

➡ NOTE:
At least one partition must be available for deferred formatting. In an office that does a lot of recording, several partitions may need to be assigned.

(3) The feature is now allowed and available. Deferred formatting is activated automatically when the formatter reaches 100% utilization. When deferred formatting is activated, the following message is printed at the Read Only Printer (ROP).

REPT AMA RECEIVER DEFERRED FORMATTING ACTIVE

7.04 To turn the feature off, that is, change it to a "not allowed" state, enter the following message at the MCRT:

SET:AMA;CONTROL;IC:DF OFF!

7.05 To turn the feature on again, that is, change its status to available, enter the message:

SET:AMA;CONTROL;IC:DF ON!

7.06 To verify that deferred formatting is on, enter the message:

OP:AMA;PTRS!

The output of this message, which is AMA pointers information, includes the status of deferred formatting. Figure 19-2 shows an example of a printout that results from executing **OP:AMA;PTRS**. In this example, deferred formatting is allowed, available, and active.

```
REPT AMA POINTERS INFORMATION
     Receive Buffer Unload pointer:
      pasnum 0 offset 85920 address 544672
     Receive Buffer Load pointer:
      pasnum 0 offset 85920 address 544672
     AM_rcvbuf alarm : NO ALARM

     Number of AMA recording registers : 25206
     Event limit: 700

     OC   SDS     load 2    unload 0   occupancy 8%
     IC   SDS     load 8    unload 8   occupancy 0%
     ICDR SDS     load 0    unload 0   occupancy 0%


     - - - - - - - - - - - - - - - - - - - - - - - - -
     | DF Switch:        allowed      |
     | DF environment:   available    |
     | DF status:        active       |
     | IC Stream:        slow         |
     - - - - - - - - - - - - - - - - - - - - - - - - -

       DF READ      load 1   unload 1    numblks    0
       DF WRITE     load 1   unload 1    numblks    0
```

Figure 19-2. Sample Printout of AMA Pointers Information

8. Input/Output Manual Pages

8.01 One new Input/Output (I/O) manual page has been created, and the manual pages for several messages have been modified to support the Recording Capacity Improvement feature:

New Manual Page:

> OP:AMA;DFDELAY

Modified Input Manual Pages:

> OP:AMA;CONFIG
> OP:AMA;DISK
> OP:AMA;MAPS
> OP:AMA;PTRS
> SET:AMA;CONFIG
> SET:AMA;CONTROL

Modified Output Manual Pages:

> REPT AMA CONFIG
> REPT AMA DISK MAPS
> REPT AMA DISK SUMMARY
> REPT AMA DISK FORMATTER
> REPT AMA DISK RECEIVER

New Message

8.02 The following message was created to support this feature:

OP:AMA;DFDELAY:RECORDS a!

The purpose of this message is to gather information pertaining to the length of time that a record is in the deferred formatting buffer before it is formatted. When this message is executed, the delay for each record placed in the buffer is calculated. The number of records that will get this treatment is specified by the variable a (a can be a number from 1 to 1000). After the defined number of records is reached, the maximum, minimum, and mean deferred formatting delays are printed.

Modified Input Messages

8.03 The deferred formatting option (**DF**) has been added to the following input messages:

> OP:AMA;CONFIG
> OP:AMA;DISK
> OP:AMA;MAPS
> SET:AMA;CONFIG
> SET:AMA;CONTROL

Deferred formatting status information and deferred formatting buffer information has been added to the OP:AMA;PTRS input message.

Modified Output Messages

8.04 Information pertaining to deferred formatting has been added to the VARIABLE FIELD DEFINITIONS on the following output message manual pages:

> REPT AMA CONFIG
> REPT AMA DISK MAPS
> REPT AMA DISK SUMMARY

8.05 Information pertaining to deferred formatting has been added to the VARIABLE FIELD DEFINITIONS and ACTION TO BE TAKEN sections on the REPT AMA RECEIVER manual pages.

8.06 Information pertaining to deferred formatting has been added to all sections on the REPT AMA FORMATTER manual pages.

Intelligent Call Processing (ICP) Caller Information Forwarding (CINFO) Service Feature (208/3112)

20

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Intelligent Call Processing (ICP) Caller Information Forwarding (CINFO) Service Feature (208/3112)

20

1. Feature Description

1.01 Intelligent Call Processing (ICP) is an Advanced 800 service platform that supports cooperative call processing features between the AT&T network and a customer premises data base. The Caller Information Forwarding (CINFO) feature is one of the initial features to be supported over the ICP platform. CINFO provides delivery of Caller Entered Digits (CED) or Customer Database Provided Digits [collected in the AT&T Switched Network (ASN)] to an Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) customer termination. The CINFO feature uses the Network Services Complex (NSCX) to collect digits and to make customized announcements via the Call Prompter feature.

1.02 The caller dials an 800 number and is prompted by the network to enter up to 30 Dual Tone Multifrequency (DTMF) digits. These digits may represent different types of information (for example, credit card number, social security number, personal identification number, or a product ID) depending upon the application. The network then collects the CED, uses them to process calls in conjunction with the customer data base, and forwards the digits along with the call to a subscriber's ISDN.

➡ NOTE:

The CED used to process calls is part of the ICP platform, but not the CINFO feature.

2. Call Flow

Call Flow Key Points

2.01 The ICP can collect additional caller information that uniquely identifies the caller to the ICP customer. This caller information (collected by the ASN as CED) is first sent to the Customer Routing Point (CRP) to make a routing decision. As part of call handling, the ASN sends the CED to the call destination where it is used by the answering agent to access the caller's profile screen.

➡ NOTE:

The CED being sent to the CRP is part of the ICP platform, but not the CINFO feature.

Call Flow Diagram
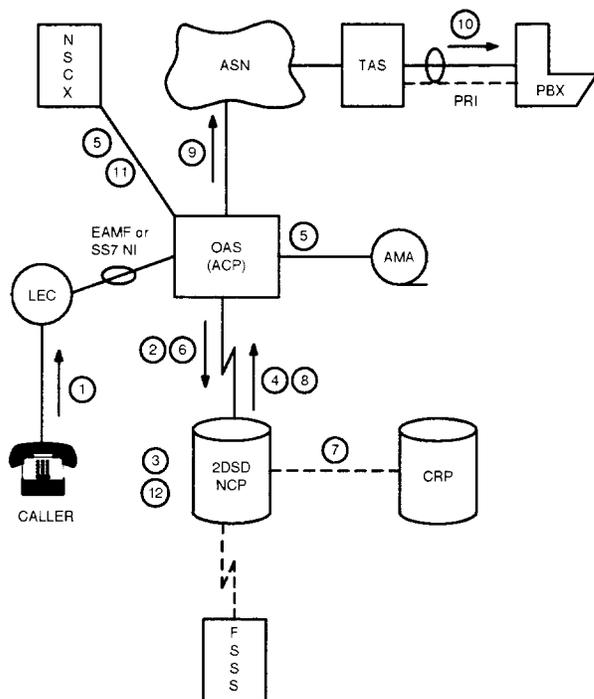
tpa 78636 l/01

Figure 20-1. Caller Information Forwarding Architecture

Call Flow Narrative

2.02 The following narrative outlines the CINFO feature call flow. The callouts (circled numbers) in Figure 20-1 are cross-referenced to the numbers in the narrative.

(1) The caller dials an 800 number which is routed to the Originating AT&T Switch (OAS) via the Local Exchange Carrier (LEC). The Automatic Number Identification (ANI) of the caller is passed to the OAS using Equal Access Multifrequency (EAMF) or Signaling System No. 7 (SS7) Network Interconnect (NI) signaling.

(2) The OAS:

- Receives the 800 number

- Performs 10-digit Global Title Translation (GTT)

- Sends a Transaction Capabilities Application Part (TCAP) query to the number 2 Direct Services Dialing (2DSD) Network Control Point (NCP).

The TCAP BEGIN message contains the dialed 800 number and the ANI of the caller.

(3) The 2DSD NCP accesses the customer's record which indicates:

- Caller Interaction—Play Announcement and collect digits required to collect caller information

- Send a query to the customer data base (CRP) to get further routing instructions.

⇒ NOTE:

This is part of the ICP platform, but *not* a CINFO feature.

(4) The NCP checks the predefined variables and compares the information contained in the customer's record to the OAS capabilities in the BEGIN message.

If the OAS..	Then the NCP...
Has the required capabilities	Sends a CONTINUE message to the OAS. The CONTINUE message contains the announcement set ID, announcement ID, and the Digit Collection Indicator for the CED. The Digit Collection Indicator includes the number of digits to be collected, the end-of-digit character, and the type of digits.
Does *not* have the required capabilities	Instructs the OAS to perform a service assist to a switch that does have the required capabilities.

(5) The OAS instructs the NSCX to Play Announcement and Collect Digits.

⇒ **NOTE:**

For non-DTMF telephones, see Items 11 and 12.

(6) The OAS sends a CONTINUE message to the NCP containing the return result with the CED parameter.

(7) When the NCP sends a query to the CRP to get routing information, the CRP also provides digits to be forwarded to the destination. These digits are referred to as the Customer Database Provided Digits (CDPD).

⇒ **NOTE:**

Step 7 is part of the ICP platform, but *not* of the CINFO feature.

(8) The NCP formulates a TCAP END message and returns the following information to the OAS:

  ■ Billing Instructions

  ■ Connection Control-Connect operation, including the ISDN Generic Digits Parameters (CED or the CDPD).

(9) The OAS starts Automatic Message Accounting (AMA) recording. It also generates the ISDN User Part (ISUP) Initial Address Message (IAM) containing the ISDN Generic Digits Parameter (GDP).

(10) The Terminating AT&T Switch (TAS) maps the GDP in the ISUP IAM to the Q.931 User Code Information Element (IE). The IE then becomes part of the Q.931 SETUP message sent to the Primary Rate Interface (PRI).

⇒ **NOTE:**

The following two items apply to non-DTMF telephones.

(11) For non-DTMF telephones, the NSCX plays the announcement, but does not collect any digits. The OAS sends a CONTINUE message with a No-Digit-Collected indication.

(12) The NCP recognizes the condition and does *not* forward the CED to the destination. The NCP instructs the OAS to route the call to destination.

Originating Treatment

2.03   The OAS must be capable of receiving one ISDN GDP in a TCAP message from the NCP. For each ISDN GDP received, the OAS must remove the TCAP/Q.773 header (first 3 octets) from the ISDN GDP and copy the remaining octets into an ISUP GDP.

2.04   If an ISUP GDP is received in the IAM for the call, it is passed unchanged in the outgoing IAM.

2.05   The maximum number of GDPs that the OAS receives in a Connection Control-Connect operation is 3. If a GDP contains more than 30 digits, the OAS discards that GDP.

Terminating Treatment

2.06   The TAS must map the ISUP IAM GDPs to Q.931 Codeset 6 User Entered Code IEs (ID = 000000010). The mapping for each GDP is as follows:

(1)   Convert the coding of the digits (contained in the Digits field in the GDP) from Binary Coded Digits (BCD) to IA5.

(2)   Map the ISUP GDP Type_of_Digits field to the Q.931 User Entered Code IE (See Table 20-A.).

(3)   Include this IE in the Q.931 SETUP message.

Table 20-A. ISUP/Q.931 Type_Of_Digits Coding Map

Type_of_Digits	ISUP GDP Type_of_Digits	Q.931 User Entered Code IE Type of User Code
Caller Entered	10111	0010000
Customer Data Base Provided	10110	0010001

2.07   If the OAS is also the TAS, then it must map the ISDN GDPs (received in the TCAP Connection Control-Connect operation) directly into a Q.931 Codeset 6 User Entered Code IE. The mapping is specified in Table 20-A.

External Interface Requirements

2.08 The ISDN GDP is a new TCAP parameter. The parameter is coded private, primitive with identifier 117. The parameter is variable in length with the encoding shown in Table 20-B.

Table 20-B. Encoding for ISDN Generic Digits Parameter

	H	G	F	E	D	C	B	A
Q.773 ISDN Generic Digits	1	1	0	1	1	1	1	1
Identifier	0	1	1	1	0	1	0	1
Total Length of Q.773 Parameter	X	X	X	X	X	X	X	X
ISUP/Q.763 Generic Digits ID	1	1	0	0	0	0	0	1
Length of ISUP GD Parameter	X	X	X	X	X	X	X	X
Coding Scheme/Type of Digits	X	X	X	X	X	X	X	X
Digits	Digit 2				Digit 1			
	Digit 4				Digit 3			
	etc.				etc.			

2.09 The Type_of_Digits (5 bits) that must be supported in the 2DSD NCP interface are shown in Table 20-C.

Table 20-C. Encoding for Type Field

Type_of_Digits	E	D	C	B	A
Caller Entered	1	0	1	1	1
Customer Data Base Provided	1	0	1	1	0

2.10 The Encoding Scheme (last 3 bits) that must be supported in the 2DSD NCP is the Network BCD, as shown in Table 20-D.

Table 20-D. Encoding Scheme

Encoding Scheme	H	G	F
BCD Even	0	0	0
BCD Odd	0	0	1

2.11 The A800 Billing Data parameter (Table 20-E) contains the AT&T Communications Interface (ACI)/ISDN features field.

Table 20-E. A800 Billing Data Parameter

H	G	F	E	D	C	B	A
ABR2					ABR1		
SFI2					SFI1		
CFA2					CFA1		
CFA4					CFA3		
SIC2					SIC1		
BOP					SIC3		
ACI/ISDN (New)					Queuing		
SPARE					SPARE		

2.12 The ACI/ISDN semi-octet (Table 20-F) of the A800 Billing Data parameter is copied into AMA Table 344 of the AMA record.

