Critical Release Notice

Publication number: 297-2401-201
Publication release: Standard 08.01

The content of this customer NTP supports the SN06 (DMS) software release.

Bookmarks used in this NTP highlight the changes between the NA015 baseline and the current release. The bookmarks provided are color-coded to identify release-specific content changes. NTP volumes that do not contain bookmarks indicate that the NA015 baseline remains unchanged and is valid for the current release.

Bookmark Color Legend

Black: Applies to content for the NA015 baseline that is valid through the current release.

Red: Applies to new or modified content for NA017 that is valid through the current release.

Blue: Applies to new or modified content for NA018 (SN05 DMS) that is valid through the current release.

Green: Applies to new or modified content for SN06 (DMS) that is valid through the current release.

Attention!
Adobe Acrobat Reader 5.0 is required to view bookmarks in color.

Publication History

September 2003

For the SN06 (DMS) release, 08.01, updates were according to CR Q00671214.

297-2401-201

DMS-100 Family

National ISDN BRI

Service Implementation Guide

NA014 and up Standard 07.01 September 2000

NORTEL NETWORKS

How the world shares ideas.

DMS-100 Family

National ISDN BRI

Service Implementation Guide

Publication number: 297-2401-201
Product release: NA014 and up
Document release: Standard 07.01
Date: September 2000

Publication history

September 2000

Standard, release 07.01

- added NA014 feature descriptions for the On-Demand B-Channel X.25 Packet Mode Data Service feature and the Uniform Display Text for ISDN NI-2 Uniform Service feature in the “Product overview” chapter

- updated table 4-1 to include NA014 ISDN BRI features; updated table 4-2 to include NA014 Packet Handler features; updated table 4-3 to include NA012 ISDN BRI features in the “Features available to ISDN terminals” chapter

- added feature descriptions for the On-Demand B-Channel X.25 Packet Mode Data Service feature and the Uniform Display Text for ISDN NI-2 Uniform Service feature in the “Software description” chapter

- added statement to indicate that there are no NA014 log reports, operational measurements, or office parameters in the “Administration methodology” chapter

- added statement to indicate that there are no NA014 office parameters in the “ISDN office parameters” chapter

- added a brief description and SERVORD examples for the On-Demand B-Channel X.25 Packet Mode Data Service feature in the “SERVORD procedures” chapter

- updated the NI-1, 2B, and NI-2 provisioning tree for NA014 in the “SERVORD procedures” chapter

- updated the information on the QCOUNTS command to include new NA014 parameter LCN (logical channel number) in the “ISDN maintenance” chapter

- removed NA012 log reports and added a statement to indicate that there are no NA014 log reports in the “ISDN log reports” chapter

- removed NA012 operational measurements and added a statement to indicate that there are no NA014 operational measurements in the "ISDN operational measurements" chapter
- added NA014 terms in the "List of abbreviations, acronyms, and terms"

October 1999

Standard, release 06.02

- added information on SX05 processor card in the "Hardware description" chapter
- updated example of table LTCINV in the "Data schema" chapter to include the SX05 processor card
- added information on adding a residential (RES) line as a secondary member of a multiple appearance directory number (MDN) single call arrangement (SCA) in the "SERVORD procedures" chapter
- added information on the addition of the parameter, status, to the query D-channel command (QDCH) in the "ISDN maintenance" chapter

August 1999

Standard, release 06.01

- added new Nortel Networks company logo to cover page and back page
- added new confidentiality statement to title and back pages
- updated "Table of Contents," "List of Figures," and "List of Tables"
- added list of new ISDN BRI features and feature enhancements added in NA012 in the "Product overview" and "Software description" chapters
- updated "Features available to ISDN terminals" chapter to include new NA012 features
- added descriptions of new NA012 ISDN BRI log reports, ISDN311 and ISDN312, to the "Administration methodology" and "ISDN maintenance" chapters
- added descriptions for new NA012 ISDN BRI office parameters CND_BRI_OFFICE, RND_BRI_OFFICE, ECHO_STAT_BILL_PARM, L3_SVC_DSRPT_CTRL, and L3_SVC_DSRPT_THLD in the "Data schema" chapter

- added additional information on X.121 translations under “Routing X.121 calls” in the “Data schema” chapter
- added description of Call Forwarding Don’t Answer Continue Existing Treatment with SS7 enhancements (CFDCET-SS7) and option CFDCET to the “Data schema” chapter
- updated NI-1, 2B, and NI-2 provisioning tree for NA012 in the “SERVORD procedures” chapter
- added description of the NA012 enhancements to option CFXVAL in the “SERVORD procedures” chapter
- added description of NA012 Redirecting Number Privacy for ISDN Call Forwarding in the “SERVORD procedures” chapter
- added description of SERVORD commands changes for SLBRI associated with LOC00025, Enhanced Local Translations, feature in the “SERVORD procedures” chapter
- added examples for using SERVORD NEW and QDN commands with DN associated with an NI-2 BRI RES SLBRI LTID when SOC LOC00025 is active in the “SERVORD procedures” chapter
- added description of Layer3 Service Disruption feature to the “ISDN maintenance” chapter
- updated the information for the QLAYER, RLAYER, and the L3LOGCTL commands to include information for layer 3 service disruption reporting in “ISDN Maintenance” chapter
- added field L3SD to table L3ABNLOG in the “ISDN maintenance” chapter
- added description of enhancements to the MADN CACH Bridged Call feature in the “SERVORD procedures” chapter
- added new chapter “Echo station X.25 loopback testing” to Operations, administration, and maintenance part of this document
- added office parameter modules for new NA012 ISDN BRI office parameters BRI_CND_OFFICE, BRI_RND_OFFICE, ECHO_STAT_BILL_PARM, L3_SVC_DSRPT_CTRL, and L3_SVC_DSRPT_THLD in the “ISDN office parameters” chapter
- removed modules for NA011 ISDN BRI office parameters MAX_ASYNC_ISDN_DIAGS and

SDT_SUBSCRIPTION_LIMIT_EXCD from the “ISDN office parameters” chapter

- added log report modules for new NA012 ISDN BRI logs ISDN311 and ISDN312 in the “ISDN log reports” chapter

- removed module for NA011 ISDN BRI log report ISDN313 from the “ISDN log reports” chapter

- updated “List of abbreviations, acronyms, and terms”

May 1999

Standard, release 05.02

- changed note in “Notes and applicability to EKTS terminals and MADN DNs” column for feature item Call Reference Busy Limit (AC0377) to read “NI-1 provisioning uses AFC in the “Features available to ISDN terminals” chapter

- replaced reference to *Translation Guide*, 297-8001-350, with *Customer Data Schema Reference Manual*, 297-8001-351, where appropriate in the “Data schema” chapter

- changed NTP number for *ISDN Service Orders for ISDN Terminals* to read 297-2401-310 instead of 297-2401-201 in description of table 14-19 in the “Data schema” chapter

- changed NTP number for *DMS-100 Family ISDN BRI Maintenance Guide* to read 297-2401-501 instead of 297-2401-510 in “Loop testing from MAP” section of the “ISDN maintenance” chapter

- changed NTP number for *DMS-100 Lines Maintenance Guide* to read 297-1001-594 instead of 297-1002-594 in “Automatic line testing” section of the “ISDN maintenance” chapter

March 1999

Standard, release 05.01

- added list of new ISDN BRI features and feature enhancements added in NA011 in the “Product overview” and “Software description” chapters

- updated feature matrix in the “Features available to ISDN terminals” chapter to include new features introduced in NA011 and to incorporate changes requested by customers

- added information on new OM group RND in the “Administration methodology” chapter

- added new NA011 log ISDN 313 to table “ISDN logs” in the “Administration methodology” chapter
- removed reference to BRAKS terminals in the “Logical components” chapter
- added office parameters MAX_ASYNC_ISDN_DIAGS and SDT_SUBSCRIPTION_LIMIT_EXCD in table ISDNVAR in the “Data schema” chapter
- added office parameter SDT_SUBSCRIPTION_LIMIT_EXCD to table Office parameters in table ISDNVAR used by BRI layer 2/3 surveillance monitoring in the “Data schema” chapter
- added information on Redirecting Number and Reason Display feature in the “Data schema” chapter
- added office parameter MAX_ASYNC_ISDN_DIAGS to table Office parameters in table ISDNVAR not used by layer 2/3 surveillance monitoring in the “Data schema” chapter
- added office parameter for asynchronous line diagnostics MAX_ASYNC_ISDN_DIAGS in the “ISDN office parameters” chapter
- added office parameter SDT_SUBSCRIPTION_LIMIT_EXCD in the “ISDN office parameters” chapter
- removed all NA010 ISDN office parameter modules from the “ISDN office parameters” chapter
- added description of the Directory Number Call Appearances Key Independence feature to the “SERVORD procedures” chapter
- added SERVORD examples for Number of DN Appearances (NDNAP) option to the “SERVORD procedures” chapter
- updated SERVORD display examples where necessary to include NDNAP option information in the “SERVORD procedures” chapter
- added information about Call Forwarding Remote Access (CFRA) for ISDN terminals to the “SERVORD procedures” chapter
- added information about change to storing SLBRI LATTR data in table KSETLINE instead of table DNCTINFO in the “SERVORD procedures” chapter

- added information about MADN/Flex interworking in the “SERVORD procedures” chapter
- added information about MADN CACH and ACB/AR interworking in the “SERVORD procedures chapter
- added information on Redirecting Number and Reason Delivery in the “SERVORD procedures” chapter
- added Number of DN Appearances (NDNAP) to list of MADN restrictions in the “SERVORD procedures” chapter
- removed Automatic Call Back (ACB) and Automatic Recall (AR) from MADN restrictions list in the “SERVORD procedures” chapter
- added description of asynchronous line diagnostics in the “ISDN maintenance” chapter
- added new NA011 log ISDN 313 to table “ISDN logs” in the “ISDN maintenance” chapter
- added figure 20-53 for OM group RND in the “ISDN maintenance” chapter
- expanded information on QCOUNTS command in the “ISDN maintenance” chapter
- added module for OM group RND in the “ISDN operational measurements” chapter
- removed NA010 OM modules from the “ISDN operational measurements” chapter
- added new NA011 log module ISDN113 in the “Log reports” chapter
- removed all NA010 log report modules from the “Log reports” chapter

November 1998

Standard, release 04.02

- made minor editing changes in document
- added EKTS applicability to statements associated with FIT terminals under two B-channel enhancement information in the “Product overview” and “Software description” chapters

- added additional statement on two B-channel access for EKTS terminals under two B-channel enhancements in the “Product overview” and “Software description” chapters

- added statement on the availability of features to ISDN BRI terminals provisioned in either a Meridian Digital Centrex (MDC) customer group or the Residential Enhanced Services (RES) group in the “Features available to ISDN terminals” chapter

- removed Code Customer Data Change (CDC), No Double Connect (NDC), Security (SEC) and Station-Specific Authorization Codes (SSAC) from Table 4-4 “Features available on ISDN” in the “Features available to ISDN terminals” chapter

- added note about effect of National ISDN Logical Link Manager introduced in XPM81 on the generation of ISDN log 108 in the “Administration methodology” and “ISDN maintenance” chapters

- added description of M5317TDE BRI business set to the “National ISDN BRI terminals” chapter

- added information about the recommended value settings for office parameters DEFOML and TMEAS when the Rapid Messaging (RM) feature is activated in the “Data schema” chapter

- added information about the recommended value settings for office parameters DEFOML and TMEAS when the Rapid Messaging (RM) feature is activated under heading “Range information” in chapters for office parameters DEFOML and TMEAS

- added information about translation and routing for X.25 packet calls with X.121 address format in the “Data schema” chapter

- added note to NI-1, 2B, and NI-2 provisioning tree for NA010 under NEW command for NI-1, 2B, NI-2, and NI-2 BRI RES service indicating that there is no SNPA prompt when Duplicate NXX feature is active on switch in the “SERVORD procedures” chapter

- removed Call Park from list of features that are incompatible with MADN CACH in the “SERVORD procedures” chapter

- removed “Trace in PMDEBUG” from the “ISDN maintenance” chapter

August 1998

Standard, release 04.01

- made editing changes in document
- updated “Table of Contents,” “List of Figures,” and “List of Tables”
- added list of ISDN BRI features added for NA010 in the “Product overview” chapter
- added parameter downloading changes related to the use of a single DN for both electronic key telephone service (EKTS) and circuit mode data (CMD) in the “Basic rate interface logical components” chapter
- removed existing table 4-2, “Interface configurations and NA009 features” and existing table 4-3 “Interface configurations and NA008 features” and placed NA008 and NA009 feature information in table 4-3 with the title, “Features available on ISDN” in the “Features available to ISDN terminals” chapter
- added NA010 features to new table 4-2, “NA010 features” in the “Features available to ISDN terminals” chapter
- added list of ISDN BRI features added for NA010 in the “Software description” chapter
- added information about NTAX78BA time switch circuit pack related to the ISDN Capacity Enhancement (ICE) feature in the “Hardware description” chapter
- added list of references located on Helmsman in the “ISDN real-time engineering guidelines” chapter
- removed PRI OM groups PRADCHL2 and PRAFAC and existing tables 12-5 and 12-8 from the “Administration methodology” chapter; renumbered succeeding tables accordingly
- added new table 12-12 describing Rapid Messaging feature OM group RMSGOMGP to the “Administration methodology” chapter; renumbered succeeding tables accordingly
- added new ISDN logs 205, 303, 306, 307, 308, and 309 to table 12-13, “ISDN logs” in the “Administration methodology” chapter
- added new table 12-14 listing Rapid Messaging logs RMSG 600, 601, 602, and 603 to the “Administration methodology” chapter

- added Rapid Messaging feature office parameters TMEAS and DEFOML to table 14-5 “table ISDNVAR” in the “Data schema” chapter
- added new NA010 ISDN office parameters to tables 14-5, 14-6, and 14-8 in the “Data schema” chapter
- added new table 14-7 “Office parameters in table ISDNVAR not used by BRI Layer 2/3 Surveillance Monitoring” in the “Data schema” chapter
- renumbered existing tables 14-6 and 14-7 to 14-7 and 14-8 respectively in the “Data schema” chapter
- added Rapid Messaging office parameters DEFOML, RMSG_MAJALARM, RMSG_MINALARM, RM_SYNC_BURST, RM_SYNC_DELAY, and TMEAS in new table 14-10 “Rapid Messaging office parameters” in the “Data schema” chapter
- added new figures 14-6 and 14-7 showing MAP display examples of tables LTGRP and LTMAP in the “Data schema” chapter
- added information about new LTID options OML and OCT under LTID parameters in the “Data schema” chapter
- renumbered existing figures 14-6 through 14-18 to 14-8 through 14-20 respectively in the “Data schema” chapter
- added new office parameter LAYER3_PACKET_SVC_THLD to table 14-8 “Office parameters in table OFCVAR used in BRI Layer 2/3 Surveillance Monitoring” in the “Data schema” chapter
- removed module for NA009 office parameter AUTOSPID from the “ISDN office parameters” chapter
- added modules for new NA010 ISDN office parameters to the “ISDN office parameters” chapter
- added description of new LTID options OCT and OML in the “SERVORD procedures” chapter under heading “Defining the logical terminal and its service parameters”
- modified description of automatic updating of LTID parameter MAXKEYS in the “SERVORD procedures” chapter under heading, “MAXKEYS automatic updating” to make it clearer to the reader
- added procedure for adding LTID options OCT and OML in the “SERVORD procedures” chapter under heading, “Adding LTID options OCT and OML”

- added new figures 17-6 through 17-10 showing the addition of LTID options OCT and OML in the “SERVORD procedures” chapter; renumbered succeeding figures accordingly
- added information in the “SERVORD procedures” chapter on changes to the command prompts for the SERVORD command SWLT (switch logical terminal) when used on a Shared DN or with a DN connected with the Duplicated NXX feature
- added new figures 17-12 through 17-14 illustrating the SWLT command prompt changes in the “SERVORD procedures” chapter; renumbered succeeding figures accordingly
- updated NI-1, 2B, and NI-2 provisioning tree for NA010 in the “SERVORD procedures” chapter
- added new figures 17-102, 17-103, 17-105 through 17-108 for SERVORD examples for DN shared across LTIDs in the “SERVORD procedures” chapter; renumbered succeeding figures accordingly
- added new figures 17-109 through 17-114 for SERVORD examples for DN shared across two LTIDs between DNH CMD hunt group and PMD in the “SERVORD procedures” chapter; renumbered succeeding figures accordingly
- added new figures 17-139 through 17-143 for SERVORD examples for assigning same DN for MADN EKTS and CMD to same LTID in the “SERVORD procedures” chapter
- added new figures 17-144 through 17-146 for SERVORD examples for assigning Call Forward to MADN CACH secondary member in the “SERVORD procedures” chapter
- added notes for Rapid Messaging feature to the POST and ALMSTAT commands in table 20-4 LTP level commands in the “ISDN maintenance” chapter
- added enhancements to L2LOGCTL and L3LOGCTL commands for Layer 2 and Layer 3 packet abnormality counts and log control in the “ISDN maintenance” chapter
- added enhancements to QCOUNTS command response display in the “ISDN maintenance” chapter
- added maintenance section for Rapid Messaging to the “ISDN maintenance” chapter

- added new ISDN logs ISDN205, 303, 306, 307, 308, and 309 to table 20-31 “ISDN logs” in the “ISDN maintenance” chapter
- added Rapid Messaging logs RMSG600, 601, 602, and 603 to table 20-31 “ISDN logs” in the “ISDN maintenance” chapter
- removed module for NA009 log report ISDN305 from the “ISDN log reports” chapter
- added modules for new NA010 ISDN log reports ISDN205, 303, 306 through 309 and Rapid messaging log reports RMSG600 through 603 to the “ISDN log reports” chapter
- removed module for NA009 ISDN OM group AUTSPID from the “ISDN operational measurements” chapter
- added module of new NA010 ISDN OM group RMSGOMGP to the “ISDN operational measurements” chapter
- updated “List of abbreviations, acronyms, and terms”

June 1998

Standard, release 03.01

- reformatted complete guide
- added “List of Figures” and of “Tables List” to “Table of Contents”
- added list of ISDN BRI features added for NA009 in the “Product overview” chapter
- added information about dynamic TEI packet-only NIT, dynamic TEI integrated NIT, TSPID, and automated SPID in the “Basic rate interface logical components” chapter
- added parameter downloading information in the “Logical components” chapter
- moved MADN engineering rules from the “SERVORD procedures” chapter to the “Engineering provisioning” chapter
- added chapter for matrix of ISDN BRI features with the title “Features available to ISDN terminals”
- added information about features added by functional groups NI000052, NI000060, and NI000061 in the “Software description” chapter

- added information about tables ISDNVAR, LTPAUX, and LTPDEF to the “Data schema” chapter
- added chapter “ISDN office parameters”
- added information about ISDN office parameter AUTSPID to the “ISDN office parameters” chapter
- added chapter “Provisioning default service” in the “Provisioning” section
- added information about MAXKEYS automatic updating in the “SERVORD procedures” chapter
- updated NI-1, 2B, and NI-2 provisioning tree for NA009 in the “SERVORD procedures” chapter
- retitled all SERVORD example figures in the “SERVORD procedures” chapter
- added information about permitted NI-2 terminal configurations in the “SERVORD procedures” chapter
- added figures showing the different ISDN configurations supported in NA009 to the “SERVORD procedures” chapter
- added information about LTID options AGA and SLBRI in the “SERVORD procedures” chapter
- added information and SERVORD examples for options CFXDNCT and CFXVAL in the “SERVORD procedures” chapter
- added information about Flexible Calling Deactivate Conference facility (DCC) in the “SERVORD procedures” chapter
- added information about the enhancement of the CHG command for ISDN lines in the “SERVORD procedures” chapter
- added SERVORD examples for dynamic TEI packet-only NIT in the “SERVORD procedures” chapter
- added SERVORD examples for NI-2 BRI RES FIT in the “SERVORD procedures” chapter
- added SERVORD examples of 2B and NI-2 FITs with an associated group in the “SERVORD procedures” chapter

- added SERVORD examples for DN shared across LTIDs in the “SERVORD procedures” chapter
- added SERVORD examples for NI-2 2BD integrated NIT in the “SERVORD procedures” chapter
- updated all NI-2 SERVORD examples to include SLBRI option information in “SERVORD procedures” chapter
- replaced SPIDSFX option with TSPID in FIT SERVORD examples in the “SERVORD procedures” chapter
- added chapter with title the “ISDN maintenance”
- deleted chapters “Pre-deployment”, “Deployment”, and “Post-Deployment” and moved the information located in these chapters to the “ISDN maintenance” chapter
- added information for POSTDK and TERMCHK commands, which includes MAP display examples, in the “ISDN maintenance” chapter
- added chapter “BRI multiple terminal maintenance” in the “Provisioning” section
- added chapter “BRI verification-office equipment” in the “Provisioning” section
- added chapter with “ISDN log reports” in the “Operation, administration, and maintenance” section
- added information about new ISDN 305 log to the “ISDN maintenance” and “ISDN log reports” chapters
- added chapter with title “ISDN operational measurements” in the “Operation, administration, and maintenance” section
- added information about new AUTSPID OM group to the “ISDN operational measurements” chapter
- updated “List of abbreviations, acronyms, and terms”

November 1997

Standard, release 02.02

- added updated information in all chapters
- added table LNTHRSH and commands L1BLMALM, THR, and DET

- modified Q-layer and R-layer commands to support layer3
- added updated logs to sections 2 and 7
- updated Q-931 PMDEBUG in section 7
- corrected an error in the heading of section 4

September 1997

Standard, release 02.01

- added engineering and capacity planning information
- added NA007 and NA008 changes
- updated bearer capability routing translations
- added capability package information

July 1996

Standard, release 01.05

- added the new corporate logo to the front cover of the document
- added “BRI” to the title of the document
- corrected figure and table numbers in the document
- corrected page numbering, footers and headings

April 1996

Preliminary, release 01.04

- updated the figures in the document
- revised Section 7, “National ISDN-1 BRI terminals,” to remove old equipment. Added figures for Fujitsu equipment.
- revised Section 9, “ISDN applications,” to include all of the current ISDN services provided

April 1995

Preliminary, release 01.03

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Tables

About this guide

When to use this guide

This guide is an overview of the software release NA010 for the DMS-100 Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) product.

This guide is written in response to customer requests to consolidate ISDN information in one document. This guide supplements information published in Nortel Networks technical publications (NTP) and is not intended to replace NTPs at this time.

This guide is divided into the following parts:

- Part I: Introduction
- Part II: Functional description
- Part III: Planning and engineering
- Part IV: Provisioning
- Part V: Operations, administration, and maintenance
- Appendix A: Equipment ordering codes

How to check the version and issue of this document

The version and issue of the document are indicated by numbers, for example, 01.01.

The first two digits indicate the version. The version number increases each time the document is updated to support a new software release. For example, the first release of a document is 01.01. In the *next* software release cycle, the first release of the same document is 02.01.

The second two digits indicate the issue. The issue number increases each time the document is revised but re-released in the same software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

To determine which version of this document applies to the software in your office and how documentation for your product is organized, check the release information in *DMS-10 and DMS-100 Family Product Documentation Directory*, 297-8991-001.

References in this document

Because Nortel Networks products comprise an extensive amount of existing documentation, it is not possible to reproduce all the operational, maintenance, engineering, and descriptive information already available in the library. Therefore, the *DMS-100 ISDN BRI Service Implementation Guide (SIG)* contains references to existing Nortel Networks documentation and directs the reader to comprehensive information describing products as applicable.

Documentation numbering conventions

Nortel Networks DMS documentation is frequently referred to as Nortel Networks technical publications (NTP). The NTPs follow a specific numbering system, such as

XXX-YYYY-ZZZ

The division number, XXX, indicates the common family of product functionality.

The layer number, YYYY, indicates the product computing module (CM) load (PCL) in the specified switching family. Within the documentation structure, the document layer number depends on the PCL number for the specific software load.

The key number, ZZZ, indicates the type of NTP, according to the specified area for the switch or group number. Group numbers range from 000-899.

Table 1 lists NTP layer numbers and their corresponding PCLs or product names.

Table 1 Document layer number table (Sheet 1 of 3)

Document layer number	PCL or product	PCL name or product name
8001	LEC/LECB	U.S. stand-alone DMS-100/200
8011	CDN/CDNB	Canadian stand-alone DMS-100/200
8021	LET/LETB	U.S. DMS-100/200 TOPS Combination
8041	UK/EUR	European DMS-100
8051	ABSM	Advanced Business Services (ABSM = Australia, China, and Cala)

Table 1 Document layer number table (Sheet 2 of 3)

Document layer number	PCL or product	PCL name or product name
8061	ABSL	Advanced Business Services (ABSK=IDC only)
8071	ATVB	Canadian stand-alone DMS-100/200 AUTOVON
8081	LATB	North American DMS200
8091	LWW	DMS-100 Wireless
8101	STPBASE	Signaling Transfer Point Base
8111	STPMDR7	Signaling Transfer Point MDR7
8121	STPSEAS STP	Signaling Engineering and Administration System
8201	RLCM/OPM	Remote Line Concentrating Module/Outside Plant Module
8211	OPAC	Outside Plant Access Cabinet
8213	OPAC	International Outside Plant Access Cabinet
8221	RSC	Remote Switching Center
8231	SCM-100S	Subscriber Carrier Module-100S
8241	SCM-100U	Subscriber Carrier Module-100 Urban
8251	SCM-100A	Subscriber Carrier Module-100 Access
8253	SCM-100A	Subscriber Carrier Module-100 Access (MVI-20)
8261	RSCS	Model A Remote Switching Center-SONET Model A (DS1)
8263	SCM-100A	Subscriber Carrier Module-100 Access Maintenance Manual
8271	RSCS Model A	Remote Switching Center-SONET Model A (PCM30)
8281	RSCS Model B	Remote Switching Center-SONET Model B (DSI)
8291	RSCS Model B	Remote Switching Center-SONET Model B (PCM30)

Table 1 Document layer number table (Sheet 3 of 3)

Document layer number	PCL or product	PCL name or product name
8301	SCM-100SR	Subscriber Carrier Module-100S Remote
8311	Host XPM	Host Extended Peripheral Module
8321	XPM	Extended Peripheral Module (DSI)
8331	XPM	Extended Peripheral Module (PCM30)
8341	TOPS	Traffic Operator Position System Message Switch
8411	USTOPS	Traffic Operator Position System (Stand-alone U.S.)
8421	CDMTOPS	Traffic Operator Position System (Stand-alone Canadian)
8501	SCP	Service Control Point
8601	DMSGL002	DMS Global
8991	PCL common misc.	PCL common and maintenance

Table 2 lists NTP types and their associated key numbers.