Table 20-F. Encoding for ISDN Features

ACI/ISDN	H	G	F	E
No CRP Query Made	0	0	0	0
CRP Query Made	0	0	0	1
CINFO Digits Forwarded	0	0	1	0
CRP Query Made and CINFO Digits Forwarded	0	0	1	1
CRP Query Made and Default Routing Used	0	1	0	0

3. Provisioning (Not affected)

4. Recording

Billing

4.01 AMA recording for the CINFO feature is based on existing A800 Structure Codes. If the 2DSD NCP included the Supplemental A800 Billing Data Parameter in the Charging—Bill_Call operation, the call is recorded in the Feature Routing Enhanced Dynamically (FRED) 2 Structure Codes. Otherwise, the non-FRED Structure Codes are used.

⇛ **NOTE:**

Both FRED and non-FRED Structure Codes contain ACI/ISDN AMA Table 344.

4.02 The Structure Codes for A800 calls previously contained a zero as the first BCD character of AMA Table 344. With the activation of the CINFO feature, the first BCD character will contain the value passed in the ACI/ISDN field in the A800 Billing Data parameter in the TCAP message.

4.03 AMA recording occurs at the OAS. Call recording begins when the 2DSD NCP sends the Charging—Bill_Call operation to the OAS to start creating an AMA record for the CINFO customer. The OAS copies the ACI/ISDN field from the A800 Billing Data parameter to the first BCD character in the ACI/ISDN field (See Table 20-G.).

Table 20-G. ACI/ISDN—AMA Table 344

BCD Char.	Digit	Definition
1	0	No indication in this character.
	1	A customer's data base was queried.
	2	CINFO digits were forwarded.
	3	A customer's data base was queried and CINFO digits were forwarded.
	4	A customer's data base was queried and default routing logic was used.
2	0	No indication in this character.
	1	NSCX-collected information was forwarded.
	2	NSCX-selected Station Identification (SID)/ANI was forwarded to the terminating end.
3	0	No indication in this character.
	1	SID/ANI was forwarded at the request of the called party.
	2	Connected line identification is received at the originating switch and forwarded to the originating customer.
	3	Both conditions denoted by values 1 and 2 above occurred.
4	Sign	(Hex C).

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Network Components

7.01 The 2DSD NCP must have the following capabilities:

(a) To send a new ISDN GDP in the TCAP Connection Control-Connect operation to the OAS

(b) To modify the Connect Primary Network Interface (PNI) procedure to permit the call processing record to add a new parameter (ISDN GDP) to be forwarded

(c) To modify the Set Dialed Number Services Billing Option PNI procedure to permit the call processing record to add a new parameter (ACI)

(d) To modify the Call Trace Report to support the new ISDN GDP in the Connection Control-Connect operation.

7.02 The CINFO feature will not be included in 2DSD NCP call processing records until full 4E17 deployment.

Turn On/Turn Off Mechanism

7.03 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

Modified Trunk Subgroup Data (MTD) Feature (211/0140)

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Modified Trunk Subgroup Data (MTD) Feature (211/0140)

21

1. Feature Description

1.01 The Modified Trunk Subgroup Data (MTD) feature provides the *4ESS*™ switch with a near real-time monitoring mechanism for traffic on selected trunk subgroups (TSGs). This feature allows the Regional Network Management System (RNMS) to designate an additional 255 TSGs on which data can be collected. It provides a modified set of TSG data that can be transmitted to direct-connect customers, such as Software Defined Network (SDN) and *Megacom*® 800 telecommunications service customers, who need an on-line "picture" of their traffic. The additional trunk subgroups are monitored through the RNMS.

1.02 Prior to MTD, a *4ESS* switch had the capacity to monitor a maximum of 1023 trunk subgroup Adjunct Head Cells (AHCs) for near real-time data collection. This included all intertoll and access trunk subgroups. With the increase in the number of direct-connect customers who have a need for near real-time network management data, the number of TSGs that can be monitored had to increase.

1.03 The MTD feature is an alternative to increasing the number of trunk subgroup AHCs. It uses three times less 1A Processor Call Store memory than the AHC. An AHC requires 24 words of Call Store per trunk subgroup. This feature requires only eight words of Call Store per trunk subgroup (2048 words total) and 500 words of Program Store. Also, the MTD feature real-time usage is low.

Modified TSG Data

1.04 The modified set of TSG data consists of seven 5-minute peg counts per *4ESS* switch. A new 5-minute data block has been added in the *4ESS* switch/RNMS interface to collect and transmit measurements for all designated TSGs. Measurements in the data block consist of the following seven peg counts:

■ Call Attempts Peg Count

■ Call Overflow Peg Count

■ Incoming Seizures Peg Count

■ Occupancy Peg Count

■ Calls Rejected by Customer Premises Equipment (CPE) Peg Count

■ Egress Busy Crankback Sent Peg Count

■ Maintenance Busy Peg Count.

2. Call Flow (Not affected)

3. Provisioning

3.01 Two new tables, NM4MTSGDATA and NM4MTDRNMS, have been defined for data collection. Each table contains the following:

■ Trunk Subgroup Number (12 bits)

■ Outgoing Seizure Peg Count (12 bits)

■ Overflow Peg Count (12 bits)

■ Incoming Seizure Peg Count (12 bits)

■ Calls Rejected by CPE Peg Count (12 bits

■ Egress Busy Crankback Sent Peg Count (12 bits)

■ Occupancy Peg Count (4 bits).

4. Recording (Not affected)

5. Network Management

Regional Network Management System

5.01 The RNMS will receive a new 5-minute modified TSG data block from the *4ESS* switch for the additional 255 trunk subgroups. A new MTD change discrete (flag) is transmitted to the RNMS when MTD collection is removed from a TSG. Upon receipt from the *4ESS* switch of an MTD change discrete, the RNMS should request an audit of the Modified TSG Data Index (MTDI) assignments. The RNMS will receive the MTDI assignments in a new data block. This data is processed and sent to the Real-Time Customer Traffic Data Reporting Service and the SDN Real-Time Network Management interface.

5.02 The RNMS is responsible for the following:

- Specifying the trunk subgroups on which the *4ESS* switch is to send data

- Monitoring the trunk subgroups for near real-time data collection

- Administering the assignment of MTDIs to the trunk subgroups using a new Reverse Control Message (RVCM).

5.03 The *4ESS* switch provides the new RVCM that includes the following information:

- Trunk Subgroup Number

- Modified Trunk Subgroup Data Index

- Action

    — Remove

    — Assign.

5.04 The RVCM is used to assign up to 120 TSGs to MTDIs. The RNMS cannot assign a trunk subgroup to an AHC and an MTDI at the same time. If the attempt is made to assign an MTDI to a TSG that has an AHC already assigned, an error message will be sent to the RNMS. The following data is contained in the RVCM:

- Trunk Subgroup Number

- Modified TSG Data Index

- Action Code

    — 0 = Remove TSG from MTDI assignment

    — 1 = Assign TSG to MTDI.

6. Maintenance/Troubleshooting

Measurements

A. 5-Minute Data

6.01 Every 5 minutes, the *4ESS* switch will transmit TSG data to the RNMS in a new regular data block. This data includes the seven 5-minute peg counts. Data in the new regular data block is only transmitted when an MTDI is assigned to a TSG.

B. 30-Second Data

6.02 Every 30 seconds, a new MTD change discrete is transmitted to the RNMS when MTD collection is removed from a TSG. When the RNMS receives the MTD change flag, the RNMS should request an audit of the MTDI assignments. The *4ESS* switch will provide a new demand data block with the MTDI assignments.

Audit System

6.03 Changes have been made to Audit 46, Network Management Data Structures Audit. Audit 46 checks the linkage of the Adjunct and TSG head cells. With the MTD feature, the linkage between NM4MTSGDATA and the TSG head cell is audited. If the linkage is bad, the slot in NM4MTSGDATA is released, and the MTD change flag for the RNMS is set. The RNMS should then request the demand data block.

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

D-Channel Node Layer 2 Error Handling Enhancement Feature (217a/3107)

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D-Channel Node Layer 2 Error Handling Enhancement Feature (217a/3107)

22

1. Feature Description

1.01 The D-Channel Node Layer 2 Error Handling Enhancement feature eliminates customer data being lost due to three error conditions. The Layer 2 data link is responsible for transmitting error-free data. When recovering from three particular error conditions, the International Telegraph and Telephone Consultative Committee (CCITT) Layer 2 standards recommend that the error conditions be ignored. Currently, the *4ESS*™ switch attempts to reinitialize the data transfer. Because the *4ESS* switch implementation is different from the CCITT standards, data can be lost.

1.02 The implementation of this feature aligns the *4ESS* switch to the CCITT version of Layer 2, thereby eliminating the possibility of losing customer data. The Layer 2 Error Handling Enhancement feature applies to all Primary Rate Interface (PRI) calls. Normal call handling is not affected.

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting

Error Conditions

6.01 The following three error conditions result in an error indication being presented to Layer 3:

- Layer 2 is in the MULTIPLE FRAME ESTABLISHED (MFE) STATE and an Unnumbered Acknowledgement (UA) response with F=1 or F=0 is received.

- Layer 2 is in the MULTIPLE FRAME ESTABLISHED STATE and a Disconnected Mode (DM) response with F=1 is received.

- Layer 2 is in the TIMER RECOVERY (TR) STATE and a UA response with F=1 or F=0 is received.

In each case, no action is taken.

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

September 1992

ISDN H$_0$ Channel Encoding Enhancements Feature (217b/3105)

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ISDN H_0 Channel Encoding Enhancements Feature (217b/3105)

23

1. Feature Description

1.01 The Integrated Services Digital Network (ISDN) H_0 Channel Encoding Enhancements feature changes the way H_0 calls are encoded in the AT&T Switched Network (ASN). Currently, AT&T indicates H_0 calls with six channels marked on the B-Channel slot map. Implementation of this feature results in the following:

- The way the *4ESS*™ switch encodes the Channel Identification Information Element (IE) is aligned with one of the International Telegraph and Telephone Consultative Committee (CCITT) methods

- All H_0 (384 kbps) Primary Rate Interface (PRI) calls are affected.

1.02 PRI customers originate or receive H_0 calls through the ASN. When the calls are originated, the channel on which the calls are routed must be indicated.

2. Call Flow

Call Flow Key Points

2.01 Code points and field formats in the Channel Identification IE specify the channels on which H_0 calls are routed. Three CCITT methods used to identify the channels are as follows:

■ The H_0 number

■ The H_0 channel with an H_0 slot map

■ The B-Channel (marking six B-Channels in the B-Channel slot map).

2.02 AT&T indicates H_0 by marking six channels on the B-Channel slot map. This aligns the method used by the *4ESS* switch to encode the Channel Identification IE to match one of the CCITT methods.

Call Flow Narrative

2.03 The H_0 Channel Encoding Enhancement feature formats the Q.931 Channel Identification IE in a manner consistent with current domestic and international standards.

A. Terminating Office

2.04 When sending a Q.931 SETUP message for an H_0 call, the terminating office encodes the Channel Type/Map Element Type field (Octet 3.2, bits 4 - 1) of the Channel Information IE to B-Channel units (0011). This aids in the interpretation of the channel map, since the *4ESS* switch always uses a B-Channel slot map.

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Dependencies on Other Network Components

7.01 The terminating office will send the Channel Type/Map Element Type code points that comply with standards. A PBX must be able to accept the updated format.

Turn On/Turn Off Mechanism

7.02 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

AT&T 3B20D Computer SCSI Disk—Software Feature (219b)

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AT&T 3B20D Computer SCSI
Disk—Software Feature (219b)

24

1. Feature Description

1.01 This feature covers the software phase of the Small Computer Systems Interface (SCSI) disk conversion.

1.02 To provide additional storage capacity, the existing 340 MByte Storage Module Drive (SMD) disk drives are being replaced with large capacity 600 MByte SCSI disk drives. Additional storage capacity is needed for the following reasons:

■ The system disk files will no longer fit on a single pair of 340 MByte disks because of the growth of the files.

■ Five days of Automatic Message Accounting (AMA) data will no longer fit on three pairs of AMA disks because the busy hour recording rate is increasing.

■ The Recording Capacity Improvements feature (194/3085) will require several hundred MBytes of disk space.

1.03 The conversion to SCSI disk drives is being accomplished in two phases. Phase 1 (Feature 219a) was the installation of the 600 MByte SCSI disk drives during 4E16 Release 2 generic. Although this phase activated the SCSI disk drives, the storage capacity of the disks did not change because the volume table of contents (VTOC) did not change. The same VTOC that had been used for the SMD disks was also used for the SCSI disks.

1.04 In the second phase (Feature 219b), the VTOC will be changed to utilize the full capacity of the SCSI disk drives. The VTOC for both the system disk and the AMA disks will be changed when the 4AP11 retrofit occurs. On the system disk, the

VTOC will be changed to increase the size of the existing partitions on the disk, and the system data will be copied to these larger partitions. On the AMA disks, the VTOC will be changed to add four more partitions per disk. Each SCSI disk will now have a storage capacity of 600 MBytes.

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording

4.01 The initial installation of the SCSI disks did not have any impact on recording. Changing the VTOC, however, increases the number of AMA partitions per disk from four to eight which also increases the number of AMA blocks that can be stored on a disk.

4.02 Increasing the number of AMA blocks means that the maximum allowable AMA block sequence number must also be increased. The AMA block sequence number is a unique number that is assigned to each AMA block. The *Billdats*® host collector uses this sequence number to specify the AMA block it wants to poll. In previous generics, six digits were allocated for sequence numbers; therefore, the maximum AMA block sequence number was 999,999. Since this feature increases the number of AMA blocks, nine digits are now allowed for sequence numbers. With nine digits, the maximum AMA block sequence number is 999,999,999.

4.03 In AT&T offices, the default maximum block sequence number for inter-LATA (IC) and operating company (OC) accounting data streams is 999,999,999 after retrofit. Not all billing host collectors, however, are capable of supporting 9-digit sequence numbers. *Billdats* II host collectors can support 9-digit AMA block sequence numbers, but *Billdats* I host collectors can only support 6-digit sequence numbers. Since some non-AT&T offices will continue to use *Billdats* I (or equivalent) host collectors, the default value for the maximum AMA block sequence number is set to 999,999 in non-AT&T offices.

⇒ NOTE:
Since the International Traffic and Maintenance Analysis of Calls (ITAMAC) will only support 6-digit sequence numbers, the maximum block sequence number for International Call Detail Recording (ICDR) streams will remain at 999,999.

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4.04 The maximum block sequence number can be changed using the following versions of the **SET:AMA;CONTROL** message:

SET:AMA;CONTROL[;OC|;IC]:MSN SHORT! sets the maximum sequence number to 999,999.

SET:AMA;CONTROL[;OC|;IC]:MSN LONG! sets the maximum sequence number to 999,999,999.

⚠ CAUTION:
Before changing the maximum block sequence number from a 9-digit number (LONG) to a 6-digit number (SHORT), make sure that all primary data past 999,999 has been polled or collected.

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 The software phase of this feature, that is, changing the VTOC, will be accomplished as part of the AT&T 3B20D computer 4AP11 retrofit. Changing the VTOC on the AMA disks will create new partitions which will be automatically equipped. The manner in which they are equipped will be based on the existing configuration.

8. Input/Output Manual Pages

8.01 The following input/output (I/O) manual pages have been modified to cover the selection of 6- or 9-digit sequence numbers:

Input:

SET:AMA;CONTROL

Output:

REPT AMA CONTROL FILE
REPT AMA CONFIG
REPT ICDR CONFIG

Small Scale Adjunct Feature (221a)

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Small Scale Adjunct Feature (221a)

25

1. Feature Description

1.01 Feature 221a provides the Signaling Service Type (SST) in the *4ESS*™ switch Service Identity Index (SII) translator that is used to identify Small Scale Adjunct (SSA) trunks. The SSA is an interim feature architecture that supports three post-answer call redirection features: Post Answer Call Redirection (PACR), Recurrent Call Prompter (RCP), and Information Forwarding 3 (INFO 3). These SSA features are described in detail in AT&T 234-090-164AC, *4ESS*™ *Switch, Product Release Document, Release 4 Generic*. For the purpose of 4E17 Release 1, a brief description of each of these features is given in the following paragraphs.

Post Answer Call Redirection

1.02 The PACR allows inbound subscribers to transfer or redirect a call in progress (that is, an answered call from the standpoint of the AT&T Switched Network). The originally called subscriber who wants to redirect the call is the redirecting party, and the party receiving the transferred call is the target party. The redirecting party requests redirection of a call from a touchtone telephone by entering a sequence of tones that includes a request for redirection and the dialable number of the target party. PACR calls includes the following types of calls:

- Blind Transfer: The redirecting party requests redirection, and the caller is put on hold. The redirecting party disconnects before or while the network establishes a call to the target party. After the redirecting party disconnects, a voice path is established between the calling party and the target party.

■ Consultation: The redirecting party requests redirection, and the caller is put on hold. A voice path is established so that the redirecting party can listen to call progress tones and treatments as the call is being routed to the target party. When the target party answers, both the redirecting and target parties consult while the caller remains on hold.

■ Conference: The redirecting party requests redirection, and the network places the caller on hold. A voice path is established so that the redirecting party can listen to call progress tones and treatments as the call is being routed to the target party. When the target party answers, the redirecting party requests that the caller be added. The network then bridges the three parties together.

Recurrent Call Prompter

1.03 The RCP is an enhancement to the Call Prompter feature. The caller dials an 800 number and hears a network-provided announcement requesting the entry of a touchtone digit to select a destination for the call. After the caller enters a digit, the network routes the call to the selected destination where the call is answered by the redirecting party. At the end of the transaction, both parties disconnect. If the transaction cannot be handled by the redirecting party, the redirecting party instructs the caller to hold for a list of transaction types. After entering the touchtone command for RCP, the redirecting party disconnects, and the network replays the original Call Prompter announcement. When the caller enters a digit, the network routes the call to the selected destination. The caller is returned to the announcement only if the target party subscribes to RCP and enters the RCP command before disconnecting.

Information Forwarding 3

1.04 With INFO 3, the caller dials an 800 number, and the call is routed to an Enhanced Service Provider (ESP). The ESP answers the call and plays an announcement requesting information from the caller. When the ESP's interaction with the caller is complete, the ESP sends a request for redirection and the caller information to the network using out-of-bound signaling over Integrated Services Digital Network Primary Rate Interface (PRI) facilities. The ESP disconnects, and the adjunct establishes a call to the target party.

2. Call Flow (Not affected)

3. Provisioning

Office Data Administration

3.01 In 4E16, a bit in the Trunk Subgroup was used to identify SSA trunks. This bit is proprietary and only applies to Q.931 trunks. For 4E17, a new PRI type is used to identify SSA trunks. The Trunk Subgroup bit that was set in 4E16 and this new PRI type identify trunks as "SSA" and can only be set in AT&T switches.

3.02 In 4E17, Trunk Block item PRIT should be set to **SSA** for the adjunct to be treated as SSA by the switch. In 4E16, Trunk Block item SPAR3 had to be set to **YES** for the adjunct to be treated as SSA by the switch. For the SSA features to work properly, 4E17 Release 1 introduces a new item, SST, that is added to the SII translator to specify the signaling type. This item determines the SST values for the SSA features and should be populated for all SII values.

3.03 Use Office Data Assembler (ODA) Form 403R and Recent Change Form 338 to populate the **SST** field. Use Verify Form 3ah to verify the values in the SII translator. A description of the valid entries for the **SST** field is provided in Table 25-A.

⇒ **NOTE:**
If the terminating PRI Customer Premises Equipment is set up to send Codeset 7 information elements in an ALERT message back towards the Terminating AT&T Switch, the Message Associated User-to-User Information will be pegged on the Automatic Message Accounting record at the Originating AT&T Switch.

Table 25-A. Signaling Service Type Entries

SST Entry	Value	Description
LDS	0	Long Distance Service
OMEG	1	Outwats and *Megacom*® Service
SDS	2	Switched Digital Service
SDCSR	3	SDI Carrier Specific Routing
SDN	4	Basic Software Defined Network (SDN)
GSDN	5	Global SDN
SDNK	6	SDN Key Service
GSDNK	7	Global SDN Key Service
MEGK	8	*Megacom* Key Service
LITE	9	800 Class of Service Lite
CLCM	10	800 Class of Service Classic-
CLC	11	800 Class of Service Classic
CLCP	12	800 Class of Service Classic+
GOLD	13	800 Class of Service Gold
PLT	14	800 Class of Service Platinum
–	15 - 43	Reserved for later use
SP1 - SP20	44 - 63	Spare 1 through Spare 20

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

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Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

Software Reengineering—Using Extended Call Store Feature (222)

26

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Software Reengineering—Using Extended Call Store Feature (222)

26

1. Feature Description

1.01   Extended Call Store (ECS) is an AT&T 1A Processor memory addition which increases the Call Store memory. By moving certain Program Store (PS) data to Call Store (CS), Program Store is made available to support features. The displaced Call Store data is then moved to ECS memory. This capability is made possible by allowing access to the *4ESS*™ switch 1A Processor memory whose address is determined by bit **22** in the Call Store address field.

1.02   The 1A Processor uses bit **22** in the address register to access either Call Store or Extended Call Store. When bit **22** is "0", the normal Call Store memory is accessed. When bit **22** is "1", Extended Call Store is accessed.

1.03   The ECS feature provides a maximum of 1.75 million words of additional Call Store. A maximum of nine Call Store units is available to provide ECS memory. Each additional Call Store unit provides 256k words of memory. Combined with the existing 13 Call Store units, an office can have a total of 22 units used in the 1A Processor.

1.04   Figure 26-1 shows an example of the ECS memory layout. Extended Call Store memory cannot have more simplex (static) or duplex (dynamic) data than the main Call Store. Protected area registers create mirrored-protected memory ranges between the CS and ECS spectrums that are used to balance the simplex and duplex data structures across the two spectrums.
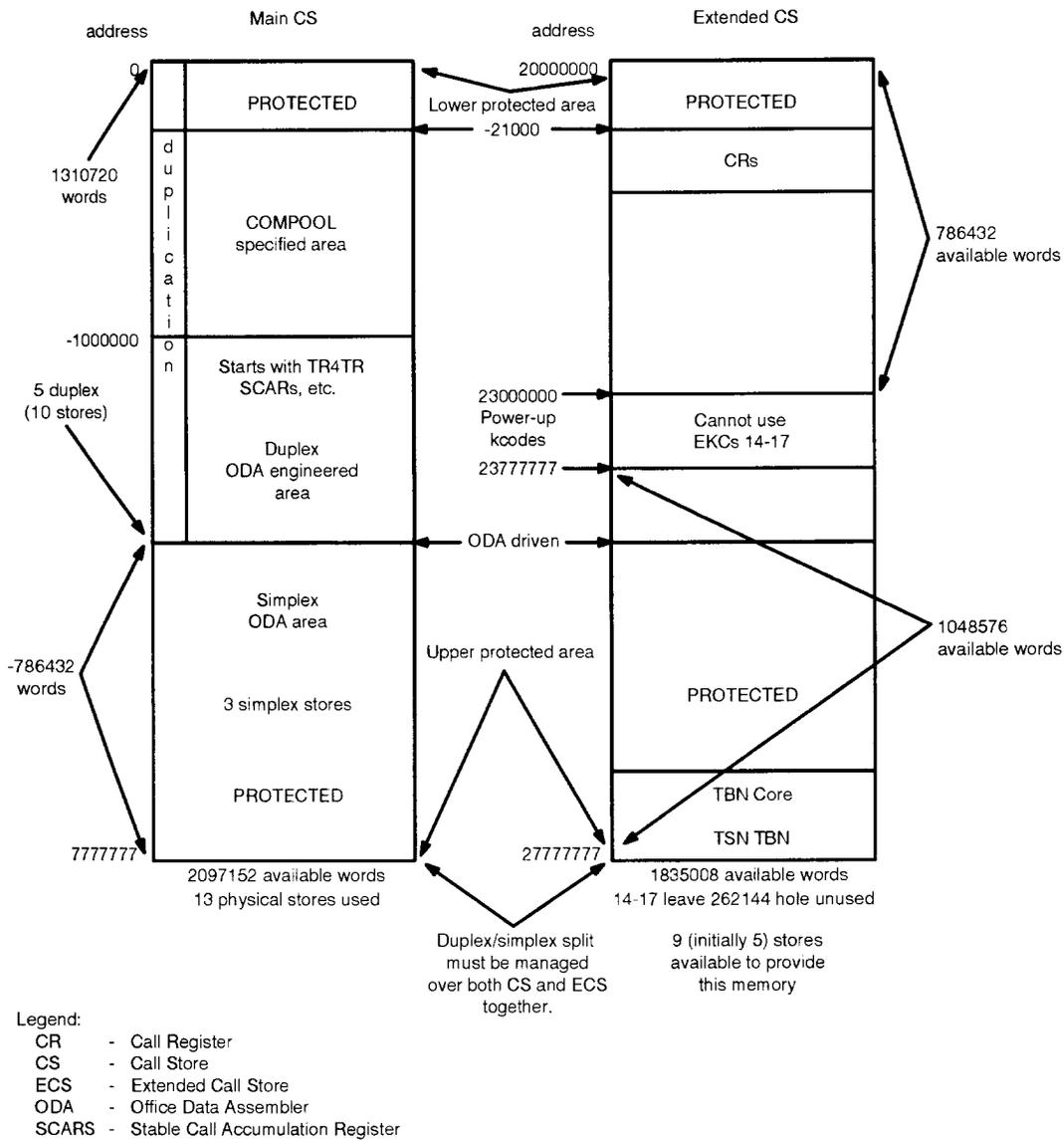
Figure 26-1. Example of ECS Memory Layout

Legend:
CR — Call Register
CS — Call Store
ECS — Extended Call Store
ODA — Office Data Assembler
SCARS — Stable Call Accumulation Register

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1.05 Extended Call Store software reengineering involved the following basic activities:

■ Determining the amount of Program Store (PS) needed for the 4E17 generic: About two additional PS Kcodes (128k, 24-bit words) were allocated to support the 4E17 real-time feature development and memory requirements.

■ Identifying Office Data Assembler (ODA) structures to move to ECS: Part of the ODA-generated Call Store data was moved to ECS (for example, translations structures and subtranslators).