Table 2 Document key number table (Sheet 1 of 2)

NTP type	Key number
Translations Guide	350
Alarm and Performance Monitoring Procedures	543
Trouble Locating and Clearing Procedures	544
Recovery Procedures	545
Routine Maintenance Procedures	546
Card Replacement Procedures	547
XPM Maintenance Manual (remotes only, layers 8201-8331)	550
Feature Description Manual	801
Peripheral Module Software Release Document	599
Hardware Description Manual (PCL common/misc. only, layer 8991)	805
Service Order Reference Manual	808

Table 2 Document key number table (Sheet 2 of 2)

NTP type	Key number
Operational Measurements Reference Manual (all PCLs and XPM)	814
XPM Translations Reference Manual	815
Automatic Message Accounting Bulletin	830
Log Reports Reference Manual	840
Office Parameters Reference Manual	855
Software-to-Data Cross Reference	856

In addition to NTPs, Nortel Networks provides System Engineering Bulletins (SEB) and System Engineering Alerts (SEA) that contain information on engineering the ISDN call processing functions. These documents present performance engineering rules, existing or new, in a simplified, user-oriented format. The information in these documents is product specific, PCL specific, or both.

The *DMS-10 and DMS-100 Family Product Documentation Directory, 297-8991-001,* is an excellent source listing of current NTPs for the DMS Family of switches.

What precautionary messages mean

The types of precautionary messages used in Nortel Networks documents include attention boxes and danger, warning, and caution messages.

An attention box identifies information that is necessary for the proper performance of a procedure or task or the correct interpretation of information or data. Danger, warning, and caution messages indicate possible risks.

Examples of precautionary message types follow:

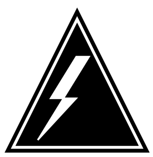
ATTENTION Information needed to perform a task.

> **ATTENTION**
>
> If the unused DS-3 ports are not deprovisioned before a DS-I/VT Mapper is installed, the DS-1 traffic will not be carried through the DS-I/VT Mapper, even though the DS-1/VT Mapper is properly provisioned.

DANGER Possibility of personal injury

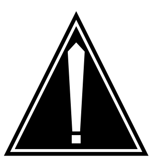
DANGER
Risk of electrocution
Do not open the front panel of the inverter unless fuses F1, F2, and F3 have been removed. The inverter contains high-voltage line. Until the fuses are removed, the high-voltage lines are active, and you risk being electrocuted.

WARNING Possibility of equipment damage



WARNING
Damage to the backplane connector pins
Align the card before seating it, to avoid bending the backplane connector pins. Use light thumb pressure to align the card with the connectors. Next, use the levers on the card to seat the card into the connectors.

CAUTION Possibility of service interruption or degradation.



CAUTION
Possible loss of service
Before continuing, confirm that you are removing the card from the inactive unit of the peripheral module. Subscriber service will be lost if you remove a card from the active unit.

How commands, parameters, and responses are represented

Commands, parameters, and responses in this document conform to the following conventions.

Input prompt (>)

An input prompt (>) indicates that the information that follows is a command:

```
>BSY
```

Commands and fixed parameters

Commands and fixed parameters that are entered at a MAP terminal are shown in uppercase letters:

```
>BSY CTRL
```

Variables

Variables are shown in lowercase letters:

```
>BSY CTRL  ctrl no
```

The letters or numbers that the variable represents must be entered. Each variable is explained in a list that follows the command string.

Responses

Responses correspond to the MAP display and are shown in a different type:

```
FP 3 Busy CTRL 0: Command request has been submitted.
FP 3 Busy CTRL 0: Command passed.
```

The following excerpt from a procedure shows the command syntax used in this document:

AT a MAP terminal complete the following steps

1 To manually busy the CTRL on the inactive plane, type

```
>BSY CTRL  ctrl_no
```

and press the Enter key

where

ctrl_no is the number of the CTRL (0 or 1)

```
Example of a MAP response:
FP 3 Busy CTRL 0: Command request has
been submitted.
FP 3 Busy CTRL 0: Command passed.
```

Audience

This guide is intended for all audiences. However, information in some sections may be pertinent to specific audiences. For example, operating company management and sales agents may want to focus on the Overview, Applications, and Terminals sections. Operating company engineering, installation, and support personnel may want to focus on the technical sections of the document.

Chapter 6, “Engineering ISDN BRI” contains DMS-100 peripheral capacity management guidelines for the ISDN BRI. This information was previously contained in *System Engineering Bulletin*, SEB-90-05-002, and should be of particular interest to anyone planning and provisioning an ISDN BRI installation.

Important notice

ISDN is a technology that requires development of additional skills to implement, operate, and maintain the DMS switch. This guide is designed to offer the user a quick and comprehensive overview of implementing ISDN. The guide is not a replacement for developing the appropriate level of knowledge within your company. Nortel Networks offers a comprehensive set of documentation and training courses for ISDN on the DMS switch. The following training courses are available through Nortel Networks's training center.

Table 3 Training courses

Course number	Title
0170	Introduction to ISDN Computer-Based Training (CBT)
3400	Introduction to DMS SuperNode Translations (CBT)
0386	ISDN Basic Rate Interface Maintenance and Testing
0471	ISDN Engineering and Provisioning
0472	ISDN Translations
0476	ISDN Customer Premise Equipment (CPE)
0491	ISDN Advanced Testing and Protocols
7002	ISDN PRI Translations

A key part of ISDN includes customer premise equipment (CPE). There is a lot of very good CPE publicly available; however, some CPE may not be compatible with the DMS switch. Verify that the CPE you purchase is National ISDN compliant.

Part I
Introduction

"Part I: Introduction" contains the following chapters:

1. Product overview

2. Basic rate interface hardware components

3. Basic rate interface logical components

4. Features available to ISDN terminals

1 Product overview

Introduction to ISDN

Integrated Services Digital Network (ISDN) is a fully digital, standardized, technology. ISDN allows for simultaneous, integrated voice and data capability over two-wire digital loops and four-wire digital trunks. These loops and trunks can access circuit-switched voice and data networks, packet-switched networks, and network services databases.

For effective deployment, ISDN providers conform to National ISDN. National ISDN refers to the set of ISDN standards that apply to North America. The International Telephone and Telegraph Consultative Committee (CCITT), now known as the International Telecommunications Union (ITU), is a United Nations organization that coordinates and standardizes international telecommunications. ITU led the original effort that produced the initial, basic guidelines for implementing ISDN.

In the early 1990s, an industry-wide effort to establish specific ISDN implementation standards produced National ISDN 1 (NI-1). These standards enable users to know that the equipment and software products they buy are compatible with a particular ISDN switch. More recently, the industry has adopted more comprehensive ISDN standards called National ISDN 2 (NI-2), which build on the foundation established by NI-1. The final phase is National ISDN 3 (NI-3), which further standardizes the interface protocols and services. Furthermore, NI-3 also expands functionality.

About the same time (1988) as National ISDN began, Europe formed the European Telecommunications Standards Institute (ETSI). After formation of this organization, Europe developed its own set of ISDN standards called Euro-ISDN. This set of standards is available to all member countries. The National ISDN standards and the Euro-ISDN standards are not compatible. This document only addresses ISDN features and configurations that are compatible with National ISDN.

National ISDN indicates to users, manufacturers, and network providers that ISDN is ready to become the advanced telecommunications infrastructure for

North America. National ISDN is important to everyone who sells communications products because it provides for the following:

- a wider access to high-speed data communications
- a new market for high-performance customer premise equipment (CPE) and networks
- many new applications

National ISDN commitments address the following three major areas:

- ISDN user equipment, such as computers, data terminals, and telephones, and services that they use
- standard operating company procedures and systems for the operation, administration, and maintenance of ISDN services and equipment
- standard communications among ISDN capable switches to extend ISDN services throughout the public switched network

With these standards in place, the operating companies have a practical ISDN service they can market, and the users are assured of stable terminals and services.

National ISDN gives switch and CPE manufacturers a standard ISDN technology base for future product development. Network providers can now deploy ISDN in their multi-vendor networks and market a portfolio of ISDN services nationwide. National ISDN gives users access to a predefined set of ISDN features from virtually any operating company switch. There is also a selection of CPE and software from many different suppliers that best matches their individual needs.

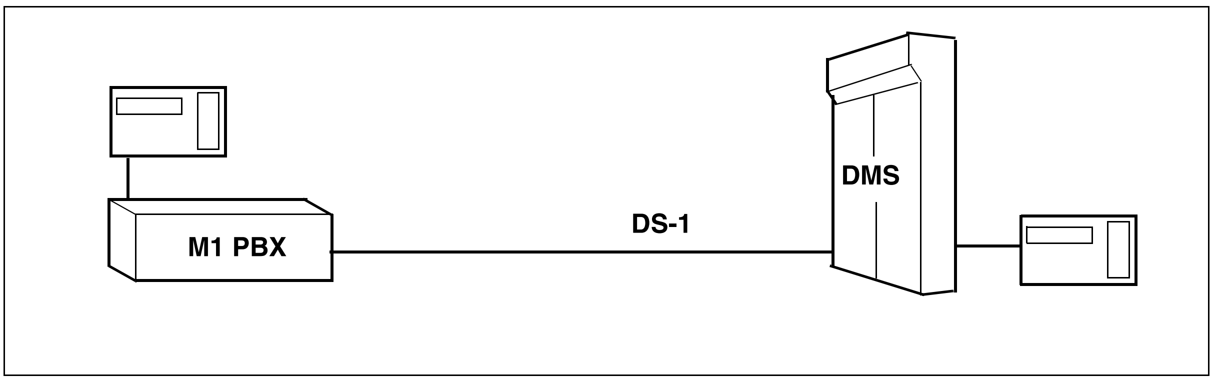
Although National ISDN standardizes the basic elements of ISDN, there is still room for innovation and value-added services. Network providers can invent a new ISDN service, or a computer manufacturer can enhance its ISDN products. Over time, many of these enhanced services make their way into the standard feature set. For example, Nortel Networks has implemented more than 200 centrex services on the standard ISDN line, using only those procedures and protocols defined by National ISDN. This approach allows for a standard technology platform, with incentives and opportunities to add value.

Most of the individual capabilities of ISDN can be duplicated with other technologies today, although ISDN delivers them over a single line. The real ISDN revolution is that ISDN is available all across North America with a standard set of standardized services. This ISDN standardization frees users from the premium cost of proprietary solutions. Economies of scale and competition have extended the advanced data services to anyone within reach of a telephone.

National ISDN has energized the ISDN industry, stimulating demand for ISDN services and promoting the supply of ISDN hardware and software. Previously, the lack of ISDN telephones, data terminals, and compatible software had a damping effect on the deployment of ISDN throughout the telecommunications industry. Telephone operating companies were reluctant to market ISDN without a wide choice of terminals and a standard feature set. Hardware and software manufacturers were reluctant to develop products until ISDN was more widely marketed. National ISDN continues to drive widespread ISDN deployment and development.

There are two types of ISDN interfaces offered in North America: primary rate interface (PRI) and basic rate interface (BRI). The PRI carries 23B+D channels over a digital DS-1 facility (30B+D in Europe). The PRI is used to link private networking facilities, such as private branch exchange (PBX), local area network (LAN) facilities, and host computers with standardized architecture. This architecture acts as the bridge between private switching equipment and the public network. Although PRI is not the focus of this document, Figure 1-1 shows an example of a PRI configuration for serving a PBX system.

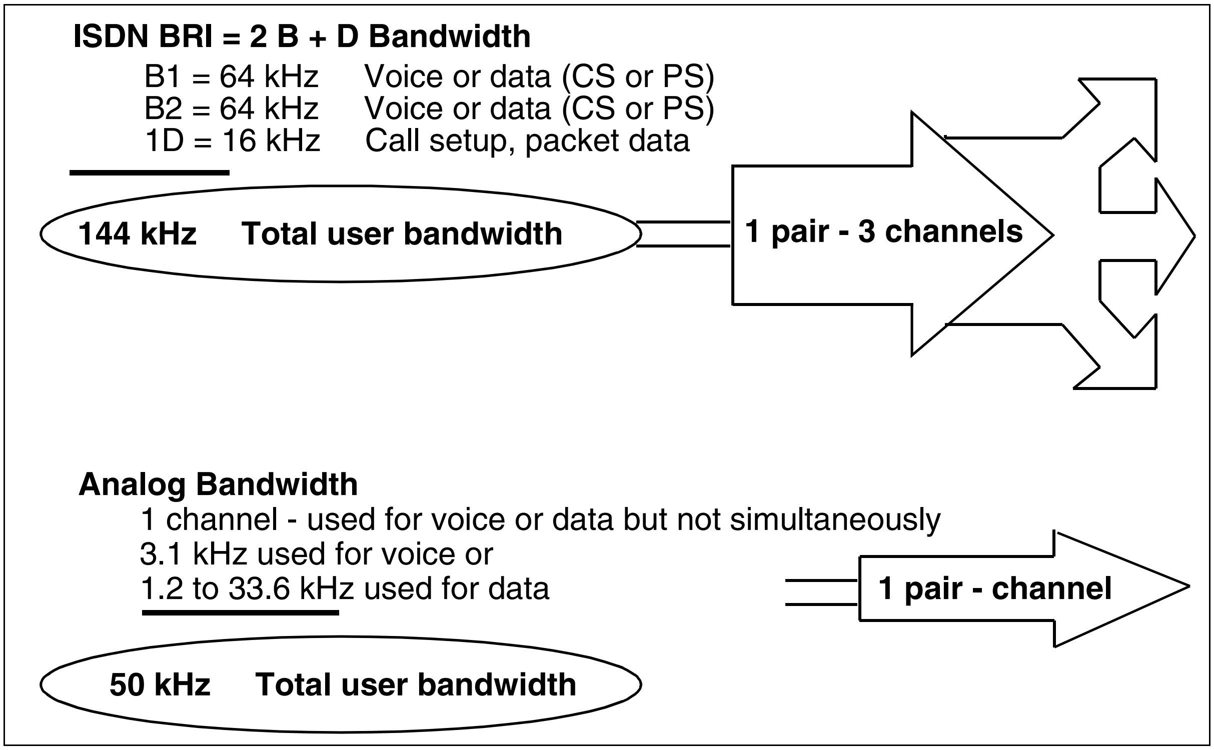
Figure 1-1 Example of PRI serving a PBX



ISDN BRI telephone lines transmit information on three separate channels. Two of the channels are called bearer channels, or B-channels, each of which can be used for voice calls or data transmissions up to 64 kbit/s. The third channel is a 16-kbit/s delta channel, or D-channel, which is used for call control of the two B-channels as well as low-speed packet data. All three channels can be used at the same time. Any combination of up to a maximum of eight FIT and NIT terminals can be configured on the loop to share the two available B-channels.

There is a D-channel priority based on a multiplexing algorithm. The algorithm gives highest priority to call control signaling for the B-channels, and a lower priority for D-channel packet-switched data. The support for NITs is derived from B-channel resources. Because there is only one D-channel available, there can only be eight total D-channel devices connected to an ISDN loop. Figure 1-2 shows a comparison of ISDN BRI and analog line configurations.

Figure 1-2 Example of ISDN BRI and analog lines



ISDN allows multiple, simultaneous phone conversations. For example

- a voice conversation can be established to one location using one B-channel
- a circuit-switched data conversation can be established to a different location on the second B-channel
- a third conversation can be established to yet another location using a packet-switched device on the D-channel

Each device served by an ISDN line is defined by a logical terminal identifier (LTID). An ISDN line can be viewed as a street, and each LTID as a house address on the street. Each house represents an ISDN device. When information is delivered to the ISDN line, the LTID defines the type of information and to which house address it is delivered. Each house (ISDN device) on the ISDN line is either a phone or a data device.

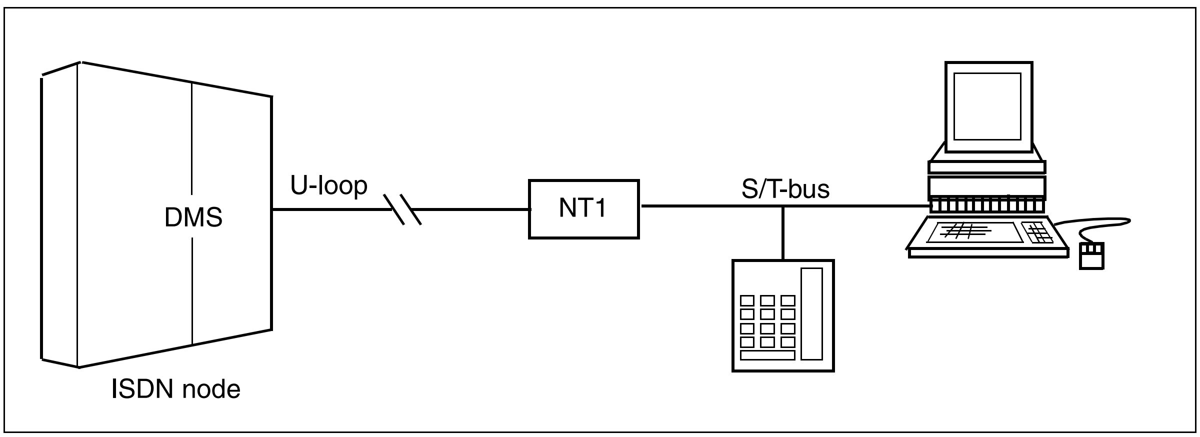
With release NA008, if an LTID is for non-initializing terminals, it can be associated with multiple terminals on the ISDN interface. A terminal service profile (TSP) can have up to eight terminals associated with it. The DMS switch allows up to eight NITs to be associated with a single default LTID; however, each fully initializing terminal (FIT) must have its own LTID on the DMS-100 switch.

Data can be transmitted through ISDN BRI lines in two ways: circuit-switched and packet-switched. Most ISDN applications currently use circuit-switched data. An ISDN circuit-switched data call is one that is switched through the same telephone network as a voice call and terminates to another data device at the other end. An ISDN packet-switched data call routes from the local telephone switch into a separate network of packet switches.

The ISDN B-channels can be defined as circuit-switched or packet-switched channels. The ISDN D-channel can only be defined as a packet-switched channel.

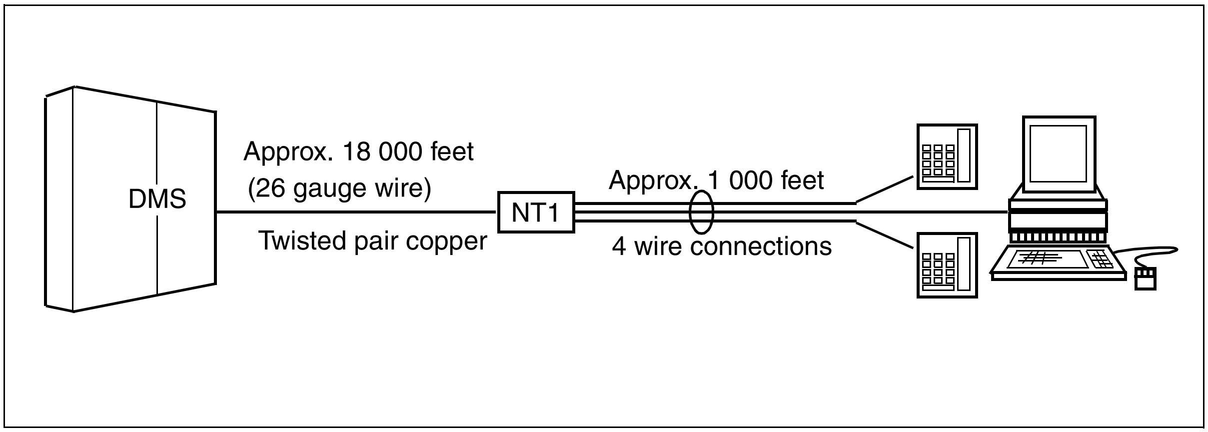
Figure 1-3 provides a diagram of a basic ISDN BRI configuration. The portion of the ISDN line between the network terminator 1 (NT1) and the DMS switch is known as the user loop, or U-loop. The portion of the ISDN line from the NT1 to the terminating CPE is referred to as the S/T-bus. As discussed previously, multiple devices can connect simultaneously to the ISDN line on the S/T-bus. Some CPE have a built-in NTI that allows them to connect directly to the U-loop. The built-in NT1 eliminates the requirement for a separate NT1.

Figure 1-3 Basic ISDN configuration



ISDN BRI is designed to work under specific distance guidelines. Figure 1-4 shows the approximate maximum wiring distances. Depending on the specific ISDN configuration, actual permissible distances can vary. Refer to the “Engineering ISDN BRI” chapter of this guide for more detailed information about wiring distance guidelines. In addition to compliance with wiring guidelines, high speed ISDN signaling also requires the transmission lines to be free from electronic noise and interference.

Figure 1-4 Approximate wiring distances



ISDN BRI packaging

Northern Telecom introduced a new process for the delivery of DMS software after BCS36. Product computing loads (PCL) are the delivery vehicle, and they replace custom load builds for each office. A limited number of PCLs are defined; each PCL contains all generally available features for a particular market and office type. PCLs are grouped into releases according to global market regions. For example, North American PCLs are grouped into the "NA00x" release, such as NA008.

PCLs represent the restructuring of DMS software into layers. The relevant PCLs for the U.S. and Canadian markets are termed "LEC" and "CDN" respectively. Each PCL contains a set of software layers that make up the whole and include base, telecom, product, and market layers. Features are activated in an office through the use of software optionality controls (SOC). This document incorporates PCL terminology where appropriate.

Figure 1-5 BRI packaging information

<table>
<tr><td>NA012
NA011
NA010
NA009
NI-2 BRI Services
NI000052</td><td>NA009
NI-1998
BRI Enhance
Phase I
NI000060</td><td>NA010
NI-1998
BRI Enhance
Phase II
NI000061</td><td>NA011
NI-1999
BRI Enhance
Phase I
NI000062</td><td>NA012
N-1999
BRI Enhance
Phase II
NI000063</td><td></td></tr>
<tr><td colspan="5">NA008 NI-2/3 BRI Phase II NI000051</td><td rowspan="2">NI-1 Packet
Maint
NI000010</td></tr>
<tr><td colspan="5">NA007 NI-2/3 BRI Phase I NI000050</td></tr>
<tr><td colspan="6">NI-1 BRI ISDN Base NI000008</td></tr>
</table>

Figure 1-6 summarizes the ISDN BRI packaging for NA007 through NA009. Note the prerequisite of NI-1 package NI000008.

Figure 1-6 ISDN BRI 1997 and 1998 software packaging

1997	1997
NI-2/3 BRI Phase I - S/W Rls NA007 - Order Code **NI000050** Prereq: N000008 (NI-1)	**NI-2 BRI services** - S/W Rls NA009 - Order Code **NI000052** Prereq: NI000051
NI-2 BRI Phase II - S/W Rls NA008 - Order Code **NI000051** Prereq: NI000050	**NI-1998 BRI Enhancement Phase I** - S/W Rls NA009 - Order Code **NI000060** Prereq: NI000051

Figure 1-7 summarizes NA007 and NA008 ISDN PRI packaging. This guide is focused on BRI, and does not provide further detailed description on PRI packaging content.

Figure 1-7 ISDN PRI software packaging

1997	1997
NI-2 PRI - S/W Rls NA007 - Order Code **NI000015** Prereq: TBD	**NI -2 Call by Call** - S/W Rls NA008 - Order Code **NI000017** Prereq: NI000015
NI-2 PRI D Channel Backup - S/W Rls NA007 - Order Code **NI000016** Prereq: NI000015	**NI -Enhancement 2B Channel Transfer** - S/W Rls NA008 - Order Code **NI000018** Prereq: NI000015

NI-2/3 Capabilities

The following provides a detailed description of ISDN BRI packaging for ISDN BRI for NA007 through NA009.

National ISDN-2/3 BRI Services Phase 1 (functional group NI000050) This functional group adds enhanced ISDN capabilities with NI-2 and key NI-3 compliance. In NA007, this functional group introduced key NI-2 and NI-3 BRI requirements for uniform interface configurations in SR-2120 and SR-2457, which were packaged in PCLs LEC00007 and LET00007.