■ Identifying program text to move to normal Call Store (CS): Nonreal-time sensitive data (such as data tables, input/output catalogs, and peripheral fault recovery programs) was moved from Program Store to normal Call Store.

1.06 Call processing data and ODA data can be stored in the ECS memory based on office requirements. The ability to grow ECS was provided in 4E16. [Refer to the Task Oriented Practice (TOP) AT&T 234-153-010, *4ESS*™ *Switch, I/O, IOP, TUC, CS, ECS, and PS, Growth/Degrowth*; the Installation Engineering Handbook 264A; and AT&T 234-090-162AC, *4ESS*™ *Switch, Product Release Document, 4E16 Release 2 Generic*.] No new capability has been added to ECS for the 4E17 generic.

2. Call Flow (Not affected)

3. Provisioning

3.01 The 4E17 Generic ECS feature provides the *4ESS* switch with a large block of Call Store memory. An office can have a maximum of 1.75 million words of ECS memory. Six 256k memory units have been added to the 1A Processor for the ECS feature. The units are housed in a remote frame. Offices that require all 32 Kcodes of Call Store memory will use 13 memory units. The ODA provides for using ECS memory similar to the way the existing Call Store memory is used. Throughout the life of the generated ODA, Recent Change space administration procedures are used to allocate and de-allocate memory.

ODA Form 406C

3.02 Two new fields, **NDCSMECS** and **NSCSMECS**, are required on the ODA Form 406C. These fields are shown in the highlighted areas on the display screen in Figure 26-2. The **NDCSMECS** field specifies the number of duplex 64k Call Store modules needed for ECS. The **NSCSMECS** field specifies the number of simplex 64k Call Store modules needed for ECS. The values of NDCSMECS and NSCSMECS when not "blank" or "0" on the ODA Form 406C must be a multiple of 4, which is the number of Kcodes in a 256k memory module. These fields should be "blank" or "0" when the sum of the **NDCSM** field and the **NSCSM** field does not equal 32. The

NDCSM and NSCSM fields specify the number of duplex and simplex Call Store modules, respectively, that are needed for a given office. The NSCSM is the existing Call Store. The maximum value is 32. The maximum value for NDCSM for an office using 32 Kcodes of regular Call Store, and needing ECS memory, is 20. This leaves 12 Kcodes for simplex memory, which provides optimum use of the ECS feature. An office should only use ECS once all their existing Call Store memory is used.

```
ESS 406C SHEET 1 OF 2 TG-4        MISCELLANEOUS OFFICE DATA
                                          4ESS
                          4E17 AND LATER GENERIC PROGRAMS


                          ESS UNIT _____


FORM CODE    6C
            1   2

NCA800TT    _____      CAD ___     QOB           _____     CAD ___
3       10  14  16          80      3  5      14   17            80

NCAT        _____      CAD ___     RCVHL        _____     CAD ___
3   6       14  16          80      3    7    14   16            80

NCD         _____      CAD ___     RPI          _____     CAD ___
3  5        14  17          80      3  5      14   15            80

NCSDNTT     _____      CAD ___     SATB         _____     CAD ___
3       9   14  16          80      3  6      14   16            80

NDCSM       _____      CAD ___     SDN          _____     CAD ___
3   7       14  15          80      3  5      14   17            80

NDCSMECS    _____      CAD ___     SDNTT        _____     CAD ___
3       10  14  15          80      3    7    14   16            80

NETWORK     _____      CAD ___     SDS          _____     CAD ___
3       9   14  16          80      3  5      14   17            80

NNR         _____      CAD ___     SSP          ___        CAD ___
3  5        14  15          80      3  5      14                80

NSCANSET    ___         CAD ___     SVAST        _____     CAD ___
3       10  14              80      3    7    14   17            80

NSCSM       _____      CAD ___     TBSHC        _____     CAD ___
3   7       14  15          80      3    7    14   18            80

NSCSMECS    _____      CAD ___     TCRB         _____     CAD ___
3       10  14  15          80      3  6      14   15            80

OFFGNSC     ___         CAD ___     TDAS1A       ___        CAD ___
3       9   14              80      3    8    14                80
```

Figure 26-2. Sample ODA Form 406C—Miscellaneous Office Data

ODA Form 407W

3.03 A new field, **FR TYPE**, has been added to ODA Form 407W to indicate the type of frame used for Call Store. The value of this field populates the XL1CSFRTYP item in the 1A Processor XL1CSMTRANS structure for the corresponding Call Store member number. The **FR TYPE** field is shown in bold type in Figure 26-3.

ESS 407W TG-4

UNIT TYPE
1A PROCESSOR
HARDWARE VERSION RECORD
4ESS

ESS UNIT _____

FORM CODE   7W   1 2

UNI-TYPE	MEMN	M T	M T H G	F R A M E	**F R T Y P E**	M P M T H G 0	M P M T H G 1	CMTHG																A D	REMARKS
								00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15		
4 8	9 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	80	

Figure 26-3. ODA Form 407W—1A Processor Hardware Version Record

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Hardware/Software Dependencies

7.01 Extended Call Store is required in all Network Services Division (NSD) *4ESS* switch offices. For Local Exchange Carrier (LEC) offices, ECS is optional. However, in order for this feature to be operational in LEC offices, an ECS frame must be added to the 1A Processor CS-PS frame, and the minimum of 4E16 generic must be installed. A maximum of three ECSs can be installed in the existing CS-PS frame. A new CS frame must be installed to house the other six ECS units.

Turn On/Turn Off Mechanism

7.02 This feature is turned on, providing the ECS hardware is installed, by setting bit **22** in the Call Store address field to "1".

8. Input/Output Manual Pages

8.01 Input/output messages are provided in the 4E16 Release 2 Generic.

Software/Hardware Inhibits Feature (267)

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**Software/Hardware Inhibits
Feature (267)**

27

1. Feature Description

1.01 This feature provides the means to limit Common Network Interface (CNI) and Interprocess Message Switch (IMS) recovery actions in the AT&T 3B20D computer when hardware or software problems occur. This is useful in quieting down a system that is rolling in recoveries, thus allowing craft personnel to take manual control.

1.02 This feature makes use of system inhibits. System inhibits prevent thrashing of error conditions that would otherwise adversely affect system operation. The automatic detection capability of system trouble attempts to restore system operations to normal.

1.03 The following two types of inhibits exist:

■ *Software:* Prevents escalation of software recovery actions where the higher action is taken arbitrarily (for example, based upon threshold counts). Low level actions are permitted.

■ *Hardware:* Disables hardware check circuits to blind the software to a recovery stimulus. This inhibit is effective for false (defective) error detectors (for example, parity errors).

1.04 When inhibits are enabled, the system has limited automatic recovery resources. Therefore, the system must be closely monitored by craft personnel, since a subsequent system error requires manual action.

1.05 Four major areas have the potential to thrash the system while recovering from IMS functionalities. Each of these areas is described in the following paragraphs.

CNI Initialization

1.06 CNI Initialization (CNIINT) is the parent process for noncritical processes. As such, CNIINT creates the noncritical processes during initialization and periodically checks to ensure that the processes are up and running.

1.07 If a process fails, CNIINT starts a recovery action. Each time a successful scan occurs (that is, each noncritical process has been up and running for a minimum of 30 minutes), CNIINT decrements each working count by one. This means that each time CNIINT can enter and exit state 75 without encountering a faulty process, 1 is deducted from each of the working counters. This method is referred to as the *leaky bucket* method which provides greater protection against thrashing, since the history of performance is maintained longer for each noncritical process.

IMS Initialization

1.08 Before the implementation of this feature, craft personnel triggered *UNIX** system Real Time Reliable (RTR) level 1 initializations so frequently that thresholds were exceeded, and the next higher level initialization was requested. This situation created the possibility of a Full Process Initialization (FPI) if the initializations were requested within a small timing interval.

1.09 With the implementation of the Software/Hardware Inhibits feature, IMS low and medium level initialization counts are cleared (instead of incremented) when the craft personnel initiate an RTR level 1 initialization. IMS does not escalate a lower level initialization to a higher level, thus allowing the craft personnel to trigger RTR level 1 initializations repeatedly within a small timing interval.

⇒ NOTE:

> Craft-initiated RTR initializations are accomplished by entering 51 on the Emergency Action Interface (EAI) page of the Maintenance Cathode Ray Tube (MCRT).

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Ring Error Analysis and Recovery

1.10 Ring Error Analysis and Recovery (EAR) is an IMS internal entity that recovers from ring communication failures (critical failures). It is invoked only when a system error occurs that interferes with all (or most) call processing functions. Ring EAR thrashing occurs when the cycling of ring recovery and the associated ring outages become dense relative to the services offered.

1.11 Six internal levels (0 through 5) are used to define the ring recovery tasks. A 5-second confidence level is associated with each successful ring restoration. If ring communications fail within this confidence level, recovery is escalated to the next higher level.

A. Level 0

1.12 In a stable mode, level 0 attempts to reestablish the ring configuration that existed just prior to the ring communications disruption (a ring restart). If this attempt fails, escalation to level 1 or 3 occurs.

1.13 In a quasi-instable mode (ring failures reach a threshold of four during a 1-hour window), a recent history of ring instability is indicated. A failure triggers a recovery attempt. Once the ring performs error-free for 1 hour, a switch is made back to the stable mode. This bimodal operation eliminates the possibility for Ring EAR level 0 thrashing.

B. Levels 1 and 2

1.14 Successful execution of level 1 or 2 results in removing one or more nodes from service and isolating them. This triggers an Automatic Ring Recovery (ARR) or Application Critical Node Recovery (ACNR) in an attempt to automatically restore these nodes. ARR attempts automatic restoral no more than three times an hour, while ACNR uses a progressive delay strategy. Both actions eliminate the potential thrashing.

C. Levels 3 Through 5

1.15 If an intermittent ring problem persistently disrupts ring communications and its location is not known through normal ring transport error reporting, level 3 (and possibly levels 4 and 5) is involved in ring recovery. If detection is avoided in recovery and failure does not occur within the 5-second confidence interval, Ring EAR could endlessly cycle in recovery. If continued escalation does not resolve the problem, an FPI is triggered. Two approaches exist to limit Ring EAR thrashing for levels 3 through 5.

1.16 The first approach provides an algorithm that causes the Ring EAR confidence interval to grow with repeated failures. For example, the confidence interval is extended to the point where a repeated failure within the extended level forces

escalation to the next higher Ring EAR recovery level. The leaky bucket mechanism limits the growth of the extended confidence level and returns it to normal after the repeating problem is eliminated.

1.17 The second approach provides a limit on the maximum number of Ring EAR levels 3 through 5 that are allowed within a given time period. For example, once the limit for the maximum acceptable number of level 3 recoveries is reached, a subsequent level 3 recovery is automatically escalated to level 4. This action places new limits on levels 4 and 5. At this point, the leaky bucket mechanism sets limits on the growth of the confidence level.

1.18 Table 27-A contains the guidelines for acceptable thresholds between a stable and a thrashing Ring EAR recovery.

Table 27-A. Antithrashing Guidelines for Ring EAR

Ring EAR Level	Typical Recovery Time (Seconds)	Maximum Number of Recoveries Per Hour	Approximate Ring Outage Time (%)
3	2.0	10	0.6
4	2.5	6	0.6
5	35.0	6	6.0

1.19 Craft personnel may issue the **CFR:RING** command to trigger a specific level Ring EAR recovery or to zero the counts. See Input/Output Manual Pages.

Automatic Ring Node Recovery

1.20 ARR restores functionalities in noncritical error categories. It recovers the ring node automatically without thrashing the system during normal operation. When the recovery count for a ring node reaches the threshold (3), ARR stops any recovery attempt. Manual (craft personnel) or Application Critical Node Recovery (ACNR) intercepts to recover the node.

2. Call Flow (Not affected)

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3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages

8.01 The input message **CFR:RING** is being modified to include two new options. They are briefly described in the following table. Refer to the Input/Output Message Manuals for detailed descriptions.

Table 27-B. Input/Output Messages

Message	Description
CFR:RING, LEVEL a (where a = level [0/3/4/5]	Execute the designated level of ring recovery and force accumulated counts to zero.
CFR:RING, ZEROCNTS	Zero the counts for level 0, 3, 4, and 5 ring recovery.

TCAP Parameter Tag Code Expansion Feature (284/3370)

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TCAP Parameter Tag Code
Expansion Feature (284/3370)

28

1. Feature Description

1.01 The affected applications for this feature are the Network Control Points (NCP, 2NCP), Customer Account Services (CAS), Intelligent Call Processing (ICP) and the INWATS Data Base (IDB).

1.02 The Transaction Capabilities Application Part (TCAP) Tag Code feature increases the length of the TCAP parameter tags. Before the introduction of the TCAP Tag Code Expansion feature, constraints at the *4ESS*™ switch and the NCPs limited the TCAP parameter tags to a length of 2 bytes. This feature increases the length of allowable parameter tags from 2 bytes to 4 bytes. The TCAP expansion alleviates the condition of insufficient tags for new parameters.

1.03 The Alternate Signaling Transport Network (ASTN) is also affected by this feature. ASTN processing must be able to recognize from which generic a certain message came. This information allows the Direct Link Node (DLN) (both 4AP10 and 4AP11) to reformat the message based on the source (destination) 1A Processor generic.

1.04 The tag code extension as specified in the International Telegraph and Telephone Consultative Committee (CCITT) Recommendation Q.773 is used for AT&T TCAP parameter tag codes. Figure 28-1 shows the parameter tag code format.

H	G	F	E	D	C	B	A
Class		Form		Tag Code			
			1	1	1	1	1
Ext 1	1						

Ext 0							
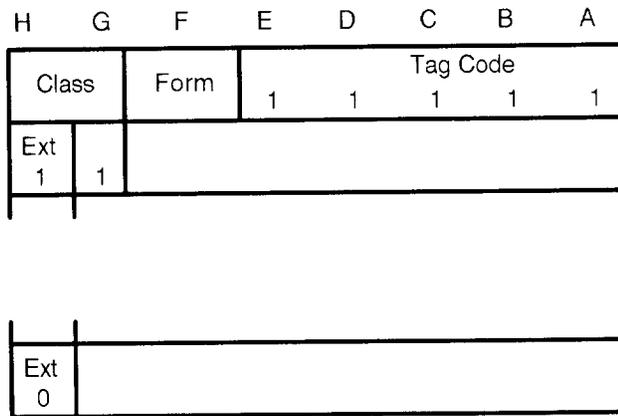
Figure 28-1. TCAP Parameter Tag Code Format

1.05 Bit H of each extension octet (Figure 28-1) is used as an extension indication. When bit H of the octet is set to 0, no further octets for the tag are used. If bit H of an extension octet is set to 1, the following octet is also used for extension of the tag code. Bit G of the first extension octet must always be set to 1. The maximum number of extension octets must not exceed 3. An extension octet will not be used until the previous extension octet has been fully utilized.

2. Call Flow

Call Flow Key Points

2.01 The *4ESS* switch supports the parameter tag code extension mechanism specified in CCITT Recommendation Q.773. The recommendation specifies that bit H of each extension octet be used as an extension indication. If bit H of an extension octet is set to 1, the following octet is also used for extension of the tag code. If bit H of an extension octet is set to 0, no other octets are used for the tag.

2.02 The *4ESS* switch will be able to build, send and receive TCAP parameter tag codes that are more than 2 octets long, but not longer than 4 octets.

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

International 800 (I800) Network Routing Number (NRN) Exhaust Feature (294a/3332)

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Contents

International 800 (I800) Network Routing Number (NRN) Exhaust Feature (294a/3332)

29

1. Feature Description

1.01 This feature provides the Recent Change/Verify associated with the International 800 (I800) Network Routing Number (NRN) Exhaust feature. The NRN Exhaust feature, which was completed in 4E16 Release 3 Generic, increased the number of Inbound I800 customer records that can be supported by the 196 NRN plan. This increase was a result of the customer demand generated by the introduction of International *Megacom*® 800 Service. As predicted by the I800 Service Development and Management, all 10,000 Inbound I800 Phase 2 customer records were in use by 2Q92. This caused the I800 numbering plan to be exhausted.

1.02 To solve the NRN exhaust problem, several changes were made in the *4ESS*™ switch network as follows:

■ Changes in its current screening of the fourth, fifth, and sixth (DEF) digits for 196 NRNs received at the switch for customer-initiated calls

■ Use of 10-digit Global Title Translation at the *4ESS* switch

■ Use of the Dialed Number Translation Table in the No. 1 Direct Services Dialing Network Control Point

■ Expansion of the I800 Phase 1 numbering plan to support advanced feature customers.

1.03 In AT&T 234-090-163AC, *4ESS*™ *Switch, Product Release Document, 4E16 Release 3 Generic*, the I800 Network Routing Number Exhaust Feature (294) describes in detail the changes that were made in the AT&T switch network to alleviate the NRN exhaust problem.

1.04 Feature 294a provides the Recent Change/Verify that gives the *4ESS* switch the capability to turn off DEF screening for all 196 NRNs. A new **NRNX** indicator has been added to the **DIGTYP** field on Office Data Assembler (ODA) Form 403I to allow for the NRN exhaust.

2. Call Flow

2.01 Prior to this feature, all numbers that were received at a *4ESS* switch were screened on the fourth, fifth, and sixth (DEF) digits. The DEF digits immediately follow the 196 special service code. For I800 calls, if the fourth digit of the number received was a "0" or "1", the call was blocked at the *4ESS* switch and sent on for final handling. This feature lifts that restriction for 196 numbers.

2.02 Now when the *4ESS* switch receives an Inbound I800 call, the switch will process the call regardless of the value of the fourth digit. The *4ESS* switch must treat all calls that arrive at the switch with 196 NRNs as Inbound I800 calls. I800 calls with 19[4,5] or 12[3,4] NRNs will be interpreted as Outbound calls.

2.03 Refer to AT&T 234-090-163AC, Feature 294, for the Inbound and Outbound I800 call flow.

3. Provisioning

3.01 The 4E17 generic retrofit ODA decompiles table HT4OVP_ADC. For each index where ODA bit XL4NRN_I800 equals "1" (4XL3DTTRUE), an **NRNX** entry is added to the **DIGTYP** field on ODA Form 403I. If "NRNX" is not entered, bit XL4NRN_I800 will be "0". The "NRNX" is a new value for the **DIGTYP** field that identifies the 196 NRNs for I800 calls.

⇒ NOTE:
If ODA XL4NRN_I800 was set in 4E16, it is automatically set for 4E17.

4. Recording (Not affected)

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5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on using Recent Change Forms 319 and 320. Enter **NRNX** in the **DIGTYP** field. Use Verify Forms 3h and 13d to verify that "NRNX" has been entered.

8. Input/Output Manual Pages

8.01 A new entry, NRNX, has been added to the VER:CODEGRP:DIGTYP input message and the VER:CODEGRP;OPT(DIGTYP) output message.

Network Switch Number (NSN) Expansion for RTNR Network Feature (303/3352)

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Contents

Network Switch Number (NSN) Expansion for RTNR Network Feature (303/3352)

30

1. Feature Description

1.01 Each switch in the AT&T Switched Network (ASN) is assigned a unique number that is used by Real Time Network Routing (RTNR) and the Alternate Signaling Transport Network (ASTN). This number is called the Network Switch Number (NSN). The maximum NSN capacity is 191; however, this is not the number of NSNs actually implemented. Only the number of NSNs needed for the network are implemented. In generic 4E16, 151 NSNs are supported. This feature increases the number of supported NSNs to 167 for generic 4E17.

2. Call Flow

2.01 When a direct route from the Originating AT&T Switch (OAS) to the Terminating AT&T Switch (TAS) cannot be found, the OAS sends a Transaction Capabilities Application Part (TCAP) load status query message to the TAS. The TAS responds with a TCAP load status reply message that contains 3 to 5 RTNR load status maps. The OAS uses the TAS load status maps along with its own load status maps to select a via switch to route the call. The length of each load status map depends on the number of NSNs assigned. Increasing the number of NSNs results in longer load status reply messages.

2.02 ASTN provides a backup for CCS7 signaling whenever a *4ESS*™ switch becomes isolated from its home Signal Transfer Point (STP). ASTN routes load status messages to other *4ESS* switches over Common Channel Interoffice Signaling (CCIS) F links. After full deployment to 4E17, the number of octets transmitted per load status map in the END message will increase from 19 to 21.

3. Provisioning

3.01 Increasing the number of supported NSNs from 151 to 167 will affect a number of Recent Change, Office Data Assembler (ODA), and Verify forms.

Recent Change Forms

3.02 The maximum allowable value for NSNs will be changed from 151 to 167 on the following Recent Change forms:

339	636
521	643
522	644
635	

3.03 The maximum allowable CALLDATA (Call Data) value for a Destination Switch Number (DSN) Call Type will be changed from 151 to 167 on the following Recent Change forms:

300	304
301	321
302	332
303	

ODA Forms

3.04 The maximum allowable value for NSNs will also be changed from 151 to 167 on the following ODA forms:

405G	4066
4060	4067
4061	

3.05 The maximum allowable CALLDATA value for a DSN Call Type will also be changed from 151 to 167 on the following ODA forms:

403D	403H
403E	403G
403F	403O
403P	403V

Verify Input Messages

3.06 The maximum allowable value for NSNs will also be changed from 151 to 167 on the following Verify forms:

5h	6at
6t	16ad
6ak	16ae
6al	16af
6am	16al
6as	

3.07 The maximum allowable CALLDATA value for a DSN Call Type will be changed from 151 to 167 on the following Verify forms:

3a	3v
3b	3w
3c	3y
3d	3z
3e	3ab
3f	3ac
3g	13f
3n	13m
3o	

4. Recording (Not affected)

5. Network Management

5.01 Increasing the allowable number of NSNs will impact the following network management messages:

Message Type 4	- RTNR Node to Node Data
Message Type 61	- RTNR Selective Bit Map Query Control Status Data
Message Type 62	- RTNR Via Route Screen Control Status Data
Message Type 63	- RTNR Trunk Reservation Turn Off Control Status Data

5.02 Message Type 4 is 5-minute data; the other three are demand data messages. Additional data will be provided to the Network Management Operations System (NEMOS) in these messages.

6. Maintenance/Troubleshooting

Measurements

6.01   Two Traffic Data Administration System (TDAS) measurement classes are associated with RTNR: "rtnr" and "safer." The "safer" measurement class, which provides data for Split Access Flexible Egress Routing (SAFER), is not affected by this feature; however, the "rtnr" measurement class, which provides hourly nodal data for RTNR, is affected.

6.02   Nodal data is collected by the 1A Processor in an engineered structure called a node-to-node register (NNR). Each Routing Pattern Identity (RPI) is assigned to an NNR for collection of nodal data. Every 5 minutes, the 1A Processor sends all the NNR data to the Attached Processor System (APS). After collecting an hour's worth of data, the APS formats the twelve 5-minute files into an RTNR hourly file which is then incorporated into the APS TDAS data base.

6.03   This feature increases the number of NSNs per NNR. Prior to this feature, there were 152 (0 to 151) NSNs per NNR. With the incorporation of this feature, the number of NSNs per NNR is increased to 168 (0 through 167).

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01   This feature is turned on automatically by software deployment.

Internal Transition Issues

A. ASTN

7.02   ASTN will work during the transition period even if the OAS and TAS are in different generics. All *4ESS* switches with a 4E16 generic, however, must be in Release 3 or 4.

B. Load Status Bit Maps

7.03 *4ESS* switches with a 4E16 generic use up to 151 NSN bits in the RTNR load
status bit maps; *4ESS* switches with a 4E17 generic use up 167 NSN bits.
During the transition between generics 4E16 and 4E17, the 4AP11 Direct Link Node
(DLN) at a 4E17 TAS will truncate 168 bit load status maps being sent to a 4E16 OAS to
152 bits. At the OAS, both the 4AP10 and 4AP11 will zero pad any received load status
map up to 192 bits.

7.04 During the transition between 4E16 and 4E17, the OAS will indicate whether it is
in the 4E16 or 4E17 generic so the DLN at the TAS can decide whether to send
152 or 168 bits of load status map. A spare bit in the NSN parameter is used to indicate
the generic. If the OAS is 4E17, the bit is set; if the OAS is 4E16, the bit is reset.

➡ NOTE:

Until the 4E17 generic is fully deployed, no *4ESS* switch should be assigned an
NSN value larger than 151.

8. Input/Output Manual Pages (Not affected)

Alternate Signaling Transport Network (ASTN) 56-Kbps Capacity Increase Feature (306/3368)

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Tables

Alternate Signaling Transport Network (ASTN) 56-Kbps Capacity Increase Feature (306/3368)

31

1. Feature Description

1.01 The Alternate Signaling Transport Network (ASTN) was formerly referred to as the Emergency Signaling Transport Network (ESTN). Because of the bandwidth and buffer limitations on the existing 4.8-kbps Common Channel Interoffice Signaling (CCIS), the ASTN capacity had to be increased. This was resolved by allowing a *4ESS*™ switch to use up to eight 56-kbps Link Access Procedure Balanced (LAPB) F-links, which significantly reduces the amount of congestion in the ASTN.

1.02 Channels ASTN0 through ASTN7 are used as the optional channels for the ASTN 56-kbps F-links. The ASTN uses eight TN82B Input/Output (I/O) Peripheral Controllers to provide synchronous transparent message signaling at 56 kbps. This upgrade provides additional signaling backup for services that rely on long Transaction Capabilities Application Part (TCAP) messages.

1.03 The ASTN data base TCAP uses the LAPB 56-kbps F-links to provide transparent Common Channel Signaling System 7 (CCS7) TCAP message signaling backup. When the 56-kbps F-links are not available, the existing CCIS6 4.8-kbps F-links will be used. This allows the ASTN to support a full range of CCS7 TCAP signaling capabilities with no perceived delay in call setup and with minimal call blocking.

1.04 Prior to this feature, signaling backup for ASTN was only supported by 4.8-kbps F-links. This backup signaling capability did not provide adequate signaling for AT&T services. When this feature is deployed, the ASTN will support backup transport via both 4.8-kbps and 56-kbps F-links, thus providing the backup signaling capability needed for AT&T services.

1.05 The 56-kbps F-links support all of the functions that ASTN currently supports. These functions are as follows:

■ Integrated Services Digital Network User Part (ISUP) message handling

■ Real Time Network Routing (RTNR) message handling

■ Destination Common Channel Interoffice Signaling (DCIS) message handling

■ TCAP message handling.