Key capabilities Beginning with NI-2, several standards-based BRI features are supported in a uniform manner to provide widespread service to subscribers. Nortel Networks is bundling and introducing these features in NI000050 to expedite NI-2 and NI-3 compliance in the marketplace. Included in this release is support for the following interface configurations:

- **Single DN for BRI** enables an integrated terminal (a terminal that supports both voice- and circuit-switched data call types) to have one DN. This same DN can transmit all circuit-switched call types and can simultaneously access both B-channels.
- **Single TEI for BRI** allows an integrated terminal to operate using a single TEI, regardless of the number of call types that terminal supports and regardless of whether one B-channel or two B-channels are being used simultaneously.
- **Support for NITs (NI-3)** supports an NIT on a BRI line after the interface is provisioned. A NIT is a class of ISDN terminals that does not require a SPID for initialization. NITs are not only able to originate and terminate calls, but also have access to a range of National ISDN features and capabilities.
- **Assignment of Feature Keys to Default TSP for NITs** permits the assignment of fixed feature identifier values to the default TSP/LTID. This allows NITs to use feature keys for feature activation and deactivation. This enhancement allows NITs to access additional capabilities, such as conference calling, call transfer, and message waiting indicator.

Principal benefits National ISDN-2/3 BRI Services increase the operational versatility of BRI line interface configurations and expand the BRI service options available to users. The use of a single DN to support all circuit-mode call types as well as simultaneous access to both B-channels improves the return on the users investment in ISDN equipment. It also adds flexibility to the way BRI lines are assigned and used. Support for NITs expands operations and equipment options while improving user access to multiple BRI services. Feature key access to services for NITs not only makes service activation and deactivation easier to use, but brings greater choice and flexibility to the assignment of terminal features.

National ISDN-2/3 BRI Services Phase II (functional group NI000051) In NA008, this group further expands National ISDN compliancy on the DMS-100 system with a broad range of NI-2 and NI-3 services. This group provides considerable revenue-generating opportunities with new ISDN services, and is packaged in PCLs LEC00008 and LET00008.

Key Capabilities A host of new features and enhanced functions are added with the release of this software package. . In addition to the features listed below, this group also provides enhancements to the Screening Indicator presentation for NI-1 and NI-2 services per feature AF7223 (NA009 and above, refer to the *Feature Description Manual,* 297-8021-801, in the LET0011 XPM11 collection for more information). Some of the key ISDN features in this release include the following:

- **Associated Group Assignment (AGA)** allows a directory number/call type (DNCT) or a group of DNCTs to be restricted to the use of a single B-channel. This option is only valid for circuit switched BRAF terminals.
- **Automatic Message Accounting (AMA) Billing** supports AMA records for the following ISDN features:
  - — New ISDN NI-2 ACB/AR functionality
  - — New ISDN NI-2 flexible calling functionality
  - — New ISDN NI-2 calling name delivery capability
- **Automatic Call Back/Automatic Recall (ACB/AR)** allows the last DN an ISDN BRI subscriber called to be automatically redialed. AR allows the DN of the last incoming call to an ISDN BRI subscriber to be automatically dialed.
- **BRI Layer 2 Performance Monitor** uses access line counters to monitor the number and percentage of data link (Layer 2) transmission errors between the DMS-100 switch and ISDN terminal equipment.
- **BRI Layer 2 and Layer 3 Abnormality Counts** uses frame check sequence-based performance monitoring, protocol abnormality monitoring, logging and alerting, and protocol capture to perform data link (Layer 2) and network (Layer 3) maintenance between the DMS-100 switch and terminal equipment.
- **BRI Multipoint Embedded Operations Channel** uses the DMS-100 switch MAP or operations system interfaces to maintain and monitor the performance of up to six intermediate line units when they are used to extend the existing U-loop range beyond 18,000 feet from the DMS-100 switching office.
- **Call Forward Enhancements** support a variety of call forwarding types (Universal, Busy, Don’t Answer) for incoming calls to an ISDN set. Additional enhancements include the following:
  - — call forward keylist for each directory number/call type (DN/CT)—universal
  - — feature key activation/deactivation for each DN/CT—universal

- — call forward activation/deactivation outside call context—universal
- — single or double feature key invocation for each DN/CT—universal
- — call forward reminder notification
- — call forward courtesy call
- — remote DN validation during programming
- — call forward dial activation/deactivation for each DN/CT
- — prevention of redirection information to originating party

- **Calling Name Delivery** offers Bellcore-compliant name delivery to the called party from the ISDN set using a CCS7 network protocol. Per call blocking and unblocking of calling name/number delivery from the ISDN set is also supported.
- **Calling Number Delivery** allows the calling party directory number (DN) and the time and date of the call to be displayed on the customer premises equipment (CPE).
- **E911 BRI Enhancements (XPM warm SWACT)** provides a set of enhancements to reconnect and maintain emergency calls on ISDN lines after a warm switch of activity (warm SWACT) of the XPM or line trunk controller (LTCI).
- **Electronic Key Telephone Service (EKTS) and Virtual Key Application** provide call handling flexibility for multiple appearances of the same directory number using Call Appearance Call Handling (CACH). This feature allows calls to originate from and terminate to any combination of call appearances and user provisioning of the call offering sequence.
- **Flexible Calling Enhancements** allows an ISDN user to establish and control two or more concurrent calls using one B-channel, as well as select the size (simultaneous 3- and 6-way calling) of a given ISDN conference call.
- **Interface Configuration Phase III** completes National ISDN-2 interface configuration support and provides key National ISDN-3 capabilities for the following interface configurations:
  - — Up to eight terminals in any combination of FIT/NIT types, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. NITs will support DN/CT sharing with contention.
  - — Enhanced support of associated groups, which was first delivered in NA008.
- **ISDN Interworking with Standard Announcements** allows NI-1 and NI-2 terminals that send digits in band to work with features that typically expect out-of-band digits.

- **Logging and Processing TEI Abnormalities** allows the logging and retrieval (using DMS-100 [MAP] maintenance and administration position commands) of the total number of TEI assignment abnormalities.
- **Music on Hold** provides access to a music source when incoming calls to the ISDN group subscribing to this feature have been placed on hold.
- **Parameter Downloading** enables the user's ISDN terminal to read certain parameters directly into its memory, synchronizing terminal and switch databases. The downloading capability can only be invoked from an initializing terminal. The terminal requests a download from the switch, and the switch responds by sending the parameter values. The terminal ends the downloading process by transmitting an acknowledgment to the switch. This minimizes the number of parameters a user is required to manually enter into an ISDN terminal.
- **Primary Interexchange Carrier/IntraLATA Primary Interexchange Carrier (PIC/LPIC)** enhances the capability to assign an intraLATA carrier different from the interLATA carrier associated with an ISDN BRI DN/CT so that an ISDN BRI subscriber can select a carrier other than the pre-subscribed carrier.
- **Provisioning Enhancements** provides the following enhancements to ISDN service provisioning:
  - — simplifies particular add, change, and delete service order procedures for NI-2/3 BRI services
  - — adjusts the parameter naming discrepancy between service order, table control, query commands, and the NI-1 data dictionary
- **Service Protection—Essential Line** provides preferential dial tone to selected ISDN BRI lines when severe overload conditions occur.
- **Single DN on Single Integrated Voice Data Terminal (IVDT)** allows the use of a single DN on a FIT that supports circuit-mode voice, circuit-mode data, and D-channel packet-mode data. This capability allows the use of a single DN or single dynamic TEI across voice-, circuit-mode data, and D-channel packet service.
- **Single DN with Different CTs on Single IVDT NIT** enables the use of a single DN on an NIT device that supports circuit-mode voice, circuit-mode data, and D- and B-channel packet-mode data services (that is, an integrated voice and data terminal that does not use SPID registration procedures). The DMS system supports integrated voice, circuit-mode data, and packet-data services for an NIT on a BRI loop, and permits access to multiple bearer services with single dynamic TEI.
- **Support of More than Two B-channel Terminals** allows NITs or seven NITs and one FIT to be supported, with one B-channel used for each type of terminal.

- **Terminal Maintenance for Multiple Terminals** supports up to eight NITs, using multiple commands, through a single maintenance interface.
- **Two B-channel Enhancement** supports the following interface configurations:
  - — Two FITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. This supports common set-ups for work-at-home and small business ISDN users. FITs in this configuration can support EKTS.
  - — One FIT and up to seven NITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. The NITs support DN/CT sharing with contention. FITs in this configuration can support EKTS.
  - — Up to eight NITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI, and supporting DN/CT sharing with contention.

Principal benefits NI-2/3 BRI Services Phase II offers multiple benefits to service providers, including the following:

- adds revenue opportunities for ISDN sales
- assists service providers in reducing the cost of maintaining the DMS-100 ISDN BRI product base
- expands the ISDN feature set for business use

National ISDN-2/3 BRI services phase III (functional group NI000052)

In NA009, functional group N1000052 adds new features and enhances capabilities for NI-2 and NI-3 services on the DMS-100 system. This group also expands ISDN terminal capabilities and supports additional interface types and configurations for users. the new features and enhanced capabilities are packaged in PCLs LEC00009 and LET00009.

Key capabilities Nortel Networks continues with its rollout of National ISDN with support for the following NI-2, NI-3, and NI Enhancement capabilities:

- **Two B-channel Enhancement** supports the following interface configurations:
  - — Two fully initializing terminals (FIT), each allowed to access both B-channels using any combination of circuit-mode call types while simultaneously using a single terminating endpoint identifier (TEI). The two B-channel enhancements support common set-ups for

work-at-home and small business ISDN users. FITs in this configuration can support EKTS.

- — One FIT and up to seven NITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single terminating endpoint identifier (TEI). The NITs support directory number/call type (DN/CT) sharing with contention. FITs in this configuration can support EKTS.
- — Up to eight NITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single terminating endpoint identifier (TEI). The NITs support directory number/call type (DN/CT) sharing with contention.
- — Two B-channel access for EKTS terminals allows a DMS-100 NI-2 TSP with EKTS or EKTS and CACH to have both B-channels active on any combination of VI and CMD calls. This capability applies to simultaneous use of B-channels for voice calls on Basic or CACH EKTS DNs in shared or non-shared configurations.

- **BRI Verification (BRIV) Office Equipment** allows normal call control procedures for retrieving the office equipment identifier of the line card associated with an ISDN BRI line. BRIV can be used by field personnel to verify that the user's access line is connected to the correct switch port. BRIV is applicable to voice and circuit-mode-data type calls. BRIV supports access line installation and maintenance with line-side (customer premise) verification and testing.
- allows the use of a single DN on a FIT that supports circuit-mode voice, circuit-mode data, and B- or D-channel packet-mode data. This capability allows the use of a single DN or single dynamic TEI across voice, circuit-mode data, and D-channel packet service.
- **OA&M Multi-terminal Maintenance** completes National ISDN -2 interface configuration support and provides key National ISDN-3 capabilities for the following interfaces and configurations:
  - — Up to eight terminals in any combination of NITs and FITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. The NITs support DN/CT sharing with contention.
  - — Enhanced support of Associated Groups, that were first delivered in NA008.
- **Single DN on Single Integrated Voice Data Terminal (IVDT)** supports the sharing of DNs across two physically separate devices, one being a voice or circuit-mode data terminal and the second being a packet-only terminal. The DMS switch supports one packet terminal for each BRI loop and allows the packet NIT to access D-channel packet services with a dynamic TEI.

- **Shared DN with Different CTs on Multiple Terminals** supports the sharing of DNs across two physically separate devices, one being a voice or circuit-mode data terminal and the second being a packet-only terminal. The DMS switch supports one packet terminal for each BRI loop and allows the packet NIT to access D-channel packet services with a dynamic TEI.
- **Single DN with Different CTs on Single IVDT NIT** enables the use of a single DN on a NIT device that supports circuit-mode voice, circuit-mode data, and D- and B-channel packet-mode data services (an integrated voice and data terminal that does not use service provider identification [SPID] registration procedures). The DMS system supports integrated voice, circuit-mode data, and packet-data services for a NIT on a BRI loop, and permits access to multiple bearer services with a single dynamic TEI.

Principal benefits The automated allocation of a TEI to packet devices supports D-channel packet services without the need to provision packet mode TEIs and associated TEI assignments with a terminal programmer.

National ISDN-98 Enhancements Phase I (functional group NI000060)

In NA009, this functional group adds enhancements to existing DMS-100 National ISDN services. In addition, this functional group provides deployment simplification, reduces cost of ownership, and provides revenue-generating opportunities.

Key capabilities A host of new features are added to existing DMS-100 services following National ISDN enhancements identified and driven by the National ISDN Council (NIC). Some of the key ISDN features in this release include the following:

- Audible Voice Mail Message Indicator provides an audible indication to the user, upon call origination, whenever a message is waiting. The feature also enhances the current visual message-waiting indication.
- Automatic SPID automates the terminal initialization procedures by having the switch send the SPID to the terminal, rather than having it entered by the user.
- B-channel Restrictions on a TSP Basis provides the ability to restrict a group of one or more Terminal Service Profiles (TSPs) to share a single B-channel, rather than allowing the TSP or group of TSPs to use both B-channels in a shared BRI environment. This prevents one user from using both B-channels simultaneously, which would prevent other users from making or receiving a call.
- BRI in a Residence Group for Single Line ISDN provides a simplification to the network provider to allow ISDN BRI lines to be provisioned in a Residential Enhanced Services (RES) group, eliminating the need to

maintain special customer groups for deploying ISDN to residential users or for single line business users.

- BRI Verification-Office Equipment (BRIV-OE) allows normal call control procedures for retrieving the office equipment identifier of the line card associated with an ISDN BRI line. BRIV-OE can be used by field personnel to verify that the subscriber’s access line is connected to the correct switch port. BRIV-OE applies to voice-mode and circuit-mode data-type calls and supports access line installation and maintenance with line-side (customer premise) verification and testing.
- Flexible Calling: Deactivate Conference Facility When Only Two Parties Remain enables the deactivation (removal) of a conference resource when
  - Only two parties remain on an established conference call
  - A connection to the third conference party is unsuccessful because of a no answer or busy condition

Principal benefits This feature simplifies ISDN implementation for both the user and the service provider in the following ways:

- removes users concerns with manual SPID registration procedures
- eliminates the need for the service provider to build a business group to provision a Residential Enhanced Services (RES) line
- provides time-saving BRI line provisioning capabilities and installation tools
- increases service-revenue opportunities by freeing a conference bridge when only two parties remain on the call

Major dependencies Software NI000051 NI-2/3 BRI Services Phase II

National ISDN-2 BRI Functionality (functional group NI000052)

In NA010, this functional group adds new features and enhanced capabilities for NI-2 services on the DMS-100 system. National ISDN-2 BRI functionality provides valuable services in support of the SOHO/small and large business marketplace.

Key capabilities National ISDN-2 adds the following capabilities to the Nortel Networks NI-2 feature set:

- Automatic Message Accounting (AMA) National ISDN-2 Enhancements
  - Uniform Usage Measurements (Basic Business Group [BBG] subfeatures) provides the capability to bill for selected BBG dial access subfeatures on a usage-sensitive basis. The subfeatures are Intercom

Dialing, Public Network Access, Private Facility/Network Access, and Facility Overflow.

— Calling Number Identification Services (CNIS) without Intra-BBF/Inter-BBG Segregations enables the BRI CNIS capability on a usage-sensitive basis without Intra-BBG/Inter-BBG segregation. This feature allows the DMS-100 system to create or not create an aggregate record of Calling Number Identification (CNI) delivery. Additionally, this software can create a detailed record for a specific calling party that wants to deny or not deny (privacy) calling number delivery.

- Busy Idle Feature Interactions Enhancement

  — B-channel manger improves robustness of the B-channel manager.

  — 3 stage release provides improved handling of features which are triggered on B-channel busy.

- Electronic Key Telephone Service (EKTS) National ISDN-2 Enhancements

  — Single DN for EKTS (CMD and PMD) provides a single DN for access to voice and circuit-mode data (CMD) and packet-mode data (PMD). Voice service is shared among all EKTS members, while CMD and PMD are non-shared in that they exist on one terminal only.

  — Call Forward Programming for Secondary Members allows any secondary MDN SCA or MDN CACH member to program where the DN is call forwarded.

  — Two B-channel access for EKTS terminals allows a DMS-100 NI-2 TSP with EKTS or EKTS and CACH to have both B-channels active on any combination of VI and CMD calls. This capability applies to simultaneous use of B-channels for voice calls on Basic and CACH EKTS DNs in shared or non-shared configurations.

- Layer 2/Layer 3 Abnormality Counts and Logs - CM provides the following enhancements:
  - QCOUNT command enhancements for reading, displaying, and resetting layer 2/3 packet abnormality counts
  - L2LOGCTL and L3LOGCTL tool enhancements to read, display, and set packet handler related abnormality log controls on demand
  - enhances the audit process to include layer 2/3 packet audit in periodic logs generated when abnormality thresholds are exceeded
  - enhances layer 2/3 abnormality control by adding new variables for packet including:
    - Layer 2 LAPD protocol abnormality on SAPI16 frames
    - Layer 2 LAPB protocol abnormality on B-channel packet data
    - Layer 3 Protocol abnormality for X.25 packet
    - Layer 3 individual packet abnormality reports ABN14 through ABN21

Principal benefits These enhancements offer significant service provider revenue-generation potential through flexible EKTS capabilities. National ISDN-2 Call Forward and Calling Number ID enhancements and usage-sensitive billing options.

Major dependencies Software NI000051 NI-2/3 BRI Services Phase II

National ISDN-98 Enhancements Phase II (functional group NI000061)

In NA010, this functional group adds enhancements to existing DMS-100 National ISDN services, encourages the use of ISDN services, and helps control costs.

Key capabilities A host of new features and enhanced functions are added with the release of this software package. Some of the key ISDN features in this release include the following:

- Auto Lamp Refresh provides an automatic update ISDN terminal feature indicators (lamps) after the terminal initializes, thus providing the user with accurate status displays for active features.
- Directory Number Sharing Among Multiple Terminals enables sharing of a DN over multiple terminals with different call types (CT). A user can

have a single DN for separate voice-mode, circuit-mode data, and D-channel packet-mode data services.

- Rapid Messaging BRI monitors the rate of incoming Q.931 messages to a user from BRI terminals. If the pre-defined rate is exceeded, rapid messaging takes the terminal either temporarily or permanently out-of-service depending on the frequency of this rate being exceeded.

Principal benefits These features simplify ISDN implementation for both the user and the service providers in the following ways:

- promotes and simplifies feature usage by automatically displaying to the user which features are activated
- encourages use of ISDN services by offering subscribers the economy of having a single DN assigned to several terminals with different call types
- lowers costs by monitoring and controlling terminal usage of ISDN lines, based on defined quotas

Major dependencies Software NI000052 National ISDN-2 BRI Functionality

National ISDN-2 Completion (functional group NI000052)

In NA011, progress towards NI-2 Completion continues with the addition of the following capabilities to the Nortel Networks NI-2 feature set:

- EKTS MADN Interaction with Flex Call enables another EKTS member who is not the controller of the call to bridge on to active Flex Call. An EKTS user can also conference more than two calls together and transfer the conference.
- EKTS MADN CACH Interaction with Automatic Call-Back and Automatic Recall (ACB/AR) enables ACB/AR to be assigned to NI-2 EKTS terminals. When an NI-2 EKTS user invokes ACB from an EKTS DN, only that particular terminal is notified of the change in the busy/idle status of the monitored user. When an NI-2 EKTS user invokes AR from an EKTS DN, the call can be completed only from that particular EKTS.
- Call Forward National ISDN-2 Enhancements include
  - *Remote Access to ISDN Call Forward* enables ISDN Call Forward subscribers to remotely activate and deactivate the Call Forward feature.
  - *Redirecting Number and Reason Delivery (RND) for ISDN Call Forward* delivers two redirecting numbers and reasons for ISDN BRI and interswitch calls over the SS7 network. Operating company personnel can control the delivery of the RND on ISDN BRI lines through datafill in tables CUSTNWK, CUSTSTN, and RESFEAT.

- — This feature creates the SERVORD options RND and Aggregate RND Recording (ARR) which records RN availability by call type. This feature also creates the customer group option RNID. The RNID option allows the user to specify the type of network calls including ONNET, OFFNET, and INTRAGROUP for which the RND option applies. The RND can be restricted to selected members of a customer group by adding the RND option to these lines using SERVORD and then removing the RND option from the customer group.
- — *Redirecting Number for ISDN CFW*. When a call is redirected (forwarded) by the original called number, the network captures, not only the calling number, but also the number that redirected the call. If a call is redirected multiple times, the DMS-100 switching system recognizes both the first and last redirecting numbers. This feature makes the redirecting number available to the Delivery of Redirecting Number feature which ultimately displays the number to the user.

  Note: Redirection display is not supported on ISDN BRI sets if the forwarded base station is a POTS line using POTS call forwarding.

- — *Redirecting Reason for ISDN CFW*. On forwarded calls, Redirecting Reason indicates to the Delivery of the Redirecting Number subscriber why a call was forwarded. An example of a reason why a call was forwarded is if a Call Forward Variable or Call Forward Don't Answer feature is active. When multiple forwarding occurs, the switching system provides the first and last redirecting reasons to the Delivery of the Redirecting Number feature which ultimately displays the reason information to the user.

- Calling Number Identification Services (CNIS) National ISDN-2 Enhancements include
  - — *Delivery of Redirecting Number*. As with Call Enhancements, when a call is redirected by the original called number, the network delivers not only the calling number but the number from which the call was redirected. If a call is redirected multiple times, the DMS-100 switching system delivers both the first and the last redirecting numbers.
  - — *Delivery of Redirecting Reason*. As with Call Forward enhancements, the redirecting reason indicates to the CNIS user why a call has been forwarded. Examples of reasons displayed that indicate the Call Forward Variable, Call Forward Interface Busy, or Call Forward Don't Answer feature is active. When multiple forwarding occurs, the DMS-100 switching system provides the first and last redirecting reasons to the CNIS user.
- CRBL (Call Reference Busy Limit) Key Decoupling eliminates the need to download to an NI-2 terminal a number of call appearances equal to the

CRBL value for a DN/CT. The actual number of call appearances downloaded for a particular DN/CT is separately provisionable from the CRBL. This feature eliminates unused DN keys on an NI-2 terminal that uses soft keys for making data calls.

Principal benefits These features add the following enhancements for the ISDN users:

- deliver improved and marketable EKTS functionality for ISDN users in a centrex environment, including Flex Call, ACB/AR, and Remote Call Forwarding
- provide advanced Call Forwarding number and reason status on an ISDN telephone
- ease the provisioning and installation of ISDN lines and increase customer satisfaction by eliminating unused keys on a voice terminal

Major dependencies Software NI000051 National ISDN-2 BRI Functionality

NA011 feature additions for ISDN BRI

In NA011, Nortel Networks added the following capabilities to the DMS-100 ISDN BRI functionality:

- Automatic CallBack and Automatic Recall (ACB/AR) assignment to NI-2 terminals
- Delivery of Redirecting Number (RND) to Call Forward users
- Delivery of Redirecting Reason (RND) for redirected number to Call Forward users
- Aggregate RND Recording (ARR) to record RN availability by call type
- Elimination of unused DN keys on an NI-2 terminal that uses soft keys for data calls
- MADN CACH interworking with ACB/AR
- MADN CACH Flex Call Interworking
- Remote activation/deactivation for ISDN Call Forward

National ISDN-2 BRI functionality additions (functional group NI000052)

In NA012, the following new features and enhanced capabilities for NI-2 services on the DMS-100 system were added.

- Call Forwarding Service Uniformity for NI-2 improves Call Forward Validation (courtesy call) by allowing Call Forward activation to occur even if the initial courtesy call is not answered. A second unanswered courtesy call is no longer required. This enhancement to Call Forward

Validation makes it possible to automatically activate Call Forwarding after the completion of the first unanswered courtesy call.

- Calling Number Service Uniformity NI-2 supports the switch-wide delivery of the uniform delivery of Type of Number/Numbering Plan Indicator values. In addition, office parameters are added for Calling Number Delivery (CND) and Redirecting Number Delivery (RND).
- The EKTS Service Uniformity for NI-2 feature enables the DMS-switching system to provide the following additional options for members of Electronic Key Telephone Service (EKTS) bridged call sessions:
  - EKTS MADN members can enter a bridged call before the call is answered.
  - If an EKTS MADN member on a bridged call activates the Hold feature, another MADN member can exclude the first member from re-entering the call by activating the Privacy feature.
- The Layer 3 Service Disruption feature supports network (layer 3) maintenance for ISDN BRI circuit switched services. The Layer 3 Service Disruption feature supports the following capabilities necessary for network maintenance between the DMS-100 switch and terminal equipment:
  - frame-checking
  - sequence-based performance monitoring
  - protocol abnormality monitoring
  - generation of logs to alert maintenance personnel when the layer 3 service disruption threshold is exceeded
  - protocol capture
- The Redirecting Number Privacy (RNP) feature enables ISDN-2 BRI subscribers with the capability to deliver or suppress the display of their telephone number when their calls are redirected. The provisioning of this feature provides the flexibility to suppress the delivery of the redirecting DN for each type of call forwarding including:
  - Call Forward Universal (CFU)
  - Call Forward Don’t Answer (CFD)
  - Call Forward Busy (CFB)

  For example, as a result of provisioning, the DN of a call which is redirected as a result of CFU can suppress the redirection number, but the DN of a call redirected as a result of CFB can be delivered.
- The SS7 Procedures for ISDN Call Forward feature enhances the CFD feature by providing continued ringing treatment, rather than a busy signal,

for CFD destinations that are busy when a forwarded call attempts to terminate. In the past, if an ISDN phone with CFD activated transferred a call to a phone that was in the busy state, the caller heard ringing followed by a busy signal.