1.06 The ASTN is responsible for message transport when the Common Network Interface (CNI) Ring is inoperable or when an ISUP, RTNR, DCIS, or TCAP message is returned. When the CNI becomes inoperable, ASTN will trigger within 2 seconds. Helper switches are used to transport ASTN messages between the originating and terminating switches. ISUP, RTNR, and DCIS will use both the LAPB 56-kbps F-links and the CCIS6 4.8-kbps F-links.

2. Call Flow (Not affected)

3. Provisioning

Office Data Administration

3.01 The *4ESS* switch Service Node Work Group is responsible for administering the office data that defines ASTN LAPB 56-kbps F-links at each *4ESS* switch office.

Recent Change

3.02 This feature requires modification to three translator structures to identify the 56-kbps F-links in a given office. These translators are shown in Table 31-A and are in addition to those structures normally populated when an I/O link is grown into an office.

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Table 31-A. Modified Translator Structures

Table	Data
OD4SLNKTERM	Internal link value (240-247)
IO4SCHANLINK	Link (0-7) Special application channel indicator
IO4SLINKCHAN	Network Switch Number (NSN) of far-end switch Link type (ASTN = 0) Link equipage (equipped) I/O channel value (84-91)

3.03 The ASTN 56-kbps F-links and their equivalent I/O channel names and values are shown in Table 31-B. The same I/O channel names are also used for the backup channels.

Table 31-B. ASTN 56-Kbps F-Links and I/O Channels Relationship

Function Requested	Link Number	I/O Channel Name	Channel Value
ASTN56LK0	0	4IO_ASTN0	84
ASTN56LK1	1	4IO_ASTN1	85
ASTN56LK2	2	4IO_ASTN2	86
ASTN56LK3	3	4IO_ASTN3	87
ASTN56LK4	4	4IO_ASTN4	88
ASTN56LK5	5	4IO_ASTN5	89
ASTN56LK6	6	4IO_ASTN6	90
ASTN56LK7	7	4IO_ASTN7	91

3.04 A new form of the **RC:MISC** Recent Change capability is used to add, change, or delete ASTN I/O related data. This form is populated when the F-link has been identified by link number (0 through 7). The format of the Recent Change is as follows:

RC:MISC;FHT,FTA: a,b,c,d,e!

a = ASTN56LKx - link identifier, where x = 0-7.
Links are paired into layers as follows:

> links 0 & 1
> links 2 & 3
> links 4 & 5
> links 6 & 7

b = Recent Change order number

c = Function to be performed:

    A = Add
    D = Delete
    C = Change (NSN only)

d = Further identifier of action to be performed:

    I = Individual link input should be handled only
    P = A link pair (layer) should be handled, assuming link-to-layer relationship is
    as stated for variable *a*

e = NSN of the far end of the input 56-kbps F-link layer or link requires a 6-digit
field, using leading zeroes.

4. Recording (Not affected)

5. Network Management

5.01 The Network Management Operations System (NEMOS) provides the following
capabilities to support this feature:

(a) Ability to respond to current ASTN NEMOS controls (ESTN Network Management
Operations, Administration, and Maintenance Phase 1 and Phase 2) on the
56-kbps LAPB F-links. This is done on a per-switch basis to either inhibit or allow
the following messages to be transmitted:

- DCIS and TCAP messages and their associated ISUP and RTNR TCAP
  messages (direct signaling calls)

- ISUP messages (Plain Old Telephone System calls) or RTNR TCAP
  messages that are not associated with a TCAP or DCIS query.

(b) Ability to receive the 30-second discrete messages from the *4ESS* switch. The
ASTN will provide the following information to NEMOS:

- ASTN is active—set when the per-call or per-TCAP transmission
  messages were sent or received on a 56-kbps link or a 4.8-kbps link during
  the previous 30-second interval

- ASTN link congestion—set when either a 56-kbps link or a 4.8-kbps link
  was in a congested state during the last 30-second interval

- ASTN link out of service—set when either a 56-kbps link or a 4.8-kbps link
  was in an out-of-service condition during the last 30-second interval

- ASTN manual hardware remove control is active—set when either a
  56-kbps link or a 4.8-kbps link is marked "manual remove"

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- ASTN link state change—set when either a 56-kbps link or a 4.8-kbps link has changed to one of the following states:

  — Link Congestion
  — Out of Service
  — Manual Hardware Removal.

(c) Ability to receive the 5-minute measurements from the *4ESS* switch. The ASTN will send to NEMOS the total number of the following on a per-switch basis:

- Initial Address Messages (IAM) received via ASTN 56-kbps links, 4.8-kbps links, and CCS7 A-links

- IAM sent

- IAM and queries blocked

- Answer messages sent via ASTN F-links and CCS7 A-links

- Answer messages received via ASTN F-links and CCS7 A-links

- Messages sent on ASTN F-links from the originating switch

- Messages sent on ASTN F-links from the via switch

- Messages received on ASTN F-links at the terminating switch

- Messages received on ASTN F-links from the via switch

- Reverse messages sent on ASTN F-links from the via switch

- Reverse messages received on ASTN F-links at the originating switch

- TCAP and DCIS messages sent on ASTN F-links from the originating switch

- TCAP and DCIS messages received on ASTN F-links at the originating switch

- TCAP and DCIS messages received on ASTN F-links at the helper switch

- TCAP and DCIS reverse messages received on ASTN F-links at the originating switch

- TCAP and DCIS reverse messages sent on ASTN F-links at the helper switch

- Initial TCAP and DCIS queries received via ASTN F-links

- TCAP and DCIS queries sent

- Initial RTNR TCAP queries sent by ASTN F-links

- Initial RTNR TCAP queries received by ASTN F-links.

(d) Ability to receive the following 5-minute per-layer measurements:

- Seconds of congestion

- Seconds of out-of-service

- Number of messages received on the F-links

- Number of messages sent on the F-links

- Number of backward failure messages sent on the F-links

- Number of backward failure messages received on the F-links.

(e) Interface with the *4ESS* switch to receive the modified link status demand message.

6. Maintenance/Troubleshooting

Measurements

6.01 The following new types of measurements for the Data Acquisition Reports and Integrated Communications System (DARICS) are required for the 56-kbps links:

- The amount of time the ASTN is in use per 56-kbps link

- The amount of time the ASTN is in congestion per 56-kbps link

- Number of bytes sent

- Number of bytes received.

6.02 These counts are sent to a 1A Processor file at 15-minute intervals. After the data has been sent to the 1A Processor file, the 1A Processor counters will be set to "0". These same counts are sent to a storage location in a Traffic Data Acquisition System (TDAS) file at 1-hour intervals. The eight 56-kbps links are identified in this TDAS file by an NSN. The per-link counts consist of four 15-minute segments. Forty-eight hours worth of data can be stored in a TDAS file. The DARICS will retrieve this data from TDAS hourly and use it to compute the amount of time the 56-kbps links are in use.

6.03 The output message group **REPT:BUNSMEAS** has been modified to include counts for events that occur when 56-kbps links are used.

1A Processor System Integrity

A. Audit 17

6.04 The I/O Mutilation and Detection audit, which previously prevented TN82B circuits from being assigned "special application", has been changed to allow this special assignment.

B. Audit 48

6.05 The ASTN portion of Audit 48, the software function which builds the data within the ASTN translators, will only be initiated in AT&T switches. To allow for the 56-kbps capacity increase, Audit 48 has been modified as follows:

- A new routine, IO_CHAN_STATUS, is used to determine the in-service and out-of-service status of the 56-kbps links.

- "Presence" indicators are used to identify which of the 16 signaling link number entries in an office are 56-kbps links as opposed to 4.8-kbps links.

- The SEND_VIA_IOCHAN routine is invoked to verify that the identity of the far-end switch is equivalent to that maintained by the near-end switch.

- The IO4SLINKCHAN table is used to obtain the 56-kbps NSNs for a given member of a layer to ensure that the two links of a layer are paired, which means that the links terminate at the same far-end switch.

6.06 A new process has been introduced into the Audit 48 function to validate various 56-kbps I/O related translators, transient data, and 56-kbps link status. The following information is audited:

- System Sanity: When the I/O system is stated as "**NOT SANE**", Audit 48 will initialize the following:

  — Per-link load and unload pointers

  — Input 56-kbps buffer load and unload pointers

  — Per-output buffer link occupancy words.

- Special Application Link Status: Verify that the 56-kbps translators are specified as "special application" and that they are stated as such in the transient I/O translators.

- Link States: Verify that the transient 56-kbps link states are valid. If the link states are not valid, set the transient link status to "unequipped."

> **NOTE:**
> Setting the transient link status to "unequipped" is the 56-kbps I/O software state. This is **not** the hardware state.

■ Output Buffer Load/Unload/Buffer State: Verify that the 56-kbps output buffer load and unload pointers are valid in terms of the current buffer state. If invalid, initialize the pointers.

■ Buffer Busy Bit/Occupancy Words/Load and Unload Pointers: Verify that the location of the load and unload pointers is consistent with the buffer busy bit and the current values within the per-link buffer occupancy counters.

■ System Inhibit/Allow: Verify that the ASTN 56-kbps system inhibit or allow setting is consistent within the individual inhibit/allow status that is maintained within the per-link buffer memory.

7. Transition Considerations

Internal Transition Issues

7.01 When 56-kbps F-links are introduced between two AT&T switches to provide a capacity increase capability for ASTN, both switches must be in the 4E17R1 or later generic. The 56-kbps F-links will not be installed in offices operating under the 4E16 generic.

Hardware/Software Dependencies

7.02 This feature requires up to eight TN82B synchronous Peripheral Controller circuit packs and three FG packs (FG85, 86, and 87). The ASTN hardware is housed in the AT&T 3B20 computer growth units. Each growth unit can contain four TN82B circuit packs. These circuit packs must be assigned as "special application" to allow traffic on the channels to bypass normal I/O Control Program handling and be handled by new application routines. Channels ASTN0 through ASTN7 are connected through 56-kbps private lines to similar channels at the far-end *4ESS* switch. Link identifiers are assigned to the channels during installation and initialization.

7.03 The TN82B circuit packs are configured to operate in a synchronous, transparent, full-duplex mode. They are supported by the BX.25 protocol. The I/O Processor growth procedures are covered in Task Oriented Practice (TOP) AT&T 234-153-011AC, *4ESS™ Switch, Alternate Signaling Transport Network Growth.*

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Turn On/Turn Off Mechanism

7.04 The 56-kbps portion of this feature is turned on using the **RC:MISC;FHT,FTA** Recent Change message followed by the initiation of Audit 48. Refer to "Provisioning" in this chapter for the layout of this message.

8. Input/Output Manual Pages

8.01 This feature requires several new and/or modified I/O messages. The new input messages use the new keyword, **SCHAN**, to indicate that the channels are Special Application Channels. These messages are summarized in Table 31-C.

Table 31-C. Input/Output SCHAN Messages

Message	Type	Purpose
INH:SCHAN	Input	Inhibits operation of the signaling channel for the specified client
ALW:SCHAN	Input	Enables operation of the signaling channel for the specified client
INIT:SCHAN	Input	Initializes I/O signaling system data structures for the specified client
OP:SCHAN;LST	Input	Outputs the specified I/O signaling system data structure or information
REPT:SCHAN-INH	Output	Prints in response to the **INH:SCHAN** input message to report that an I/O signaling system client has been inhibited
REPT:SCHAN-ALW	Output	Prints in response to the **ALW:SCHAN** input message to report that an I/O signaling system client has been enabled
REPT:SCHAN-EST	Output	Reports that an I/O system signaling link has established a communication path with its far-end device
REPT:SCHAN-FAIL	Output	Reports that an I/O system signaling link has lost its communication path to its far-end device
OP:SCHAN;LST	Output	Prints in response to the **OP:SCHAN;LST** input message and reports the status of the I/O signaling system links

8.02 This feature also requires a new output message and modifications to several old output messages. These messages are as follows:

New Output Message: **REPT:ASTN56LINK:5 MINUTE STATUS**

Modified Messages: **OP:BUNSTAT**
REPT:SDC:BUNSFLINK
REPT:BUNSMEAS

Additional Messages: **UPD:BUNSTAT**
REPT:BUNS:ACTIVATED

New Output Message

8.03   The following output message was created to support this feature:

REPT:ASTN56LINK:5 MINUTE STATUS

This autonomous message will be issued at 5-minute intervals when any of the 56-kbps ASTN F-links have been used for ASTN processing or have exhibited congestion during the preceding 5-minute interval. The seconds of ASTN activity and the seconds of F-link congestion will be output per link.

Modified Output Messages

8.04   Table 31-D summarizes the output messages that have been modified to support this feature. Refer to the last pages in this chapter for an explanation and the format of these output messages.

Table 31-D.   Modified Output Messages

Message	Purpose
OP:BUNSTAT	Provides the identities of each assigned F-link layer in an office. The 56-kbps link layers are distinguishable from the 48-kbps link layers by the presence of a terminating "*".
REPT:SDC:BUNSFLINK	Indicates that an ASTN F-link layer specified by the NSN has been inhibited or allowed. A terminating "*" on this message indicates that the F-link layer is a 56-kbps type.
REPT:BUNSMEAS	Provides the counts of messages handled by the ASTN. This message consists of two sections: ■ Counts related to CCS7 and RTNR message transport ■ Counts related to TCAP and DCIS message transport.

Additional Messages

8.05 The **UPD:BUNSTAT** input message is an ASTN demand signaling-related
message. It allows a demand update to be performed to broadcast the current
F-link layer connectivity of an office to every other *4ESS* switch. The expected response
is an "OK".