- The User Loop Testing (X.25 Echo Station) feature enables field technicians to initiate loopback testing for packet data on a BRI line. The User Loop Testing feature enables a technician to set up a test session by calling a directory number that directly terminates on the packet handler in the central office.

Principal benefits These features add the following enhancements for the ISDN users:

- The ability to control whether or not their caller IDs are displayed enables users to manage call privacy more efficiently resulting in an increased satisfaction with ISDN services.
- More convenient Call Forwarding programming for the end-user encourages more frequent use of this Call Forwarding feature and enhances customer satisfaction.
- The delivery of more accurate caller ID information for international calls promotes increased convenience and satisfaction for ISDN customers.
- EKTS members participating in bridged call sessions are offered greater privacy.
- The monitoring and maintenance of layer 3 service promotes fast resolution of actual and potential problems in the network resulting in the reduction of the chance of service disruption to the subscribers.
- Faster and more direct resolution of packet-data problems on ISDN BRI lines provides more efficient use of resources.

NA012 feature additions for ISDN BRI In NA012, Nortel Networks added the following capabilities to the DMS-100 ISDN BRI functionality:

- activation of Call Forwarding after completion of first unanswered courtesy call
- international call ID information delivery resulting from switch-wide delivery of E.164 international numbering format
- call bridging by EKTS MADN member before call is answered
- blocking of return-from-hold by EKTS MADN member after Bridged Call Exclusion activated
- layer 3 service disruption reporting for ISDN BRI circuit switched services
- Redirecting Number Delivery Suppression (SUPPRND) allows control of the delivery or suppression of the redirecting number for individual Call Forwarding variants

- User Loop Testing (X.25 Echo Station) for packet data on BRI line
- SS7 enhancements that provide continued ringing treatment, rather than a busy signal, for Call Forward-Don't Answer (CFD) destinations that are busy when a forwarded call attempts to terminate

Major dependencies Software NI000051 National ISDN-2 BRI Functionality

National ISDN-2 BRI functionality additions (functional group NI000052)

In NA014, Nortel Networks added the following new features and enhanced capabilities for NI-2 services on the DMS-100 system:

- The On-Demand B-Channel X.25 Packet Mode Data Service feature provides switched B-channel high-speed packet service between the user's ISDN NI-2 terminal and the DMS-100 packet handler.

  While one B-channel is being used for packet mode data, the second B-channel can be used for a simultaneous voice or circuit switched data session. On completion of the B-channel packet mode data call, that B-channel can be used for a circuit mode data call.
- The Uniform Display Text for ISDN NI-2 Uniform Service feature expands the text information that appears on the display of the end user's ISDN telephone. The ISDN telephone displays text messages that give the user information on various call states and prompt the user for additional feature information before, during, and after a call.

  Display text for features includes ACB, Basic Call Control, Calling Name and Number (CNIS), Additional Call Offering, Call Forwarding, Call Hold, Flexible Call, and EKTS.

Principal benefits These features add the following enhancements for the ISDN users:

- The DMS-100 packet handler can transmit packet data at a high rate of speed using the same ISDN line the subscriber already has in service.
- The user can direct an X.25 data call to any destination because B-channel packet transport is now a dialable service. Previously, the subscriber needed a dedicated nailed-up data connection aimed at a single location.
- Subscribers can take advantage of many ISDN voice and data features because the ISDN telephone displays dynamic information during all phases of a call. The expanded text display helps the user understand the status of the current call, and non-call activity such as feature status.

Major dependencies Software NI000051 National ISDN-2 BRI Functionality

ISDN applications

This section provides examples of cost-reducing, productivity-enhancing applications enabled by National ISDN. For a more detailed list of applications for National ISDN, complete with a list of required terminal equipment, refer to *A Catalog of National ISDN Solutions for Selected NIUF Applications*.

ISDN lines can generally handle any application that requires modems or private lines with full digital transmission and much higher data speeds than analog technologies. A few of the key applications driving the rapid deployment of ISDN BRI are listed as follows.

Pair gain

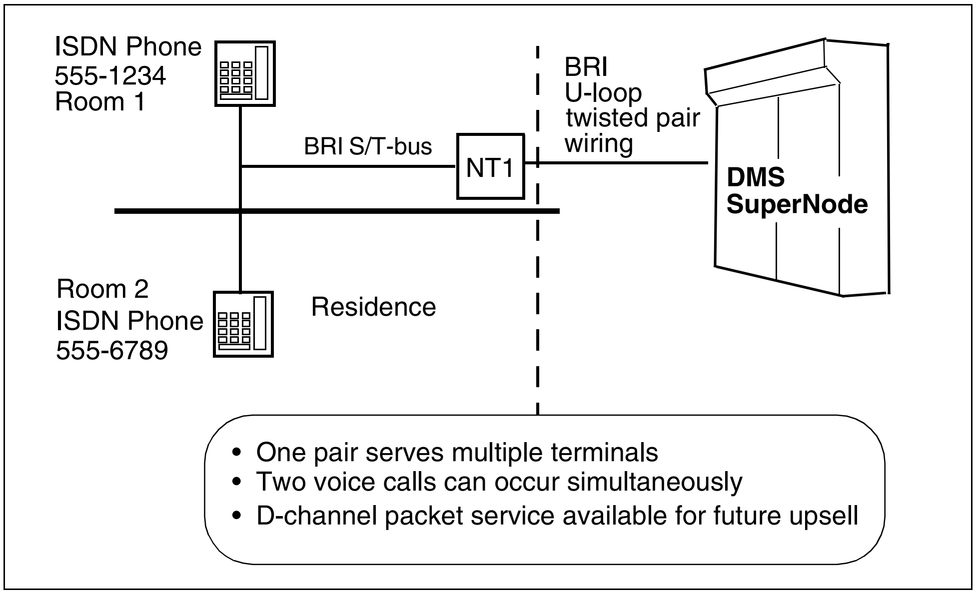
Perhaps one of the simplest, yet most powerful, applications is using pair gain as a method to gain an additional unique phone number from the existing building wiring plan. Known as pair gain, this application makes use of ISDN BRI's current ability to support 2 B-channel terminals on a single line.

Operating company issues driving the need for the ISDN pair gain application include the following:

- increased utilization of existing twisted pair wiring plant desired
- high percentage of residential wiring plant installed with splices, resulting in limited service (2 pairs) run to homes
- higher than planned housing density shift negates existing wire plant from providing growth for additional service demands
- multiple residences such as college dormitories, fraternity houses, and apartment buildings where more than one person living within may want their own telephone number
- problems in growth of strip shopping areas and small business locations where additional service needs to be deployed as service demand grows. ISDN in an Meridian Digital Centrex (MDC) environment can be used to serve two users with a single BRI line, with fully featured voice service and X.25 packet-data access. This strategy can significantly reduce the cost of delivering voice and data services to subscribers who do not require high-speed circuit-switched data.

Pair gain configuration As shown in Figure 1-8, the basic ISDN BRI wiring configuration is sufficient to provide the benefits of pair gain. From Nortel Networks NT1 product, two S/T-buses provide service to two ISDN terminals, each of which can have a unique phone number.

Figure 1-8 Pair gain example



If analog phone service is desired, the ISDN phones in Figure 1-8 can be replaced with ISDN terminal adapters that have standard analog telephone service as an output. Some commercially available terminal adapters can provide ringing for up to five analog phone sets.

Implementation of National ISDN-2 (NI-2) feature Uniform Interface Configuration for BRI allows up to eight B-channel devices to contend for the two B-channels. Each ISDN BRI connection supports any combination of up to eight telephones, faxes, PCs, and other terminals and supports any two of these B-channel conversations at any one time. With this feature, ISDN quickly becomes an attractive advantage over much of the existing key system market.

Internet access

ISDN's 64/128 kbit/s transmission rate is establishing ISDN as the best choice for connection to the Internet at the speeds that today's leading-edge users are increasingly demanding. With Internet access growing at exponential rates, this application is emerging as a key revenue driver for service providers, and is currently a major driver in ISDN deployment throughout North America.

The following are examples of Internet services:

- e-mail, file transfer
- communities of interest
- commercial services
- academic discussions

- electronic newsletters
- image, voice services

Benefits

- faster screen refresh
- quicker file downloads
- complex graphical user interfaces
- more interactive computing

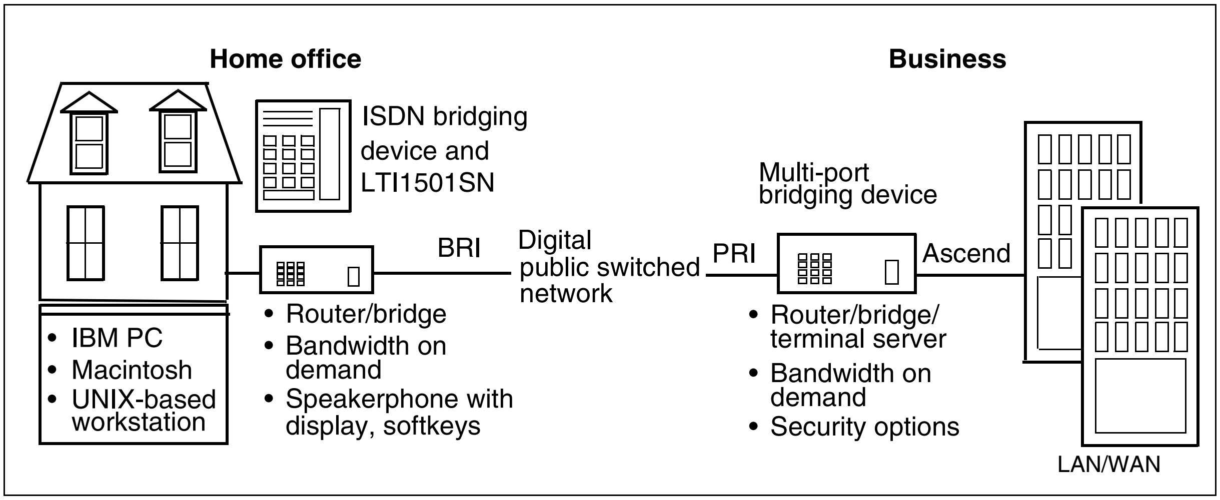
Access to online services Most online service providers now support ISDN access. ISDN access to these services is a great timesaver that enables the user to make quick file transfers and screen updates. Because most online services charge for time used, ISDN access is not only convenient, but cost effective.

Telecommuting

As work-at-home programs become increasingly popular, businesses must find a way to offer employees the same data communication capabilities at home that they have at the workplace. Using an ISDN line installed at home, an employee can dial up the corporate network and access the same LAN resources available at work.

One popular configuration among corporations today is using an Ethernet bridge device on the ISDN line. The home user has the option to dynamically bond the B-channels for a 128 kbit/s uncompressed (up to 512 kbit/s with 4:1 compression) Ethernet connection to the corporate LAN. The user can also opt to use one of the B-channels for a full-featured ISDN business set (Figure 1-9). Using Multi-location Business Groups (MBG), the home user can be included in the corporation’s centrex group even if the home user is served by a different central office.

Figure 1-9 Telecommuting extends office to home



Telecommuting software applications ISDN telecommuting requires no custom applications programming. It works with many familiar applications available today. The following are examples of applications that can be used with ISDN telecommuting.

- screen sharing. Carbon Copy Plus (Microcom Inc.), Timbuktu/Remote (Farallon), PC ANYWHERE (Symantech/ DMA), CO/Session (Tritin Technologies), and HyperAccess/5 (Hilgraeve). Other programs may support ISDN screen sharing too.
- high-speed file transfer. Procomm Plus (DataStorm, Inc.), Crosstalk (Digital Communications), Blast (Communications Research), Microphone II (Software Ventures), White Knight (The Freesoft Corp.), and ExellNET/ISDN (EXELTECH).
- remote LAN access. ManyLink for ISDN (ManyLink Corp.), SimPC and SimMAC (Simware), and Gandalf Premier LANLine 5500 (Gandalf Technologies Inc.).

Videoconferencing (desktop and conference room)

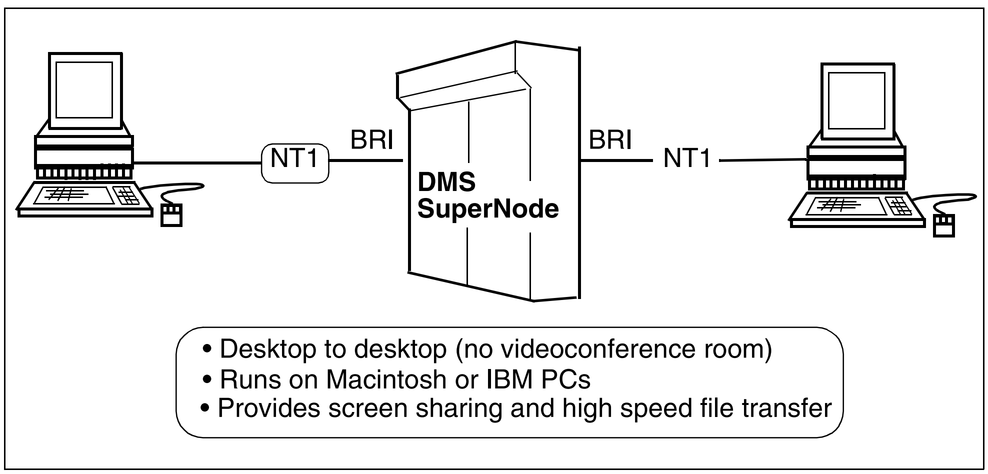
Over the last few years, video systems have suffered from a lack of true standards across all CPE. In the past, only products from the same manufacturer could communicate, and desktop systems could not communicate with room-based systems. Because CPE video manufacturers now support H.320 standards, the videoconferencing market is poised for tremendous growth as economy of scale takes place.

Desktop videoconferencing picture quality and acceptability continues to grow with the rapid advance of signal compression through ISDN coder-decoders (CODECS). A number of systems on the market now offer video refresh rates of 15 frames per second (fps), compared to 30 fps for broadcast television. This application enables the business customer to enjoy the advantages of face-to-face meetings without travel. Figure 1-10 illustrates videoconferencing.

Conference room videoconferencing enables more productive meetings. Travel time and expenses are drastically reduced. Participants are better prepared, with immediate access to computers, notes, files, and other staff members. And, scheduling is easier because time commitments are reduced. These systems most often operate using multiple BRI or PRI connections.

In addition to the rapid growth in the popularity of telecommuting, studies have shown that, over time, employees may feel isolated from management as well as from co-workers. Increasing the level of communication within a telecommuting program to include desktop videoconferencing addresses this issue.

Figure 1-10 Videoconference example



Examples of National ISDN in action

Following are some examples of ISDN use today. The number of actual applications is expanding as rapidly as growth in the technology allows.

Universities Universities with multiple campuses often lack the classroom space and teaching resources necessary to conduct the same course at multiple campus locations. With the help of ISDN BRI, one large Midwestern university has found a cost-effective way to connect its widely-separated campuses for a unique distance-learning opportunity.

Professors can interact effectively and share graphs, charts, slides, and other visual aids with all members of the class, regardless of campus location.

In addition to facilitating instruction between multiple classrooms, ISDN video conference allows university administrators to negotiate face-to-face across campuses and lets professors at one campus consult colleagues at another. The time savings is significant; a round-trip between campuses requires approximately six hours of driving time.

High school A board of education is currently using ISDN video conferencing in two of its high schools to offer students access to expanded educational opportunities.

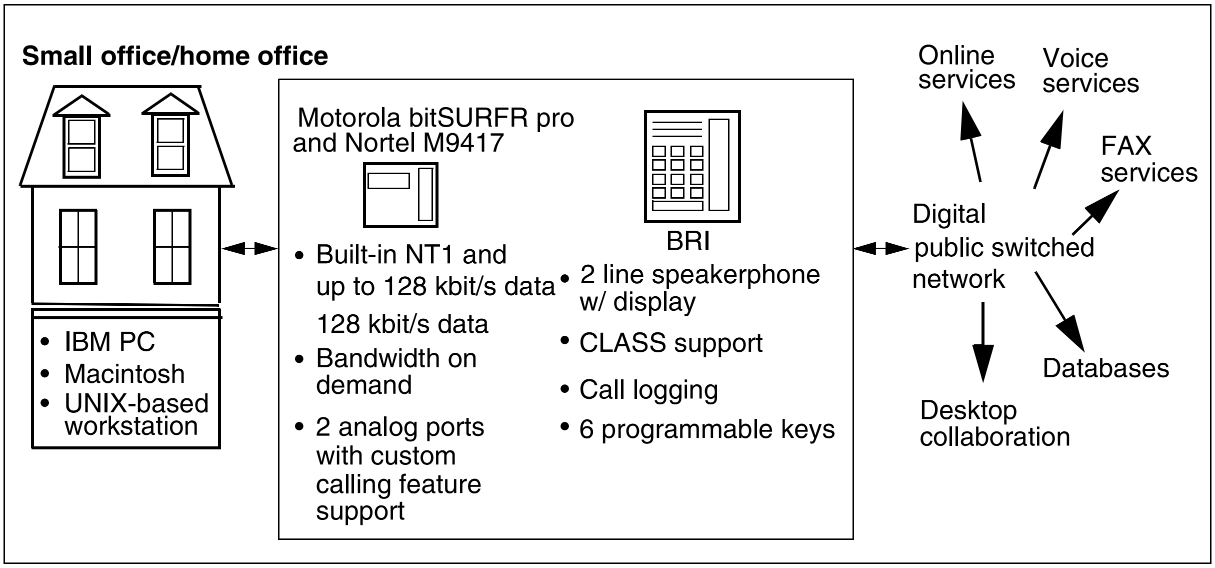
For example, students in a geographically remote school attend a computer programming class being taught by a professor at another school. Because of the dual B-channel capability of ISDN BRI, these students are doing much more than watching a class on television; they are actively participating in the course, asking the professor questions, and contributing to class discussions.

Banking A large multi-location bank serving the San Francisco area conducts its internal staff meetings using ISDN video conference in order to reduce time and travel expenditures. The new system keeps bank employees off the roads, leaving them more time for their work.

Modem replacement Businesses using low-speed modems on analog lines for internal communications can replace them with high-speed ISDN lines that deliver both voice and data. ISDN circuit-switched data at 64/128 kbit/s can support applications requiring higher data speeds than are typically available with a modem, such as videoconferencing and file downloading.

Small office/home office Many people now have offices in their homes as the base of operations for small businesses. With just one ISDN line, the small office/home office (SOHO) user has phone access, as well as high-speed data access to online services, the Internet, bulletin boards, and other services (see Figure 1-11). Many ISDN CPE vendors provide analog jacks to enable existing phones (with custom-calling features), fax machines, and modems to be used. In the following configuration, the Motorola BitSURFER Pro is used; similar devices are made by many CPE manufacturers.

Figure 1-11 Example of small office/home office application



LAN-to-computer and LAN-to-LAN interconnection A local area network (LAN) is a networking technology that links personal computers, disk drives, printers, and other devices. Distance limitations can restrict LANs to a single building or require expensive leased-line technology. ISDN BRI lines can link these devices into a LAN-like network, even over large distances.

Similarly, if a remote office LAN is required to be connected to the corporate LAN, ISDN provides a solution. With widely available CPE, a BRI connection can provide secure and dynamic connections with a compressed bandwidth of approximately 512 kbit/s.

Disaster recovery, network survivability, and overflow Network planning for reliability, survivability, and route diversification are essential to many businesses. At a small fraction of the cost for a separate leased line, ISDN can provide backup and failure protection with a dialed ISDN digital connection with around-the-clock standby protection. The same line can also accommodate unexpected overloads on the primary connection.

Centrex on ISDN The Nortel Networks ISDN product provides access to valuable voice features. Approximately 220 MDC features are supported on the Nortel Networks ISDN. Additionally, ISDN users and traditional MDC users can co-exist and inter-work within the same business group. As a result, you do not have to undergo a “forklift upgrade” to take advantage of ISDN solutions. You can simply add ISDN service incrementally as your communications needs dictate.

ISDN MDC is a complete business service that offers the largest number of productivity-enhancing voice features in the industry. ISDN MDC’s sophisticated call-coverage, call-handling, and cost-savings features can enhance internal communications and improve customer service.

ISDN MDC offers functional-signaling features in accordance with Bell Communications Research (Bellcore) document *ISDN Basic Access Call Control Switching and Signaling Requirements, TR-TSY-000268*.

All of the following services on Nortel Networks standard BRI lines are compliant with the protocol procedures defined in Phase 1.1 technical requirement and use no vendor-specific protocols or protocol extensions:

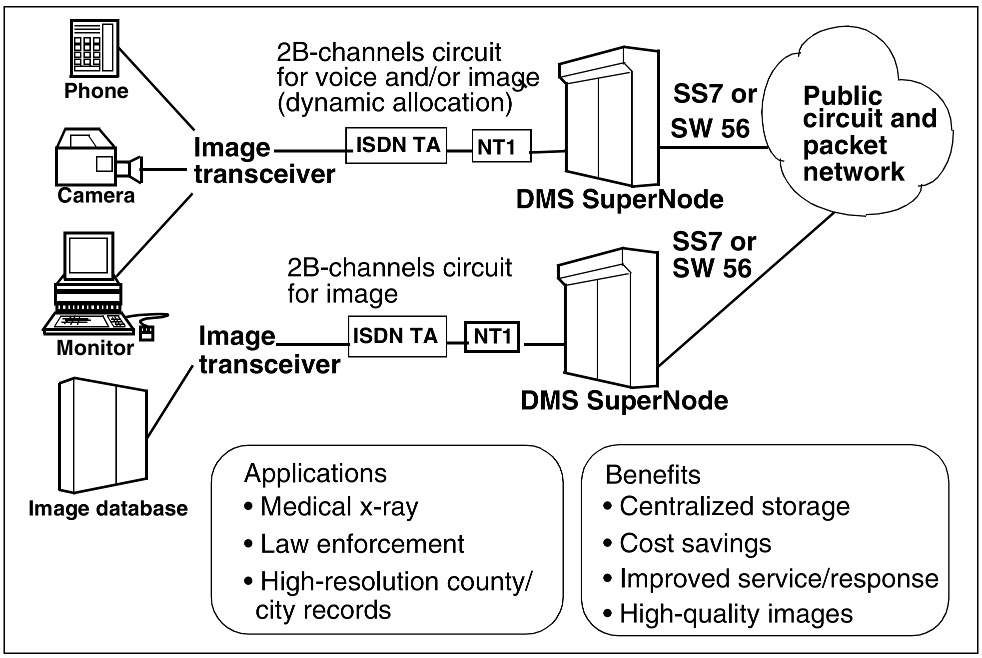
- ISDN electronic key telephone service (EKTS)—a Bellcore-defined group of features that includes multiple-appearance directory number (MADN, or shared directory number), intercom/group intercom, and directory-number bridging
- basic business group features—including direct inward dial/direct outward dial (DID/DOD), abbreviated dialing, line restrictions, virtual facility groups (VFG), and network class of service
- call forwarding—including call forward all calls, busy, don't answer, with redirected number
- call pickup—ISDN and non-ISDN stations can share call-pickup groups
- automatic callback (ring again)
- call hold and additional call offering (call waiting)
- flexible calling—including call transfer, three-way conference with full add/drop capabilities
- hunt groups—with linear and circular hunt groups
- calling-line ID—The BRI D-channel is used to transmit called and calling number, redirected-number information, and other call information. This includes information on alerting the called party, answer by the called party, and routing to treatments, tones, and announcements. This information gives both parties more information about a call and allows the delivery of many advanced services, such as network-wide message service.
- value-added MDC features such as authorization codes, busy override, and call park

Like most business telephone sets, some Nortel Networks ISDN phone sets have many keys that can have features assigned to them. Additionally, the M5317TDX, and M5317TDE sets both have context-sensitive soft keys (and associated displays) that can be used for feature invocation. The user is not required to remember those numeric access codes to initiate a favorite feature. ISDN BRI provides equivalent functionality, at the touch of a button.

Image communications Image communications involve the transmission of large graphics files between two locations (Figure 1-12). ISDN's high-speed transfer of data through the telephone network allows a large base of widely-dispersed users to exchange these files or access a central graphics file database quickly, easily, and cost-effectively.

An application that demonstrates the strength of ISDN in image communications is a real estate imaging system. These systems allow a realtor to interactively view high quality property photographs and current listing data on a computer screen from a remote server.

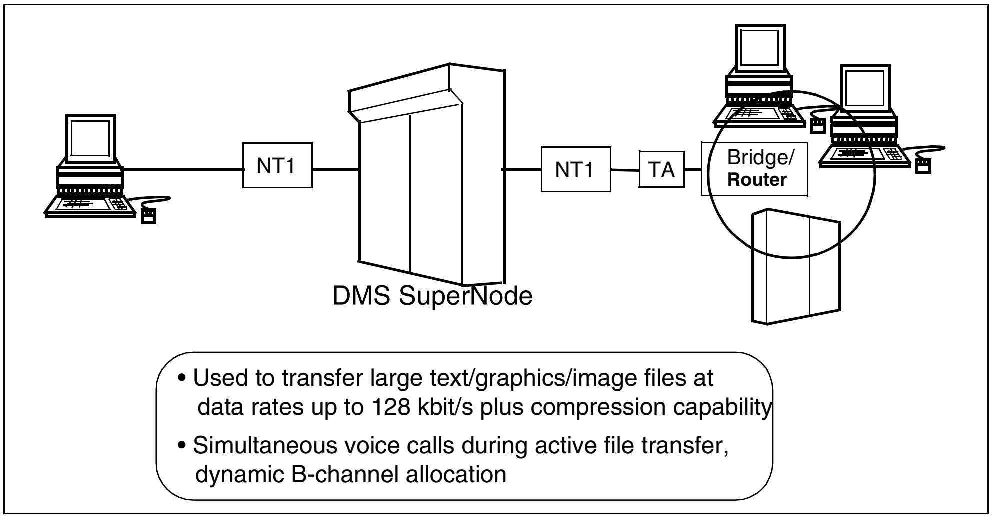
Figure 1-12 Image communications



Group IV fax Sometimes transmitting a paper copy is the best option, but most fax machines cannot deliver the quality needed to proof graphics of architectural renderings. ISDN supports high-speed Group IV fax, with quality that matches 300-dpi laser printers.