8.06 The **REPT:BUNS:ACTIVATED** output message is an ASTN autonomous
signaling message. It indicates that the ASTN function has been activated to the
switch stated by the output Trunk Subgroup.

ASTN INPUT/OUTPUT MESSAGES

1. OP:BUNSTAT

Input Format: OP:BUNSTAT!

Output Format: OP:BUNSTAT

OD4BUNSDIS	07522567	ENABLED	
OD4SLKNTERM	07400000	BU4SLKNNSN	00024006
BU4TERMSLKN	00023406	BUN4NSNSLKN	00023126
BU4MYSLKNTST	00741505	BU4MYSLKNCST	00741506
BU4MYSLKNINH	01000173	BU4MYSLKNSTAT	01000616

SLKN	ID	TERM0	ID	TERM1	CLLI	TST	CST	DSIG	INH	NSN
01	1	000	1	016	NPVL IL IH 2MD 1MD	1	0	1010	0	111
02	1	240	1	241	NPVL IL IH 3MD 1MD	1	0	1010	0	150*

01/23/92 13:24:50

2. REPT:SDC

The following messages are autonomous responses to an F-link inhibit or allow commands from NEMOS or the craft personnel:

(a) ****REPT:SDC;BUNSFLINK NSN 150,N INH***

initiated by a NEMOS inhibit command for a 56-kbps F-link

(b) ****REPT:SDC;BUNSFLINK NSN 111,N INH**

initiated by a NEMOS inhibit command for a 4.8-kbps F-link

(c) ****REPT:SDC;BUNSFLINK NSN 150,M INH***

initiated by a manual inhibit command for a 56-kbps F-link

(d) ****REPT:SDC;BUNSFLINK NSN 111,M INH**

initiated by a manual inhibit command for a 4.8-kbps F-link

(e) **REPT:SDC;BUNSFLINK ALL,M INH*

initiated by a manual allow command for all F-links

(f) REPT:SDC;BUNSFLINK NSN 150,N ALW*

initiated by a NEMOS allow command for a 56-kbps F-link

(g) REPT:SDC;BUNSFLINK NSN 111,N INH

initiated by a NEMOS allow command for a 4.8-kbps F-link

(h) REPT:SDC:BUNSFLINK NSN 150,M ALW*

initiated by a manual allow command for a 56-kbps F-link

(i) REPT:SDC;BUNSFLINK NSN 111,M ALW

initiated by a manual allow command for a 4.8-kbps F-link

(j) REPT:SDC;BUNSFLINK ALL,M ALW*

initiated by a manual allow command for all F-links

3. REPT:ASTN56LINK:5 MINUTE STATUS

REPT:ASTN56LINK:5 MINUTE STATUS			
LINK	SEC/CONG	SEC/ACTIVE	BYTES/SENT	BYTES/RECEIVED
0	000	000	000	000
1	001	001	001	001
2	010	050	010	010
3	000	000	050	050
4	000	000	000	000
5	000	000	000	000
6	000	000	000	000
7	000	000	000	000

4. REPT:BUNSMEAS

M 15 REPT:BUNSMEAS

| IAMSENT | ANSSENT | SENTFO | | SENTFV |
| IAMRCVD | ANSRCVD | SENTSO SENTSV | |

| 00001809 | 00001265 | 00010704 | | 00000000 |
| 00004737 | 00003285 | 00000747 | | 00000000 |

| RCVDFT | RCVDFV |
| RCVDST | RCVDSV |

| 00028685 | 00000000 |
| 00000000 | 00000000 |

| RSNTFV | RRCVFO | RRCVSV |
| RSNTSV | RRCVSO |

| 00000000 | 00000000 | 00000000 |
| 00000000 | 00000000 |

04/02/91 09:15:29
#229

910402091410010 M 15 REPT:BUNSMEAS:DSIG

INWATS
| SENTFO | RCVDFFO | RRCVFO |
| SENTFV | RCVDFV | RSNTFV |

| 00000842 | 00000846 | 00000000 |
| 00000000 | 00000000 | 00000000 |

DSD
| SENTFO | RCVDFO | RRCVFO |
| SENTFV | RCVDFV | RSNTFV |

| 00000757 | 00000764 | 00000004 |
| 00000000 | 00000000 | 00000000 |

04/02/91 09:15:2;9
#230

Resize Number of Switches Count Feature (3213)

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Resize Number of Switches Count Feature (3213)

32

1. Feature Description

1.01 This feature decreases the size of the number of switches count field and adds a new spare field in the ISUP Initial Address Message (IAM).

1.02 To prevent the condition known as "shuttle routing," no more than ten switches should be involved in setting up a call. To ensure this limit is not exceeded, a count is kept of the number of switches involved in the call. The count is kept in the number of switches count field, which is in the IAM Routing Information Indicator (RII) parameter. Each switch involved in the call increments the number of switches count field before the IAM is passed on to the next switch. A *4ESS*™ switch that receives an IAM with a count of ten or more in the number of switches count field will terminate the call.

1.03 Prior to the incorporation of this feature, the number of switches count field was five bits long (MLKJI). However, five bits are not required, since ten is the maximum value this field needs to support. This feature reduces the the number of switches count field from five bits to four bits (LKJI) with bit M becoming a spare.

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

7.01 The transition between generics will be handled automatically by the software. The *4ESS* switch will continue to map five bits from the incoming IAM to the outgoing IAM. Four bits will represent the number of switches count, and the fifth bit will be copied unchanged from the incoming IAM to the outgoing IAM.

Turn On/Turn Off Mechanism

7.02 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

Alternate Destination Routing 2 (ADR2) Feature (334/3446)

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Alternate Destination Routing 2 (ADR2) Feature (334/3446)

33

1. Feature Description

1.01 The Alternate Destination Routing (ADR2) feature is a No. 2 Direct Services Dialing (2DSD) version of two combined features previously implemented in the *4ESS*™ switch and the No.1 Direct Dialing (1DSD) Network Control Point (NCP). The features are the Centralized Alternate Destination Call Redirection (CADCR) No. 149 from the 4E15 Release 4 Generic and the Ring No Answer (RNA) No. 251 from the 4E16 Release 1 Generic. Both features (CADCR/RNA) were implemented in the 1DSD in release 6.2.

1.02 A description of the CADCR feature is in AT&T 234-090-154AC, *4ESS*™ *Switch, Product Release Document, 4E15 Release 4 Generic.* The description of the RNA feature is in AT&T 234-090-161AC, *4ESS*™ *Switch, Product Release Document, 4E16 Release 1 Generic.*

1.03 The ADR2 feature has the capability to redirect a call to an alternate location under the following conditions:

■ If the call is not answered within a specified period of time (this is the RNA portion of the combined feature CADCR/RNA)

■ If the call cannot be completed to the primary location because of network congestion or egress busy (the CADCR portion of CADCR/RNA)

■ If a customer has Integrated Services Digital Network (ISDN) capability at their primary location, individual calls can be redirected, before ringing occurs, to the presubscribed secondary location.

1.04 This feature is applicable for the following services:

- *Megacom*® 800 Telecommunications Service

- 800 *READYLINE*® Telecommunications Service

- *Masterline*SM 800 Telecommunications Service

- Basic 800

- Inbound I800

- *MultiQuest*® Telecommunications Service Interactor

- *MultiQuest* 900 Telecommunications Service.

2. Call Flow

2.01 Call flow for the ADR2 is the double-dipped and single-dipped calls of the CADCR/RNA. Call flow is described in AT&T 234-090-161AC.

3. Provisioning

3.01 The primary and secondary numbers for the ADR2 feature reside in the NCP in the 2DSD data base.

3.02 The routing information for the primary and secondary numbers must be provisioned at the *4ESS* switch.

3.03 The timer value for the RNA portion of the combined CADCR/RNA (ADR2 feature) must be populated via Recent Change (RC) Form 800 in the same manner as was previously done for the RNA feature.

3.04 RC Forms 300, 301, and 302 should be used to update the Multiple Routing Treatment (MRT) and point to a Routing Data Block (RDB). The RDB must have the Final Handling Treatment (FHT) field set to Busy Tone (BT) in order to transfer calls to a secondary number.

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4. Recording

4.01 The Automatic Message Accounting (AMA) record is updated whenever this feature is used. The update takes place in the same manner as the CADCR/RNA.

5. Network Management

5.01 If the secondary routing number is used, a message indicating this is sent to the NCP data base. The NCP uses this information to manage customer resources and for overload control.

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on by the 2DSD NCP data base.

8. Input/Output Manual Pages (Not affected)

Change Under Minimum Billable Call Duration (UMCD) Threshold Feature (3448)

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Change Under Minimum Billable Call Duration (UMCD) Threshold Feature (3448)

34

1. Feature Description

1.01 This feature allows the under minimum billable call duration (UMCD) threshold to be changed to a value of less than 2 seconds.

1.02 Currently, the UMCD threshold is set for 2 seconds for most types of services. If a call is answered but the connection lasts less than 2 seconds, no Automatic Message Accounting (AMA) record is generated. The call is treated as unanswered and unbillable.

1.03 This feature modifies the *4ESS*™ switch so it will generate AMA records for all answered calls regardless of the elapsed time. The Recorded Information Collection System (RICS) will then determine if the call should be billed. To support this feature, RICS will be modified to mark all answered connections that last less than the UMCD threshold as unanswered. The marking of calls is based on the type of service (TOS) and the UMCD threshold specified for that TOS.

1.04 The RICS organization will define the threshold for each type of service and will maintain tables with the threshold values. This feature allows Business Units to modify the UMCD threshold for their services. The National AMA Collection Center will have the capability to view these threshold values.

2. Call Flow (Not affected)

3. Provisioning (Not affected)

4. Recording

4.01 AMA Tables 7, 9, and 19 have been modified as follows as a result of incorporating the Change UMCD Threshold feature:

- Table 7 (timing indicator)

  — If no short supervisory transition (SST) occurs on a call, Table 7 is populated with a "0".

  — If one or more SSTs occur on a call, Table 7 is populated with a "1".

- Table 9 (answer indicator)

  — If the call is answered, the first binary coded decimal (BCD) character in Table 9 is set to "0".

  — If the call is not answered, the first BCD character in Table 9 is set to "1".

- Table 19 (elapsed time)

  — The minimum elapsed time that results in an AMA record was changed from 2 seconds to 0.0 seconds.

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

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7. Transition Considerations

Dependencies on Other Network Components

7.01 RICS needs to define threshold values for the different services before the *4ESS* switch starts sending records with the new formats.

Turn On/Turn Off Mechanism

7.02 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

Automatic Number Identification Table Expansion Feature (3460)

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Automatic Number Identification Table Expansion Feature (3460)

35

1. Feature Description

1.01 The Automatic Number Identification (ANI) Table Expansion feature increases the maximum number of allowable adjunct trigger table entries. This feature is a subset of Positive Call Processing (PCP).

1.02 With the implementation of the 4E17 Release 1 generic, the maximum number of allowable adjunct trigger table entries in each *4ESS*™ switch is 256,000 (increased from 140,000).

2. Call Flow (Not affected)

3. Provisioning

3.01 The ANI Table Expansion feature is activated by a 1A Processor recent change. Provisioning requirements are contained in AT&T 234-090-161AC, *4ESS*™ *Switch, Product Release Document, Release 1 Generic.*

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations (Not affected)

Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

8. Input/Output Manual Pages (Not affected)

PAV/ANI Table Expansion of PCP Release 2 Feature (349/3497)

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PAV/ANI Table Expansion of PCP Release 2 Feature (349/3497)

36

1. Feature Description

1.01 This feature is an enhancement to the 4E16 Positive Call Processing (PCP) Release 2 feature. Positive Call Processing, which was originally defined in the 4E15 generic, is a *4ESS*™ switch capability that determines how calls are to be handled based on the customer's Automatic Number Identification (ANI). Refer to AT&T 234-090-161AC, *4ESS*™ *Switch, Product Release Document, 4E16 Release 1 Generic* for additional information on PCP.

1.02 The Preassigned Value (PAV)/ANI expansion is necessary to accommodate those customers who have a need to subscribe to the PCP Release 2 features in the time frame that the 4E17 generic is being deployed. The PAV/ANI expansion increases the number of ANIs in the *4ESS* switch PCP Subscription Table and the number of subaccount billing ANIs with preassigned values in the Direct Link Node (DLN).

1.03 The 1A Processor in the *4ESS* switch maintains the PCP subscription information, which includes the customer's ANI. The PCP ANI Subscription Table has been updated to provide a minimum of 120,000 ANIs. Prior to this feature, 15,000 ANIs were provided. Recent Change Form 645 is used to populate the PCP ANI Subscription Table.

1.04 The DLN on the Common Network Interface (CNI) ring maintains the customer's subaccount billing codes. A PAV is one to eight digits in length and is stored in the DLN. It is always the first portion of the customer's account code. The PAV specifies the preassigned account values for a subaccount billing customer.

A switched-access customer may select a maximum of ten different PAVs per ANI. Direct-connect customers may select a maximum of ten different PAVs per billing number.

1.05 In PCP Release 2, the number of subaccount billing ANIs with preassigned values in the DLN was 6,000. As a result of the PAV/ANI expansion, the number of ANIs with preassigned values in the DLN was increased based on the number of existing PAVs. For example:

If...	Then...
Each ANI had 5 PAVs,	the number of ANIs with PAVs was increased to 14,500.
Each ANI had 10 PAVs,	the number of ANIs with PAVs was increased to 7,600.

2. Call Flow (Not affected)

3. Provisioning

3.01 Refer to AT&T 234-090-161AC for information on Office Data Administration.

4. Recording (Not affected)

5. Network Management (Not affected)

6. Maintenance/Troubleshooting (Not affected)

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7. Transition Considerations

Turn On/Turn Off Mechanism

7.01   This feature is turned on or off by the Office Data Assembler (ODA) Form 406Z during retrofit. This form contains miscellaneous office data that is decompiled and recompiled across retrofits. A 1-bit field called **PCP** is used to activate and deactivate PCP processing. The valid entries are blank, **Y** (on), and **N** (off). The field layout is as follows:

```
PCP ——— CAD ———
3 5   14         80
```

8. Input/Output Manual Pages (Not affected)

Class of Service Expansion Feature (3534)

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Class of Service Expansion Feature (3534)

37

1. Feature Description

1.01 This feature expands the ability of the *4ESS*™ switch to identify the type of service requested for international calls.

1.02 The type of service requested is identified by a set of parameters referred to as Class of Service (COS). First introduced in generic 4E15 as part of the Network Routing Features (NRF), the COS provides a means of determining the service identity, that is, Long Distance Service (LDS), Software Defined Network (SDN), etc., of every call entering the AT&T Switched Network (ASN). The following three parameters make up the COS:

- Service Identity (SI)
- Transport Capability (TC)
- Routing Pattern Identity (RPI).

1.03 The parameter that is affected by this feature is the Service Identity (SI). SI is an information item that defines the particular ASN service/feature that the call is requesting. The Originating AT&T Switch (OAS) determines the SI from the following four call characteristics that it receives with the call:

- Type of Origination (TORIG)
- Type of Destination (TDEST)
- Dialed Number Service Type (DNST)
- Signaling Service Type (SST).

1.04   The four SI call characteristics are administratively mapped to a Service Identity Index (SII) value by the OAS. This SII value is then signaled to the Via AT&T Switch (VAS) and the Terminating AT&T Switch (TAS) in the CCS7 Integrated Services Digital Network User Part (ISUP) Initial Address Message (IAM).

1.05   Each call characteristic has certain identifiers associated with it that the *4ESS* switch uses to derive the COS. For example, the TORIG and TDEST call characteristics have the following identifiers for determining the type of customer originating or terminating a call within the AT&T network:

- LEC — a switched access customer

- NODAL — a direct connect customer

- ISC — a customer in a foreign country.

1.06   Most services can be uniquely defined with the four SI call characteristics; however, some international services cannot be defined. For example, International Calling Card Verification (ICCV), *USA Direct*® telecommunications service, and operator-handled traffic (O+ calls) fall into one or more SIIs. ICCV and *USA Direct* telecommunications service look like International Long Distance Service (ILDS) traffic to the *4ESS* switch. International World Zone 1 traffic to Canada and the Caribbean is also treated as ILDS traffic, but it is routed differently and has special routing needs that are not normally associated with ILDS traffic, for example, special prefix digits to identify services.

1.07   As a result of these limitations, not all international services can be uniquely identified and routed without some special screening or routing arrangements. This feature enables the *4ESS* switch to identify traffic that is routed to or from International World Zone 1 countries.

1.08   To handle International World Zone 1 traffic, a new identifier, IWZ1 (International World Zone 1), has been added to TORIG and TDEST. [SP1 (spare) is also an allowable entry under TORIG and TDEST if needed.]

1.09   Existing COS capabilities will be used to identify *USA Direct* telecommunications service traffic as it enters the AT&T Network destined for Operator Service Position System (OSPS). The International Switching Center (ISC) can identify these calls from the dialed number since all *USA Direct* calls arrive with a "199" prefix. When the *4ESS* switch translates a "199" prefix, it triggers the derivation of a DNST value that is unique to *USA Direct* traffic.

2. Call Flow (Not affected)

3. Provisioning

Population and Retrieval

3.01 This feature has an impact on the following forms:

- Office Data Assembler (ODA) Form 4064
- Recent Change (RC) Form 642
- Verify Form 16ai (Input)
- Verify Form 6ap (Output).

Two new entries, IWZ1 and SP1, have been added to the TDEST and TORIG fields on these forms. Also, the following new entries have been added to the SST field on these forms:

- CLC (800 COS Classic)
- CLCM (800 COS Classic Minus)
- CLCP (800 COS Classic Plus)
- GOLD (800 COS Gold)
- LITE (800 COS Lite)
- PLT (800 COS Platinum)
- SDCSR (Switched Digital International - Carrier Specific Routing)
- SP7 through SP20 (spares).

4. Recording (Not affected)

5. Network Management

5.01 The International World Zone 1 TORIG and TDEST values will be printed in Final Handling (FH) traps captured by the Signaling Network Analysis System (SNAS), a support system that parses FH codes.

6. Maintenance/Troubleshooting (Not affected)

7. Transition Considerations

Turn On/Turn Off Mechanism

7.01 This feature is turned on automatically by software deployment.

Internal Transition Issues

7.02 New SIIs will be created as a result of adding the IWZ1 identifier. The Integrated Routing Assignment System (IRAS) will broadcast the new SIIs to all *4ESS* switches in the ASN after retrofit to the 4E17 generic has been completed.

7.03 If IWZ1 gateways (4E16 and 17) are doing Route Selection Index (RSI) screening, the screening may need to include new SII values.

8. Input/Output Manual Pages (Not affected)

Abbreviations and Acronyms

A

ACI
AT&T Communications Interface

ACM
Address Complete Message

ACNR
Application Critical Node Recovery

ACRT
Administrative Cathode-Ray Tube

ADR2
Alternate Destination Routing 2

AH
Announcement Handling

AHC
Adjunct Head Cell

ALTNUM
Alternate Numbers

AMA
Automatic Message Accounting

ANI
Automatic Number Identification

ANM
Answer Message

ANSI
American National Standards Institute

AOPC
Alias Originating Point Code

APN
Action Point Numbering

APS
Attached Processor System

ARR
Automatic Ring Node Recovery

ASN
AT&T Switched Network

ASTN
Alternate Signaling Transport Network

ATP
Access Transport Parameter

B

BCD
Binary Coded Decimal

BCI
Backward Call Indicator

BEC
Basic Error Correction

BITS
Building Integrated Timing Supply

BOR1
Billing Options Register 1

C

CADCR
Centralized Alternate Destination Call Redirection

CED
Caller Entered Digits

CAS
Customer Account Services

CCIS
Common Channel Interoffice Signaling

CCITT
International Telegraph and Telephone Consultative Committee

CCS
Common Channel Signaling

CCS7
Common Channel Signaling System 7

CDD
Call Detail Data

CDPD
Customer Data Base Provided Digits

CIC
Circuit Identification Code

CINFO
Caller Information Forwarding

CLU
Cluster

CNI
Common Network Interface

CNIINT
CNI Initialization

COS
Class of Service

CPE
Customer Premises Equipment

CPG
Call Progress

CR
Call Register

CRANX
CR Annex

CRIB
CR ISDN Block

CRP
Customer Routing Point

CS
Call Store

CSU
Channel Service Unit

D

DARICS
Data Acquisition Reports and Integrated Communications System

DCIS
Destination Common Channel Interoffice Signaling

DLN
Direct Link Node

DM
Disconnected Mode

DMS
Database Management System

DNST
Dialed Number Service Type

DS
Digital Signaling

DS0
Digital Signal Zero

DSA
Digital Service Adapter

DSD
Direct Services Dialing

DSDC
Direct Services Dialing Capability

DSN
Destination Switch Number

DSU
Data Service Unit

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DTMF
Dual Tone Multifrequency

E

EAI
Emergency Action Interface

EAMF
Equal Access Multifrequency

EAR
Emergency Alternate Routing

EAR
Error Analysis and Recovery

EBAF
Extended Bellcore AMA Format

ECD
Equipment Configuration Database

ECS
Extended Call Store

ESP
Enhanced Service Provider

ESTN
Emergency Signaling Transport
Network

ETC
End Office or Tandem Connecting

F

FENCLASS
Far End Network Class

FHA
Final Handling Announcements

FIFO
First-In-First-Out

FISU
Fill In Signaling Unit

FNSI
Forward Network Specific Information

FPI
Full Process Initialization

FRED
Feature Routing Enhanced
Dynamically

G

GDP
Generic Digits Parameter

GTT
Global Title Translation

I

I/O
Input/Output

I800
International 800

IAM
Initial Address Message

ICCV
International Calling Card Verification

ICDR
International Call Detail Recording

ICP
Intelligent Call Processing

ICS
International Communications Services

IDB
INWATS Data Base

IE
Information Element

IEC
Interexchange Carrier

ILDS
Intermediate Long Distance Service

IMS
Interprocess Message Switch

INC
International No Circuit

INPA
Interchangeable Numbering Plan Area

IRAS
Integrated Routing Assignment System

IRN2
Integrated Ring Node No. 2

ISAIC
Improved Service Announcement and
Information Collection

ISC
International Switching Center

ISDN
Integrated Services Digital Network

ISUP
Integrated Services Digital Network
User Part

ITAMAC
International Traffic and Maintenance
Analysis of Calls

L

LAPB
Link Access Procedure Balanced

LATA
Local Access and Transport Area

LBRV
Low Bit Rate Voice

LCC
Local Carrier Connecting

LEC
Local Exchange Carrier

LFS
Link Fault Sectionalization

LI
Link Interface

LID0
Link Interface DS0-A

M

MAS
Mass Announcement System

MCRT
Maintenance Cathode Ray Tube

MD
Mutilation Detection

MFE
Multiple Frame Established

MLSS
Machine Load Service Summary

MML
Man-Machine Language

MRT
Multiple Routing Treatment

MTD
Modified Trunk Subgroup Data

MTDI
Modified Trunk Subgroup Data Index

MTP
Message Transfer Part

N

NANP
North American Numbering Plan

NCA
No-Circuits Announcement

NCAT
Non-Call Associated Temporary

NCP
Network Control Point

NEMOS
Network Management Operations
System

NI
Network Interconnect

NNR
Node-to-Node Register

NPT
Numbering Plan Type

NRF
Network Routing Features

NRN
Network Routing Number

NSCX
Network Services Complex

NSD
Network Services Division

NSN
Network Switch Number

NSS
Network Support System

O

OA&M
Operations, Administration and
Maintenance

OAS
Originating AT&T Switch

OBCI
Optional Backward Call Indicator

OCC
Other Carrier Connecting

OCDD
On-Line Call Detail Data

OCU
Office Channel Unit

ODA
Office Data Administration

ODA
Office Data Assembler

OPC
Originating Point Code

OSOR
On-Site Operations Report

OSPS
Operator Service Position System

OSS
Operation Support System

P

PACR
Post Answer Call Redirection

PAS
Public Announcement System

PAV
Preassigned Value

PC
Point Code

PCP
Positive Call Processing

PCR
Preventive Cyclic Retransmission

PDS
Program Demand Schedule

PNI
Primary Network Interface

PRI
Primary Rate Interface

PRIMDOM
Primary Domain

PS
Program Store

PUC
Peripheral Unit Controller

R

RC
Recent Change

RC/V
Recent Change and Verify

RCP
Recurrent Call Prompter

RDB
Routing Data Block

REG
Region

RICS
Recorded Information Collection
System

RNA
Ring No Answer

RNMS
Regional Network Management
System

ROP
Read Only Printer

RPI
Routing Pattern Identity

RSI
Route Selection Index

RTNR
Real Time Network Routing

RTR
Real Time Reliable

RVCM
Reverse Control Message

S

SAFER
Split Access Flexible Egress Routing

SAM
Subsequent Address Message

SAO
Subsequent Address Message With
One Signal

SCAR
Stable Call Accumulating Register

SCCP
Signaling Connection Control Part

SCCS
Switching Control Center System

SCS
Service Circuit System

SCSI
Small Computer Systems Interface

SDE
Synchronization Distribution Expander

SDN
Software Defined Network

SI
Service Identity

SID
Station Identification

SII
Service Identity Index

SIPO
Status Indication Processor Outage

SLS
Signaling Link Selection

SMD
Storage Module Drive

SMS
Service Management System

SNAS
Signaling Network Analysis System

SP
Signaling Point

SPOI
Signaling Point of Interface

SRE
SIPO Receiving End

SS7
Signaling System No. 7

SSA
Small Scale Adjunct

SSP
Service Switching Point

SSS
Service Support System

SST
Short Supervisory Transition

SST
Signaling Service Type

SST
Signaling System Test

STE
SIPO Transmitting End

STP
Signal Transfer Point

SU
Signaling Unit

SUERM
Signaling Unit Error Rate Monitor

T

TAS
Terminating AT&T Switch

TASI
Time Assignment Speech Interpolation

TC
Transport Capability

TCAP
Transaction Capabilities Application Part

TDAS
Traffic Data Administration System

TDEST
Type of Destination

TMR
Trunk Maintenance Register

TOP
Task Oriented Practice

TORIG
Type of Origination

TOS
Type of Service

TR
Timer Recovery

TSC
Temporary Signaling Connection

TSG
Trunk Subgroup

U

UA
Unnumbered Acknowledgement

UCB
Unit Control Block

UMCD
Under Minimum Billable Call Duration

UNI
User Network Interaction

USI
User Service Information

UUI
User-to-User Information

V

VAS
Via AT&T Switch

VTOC
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