Other ISDN high-speed data services Analog modems are too slow for today's information technologies. ISDN BRI can be a cost-effective solution for businesses that need to optimize the data performance of a single twisted-pair line from the operating company (see Figure 1-13). As previously discussed, BRI has three separate channels of information flow. Two channels support voice or data up to 64 kbit/s, and a third channel supports packet-data transmission. Users can put this desktop data power to work for many applications, with speeds normally achieved only with a direct LAN connection.

Figure 1-13 File transfer and multitasking



File transfer Files can be transferred at speeds up to 64 kbit/s, outperforming the 2.4- to 28.8-kbit/s connections of an analog modem. High-speed, digital file transfer increases productive time and helps ensure more accurate transmission.

Screen sharing Today's businesses need the flexibility to locate offices and employees where needed. But often, widely dispersed employees must collaborate on documents, spreadsheets, and presentations. ISDN's high-speed data capabilities allow these employees to work together in real time, across town or across the country.

Simultaneous and integrated access A number of different communications applications can be run over a single ISDN line. For example, an employee can talk on the telephone while searching a remote database, or sharing information on a PC with a screen sharing program.

Home office integration services

The Nortel Networks Meridian Home Office service is a powerful portfolio of telecommuting applications that combines advanced network services with sophisticated software and terminal communications equipment. The result enables telecommuters achieve full office functionality and access to company resources directly from a desk at home.

Packet services

ISDN packet services switch data in “packets” of digital code. Each packet is individually addressed and sequentially numbered by the packet assembler/disassembler (PAD) in the transmitting terminal. The packets are then routed individually over ISDN lines and trunks to other ISDN nodes, private networks, or Public Packet-Switched Networks (PPSN). When the packets reach their destination, the PAD in the destination terminal places the packets in sequential order and removes the address information and restores the data to the form originally transmitted by the originator.

ISDN supports up to eight D-channel devices on a single BRI. All devices can be PCs, point-of-sale terminals, or similar terminals.

Every D-channel terminal has its own Host ID or E.164 address. This means that X.25 E-mail and messages can be sent directly to another location rather than to a mailbox for later retrieval.

Customer wiring is simplified because access to both packet-data service and circuit-switched data service is over one standard twisted-pair loop.

ISDN packet applications The D-channel of an ISDN connection gives virtually any device, such as a cash register, point-of-sale terminal, credit card reader, PC, or almost any other data device, a permanent, full-time link to the public X.25 packet-switched network. Packet switching is the most cost-effective transmission technology for lower-speed bursty data applications. With its end-to-end error checking and correction, packet switching offers a superior level of data connectivity.

In effect, ISDN offers the benefits of a private virtual network, yet uses standard telephone lines and the public telephone network. Across North America, these advantages are being put to use in a growing number of applications. The following are just a few examples:

- **Point of sale**—A major credit card reader manufacturer now packages ISDN for its users. Authorization times have been reduced from an average of more than 30 seconds to 2 to 4 seconds. Costs have also been greatly reduced. Several major oil companies are testing ISDN telephone lines to link gas pumps, cash registers, and even vending machines into nationwide data networks. Central computers authorize credit purchases, control inventory, and schedule “just-in-time” replenishment of everything from gasoline to potato chips.
- **Health care**—A number of health maintenance organizations use point-of-sale card readers and ISDN telephone lines to authorize medical insurance benefits and issue payment requests to a range of health-care insurers.
- **Banking**—A growing number of banks are now linking remote automatic teller machines to a central computer through ISDN and packet switching. The D-channel connections eliminate the need for dedicated lines to the ATM, and make it economical to serve many more locations.
- **Education**—Colleges and universities that installed ISDN for voice and high-speed data connections have found they can economically use student ID cards for meal payments, library check outs, classroom and dormitory

entry, test authorization, and other applications. D-channel card readers are easily linked to an appropriate computer through the nearest ISDN telephone connection.

- **Security—**In addition to security and other forms of telemetry, many corporate and government locations use low-cost D-channel connections for entry to buildings, laboratories, warehouses, and other restricted areas.
- **Host-to-computer connections—**Terminals access host computers over dedicated links or by means of dial-up modems through the POTS network. The ISDN user can employ a terminal adapter with an X.25 PAD functionality to concentrate asynchronous terminals and asynchronous host ports onto B-channels or D-channels.
- **SNA networking—**Widely available 3270-emulation software for PCs increases their functionality and allows them to be used in IBM's Systems Network Architecture (SNA) environment, to avoid the cost of 3270 terminals dedicated to SNA host access. With ISDN, a single BRI loop can support up to eight PCs using 3270-emulation software to gain access to one or more host mainframes. Each of these PCs can have simultaneous access to a different host.
- **State lottery—**Several agencies are experimenting with ISDN-based approaches to playing state lottery and numbers games. The attraction of ISDN is that it uses existing telephone lines, and thus reduces the current dependence on dedicated connections to these statewide systems. This capability makes lotto terminals more widely available to almost any public location that has phone service.

Note: For many of these applications, the use of a dialed modem on an ordinary telephone line is simply not practical (for example, call-by-call connection times are far longer than a customer would prefer to wait).

2 Basic rate interface hardware components

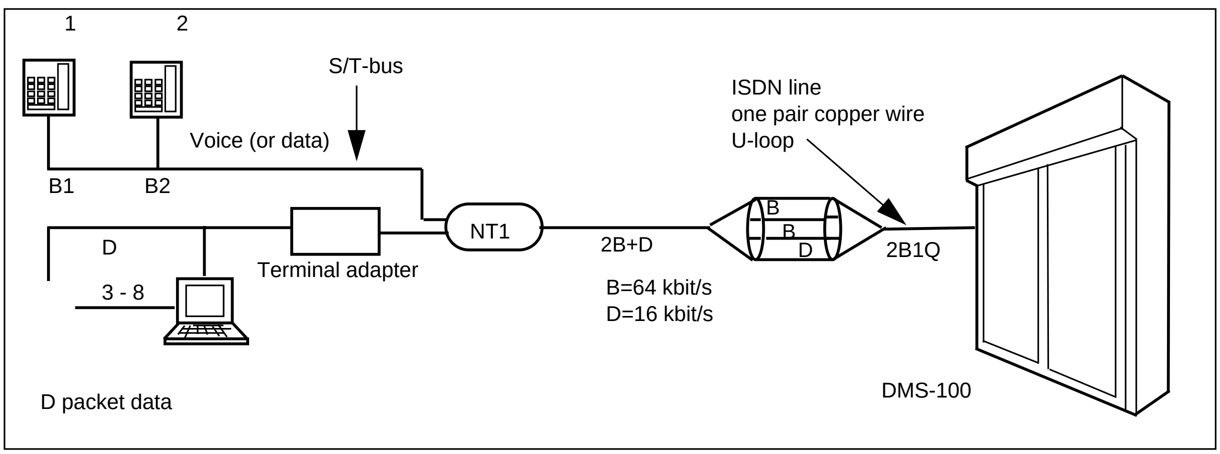
Introduction

The following describes the hardware components for an integrated services digital network (ISDN) loop.

To further understand ISDN, it is necessary to first become familiar with the terms and acronyms used in ISDN systems. This chapter lists the most commonly used terms and acronyms and explains their usage.

In Figure 2-1, the physical components of the ISDN Basic Rate Interface (BRI) system are depicted in a simplistic overview.

Figure 2-1 ISDN physical equipment and connections



DMS exchange termination

The DMS exchange termination (ET) is the DMS switch system. This system must be configured with ISDN software and hardware to support ISDN services. The software and hardware required to support ISDN is slightly different from a non-ISDN switch. ISDN software and hardware requirements are discussed in the “Engineering ISDN BRI” chapter of this guide.

Line card

The line card (LC) is the digital circuit board used by the DMS switch to physically connect to the wires that go to the ISDN customer premise equipment (CPE). The line card supports the conversion of the digital line coding format (2B1Q) used on the ISDN loop to the digital coding format used internally by the DMS switch. The line card works as an integral part of the DMS switch when performing maintenance and diagnostic procedures on the ISDN line.

The LC is addressed in the DMS switch by a line equipment number (LEN). The DMS switch uses the LEN to assign a unique identity to the LC that supports a single ISDN loop.

U-loop

The U-loop is the wiring between the line card in the DMS switch and the customers' premises. Simple U-loops are made up of a pair of copper wires and can be up to approximately 15 000 feet in length. There are very specific requirements concerning the gauge and configuration of the wire. For more information on U-loop engineering, consult the "Engineering ISDN BRI" chapter of this guide. Because of the approximate 15 000 foot distance maximum for ISDN U-loops, a method of extending these loops has been developed. These loops are called Extended loops, BRITE loops, or Multipoint (MP) loops.

Figure 2-2 Extended ISDN U-loop wiring

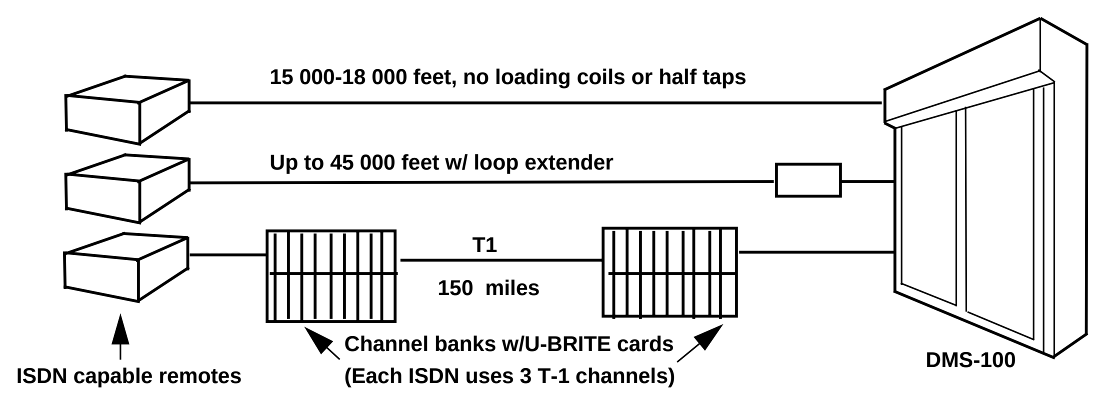


Figure 2-2 is a diagram of an extended ISDN U-loop. To show a complete extended loop, Figure 2-2 would be inserted in the place of the U-loop shown in Figure 2-1. While a detailed description of the operation of an extended loop is beyond the scope of this text, it is important to know that an extended loop can carry ISDN services within the same serving area supported by traditional digital signal level 1 (DS-1) signaling, up to several hundred miles.

Network termination 1

The network termination 1 (NT1) is a device connected to the U-loop (see Figure 2-1) that converts the signals being transmitted on the two wire U-loop to a four wire S/T-bus. The NT1 is the first piece of CPE in the link between the DMS switch and the user. Many CPEs incorporate the NT1 directly into the ISDN terminal equipment, thus eliminating this additional piece of equipment. Only one device can be connected to the U-loop (although the device can function as multiple logical devices); multiple ISDN terminals can be connected to the S/T-bus.

S/T-bus for stand-alone NT1

The S/T-bus is the wiring that connects the ISDN S/T interface terminals to the NT1. The S/T-bus supports up to eight ISDN terminals connected to a single ISDN loop. While the S/T-bus can be as simple as an RJ45 interface cable between one terminal and the NT1, care should be taken to ensure the S/T-bus is properly configured. The S/T-bus is composed of both a transmit and a receive pair of wires. The S/T-bus can also have another pair of wires used to transmit power to the ISDN terminals on the loop. There are very specific requirements concerning the gauge and configuration of the wire. For more information on S/T-bus engineering, consult the “Engineering ISDN BRI” chapter of this guide.

Terminal adapter

Terminal adapters (TA) are devices used to convert the signals of the ISDN loop to a format that can be used by either an analog telephone, computer, or another intelligent device. Up to eight ISDN TAs can be connected to the loop, but they must all share the facilities of the loop. Vendors have created TAs that act as the following devices:

- telephones
- modems
- synchronous data devices
- asynchronous data devices
- network bridges
- network routers
- call centers and agent positions
- credit card readers

3 Basic rate interface logical components

Introduction

The following information describes the logical connections on an ISDN loop and the encoding techniques used on the physical connections.

Logical terminal or terminal service profile

Because a single ISDN line card can support up to eight physical devices, a logical representation is needed to define the devices within the telephone switch. The convention used in the DMS switch is the concept of a logical terminal identifier (LTID), also known as a terminal service profile (TSP). The logical terminal is defined in the DMS switch and assigned all the characteristics of the line. Some of the characteristics assigned to the LTID include the DN of the line, the number of keys assigned to the line (another logical concept), and the features assigned to each key of the line. Most of the concepts that follow are assigned to the logical terminal.

Protocol version control

The protocol version control (PVC) parameter is required for all ISDN lines. This parameter ensures that the DMS switch and the ISDN CPE are communicating with each other by using the same version of ISDN message protocol. This parameter is set to Functional Issue 2 for National ISDN (NI-1) and NI-2 services. Functional Issue 0 and 1 are available but are not National ISDN compliant.

When ISDN was first introduced, vendors had their own version of the signaling protocol. There were many areas that were subject to interpretation when the initial ISDN specifications were published. Nortel's first protocol version is referred to as PVC 0. Subsequent to that, PVC 1 was introduced, which contained protocol changes and was closer to the NI-1 specifications. The current version of Nortel's ISDN is PVC 2.

Terminal endpoint identifier

Call control signaling for the B-channels and data transmission by way of D-channel packet service are supported by a complex protocol. This protocol has been defined by the International Telecommunications Union (ITU), and refined by Bellcore in the United States. While this text will not provide protocol details, it is helpful to discuss several of its components. One of these components is the terminal endpoint identifier (TEI). The DMS switch uses the TEI to address packets of D-channel information to a device on the ISDN loop (either a specific terminal adapter on the ISDN loop or to all the terminal adapters on the loop). This level of communication is also known as Layer 2 and refers to the seven layer Open System Interconnection (OSI) model.

There are seven types of TEIs.

- Static TEI (STEI). The STEI has a fixed value and does not change without modification to the DMS switch and the CPE. STEIs have numerical values from 0 to 63. The assigned value for an STEI is randomly assigned by the operating company, but must be duplicated in the CPE. Packet devices require an STEI through DMS-100 software release NA007.
- Dynamic TEI (DTEI). A DTEI has a value that is negotiated between the DMS switch and the CPE. DTEIs range in value from 64 to 126. A DTEI is requested on power-up by a CPE configured for DTEI. The conversation proceeds as follows:
  - CPE sends the TEI request
  - ET assigns the TEI (value)
  - ET sends an ID check request
  - CPE sends an ID check response (value)
  - broadcast TEI (value 127)

  After this exchange of information, the CPE and the DMS switch complete some further TEI checks. The TEI is then ready to be used to address information to the CPE, or to tell the DMS switch the source of the information. The NIT CPE all uses user- or network-assigned TEIs (UNATEI).
- Dynamic TEI packet-only NIT (NA009 and above) allows one dynamic TEI packet-only NIT on a loop.
- Dynamic TEI integrated NIT (NA009 and above) allows only one dynamic TEI integrated NIT to access packet service. Up to eight dynamic TEI integrated NITs can access voice/circuit service, but only two at a time. Eight is the maximum number of terminals (NITs or otherwise) that can be served on a loop.
- Auto user assigned (UATEI) TEI. This TEI is dynamic in the DMS switch in the range of 0 to 63, and static in the CPE. With UATEI, the CPE chooses the TEI to be used for conversation, and the DMS switch accepts the TEI value. Few terminal adapters use UATEI.

- User or network assigned TEI (UNATEI). As its name implies, the CPE or the Network can assign the TEI. NITs only use UNATEI.
- Broadcast TEI (value 127). The DMS switch uses broadcast TEIs to address information that can be of interest to all devices on a loop. Call offering uses TEI=127 for the SETUP message.

TEI values can be repeated many times on the DMS switch, but never on a single ISDN loop within the DMS switch.

Prior to NA007, each B-channel had to have a different LTID or TSP and TEI. With NA007 and up, the ISDN line can be optionally datafilled with one LTID or TSP TEI to support both B-channels.

Service profile identifier

The service profile identifier (SPID) is used to map an LTID or TSP in the DMS switch to the proper CPE connected to the ISDN loop. SPIDs only support dynamic TEI defined LTIDs. Static TEI LTIDs do not use a SPID. The SPID is used by the CPE to identify the device on the loop and the associated dynamic TEI registered on the loop. After power up, the CPE assigns dynamic TEIs. After the TEI is established between the CPE and the DMS switch, the TA sends a message to the DMS switch and registers the SPID being used on that TEI. If the SPID value matches the SPID defined on an LTID attached to the loop, the DMS switch sends a message back to the CPE that confirms acceptance of the SPID. From that time forward, the DMS switch knows which device is ready to send or receive calls. This level of communication is also known as “Layer 3,” referring to the seven layer OSI model.

BRAMFT terminals

The SPID for Basic Rate Access Meridian Feature Transparency the BRAMFT terminal is defined by the ITU as being composed of 4-20 digits followed by an optional 1-6 digit SPID suffix. In the DMS switch (with NI-1), the SPID is defined by the 10-digit DN assigned to the LTID as follows:

NPA + Nxx + xxxx = SPID. For example, 919555123400.

The SPID suffix is an extension to the SPID. The SPID suffix is only required on an LTID that supports advanced DN features, like shared DN appearances. If a SPID suffix is defined on an LTID, it must also be matched in the CPE. Most operating companies that implement SPID suffixes use a two-digit number as the SPID suffix.

For example, 91955512340100. In this example, 00 is the SPID suffix.

> ***Note:*** In release NA009 the SPID suffix has been replaced with the TSPID for all LTIDs except those associated with Meridian Feature Transparency.

BRAFS

In release NA009, the SPID format and procedure for assigning a SPID are changed for basic rate access functional set (BRAFS) terminals. The SPID format (using the Free Format feature) is introduced, which provides for SPIDs of 3-20 digits. Each terminal is assigned a terminal service profile identifier (TSPID) of 1-18 digits. The SPID is made up of the TSPID plus a 2-digit terminal identifier (TID). BRAFS terminals are assigned a SPID manually or by using the Automated SPID selection feature.

Automated SPID selection

The Automated SPID selection feature is used in conjunction with the free format SPID to automatically select a SPID value of 3-20 digits (a TSPID of 1-18 digits plus a 2-digit TID). A BRI CPE initiates an automated SPID selection request by sending a Q.931 INFOrmation message to the network with the SPID information element (IE) encoded to the universal SPID (value = 01010101010101). If the AUTOSPID parameter in table ISDNVAR is set to OFF, the request is rejected and the SPID must be assigned manually.

If AUTOSPID is set to ON and the requesting terminal is an initializing type terminal, the AUTOSPID selection is allowed to continue. The network returns the SPID, primary directory number, and all call types available for each LTID to the requesting terminal. The DMS switch returns this information in a series of Q.931 INFOrmation messages with the null call reference. The DMS switch sends one Q.931 INFOrmation message with each SPID on the interface. If the request is from a non-initializing terminal, the DMS switch denies the request.

When an interface supports both non-initializing terminals and initializing terminals, the network sends the SPIDs associated with each of the initializing terminals to the requestor.

If the DMS switch receives an automated request from a terminal that is already initialized, the network processes the request, but the SPID that the terminal is currently using is marked as unavailable.

Automated SPID requests take precedence over requests for Layer 3 initialization. If a terminal attempts to initialize while automated SPID selection is occurring, the Layer 3 initialization attempt is rejected.

Terminal identifier

The terminal identifier (TID) is an extension of the SPID that is defined in the CPE. The TID is not defined on the DMS-100 switch, but must be defined in the CPE. The CPE sends the TID to the DMS switch as a part of the SPID. The TID is composed of two digits (00-62) and is usually defined in the CPE as the last two digits of the SPID.

The complete SPID that must be datafilled in the CPE is a combination of the TSPID + TID. Many operating companies set default values for the SPID suffix and the TID to help reduce the complexity of the identifier.

Directory numbers

The public network uses directory numbers (DN) to route calls to the proper destinations. In ISDN, DNs are used by both the DMS switch and the ISDN terminal in call messaging from one to the other. For this reason, the DMS switch and the CPE must each be datafilled with the appropriate DNs for services on the associated LTIDs.

Fully initializing terminals and non-initializing terminals

With NI-1, the FIT was the only type of ISDN terminal interface available on the DMS-100 platform. The LTIDs, DNs, and features for both B-channels had to each be provisioned separately and then attached to a single line equipment number (LEN). This type of interface is described as a 1B FIT.

With release NA007 and National ISDN 2/3, a two B-channel terminal interface was introduced on the DMS-100. If the CPE supports this interface, both B-channels associated with an ISDN line can be provisioned using only one LTID and one DN. For example, a single DN can be used for simultaneous voice and data on a single CPE. In terms of layer 2, the two-B-channel terminal can be supported by a single TEI. As of NA008, two B-channel access is supported for EKTS, EKTS CACH, and non-EKTS terminals

In addition to adding two B support for FITs with NA007, a non-initializing terminal (NIT) interface is also introduced. With NITs, the terminal establishes a TEI to communicate, but does not use a SPID. NITs supports 1B-channel as well as the 2B-channel terminal interface.

Prior to NA007, only 1B FITs were supported on an ISDN line. With NA007, 2B FITs, 1B NITs, and 2B NITs are supported. Provisioning for the new terminal interfaces is added without any adverse effect to previous flow-though.

With NA008, you can provision up to eight NITs or two B-channel FITs on a loop. NA008 supports a single DN and TEI for both B-channels and D-packet. With NA009, you can provision up to eight any combination of FITs and NITs on one LEN.

ISDN parameter downloading

Parameter downloading (PD) is part of an overall NI-2 BRI development program. PD involves transferring of subscribed services information from the DMS switch to an ISDN terminal. The ISDN terminal stores the downloaded information to provide the user's requested services. Without PD, the user would be required to manually enter the information in the terminal. The PD feature allows the DMS switch to program the terminal for the user, resulting in the terminal and DMS switch being synchronized.

ISDN parameter downloading notification

NOTIFY messages are sent in response to PD-related data changes made by the service order system (SERVORD), the table editor, or the data modification processor (DMOPRO).

If multiple PD-related changes occur for the same terminal within a 5-minute interval, an effort is made to avoid sending a separate message for each change. Depending on when the changes occur, as few as one NOTIFY message is sent for the sequence of changes.

If the line concentrating device (LCD) serving a terminal is not in service when a PD-related data change occurs, the message is not sent until the LCD is restored to service. The LCD is not in-service if either both units of the LCD are not in-service or both units of the extended peripheral module (XPM) are not in-service.

If Q.931 message communication is not working when a PD-related data change occurs, the NOTIFY message is not sent until communication is restored.

NOTIFY messages are not sent for PD-related data changes occurring as part of one night processing (ONP).

Parameter downloading changes for NA010

In NA010, enhancements to parameter downloading results in the downloading in a single message the parameter information to a terminal assigned a single directory number (DN) for both electronic key telephone service (EKTS) and circuit mode data (CMD).

The parameter downloading enhancements cause the DMS switching system to continue searching until all appearances of the DN are found, and then send a single message to the terminal. Before NA010, a separate message was sent for each appearance of the DN found on the terminal.

Message protocols for parameter downloads

Since the messages downloaded to the DN appearance and call appearance identifier (CAPI) use the same format, the same message can be sent to both to convey the required information. This change is compliant with SR-3339 which specifies national integrated services digital network (NI) basic rate interface (BRI) terminal guidelines. There are no changes to the following message format. The content of the combined message format is sent using the existing formats shown in Table 3-1 .

Table 3-1 Parameter data downloaded to terminal

Message information	Current implementation
SME feature	DN and CAPI
SCP event	DN and CAPI
Version_2 Bool	DN and CAPI
Parameter Download Status	DN and CAPI
Originating DN Bool	DN and CAPI
DN Appearance Count	DN and CAPI
Directory DN	DN and CAPI
Bearer Capability List	DN and CAPI
CRBL for Voice and Data (see note 1)	DN and CAPI
CACH Count	DN and CAPI
FAFI_VI	DN and CAPI
FAFI_CMD	DN and CAPI
Default Bearer Capability Type for each DN appearance	DN only
CARES Present Bool	DN and CAPI
CARES Type	DN and CAPI
DN Appearance ID (see note 2)	DN only
Call Appearance ID (see note 3)	CAPI only

Note 1: Not provided for EKTS VI appearances

Note 2: Includes information on all CMD appearances on terminal

Note 3: Includes information on all MADN VI appearances on terminal

4 Features available to ISDN terminals

Introduction

This chapter provides a summary of the features available to National ISDN -1 terminals, 2B-channel terminals, and National ISDN-2 terminals, with or without EKTS service.

Descriptions and further information on the features covered in this document can be obtained by referencing the following documents:

- *DMS SuperNode Meridian Digital Centrex Feature Librar*y, Issue 2, December 1996
- *DMS-100/DMS-500 Systems Feature Planning Guide Year 2000*
- *ISDN Service Order for ISDN Terminals Reference Manual*, Standard 24.01, September 2000

The listed documents can be obtained by contacting Nortel Networks at 1-800-4NORTEL.

This document represents a planning view of the ISDN features available to the different terminal types. The intent is to update this document at each new DMS-100 switch software release.

Background

As Nortel Networks increases the DMS-100 switch's level of compliance to the National ISDN standards, some of the new capabilities introduced are not available to the NI-1 terminal service profile (TSP). This is due to differences in data structures and service definitions for NI-1 and NI-2 terminals. These differences do not affect customer premises equipment (CPE). CPE that supports the NI-1 level of service, continues to operate on the NI-1 TSP. CPE that is NI-2 compatible, can have data entered as an NI-2 TSP and be able to access new NI-2 capabilities.

Beginning with NA009, ISDN BRI lines can be provisioned either in a Meridian Digital Centrex (MDC) customer group or in the Residential Enhanced Services (RES) group. The following tables describe any specific restrictions placed on features that make them available for assignment only to ISDN BRI lines that are part of a MDC group or the RES group.

The set of tables in this chapter only list the feature capabilities that are available to fully initializing terminal (FIT) types. Nortel Networks provides three types of FITs:

- NI-1 TSP
- 2B-channel TSP
- NI-2 TSP

In terms of the features which they support there are very few differences between the NI-1 and the 2B-channel TSPs. For this reason, they share a single column in the following tables. This common column notes the key differences between NI-1 and 2B terminals.

The NI-2 TSP has a separate column because there are some differences between NI-2 and NI-1 terminals. These differences resulted from the introduction of new “busy” definitions used to support:

- DN/CT busy limits
- B-channel busy throttling with associated groups
- ISDN lines associated with more than 2 B-channel terminals

An additional key difference between NI-2 terminals and NI-1 and 2-B-channel TSPs is that only NI-2 terminals support standardized Bellcore Parameter Downloading.

The number of differences between NI-1 and NI-2 TSPs is minimal when compared to the total number of features common to both.

Both the NI-1 and NI-2 TSPs have the option to subscribe to EKTS. The column called “Notes, Applicability to EKTS Terminals and MADN DNs” lists the terminal and feature differences for shared EKTS (MADN) DNs.

Table description

In the following tables, each row contains a DMS-100 switch access or system feature available to ISDN BRI terminals. The following headings are used for the columns in the tables.

Feature title and feature number—lists DMS-100 access or system feature names (in alphabetical order) available to ISDN BRI terminals. The feature title and feature number are identical to those listed in the MDC feature library and the *DMS-100/DMS-500 Systems Feature Planning Guide Year 2000*. The MDC feature library is available online at http://www.nortel.com/pcnprods/mdc/library/isdn/index.html. Other features come from the *DMS-100 Service Order Reference Manual*, 297-8001-8081, and do not have a feature number. Feature package numbers are included where applicable.

DMS-100 parameter— provides the DMS-100 switch provisioning keyword name for features that can be assigned to a line, a terminal, or a DN.

A parameter is not listed for one of the following reasons:

- The feature is a system level capability that does not require keyword assignment.
- The feature is assigned at the customer group level.
- The information was not available at the time of publication.

NI-1 terminal and 2B terminal—identifies features that can be assigned to NI-1 and 2B terminals.

NI-2 terminal—identifies the features that are available to NI-2 terminals.

NI-2 EKTS CACH terminal—indicates the feature, such as CRBL, is available to NI-2 CACH terminals with a non-MADN DN assigned to the PDN.

NI-2 EKTS CACH w/MADN—indicates that the feature is available to NI-2 CACH terminals with a MADN DN. MADN sharing provides the capability for a single call appearance of a DN to be shared across multiple EKTS TSPs. An example of MADN sharing is MADN SCA. MADN CACH DN sharing provides the capability of sharing multiple appearances of a DN.

The "Basic" and "CACH" EKTS options can be assigned to an NI-1, 2 B-channel, or NI-2 LTID/TSP. Only NI-2 LTID/TSPs fully support subscription of multiple appearances of MADN CACH DN sharing. Assigning the CACH option to any of the above LTID/TSP types configures the protocol to use EKTS CACH signaling. However, the EKTS sharing service on an NI-1 or 2B-channel LTID/TSP is limited to a single MADN call appearance.

Some features are not provisionable on MADN CACH DNs. This is indicated by a "NO" entered in the MADN column of the matrix. In some cases, the feature is available to MADN SCA DNs. This is indicated by a note associated with the entry "NO" in column, "NI-2 EKTS CACH w/MADN."

Some features are assigned only to the primary member of a MADN. The primary member of a MADN DN is distinct from the primary DN on a terminal. The primary number of a MADN is the DMS provisioning point for the DN. For MADN CACH DNs this member is designated as the CACH controller. For MADN SCA it is designated as the primary member. DN/CT based features assigned to the primary DN apply to all members of the DN. This is generally applicable to terminating features such as Call Forwarding. These features are indicated with a YES in the MADN column and a note in the notes column.

Some features are restricted to use by the primary or controlling member of a MADN. These are identified in the MADN column with the COF notation. COF stands for controller only function.

Restrictions for MADN DN provisioning are the same for all terminal types. Even though MADN CACH is provisionable on an NI-1 or 2B terminal, those DNs do not have any additional functionality. Call processing for MADN CACH DNs is only available to customers of the NI0000051 SOC option. Customers that do not have the SOC option will not be able to make calls on MADN CACH DNs.

> ***Note 1:*** This column provides notes on the differences between the NI-1, 2B-channel, and NI-2 terminal types. It also contains explanatory text on features or the DMS-100 provisioning parameters.
>
> ***Note 2:*** Any restrictions for RES or CENTREX features are also indicated in this column.

Table 4-1 lists ISDN BRI features introduced in NA014. Table 4-2 lists packet handler features introduced in NA014. Table 4-3 lists ISDN BRI features introduced up to and including NA012. Table 4-4 lists packet handler features introduced up to and including NA012.

Table 4-1 NA014 ISDN BRI features

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
NI-2 Uniform Display Features	59005970 (NI000052)		Yes	Yes	Yes	Yes	Applies to EKTS MADN CACH and SCA DNs.

Table 4-2 NA014 Packet Handler features

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
On-demand B-channel (ODB)	59013206 59013267 59013271 (NI000052)		N/A	Yes	N/A	N/A	Does not apply to EKTS MADN CACH and SCA DNs. These are packet handler features.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 1 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
BRI access, call control, and signaling							
ISDN BRI Layer 1	(NI000008)	–	Yes	Yes	Yes	Yes	GR-303 interface. NI-2 not supported until NA009.
ISDN BRI Layer 2	AL2277 AJ0164 AR0041 (NI000008)	–	Yes	Yes	Yes	Yes	
BRI Circuit-Mode Call Control	AC0329 AF3604 AJ0812 AR0042 (NI00008)	–	Yes	Yes	Yes	Yes	
BRI Terminal Initialization	AR0041 (NI000008) AF7448 (NI000061)	DEFTERM	Yes	Yes	Yes	Yes	DEFTERM = N; parameter introduced in NA007. AF7448 provides automatic lamp refresh after initialization.
Service Profile Identifier	AF7240 (NI000052)	TSPID	Yes	Yes	Yes	Yes	Replaces SPIDSFX + Primary DN in NA009.
Parameter Downloading	AF6632 (NI000051)	–	No	Yes	Yes	Yes	Applicable to NI-2 provisioned terminals only.
Parameter Downloading-Version 2 (Extensions for Virtual Key Service)	AF6632 (NI000051)	–	No	Yes	Yes	Yes	Applicable to NI-2 provisioned terminals only.
Download Additional Data for Softkey Operations-Parameter Downloading-Version 2.1	AF6632 (NI000051)	–	No	Yes	Yes	Yes	Applicable to NI-2 provisioned terminals only.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 2 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
DN Call Appearance Key Independence (CRBL Key Decoupling)	AF7485 (NI000052)	NDNAP	No	Yes	Yes	Yes	EKTS MADN CACH DNs do not use CRBL. Available in NA011.
Service Profile Management (SPM)	AC0451 (NI000008)	–	Yes	No	No	No	Applicable to NI-1 provisioned terminals only. NI-2 provisioned terminals use Parameter Downloading.
Automatic SPID	AF7240 (NI000060)	–	Yes	Yes	Yes	Yes	Available in NA009
Default Services for Terminals	AF7346 (NI000051)	–	Yes	Yes	Yes	Yes	Not applicable to 2B CMD-only terminals.
D-channel Message Performance Monitoring and Control	AF7461 (NI000061)		Yes	Yes	Yes	Yes	Rapid Messaging. Feature is available in NA010.
BRI Interworking with SS7	AC0249 AC0250 AC0251 AG0671 AG2001 AG2211 AF3243 (NI000008)	–	Yes	Yes	Yes	Yes	
Uniform Interface Configurations for BRI							
Single User with Multiple Applications	AC0097 (NI000051)		Yes	Yes	Yes	Yes	
Two users sharing a BRI	AC0097 (NI000051)		Yes	Yes	Yes	Yes	

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 3 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
More than 2 B-channel terminals on a BRI	AF7327 (NI000052)		No	Yes	Yes	Yes	Available only using NI-2 provisioning. Feature available in NA009.
Associated Group Indicator	(NI000051)	AGA	NI-1 No 2B Yes	Yes	Yes	Yes	Associated Groups on an LTID basis.
B-channel Access Restriction on a TSP	AF7326 (NI000060)	AGA	No	Yes	Yes	Yes	Associated Groups on an LTID basis.
DN Sharing over Multiple Call Types on an Integrated Terminal	AF6733 (NI000050) AF6778 (NI000051) AF7455 (NI000052)		NI-1 No 2B Yes	Yes	Yes	Yes	NA007 CMD and VI only, NA008 added PMD, NA010 added CMD for MADN CACH DNs.
Non-initializing Terminals	AF6461 (NI000050) AF6788 (NI000052)	DEFTERM	Yes	Yes	N/A	N/A	EKTS terminals require initialization. AF6461 (NA007) provides circuit-mode NITs; AF6788 (NA009) provides packet-mode NITs.
Assignment of Feature Keys to Default TSP (NITs)	AF6461 (NI000050)	–	Yes	Yes	N/A	N/A	Not applicable to EKTS terminals, since they require initialization.
Features Available to NITs: Message Service	AF6461 (NI000050)	MWT	Yes	Yes	N/A	N/A	EKTS terminals require initialization.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 4 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Features Available to NITs: Flexible Calling	AF6461 (NI000050)	FC CONFSIZE DROP TRANSFER	Yes	Yes	N/A	N/A	EKTS terminals require initialization.
Features Available to NITs: Automatic Callback	AF6619 (NI000051)	ACB	Yes	Yes	N/A	N/A	EKTS terminals require initialization.
Support of Two Simultaneous Voice Calls on Different B-channels from a Single TEI	AF6432 (NI000050)		NI-1 No 2B Yes	Yes	Yes	Yes	Applicable to terminals provisioned as 2B or NI-2 only.
DN Sharing Over Multiple Terminals	AF7328 AF6778 (Ni000061)		No	Yes	Yes	Yes	Applicable only to terminals provisioned as NI-2.
Support of Multiple Non-EKTS DNs on a Single TEI	AJ0165 (NI000008)		Yes	Yes	Yes	Yes	
BRI Features							
EKTS							
EKTS/FLEX Interworking for ISDN	AF7683 (NI00052)	–	Yes	Yes	Yes	Yes	Not provisionable.
Multiple DNs on a terminal	AG1342 (NI000008)	SCA	Yes	N/A	N/A	Yes	
Analog Member of an EKTS Group	(NI000008)	MDN SCA/CACH	Yes	N/A	N/A	Yes	
Multiple DN Appearances/CACH	AF6638 (NI000051)	CACH MDN	Yes	N/A	Yes	Yes	
Hold/Retrieve	(NI000008)	EHLD	Yes	No	No	Yes	
Bridging/DN Bridging	AG1301 (NI00008) AF7683 59005931(NI000052)		Yes	No	No	Yes	AF7683 available in NA011.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 5 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Intercom Calling	AJ0166 (NI000008)	GIC	Yes	Yes	Yes	Yes	
Membership in a Multiline Hunt Group	(NI000008)		Yes	No	Yes	No	Provisioning parameters described in MLHG section. Terminal must be provisioned as EKTS, DN must be non-shared.
Abbreviated and Delayed Ringing	AF1272 AQ0734 (NI000008)	MRF	Yes	No	No	Yes	Also known as MADN Ring Forward.
Automatic Bridged Call Exclusion	(NI000008)	PRV PRL INT_STAT PRL_MODE	Yes	N/A	N/A	Yes	PRV = privacy PRL = privacy release.
Manual Bridged Call Exclusion	(NI000008)	PRV PRL INT_STAT PRL_MODE	Yes	N/A	N/A	Yes	
Allow EKTS DNS and Call Appearances to be Restricted to Originating or Terminating Only	AF6649 (NI000051)	CARES DTM DOR	Yes	No	No	Yes	
Allow EKTS DNs and Call Appearances to be restricted to Originating and Priority Incoming Only	AF6649 (NI000051)	CARES DTM DTMEPI	Yes	No	No	Yes	
EKTS Key Short Hunt	AQ0733 (NI00008)	KSH	Yes	No	No	No	Proprietary DMS feature. Use MADN EKTS CACH to get equivalent function on NI-2.
EKTS NI-2 Service Uniformity	59005931 (NI000052)		Yes	Yes	Yes	Yes	Not provisionable.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 6 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Intercom	AF0166 (NI000008)	MRFM	Yes	No	No	Yes	Proprietary DMS feature.
MADN Ring Forward Manual	AF1272 (NI000008)	MRFM	Yes	No	No	Yes	Proprietary DMS feature. Similar, but not equivalent to Station Ring Transfer.
Call Forwarding							
Call Forwarding Variable	AL0655 AQ0735 F1815 F2549 (NI000008) AF6901 (NI000051)	CFI, CFU, CFXDNCT, CFXVAL	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	CFXDNCT is used for NI-2 with suboptions of CFI, CFU and CFF. CFXVAL is an NI-2 option that provides validation of remote DN.
Courtesy Call	AF6901 (NI000051)	CFXVAL	Yes	Yes	Yes	Yes	Customer group option CFWVAL is used for NI-1.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 7 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Reminder Notification	F3804 (NI000008) AF6901 (NI000051)		Yes	Yes	Yes	Yes	
Redirecting Number	AF7686 (NI000052)		Yes	Yes	Yes	Yes	Available in NA011.
Redirecting Reason	AF7686 (NI000052)		Yes	Yes	Yes	Yes	Available in NA011.
Call Forward Interface Busy	F1815 BC1206 (NI000008) AF6901 (NI000051)	CFB, CBU, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	CFB can forward only to an intragroup DN. CBU can forward to any DN and must be assigned with CFB. CFXDNCT is used for NI-2 only with suboptions of CFB and CBU.
Call Forward Don't Answer	BC1206 BZ0588 AU3099 (NI000008) AF6901 (NI000051)	CFD, CDU, CFDVT, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	CFDVT = don't answer timer CDU can forward to any DN and must be assigned with CFD CFXDNCT is used for NI-2 only with suboptions of CFD and CDU.
Call Forward Variable Customer Group	AL0655 AQ0735 F1815 F2549 (NI000008) AF6901 (NI000051)	CFI, CFU, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	CFXDNCT is used for NI-2 only with suboptions CFU and CFI.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 8 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Call Forwarding Intragroup only	F0410 (NI000008)	CFI	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	Remote DN must be within same customer group. Assign CFI suboption to CFXDNCT feature.
Call Forwarding Busy Group Only	BC0815 F1815 (NI00008) AF6901 (NI000051)	CBE, CFB,CBU, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	Only forward calls coming from within customer group. CBE prevents incoming calls from being forwarded.
Call Forwarding Busy Group Only, Intragroup	BC0815 F1815 (NI000008) AF6901 (NI000051)	CBE, CFB, CBU, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	Only forward calls coming from within customer group. Remote DN must be in customer group.
Call Forward Busy Incoming Only	BC1206 (NI000008) AF6901 (NI000051)	CBI, CFB, CBU, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	CBI prevents intragroup calls being forwarded when CFB and CBU are assigned.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 9 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Call Forward Busy Incoming Only Intragroup	BC1206 (NI00008) AF6901 (NI000051)	CDI,CFB, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	Remote DN must be in customer group.
Call Forwarding Don't Answer Group Only, Intragroup	BC0815 F1815 (NI000008) AF6901 (NI000051)	CDE, CFD, CDU, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	Only forward calls coming from within customer group. CDE prevents incoming calls from being forwarded.
Call Forwarding Don't Answer Group Only, Intragroup	BC0815 F1815 (NI000008) AF6901 (NI000051)	CDE, CFD, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	Only forward calls coming from within customer group. Remote DN must be in customer group.
Call Forward Don't Answer Incoming Only	BC1206 F1815 (NI000008) AF6901 (NI000051)	CDI, CFD, CDU, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	CDI prevents intragroup calls from being forwarded when CFD and optionally CDU are assigned.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 10 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Call Forwarding Don’t Answer Incoming Only Intragroup	BC1206 F1815 (NI000008) AF6901 (NI000051)	CDI, CFD, CFXDNCT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	Remote DN must be in customer group.
Call Forwarding Over Private Facilities-Voice	F1815 (NI000008)		Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	
Call Forwarding Over Private Facilities-Data	F1815 (NI000008)		Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	
Remote Access to ISDN Call Forwarding	AF7685 (NI000052)	CFRA	Yes	Yes	Yes	Yes	
Call Forwarding Fixed	F1815 (NI000008)	CFF, CFXDNCT	Yes	Yes	Yes	Yes	DMS proprietary feature. User can activate and deactivate, but can not program remote DN. ON NI-2 lines, CFF is a suboption of CFXDNCT.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 11 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Call Forward Timed for CFB	AF6278	CFTB	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	DMS proprietary feature. The CFTB option routes forwarded calls that are busy to treatment tone or announce-ment.
Call Forward Timed for CFD	AF6278	CFTD	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	DMS proprietary feature. The CFTD option routes forwarded calls that are answered to treatment after time-out period determined earlier expires.
Denied Call Forwarding	BC1206 (NI000008)	DCF	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	DMS proprietary feature. The DCF option is used to prevent a line from receiving forward calls.
Call Forwarding NI-2 Service Uniformity	59005942 (NI000052)	CFXVAL	No	Yes	Yes	Yes	Yes
ISDN Call Hold							
Hold and Retrieve	(NI000008)	–	Yes	Yes	Yes	Yes	Not provisionable.
B-channel Reservation	(NI000008)	–	Yes	Yes	Yes	Yes	Not provisionable.
Flexible Calling							

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 12 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Three-way and Six-way Conference Calling	AQ0736 AG1301 (NI000008) AF6951 AF6592 (NI000051) AF7683 (NI000052	FC CONFSIZE	Yes	Yes	Yes	Yes	AF7683 available in NA011.
12-, 18-, 24-, and 30-way Conference Calling	AQ0736 (NI000008)	FC CONFSIZE	Yes	Yes	Yes	Yes	
Simultaneously Assign 3-way and 6-way Conference to Controller	AF6593 (NI000051)		Yes	Yes	Yes	Yes	Any two sizes of Flexible Calling may be assigned including: 3, 6, 12,18, 25, or 30.
Consultation Hold	AG1301 (NI000008)		Yes	Yes	Yes	Yes	Always assigned.
Conference Hold and Retrieve	(NI000008)		Yes	Yes	Yes	Yes	Always assigned.
Drop Last Call on Conference	AG1301 (NI000008)	DROP	Yes	Yes	Yes	Yes	
Implicit Call Transfer	AF4848 (NI000008) AF6603 (NI000051)	FC	Yes	Yes	Yes	Yes	
Explicit Call Transfer	AG1301 (NI000008)	XFER	Yes	Yes	Yes	Yes	XFER on NI-1 only.
Explicit Call Transfer	AF6603 (NI000051)	TRANSFER	No	Yes	Yes	Yes	TRANSFER on NI-2 only.
Deactivate conference Facility When Only Two Parties Remain	AF7297 (NI000060)	DCC	Yes	Yes	Yes	Yes	Available in NA009.
Flexible Calling-Three-way Chaining	AF3244 AF4847 (NI000008)		Yes	Yes	Yes	Yes	
Meet-me Conference	BV0477 BV0958 (NI000008)		Yes	Yes	Yes	Yes	

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 13 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Preset Conference	BC0708 AF2014 (NI000008)		Yes	Yes	Yes	Yes	
Additional Call Offering							
Additional Call Offering-Unrestricted	AQ0779 (NI000008)	ACOU	Yes	Yes	NO	No	Not applicable to EKTS DNs by Bellcore definition.
Notification Busy Limit	AQ0779 (NI000008)	NBL	Yes	Yes	No	No	NBL is not applicable to EKTS DNs.
Call Reference Busy Limit	AC0377 (NI000008)	AFC	Yes	Yes	No	No	NI-1 provisioning uses AFC.
Call Reference Busy Limit	AF6658 (NI000051)	CRBL	No	Yes	Yes	No	NI-2 provisioning uses CRBL. EKTS CACH uses CAPIs not CRBL.
Calling Number Identification Services							
Delivery of Network Provided Calling Party Number	AG0981 AG1709 (NI000008) AF6628 (NI000051)	CND	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	AF6628 provides DN-based provisioning.
Privacy of Calling Party Number	AG0923 (NI000008)	SUPPRESS	Yes	Yes	Yes	Yes	
Privacy Change Allowed	AF6627 (NI000051) AF7454 (NI000052)	PCAIDS	Yes	Yes	Yes	Yes	AF7454 provides detailed billing capability.
Ability to Segregate Number Delivery on Inter/Intra -BBG Basis	(NI000008)		Yes	Yes	Yes	Yes	

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 14 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Calling Party Number Subaddress	AJ0814 (NI000008)	PROVCGS	Yes	Yes	Yes	Yes	
Called Party Number Subaddress	AJ0814 (NI000008)	PROVCDS	Yes	Yes	Yes	Yes	
High-layer Compatibility	AJ0814 (NI000008)	PROVHLC	Yes	Yes	Yes	Yes	
Low-layer Compatibility	AJ0814 (NI000008)	PROVLLC	Yes	Yes	Yes	Yes	
Screening	AF3243 (NI000008) AF7223 (NI000052/ NI000051)		Yes	Yes	Yes	Yes	AF7223 available in NA009.
Delivery of Redirecting Number	AR0179 (NI000008) AF7736 (NI000052)	RND ARR	Yes	Yes	Yes	Yes	ARR provides for aggregate AMA records for RND. AF7736 is available in NA011 and provides for delivery of the second redirecting number.
Delivery of Redirecting Reason	AR0179 (NI000008) AF7736 (NI000052)		Yes	Yes	Yes	Yes	AF7736 is available in NA011 and provides for delivery of the second redirecting number.
Privacy of Redirecting Number	59005918 (NI000052						If SUPPRND is not pro- visioned, the SUPPRESS option is used.
Redirecting Number Privacy	AG0923 (NI000008)	SUPPRESS	Yes	Yes	Yes	Yes	Privacy of RN is the same as the privacy of the CPN.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 15 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Redirecting Number and Reason Delivery	AF7736 (NI000052)	RND ARR	Yes	Yes	Yes	Yes	ARR provides for aggregate AMA records for RND.
Redirecting Number and Reason for ISDN Call Forwarding	AF7686 (NI000052)	–	Yes	Yes	Yes	Yes	Not provisionable.
Allow number privacy change to be generally available without subscription	AF6627 (NI000051)		Yes	Yes	Yes	Yes	
ISDN Display Service							
Protocol and Procedures	G0138 AR0179 (NI000008)	REASDSP	Yes	Yes	Yes	Yes	DMS feature is called Name and Reason Display.
Automatic Callback							
Intraswitch	BV0533	RAG	Yes	No	No	No	RAG is NI-1 and 2B only.
Intraswitch	AF6619 (NI000051) AF7684 (NI000052)	ACB	No	Yes	Yes	Yes	Not available on NI-1 and 2B terminals.
Interswitch-Any Designated Call	AC0262	NRAG	Yes	No	No	No	NRAG = Network Ring Again. NRAG is a proprietary DMS feature and is provisionable on NI-1 and 2B terminals only.
Interswitch-Any Designated Call	AF6619 (NI000051) AF7684 (NI000052)	ACB	No	Yes	Yes	Yes	Not available on NI-1 and 2B terminals.
Interswitch-Circuit-mode Data	AF6619 (NI000051)	ACB	No	Yes	Yes	N/A	Not available on NI-1 and 2B terminals.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 16 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
MADN CACH/ACBAR Interworking	AF7684 (NI000052)	ACB AR	No	No	Yes	Yes	Already supported for non-MADN CACH DNs in previous releases.
Message Service							
Audible Message Waiting Indicator	AF7333 (NI000060)	MWT	Yes	Yes	Yes	Yes (COF – Controller only functional-ity)	Specify STD or MWL_STD. Feature available in NA009.
Visual Message Waiting Indicator	BC0816 AJ0432 (NI000008)	MWT	Yes	Yes	Yes	Yes (COF – Controller only functional-ity)	Specify STD or MWL_STD. Feature available in NA009.
Multiline Hunt Group							
Analog in Hunt Group	F1237 (NI000008)		Yes	Yes	Yes	No	
Linear Hunting	F1237 (NI000008)	DNH	Yes	Yes	Yes	No	
Circular Hunting	F1237 (NI000008)	CIR	Yes	Yes	Yes	No	Assign CIR on pilot DN.
Uniform Hunting	F1237 (NI000008)	DLH	Yes	Yes	Yes	No	
Preferential Hunting	F1237 (NI000008)	PRH	Yes	Yes	Yes	No	Assign to GROUPTYPE.
Stop Hunt	F1237 (NI000008)	SHU	Yes	Yes	Yes	No	
Make Busy	BV0936 AL0619 (NI00008)	MSB MBK MSBI	Yes	Yes	Yes	Yes	Also known by feature numbers F1828 and F2964.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 17 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Line Overflow to DN	F1237 (NI000008)	LOD	Yes	Yes	Yes	No	DMS proprietary feature Applicable to Hunt groups only.
Line Overflow to Route	F1237 (NI000008)	LOR	Yes	Yes	Yes	No	DMS proprietary feature Applicable to hunt groups.
Basic Business Group							
Inclusion of Non-ISDN Circuit-mode lines	BV1214 (NI000008)		N/A	N/A	N/A	N/A	
Inclusion of Non-ISDN Circuit-mode Private Facilities	BV1214 (NI000008)		N/A	N/A	N/A	N/A	
Semi-Restricted Originating Access	BV0779 (NI000008)		Yes	Yes	Yes	Yes	Available using NCOS.
Semi-Restricted Terminating Access	(NI000008)	TRC ATRC	Yes	Yes	Yes	Yes	Modify using CHG command.
Semi-Restricted Line	BV0415 BV0416 (NI000008)	TRC ATRC	Yes	Yes	Yes	Yes	Use TRC, ATRC, and NCOS.
Fully-Restricted Originating Access	BV0779 (NI000008)	Yes	Yes	Yes	Yes	Yes	Parameter CRL in table IBNXLA.
Fully-Restricted Terminating Access	BV0415 (NI000008)	DIN	Yes	Yes	Yes	Yes	DMS Denied Incoming feature.
Fully Restricted Line	BV0415 BV0416 (NI000008)		Yes	Yes	Yes	Yes	Parameter CRL in table IBNXLA and NCOS.
Denied Origination	F0199 (NI000008)	DOR	Yes	Yes	Yes	No	For NI-2 EKTS MADN XACH DNs use cares to deny origination.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 18 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Special Intercept Announcement	BV0427 (NI000008)		Yes	Yes	Yes	Yes	FLEX_INTCP T parameter in table IBNXLA.
Denied Termination	F0199 (NI000008)	DTM	Yes	Yes	Yes	Yes	
Simulated Facility Groups for In and Out Calls	F1234 F2359 (NI000008)		Yes	Yes	Yes	Yes	DMS feature is called Virtual Facility Group (parameter VFG in table VIRTGRPS.
Business Group Dial Access Feature							
Manual/Direct Connect	BC0932 BR0805 (NI000008) AF6592 (NI000051)	AUL	Yes	Yes	Yes	Yes	DMS feature name is Automatic Line.
Expensive Route Warning Tone	BV0698 BR0682 (NI000008)		Yes	Yes	Yes	Yes	Parameter ERDT in table CUSTHEAD, NCOSOPT in table NCOS, and table IBNRTE.
Business Group Dialing Plan	BV0412 (NI000008)		Yes	Yes	Yes	Yes	Feature number is also known as F0407. Table IBNXLA.
Abbreviated Dialing for Circuit-Mode Calls	BV0412 (NI000008)		Yes	Yes	Yes	Yes	Table IBNXLA.
Intercom Dialing	BV0412 (NI000008)		Yes	Yes	Yes	Yes	Parameter EXTN in table IBNXLA.
Single-Digit Dialing	BV0412 (NI000008)		Yes	Yes	Yes	Yes	Table IBNXLA.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 19 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Attendant Access	AF0507 AJ0507 (NI000008)		Yes	Yes	Yes	Yes	Parameter TRESEL in table IBNXLA.
Speed Dialing Access	F1814 (NI000008)	SCL SCS	Yes	Yes	Yes	Yes	SCL = Speed Call, Long SCS = Speed Call, Short.
Dial Access to Private Facilities	(NI000008)		Yes	Yes	Yes	Yes	NET and PVT parameters in table IBNXLA.
Dial Access to Automatic Flexible Routing	(NI000008)		Yes	Yes	Yes	Yes	Parameter ARS in table IBNRTE.
Customer ACCESS Treatment Code Restrictions	(NI000008)		Yes	Yes	Yes	Yes	Parameter CRL in table CODEBLK.
Code Restriction and Diversion	BV0421 (NI000008)	CTD CRL	Yes	Yes	Yes	Yes	
Direct Outward Dialing	BV0414		Yes	Yes	Yes	Yes	
Direct Inward Dialing	BV0413 (ni000008)		Yes	Yes	Yes	Yes	
ISDN Call Pickup							
ISDN Call Pickup	BC1453 BV0821 AF3554 (NI000008)	CPU	Yes	Yes	Yes	No	Can be assigned to MADN SCA DNs.
Directed Call Pickup Non-Barge-in		DCPU	Yes	Yes	Yes	Yes	
Access to Analog Features							
Multiline Variety Package	BC0954 (NI000008)		Yes	Yes	Yes	Yes	Allows use of POTS dialing plan and Centrex access codes.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 20 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Free Terminating Service	F0203 (NI000008)	FNT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	
Speed Calling	F0419 F1814 (NI000008)	SCU	Yes	Yes	Yes	Yes	SCU = Speed Call User.
Customer-Change-able Speed Calling	F0416 F0417 F1814 (NI000008)	SCL SCS	Yes	Yes	Yes	Yes	SCL = Speed Call, Long SCS = Speed Call, Short.
Remote Call Forwarding	(NI000008)		Yes	Yes	Yes	Yes	Uses Virtual DN (VDNTYPE = RCF or RCFEA in NEWDN command).
Trunk Answer Any Station	BV0445 BV0505 (NI000008)		Yes	Yes	Yes	Yes	
Foreign Exchange Facilities	BV0480 BR0369 (NI000008)		Yes	Yes	Yes	Yes	
800 Service (INWATS)	BV0687 (NI000008)		Yes	Yes	Yes	Yes	
800 Services-Simulated Facility Group (SFG)	BV0687 (NI000008)		Yes	Yes	Yes	Yes	
Regulatory–Two-way WATS	AF1664 (NI000008)		Yes	Yes	Yes	Yes	
Outward Wide Area Telecommunications (OUTWATS)	BV0686 AF1664 (NI000008)		Yes	Yes	Yes	Yes	

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 21 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
OUTWATS Simulated Facility Group	BV0686 AF1664 (NI000008)		Yes	Yes	Yes	Yes	
Tie Facility Access	(NI000008)		Yes	Yes	Yes	Yes	CUTTD in table IBNXLA.
Electronic Tandem Switching (ETS) Access	BV0585 BV0789 (NI000008)		Yes	Yes	Yes	Yes	ETN
Enhanced Private Switched Communication Service Access (EPSCS) Access	F1160 (NI000008)		Yes	Yes	Yes	Yes	
Dial Access to Private Facilities	(NI000008)		Yes	Yes	Yes	Yes	
Tandem Tie Facility Dialing	(NI000008)		Yes	Yes	Yes	Yes	
Radio Paging Access	BV0502 BV0503 (NI000008)		Yes	Yes	Yes	Yes	
Code Calling	BV0501 (NI00008)		Yes	Yes	Yes	Yes	
Loudspeaker Paging	BV0914 (NI000008)		Yes	Yes	Yes	Yes	
Selective Control of Facilities	(NI000008)		Yes	Yes	Yes	Yes	
Deluxe Queuing	(NI000008)		Yes	Yes	Yes	Yes	
Off-hook Queuing	BV0507 BV0967 BV0784 (NI000008)		Yes	Yes	Yes‘	Yes	
On-hook Queuing	BC0931 BV0785 (NI000008)		Yes	No	No	No	DMS feature is Call Back Queuing.
Post-Queue Routing	(NI000008)		Yes	Yes	Yes	Yes	
Priority Queuing	(NI000008)		Yes	Yes	Yes	Yes	CBQSP

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 22 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Service Protection	AF6934 (NI000051)	ELN	Yes	Yes	Yes	Yes	Essential Lines
Automatic Route Selection	G0050 BV0506 AF1097 (NI000008)		Yes	Yes	Yes	Yes	
Deluxe Automatic Route Selection	BV0782 (NI000008)		Yes	Yes	Yes	Yes	Feature also known as F0757.
Automatic Alternate Routing	BV0782 (NI000008)		Yes	Yes	Yes	Yes	Feature also known as F0757.
Uniform Numbering	BV0417 (NI000008)		Yes	Yes	Yes	Yes	
Off-Network to On-Network Conversion	AN0322 (NI000008)		Yes	Yes	Yes	Yes	Provided using Network Access Registers.
On-Network to Off-Network Conversion	(NI000008)		Yes	Yes	Yes	Yes	
Facility Restriction Level	(NI000008)		Yes	Yes	Yes	Yes	
Manual/Time-of-Day Routing Control	BV0791 BV1136 (NI000008)		Yes	Yes	Yes	Yes	Reference features also known as F1183 and F1787.
Authorization Codes for AFR	BR0822 (NI000008)		Yes	Yes	Yes	Yes	
Account Codes for AFR	F0423 (NI000008)		Yes	Yes	Yes	Yes	
Customer Dialed Account Recording (CDAR)	BC1699 BV0493 (NI000008)		Yes	Yes	Yes	Yes	
Attendant Access to Code Calling	F0391 (NI000008)		Yes	Yes	Yes	Yes	
Attendant Conference	F1631 (NI000008)		Yes	Yes	Yes	Yes	

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 23 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Night Service– Attendant	BV0445 BV0688 (NI000008)		Yes	Yes	Yes	Yes	Reference features also known as F1626 and F1265.
Power Failure Transfer– Attendant	(NI000008)		Yes	Yes	Yes	Yes	
Dial Through Attendant	F3792 F3885 (NI000008)		Yes	Yes	Yes	Yes	
Attendant Tie Trunk Busy Verification	F0771 (NI000008)		Yes	Yes	Yes	Yes	
Basic Emergency Service (911)	(NI000008)		Yes	Yes	Yes	Yes	
Tracing of Terminating Calls	BR0320 (NI000008)	CLI	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	
Tandem Call Tracing	(NI000008)		Yes	Yes	Yes	Yes	
Trace of a Call in Progress	BR0320 (NI000008)	CLI	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	
Series Completion	AF2589 (NI000008)	SCMP	Yes	Yes	Yes	No	
Automatic Recall	(NI000051)	AR	No	Yes	Yes	No	

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 24 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Customer Originated Trace	AN0189 (NI000008)	COT	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	
Screen List Editing	AN0189 (NI000008)		Yes	Yes	Yes	No	
Selective Call Acceptance	AN0189	SCA	Yes	Yes	Yes	No	
Selective Call Forwarding	AN0189 (NI000008)	SCF	Yes	Yes	Yes	No	
Selective Call Rejection	AN0189 (NI000008)	SCRJ	Yes	Yes	Yes	No	
Anonymous Call Rejection	(NI000052)	ACRJ	Yes	Yes	Yes	No	
ISDN Calling Name Identification Services							
Calling Name Delivery (TCAP)	AF6640 (NI000051)	CNAMD	Yes	Yes	Yes	No	Bellcore defined feature uses TCAP queries to centralized database.
TCAP Name Delivery for MADN DN	59005587 (NI000052)		Yes	Yes	Yes	No	Applies to EKTS MADN CACH and SCA DNs.
Calling Name Delivery (DMS)	AR0179 (NI000008)	NAMEDISP	Yes	Yes	Yes	Yes	DMS defined feature that uses a switch database for name information.
Calling Number NI-2 Service Uniformity	59005908 (NI000052)		Yes	Yes	Yes	Yes	Not provisionable.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 25 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Calling Identity Delivery and Suppression	AF6627 (NI000051)	CIDSDLV, CIDSSUP	access code only	Yes	Yes	Yes	FA and Access Code for NI-2 terminals.
Privacy Redirecting Number	59005918 (NI000052)	SUPPRND	Yes	Yes	Yes	Yes	
ISDN Delivery Features Deactivation/Reactivation	AF6628 (NI000051) AF7736 (NI000052)	RND	Yes	Yes	Yes	Yes	CNDA and CNDD dial access codes for NI-2 terminals.
Advanced Intelligent Network							
Advanced Intelligent Network	AR0219	AIN	Yes	Yes	Yes	Yes	Provisioning using trigger group provisioning model. See NTP 297-5161-022 for more information on AIN.
Advanced Intelligent Network	AR0219	AINDN	Yes	Yes	Yes	Yes	Provisioning using trigger group provisioning model or trigger item provisioning model. See NTP 297-5161-022 for more information on AIN.
AIN Message Waiting	AU2903 (AIN00240)	AINMWT	Yes	Yes	Yes	Yes	See NTP 297-5161-022 for more information on AIN.
+XX Trigger Call (for example: second feature translator)		XXTRG	Yes	Yes	Yes	Yes	See NTP 297-5161-022 for more information on AIN.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 26 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Other Services							
Access Feature Grouping	AG1162 AG1866 (NI000008)		Yes	Yes	Yes	Yes	
Asynchronous Diagnostics	AF7691 (NI000052)	–	Yes	Yes	Yes	Yes	Not provisionable. Available in NA011.
Authorization Codes	BV0494 BR0524 (NI000008)		Yes	Yes	Yes	Yes	
Automatic Dial	BV0834 (NI00008)	AUD	Yes	Yes	Yes	Yes	
Call Park	BV0938 (NI000008)	PRK	Yes	Yes	Yes	Yes	NI-1 access to analog version of Call Park.
Direct Inward System Access (DISA)	BV0508 AD0729 BV1543 (NI000008)		Yes	Yes	Yes	Yes	
Do Not Disturb	BC0933 (NI000008)	DND	Yes	Yes	No	No	Feature also known as F1153.
Executive Busy Override	BV0949 F1848 AF1923 (NI000008)	EBO	Yes	Yes	Yes	Yes	EBO activation against MADN CACH group not supported.
Executive Busy Override Exempt	F1270 (NI000008)	EBX	Yes	Yes	Yes	Yes	
Individual Business Line	BV0819 (NI000008)		Yes	Yes	Yes	Yes	
ISDN Translations and Routing (TR0448)	AJ0811 AG2210		Yes	Yes	Yes	Yes	
Last Number Redial	BC1204 (NI000008)	LNR	Yes	Yes	Yes	Yes	
Last Number Redial	AL0556 (NI000008)	LNRA	Yes	Yes	Yes	Yes	

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 27 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Layer 3 Service Disruption	59006381 (NI000052)		Yes	Yes	Yes	Yes	Not assignable
Line Study	(NI000008)	SDY	Yes	Yes	Yes	Yes	Allows an AMA record to be generated for a line complaint observing and or line usage studies.
Modem Pooling	AC0515 AC0547 (NI000008)		Yes	Yes	Yes	Yes	
Music On Hold	AF6655 (NI000051)	KSMOH	Yes	Yes	Yes	Yes	
Release	*NI000008)	RLS	Yes	Yes	Yes	Yes	
Secondary Language	(NI000008)	SL	Yes	Yes	Yes	Yes	
SS7 Support for CFDA Continue Existing Treatment	59006550 (NI000052)		Yes	Yes	Yes	Yes	Customer group option.
User Loop Back Testing (X.25 Echo Station)	59006435 (NI000052)		N/A	N/A	N/A	N/A	Not assignable to terminal. Provisioned by MTCE commands and assigned to XLIU.
Equal Access							
Primary Interexchange Carrier Presubscription	BC1368 AL0289 (NI000008)	PIC	Yes	Yes	Yes	Yes	
IntraLATA Toll PIC	(NI000050)	LPIC	Yes	Yes	Yes	Yes	
Automatic Message Accounting (Usage Measurements for BRI Features)							
Full AMA as described in TR301 and TR862)excluding ACB, ACO, Calling Number Privacy, EKTS, MLHG, CPU)	AF1234 AF3556 (NI00008) AF6709 (NI000051)		Yes	Yes	Yes	Yes	NI-1 (SR-1937) AMA requirements.

Table 4-3 NA012 and earlier ISDN BRI features (Sheet 28 of 28)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	NI-2 EKTS CACH terminal	NI-2 EKTS CACH w/MADN	Notes and applicability to EKTS terminals and MADN DNs
Station Message Detail Recording	BV0463 BR0368 BR0399 AL0427 AF1454 AL0524 (NI000008)	SMDR	Yes	Yes	Yes	Yes	
Uniform Usage Measurements– Basic Business Group Subfeatures	AF7603 AF7504 (NI000052)		Yes	Yes	Yes	Yes	NI-2 (SR-2120) AMA requirements. NA010 feature.
Uniform Usage Measurements– CNIS Billing without Intra-BBG/Inter-BBG Segregation	AF7454 (NI000052)		Yes	Yes	Yes	Yes	NI-2 (SR-2120) AMA requirements NA010 feature.
Terminating Billing option	AF1922 (NI000008)	TBO	Yes	Yes	Yes	Yes *Note*: Assign-ment to MADN controller affects all appear-ances of the DN/CT.	

Table 4-4 NA012 and earlier Packet Handler features (Sheet 1 of 5)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	Notes and applicability to EKTS terminals and MADN DNs
Automatic Packet Resource Assignment			Yes	Yes	
Call Identifier			Yes	Yes	
Called Line Address Modified Notification			Yes	Yes	
Calls Barred-Incoming			Yes	Yes	

Table 4-4 NA012 and earlier Packet Handler features (Sheet 2 of 5)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	Notes and applicability to EKTS terminals and MADN DNs
Calls Barred-Outgoing			Yes	Yes	
CCITT-Specified DTE Facilities			Yes	Yes	
Clearing Network Identification Code			Yes	Yes	
Closed User Group Features			Yes	Yes	
Closed User Group Indication			Yes	Yes	
Default Throughput Class Assignment			Yes	Yes	
DMS Packet Handler Call Processing Base	AL2025		Yes	Yes	
DMS Packet Handler Call Processing Billing Interface	AG2343		Yes	Yes	
DMS Packet Handler E.164 Translations and Routing	AG2327		Yes	Yes	
DMS Packet Handler Hunt	AQ0894		Yes	Yes	
DMS Packet Handler Line Maintenance Interactions	AL2200		Yes	Yes	
DMS Packet Handler on Single-Shelf LPP	AL2753		Yes	Yes	
DMS Packet Handler X.75 Trunk Maintenance I	AL2198		Yes	Yes	
Fast Select			Yes	Yes	
Fast Select Acceptance			Yes	Yes	
Fast Select Indication			Yes	Yes	
Flow Control Parameter Negotiation			Yes	Yes	
Flowthrough Provisioning					
High Level Design for Call Processing	AL1902		Yes	Yes	
HPF LAPB Protocol	AL2059		Yes	Yes	
HPF LAPD Protocol	AL2058		Yes	Yes	

Table 4-4 NA012 and earlier Packet Handler features (Sheet 3 of 5)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	Notes and applicability to EKTS terminals and MADN DNs
Hunt Groups			Yes	Yes	
Interexchange Carrier Preselect			Yes	Yes	
Interexchange Carrier Preselection Indication			Yes	Yes	
ISDN X.25 Basic Service Provisioning	AL2291		Yes	Yes	
ISDN X.25 Supplementary Service Provisioning	AL1616		Yes	Yes	
Local Charging Prevention			Yes	Yes	
Network User Identification			Yes	Yes	
Non-Standard Default Packet Size			Yes	Yes	
Non-Standard Default Window Size			Yes	Yes	
One-way Logical Channels-Outgoing			Yes	Yes	
Packet Resource Re-Assignment					
Packet Size Indication			Yes	Yes	
Packet Terminal Provisioning	AL2125		Yes	Yes	
Permanent Virtual Calls			Yes	Yes	
PVC Type II Billing	AQ1010		Yes	Yes	
Recognized Private Operating Agency (RPOA) Selection			Yes	Yes	
Reverse Charging			Yes	Yes	
Reverse Charging Acceptance			Yes	Yes	
Reverse Charging Indication			Yes	Yes	
RPOA Selection Barred			Yes	Yes	

Table 4-4 NA012 and earlier Packet Handler features (Sheet 4 of 5)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	Notes and applicability to EKTS terminals and MADN DNs
SERVORD for the DMS Packet Handler	AL2289		Yes	Yes	
Special Connections for the DMS Packet Handler	AL2326		Yes	Yes	
Switched Virtual Calls			Yes	Yes	
Tariff			Yes	Yes	
Operating company-Determined Parameter Defaults	AQ1008		Yes	Yes	
Throughput Class Indication			Yes	Yes	
Throughput Class Negotiation			Yes	Yes	
Transit Delay Indication			Yes	Yes	
Transit Delay Indication and Selection			Yes	Yes	
Transit Network Identification Code			Yes	Yes	
User Self Testing Capabilities			Yes	Yes	
Utility Marker			Yes	Yes	
Window Size Indication			Yes	Yes	
X.121 Translations on DMS-100	AQ0956		Yes	Yes	
X.25/X.75 Services Interface	AL2066		Yes	Yes	
X.75 Basic and Supplementary Service Data	AL2127		Yes	Yes	
X.75 Interface Identifier					
X.75 Service Assignment	AJ1833		Yes	Yes	
X.75 Trunk Data	AL2126		Yes	Yes	
XLIU Loads and Maintenance	AL1906		Yes	Yes	

Table 4-4 NA012 and earlier Packet Handler features (Sheet 5 of 5)

Feature title	Feature number	DMS-100 parameter	NI-1 terminal and 2B terminal	NI-2 terminal	Notes and applicability to EKTS terminals and MADN DNs
XLIU Maintenance I	AL1615		Yes	Yes	
XLIU X.25, X.75, and X.75' Protocols	AL2067		Yes	Yes	

Part II
Functional description

"Part II: Functional description" contains chapter "5. National ISDN BRI terminals."

5 National ISDN BRI terminals

Introduction

Nortel offers one family of voice/data ISDN business sets: the Meridian series which uses Bellcore-compliant functional signaling. The BitSURFR family of terminal adapters, manufactured by Motorola, makes many current computers and analog devices compatible with an ISDN line. The network termination 1 (NT1) device is required for most ISDN lines between the CPE and the wall jack.

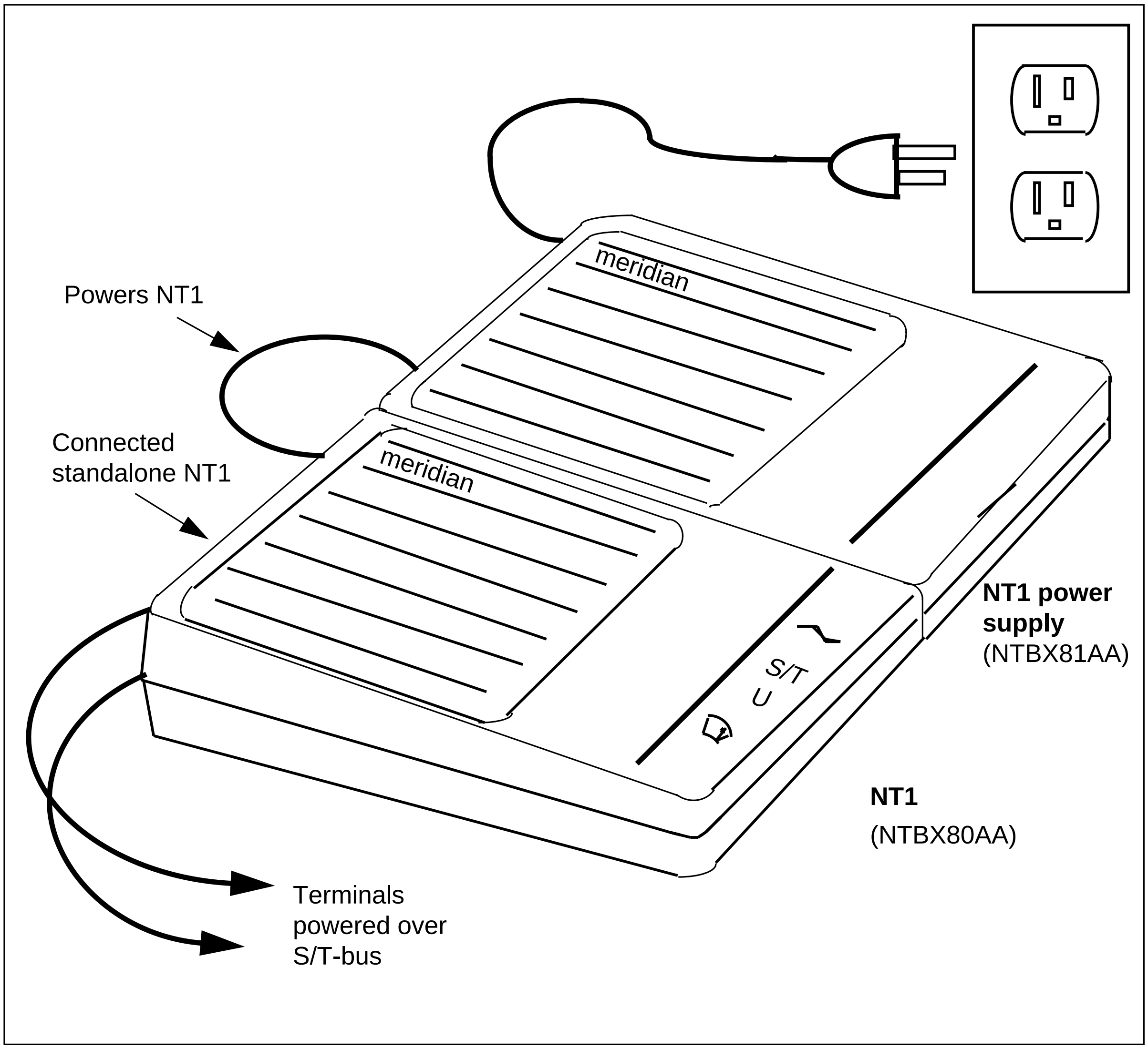
Network termination 1 products

An NT1 device is the interface between the four-wire passive bus (from the terminals) and the two-wire loop (to the line card). Nortel’s 2B1Q NT1 offers optional terminal powering and battery backup options that can simplify wiring and increase network reliability.

NTBX81AA standalone NT1 and power supply

The 2B1Q NT1 is placed on the user’s desktop or near the desk (see Figure 5-1). Through its two S/T-interface connectors, it supports both voice and data ISDN terminals. With its power supply, the NT1 can deliver a maximum of 10 W of combined power to the connected terminals. The NTBX81AA was manufacture retired June 30, 1996.

Figure 5-1 NT1 with connected 10-W power supply (NTBX81AA)



A 2-W power supply—A0381081—provides a low-cost alternative to the NTBX81AA for standalone NT1 users. It provides power only for the NT1; no S/T-bus terminal powering is provided.

NT1 powering

There are two commonly used methods of providing power to an ISDN terminal from an NT1, referred to as power source 1 (PS1) and power source 2 (PS2):

- PS1 (also known as “phantom power”) delivers terminal power over the transmit and receive wire pair.
- PS2 (also known as “auxiliary power”) delivers terminal power over an additional wire pair in the cable.

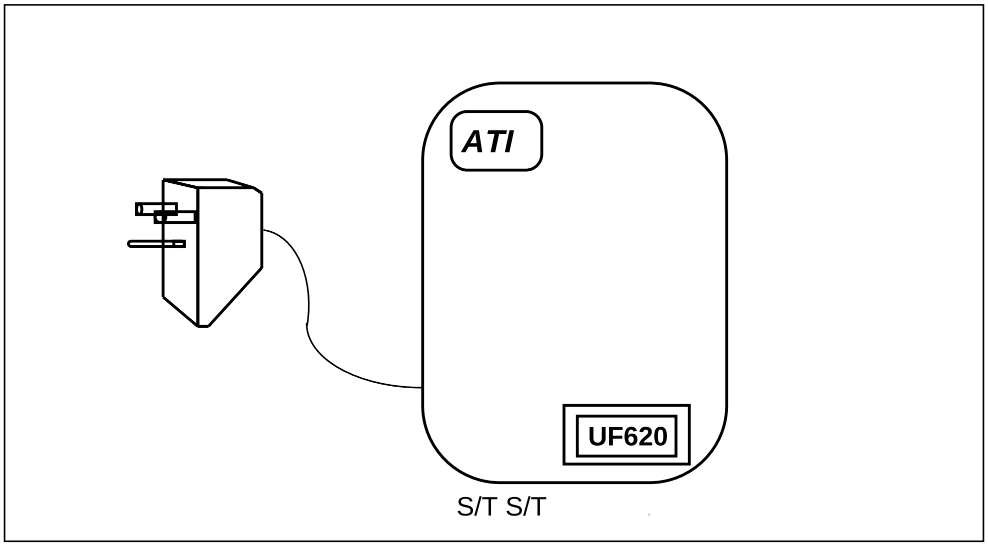
The 2B1Q NT1, through the NTBX81AA power supply, can provide PS1 or PS2 power to the connected ISDN terminals.

The standalone NT1 and NTBX81AA power supply are FCC, Class B compliant.

UT620 standalone NT1 and power supply

Nortel began offering the UT620 ISDN NT1 (manufactured by Alpha Telecom, Inc.) July 1, 1996 (see Figure 5-2). This product is packaged with a 10-W power supply (order number TEC01910), or a 2-W power supply (order number TEC01903).

Figure 5-2 Alpha Telecom, Inc. standalone NT1



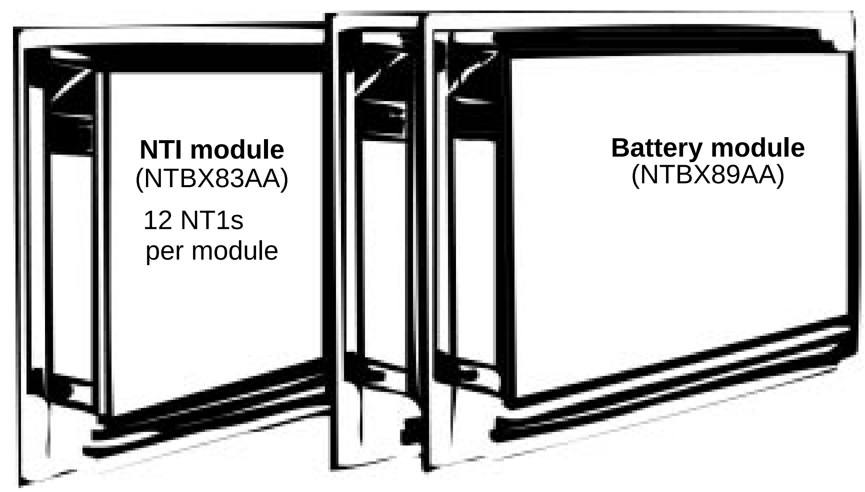
Rackmount NT1, power supply, and battery backup

The rackmount NT1 can be attached flush to a wall or inserted into an NT1 rackmount shelf that is installed on a standard 19-in. rack. The NT1 module (NTBX83AA) houses up to 12 NT1 units that can support either the basic passive bus configurations or the Star configuration with two S/T-interfaces.

The Star configuration enables a subscriber to extend loop lengths from the NT1 to the user's desktop ISDN terminal.

The rackmount configuration is available with an optional battery backup module to sustain the power module if commercial power is lost. This approach assures continuous service to the ISDN user. The rackmount product is shown in Figure 5-3.

Figure 5-3 NTI rackmount unit



M5317TDX

Nortel offers the M5317TDX ISDN Business Set, shown in Figure 5-4 and 5-5, with 12 line/feature keys, 5 context-sensitive softkeys, and an 80-character display. The M5317TDX is compliant with Bellcore National ISDN standards.

Current Firmware Version—The current firmware version for the M5317TDX is 3.3B. To identify the firmware version number and date on the M5317TDX, start from the SETUP menu and press the More softkey. Press the Version softkey. The version shown is the firmware release of the telephone set. The date indicates when the release was applied. Press the Exit softkey to return to the SETUP menu. Upgrades may be purchased by contacting your Nortel Sales Representative.

> ***Note:*** All M5317 sets at a release 2 level are eligible for a no-charge upgrade to release 3.3B. Please contact the Nortel warranty and repair department at 1-800-251-1758.

Advanced Display Features—The M5317TX display is 2 lines of 40 characters each. The display accommodates advanced ISDN display features, such as Call Progress information, Calling Name and Number Delivery, and Call Forwarding information. It also displays the time and date and the calling numbers of the last 10 incoming unanswered calls.

The second LCD line displays the soft key functions, which are context-sensitive and change to accommodate different calling situations. Soft keys help guide the user step-by-step through feature activation.

The M5317TX is a full-featured voice set that can be upgraded in the field to an M5317TDX. The M5317TDX has a data card with a DB-25/RS-232C interface that can be connected to the serial port of a computer or to a data terminal. The data card also includes a headset jack.

The following are M5317TDX features:

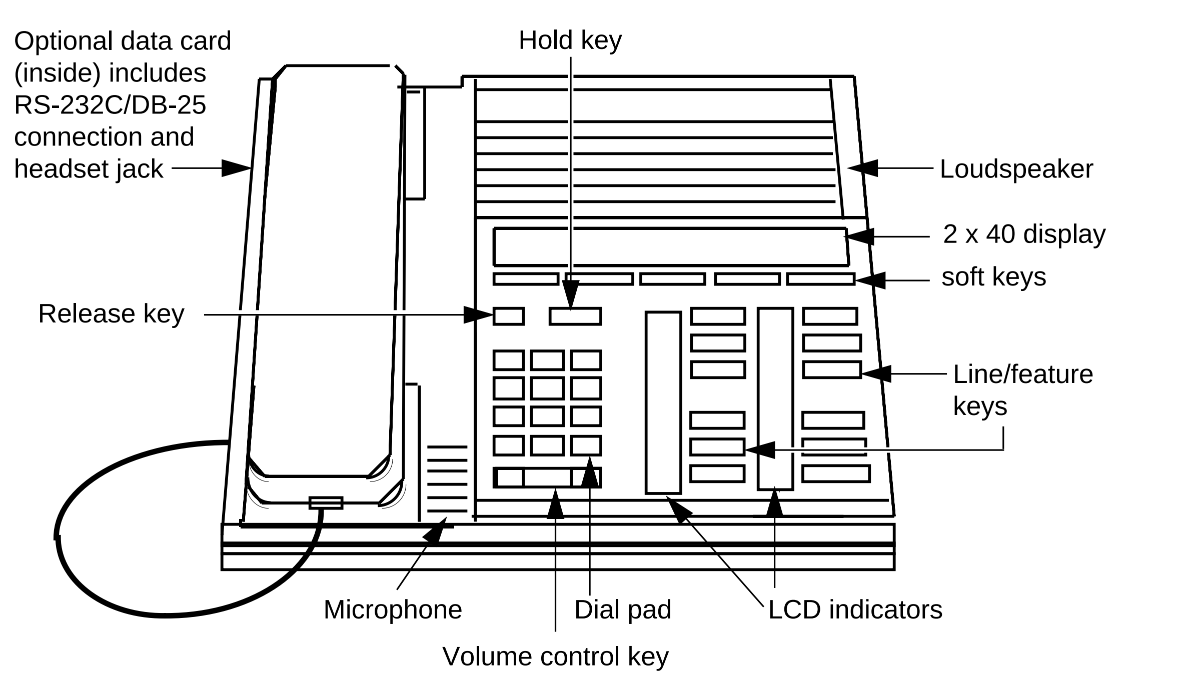
- D-channel packet-data capabilities at up to 9.6 kbit/s
- B-channel circuit-data capabilities at 300 kbit/s through 19.2 kbit/s
- firmware upgrades done by downloading data over the ISDN telephone line without the need to dispatch operating company personnel to physically upgrade the set
- automated feature downloading (SPM) from the DMS-100 switch

Other capabilities include

- INSPECT feature to query the status of call appearances—ringing with Calling Line ID, held, and active calls can be identified
- V.120 rate adaptation for circuit-switched data
- Hayes AT command set
- user-selectable data transmit bearer capability of 56 kbit/s or 64 kbit/s unrestricted data
- break key support for data
- 1B+D capability that allows each of two sets to have a single circuit-switched B-channel, and both sets have access to the D-channel for packet data
- instant protocol recognition that allows the set to determine the rate adaptation protocol at the far end, facilitating rate adaptation synchronization and speeding up the initiation of data transfer
- European Telecommunications Standard Institute (ETSI) protocol

The M5317TX/TDX ISDN business set features integrated handsfree and mute operation (for office conferencing and on-hook dialing). It can be powered from an NT1 power source that can be equipped with optional battery backup for service during a power outage.

Figure 5-4 M5317TX/TDX ISDN business set



Other local features include date and time display; volume control for handset, speaker, and ringing; four optional ringing frequencies and cadences; automatic keys for one-touch dialing; pre-dial editing of called number; and display contrast adjustment.

Multiple directory numbers and single-key feature access

The M5317TX/TDX/TDE have 11 line/feature keys that can be assigned directory numbers, ISDN Meridian Digital Centrex features, or local automatic dialing keys. Key 12 is assigned by default as Handsfree and Mute.

The multiline capability of the M5317TX/TDX provides full key-system functionality over a single twisted pair. The LCD associated with each directory number key shows idle, ringing, hold, and active states for that line.

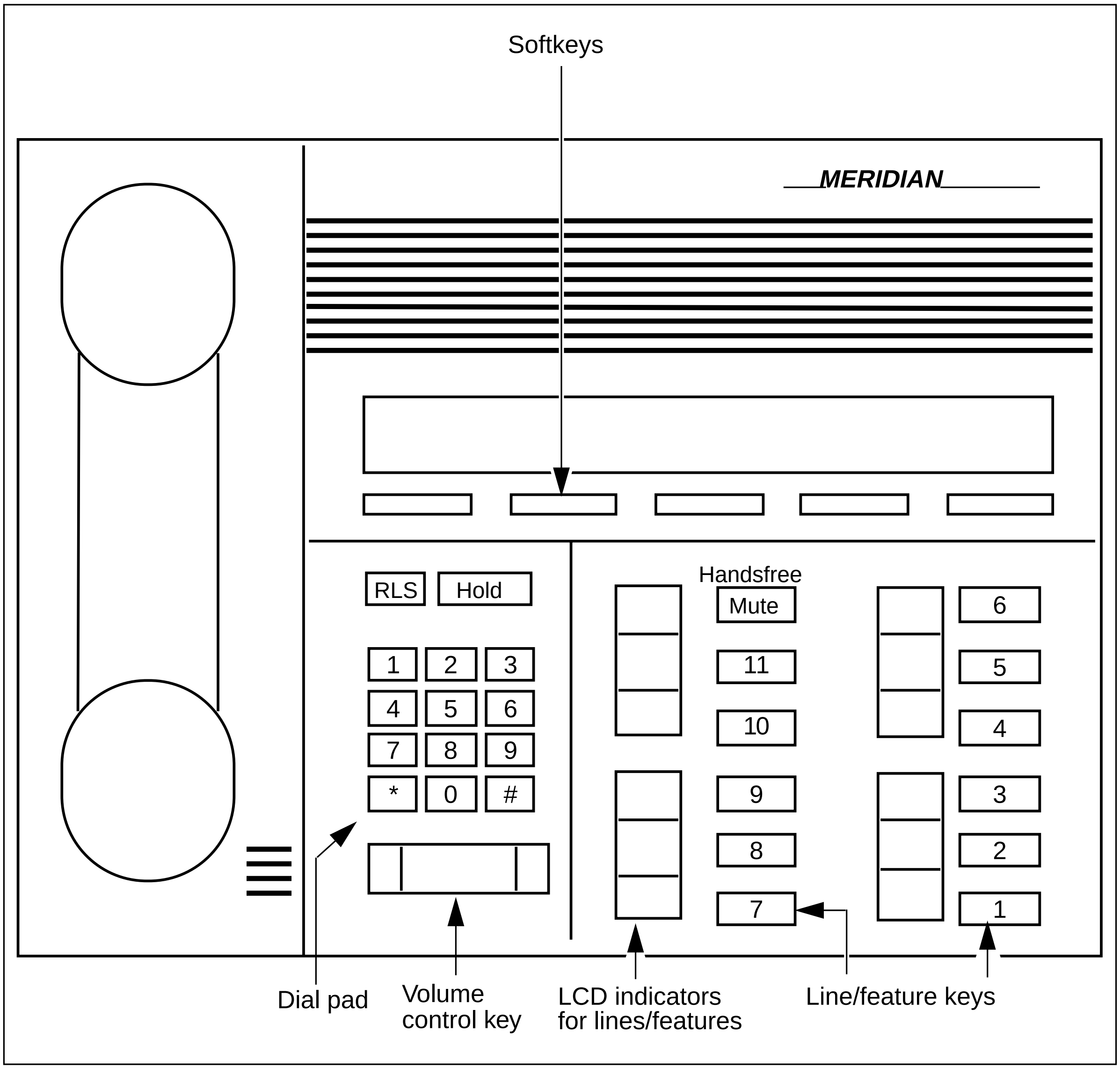
Single-key feature access increases call handling productivity through easy access to ISDN MDC calling features.

The M5317TX/TDX offers many set-resident features, including

- predial—for dialing on-hook before lifting the handset
- automatic number—for quickly dialing a frequently called number by simply pressing a single feature key
- four distinct alerting tones—to help users identify their ring in a busy office environment. The tone can be chosen by the individual user.
- automatic call timing—for each call appearance
- set data retention—(except time and date) during power failure or when the set is unplugged
- Dual Tone Multifrequency (DTMF) tone generation—allows the remote operation of answering machines and other devices controlled by DTMF tones
- local setup mode—for user-performed changes in date and time, and assignment of automatic number keys
- interactive data terminal interface protocol (Hayes AT command set—M5317TDX only)
- B-channel circuit-switched data service (M5317TDX only)—with industry-standard V.120 rate adaptation and the Nortel T-link rate-adaptation protocol
- power-up self-test —performs diagnostic tests for circuitry and display on power-up. The feature also displays appropriate messages, such as the current version release.

The M5317TX/TDX is FCC Class A compliant.

Figure 5-5 M5317 button layout



M5317TDE

Beginning with NA010, Nortel offers the M5317TDE enhanced ISDN Business Set, shown in Figure 5-6 and Figure 5-7. The M5317TDE is a single-line set with multi-line functionality. This allows for simultaneous digital voice and data connections, allowing for interaction with the mainframe or other data sources while maintaining voice conversations. The M5317TDE is compliant with National ISDN 2 standard (NIS-S208-6.03.1). The M5317TDE is designed to deliver National ISDN services not only from the DMS platform but other vendor’s switches as well including those produced by Lucent and Siemens. The M5317TDE can support up to three M518T

18-button add-ons and has EKTS Virtual Keys to allow the customization of call flow resulting in increased call handling speed.

Figure 5-7 shows the M5317TDE ISDN business set which has 12 line/feature keys, 5 context-sensitive softkeys, and a 80 character display.

Figure 5-6 M5317TDE ISDN business set

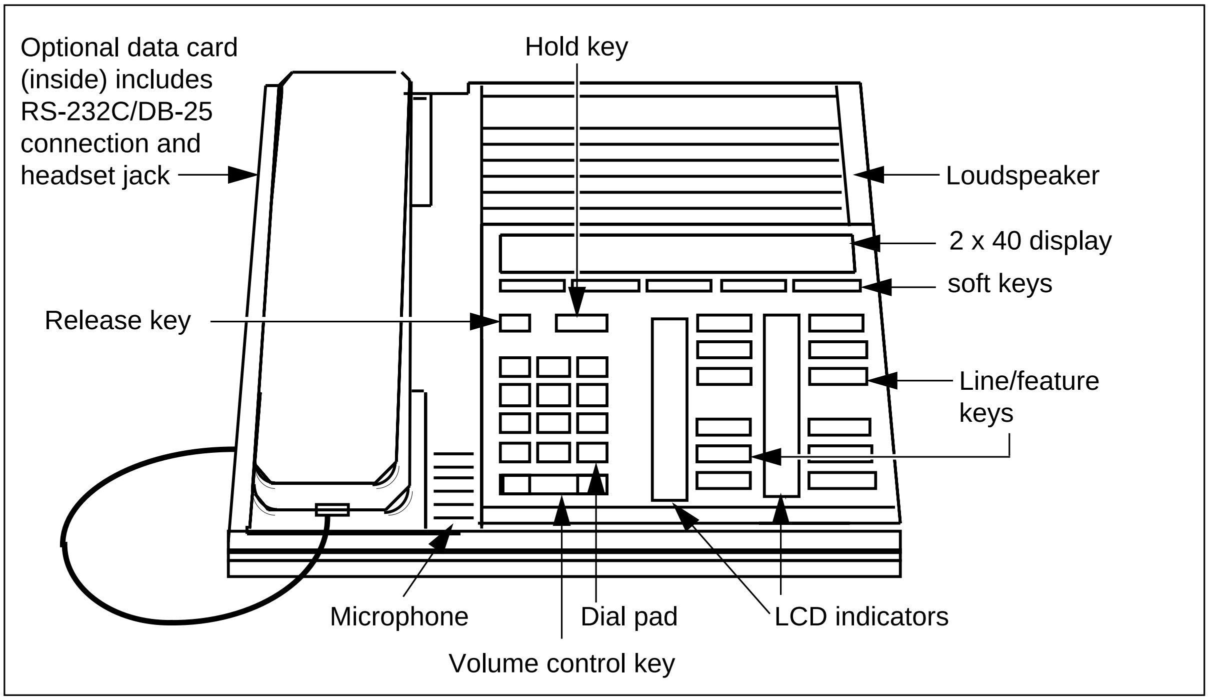
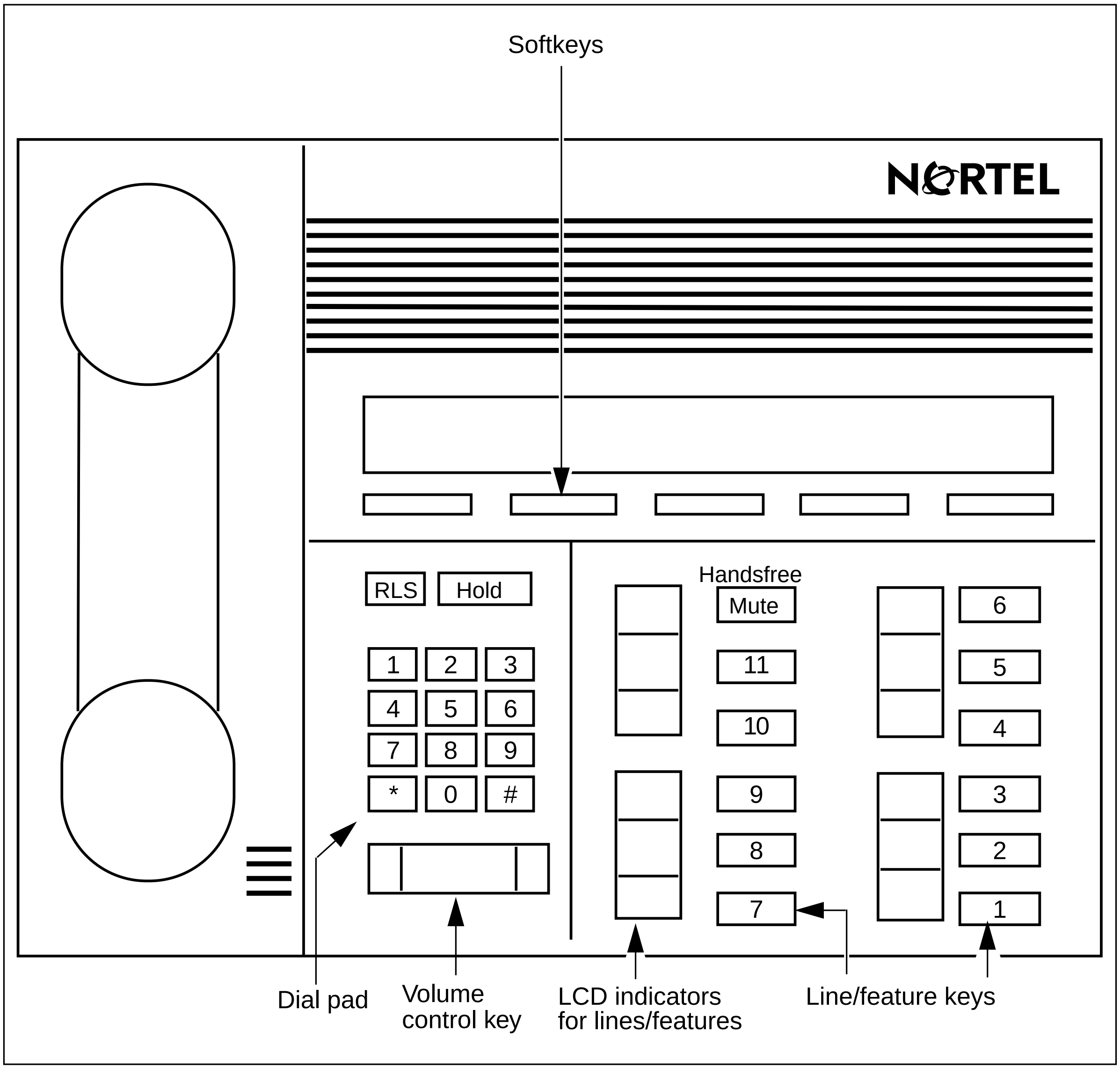


Figure 5-7 further illustrates the button layout of the M5317TDE ISDN business set. Like the earlier models of the M5317 ISDN business sets, the M5317TDE display is 2 lines of 40 characters each. The display accommodates advanced ISDN display features such as Call Progress information, Calling name and Number Delivery, and Call Forwarding information. It also displays the time and date as well as a list of unanswered incoming calls.

The second LCD line displays the soft key functions, which are context-sensitive and change to accommodate different calling situations. Sot keys help guide the user step-by-step through feature activation.

Figure 5-7 M5317TDE button layout



M5317TDE advantages

The M5317TDE has the following powerful advantages

- High speed async data up to 230.4 kbps
- Local features such as directory dialing
- Autobaud of AT command up to 230.4 kbps
- Async circuit switched data with multilink PPP for Internet access
- Call directory and Caller list up to 100 locations with editing functions
- Local firmware download using RS-232

M5317TDE ISDN terminal features

The M5317TDE has the following performance features

- Acoustic performance that meets TIA 579 standard
- Auto call back and auto recall
- Call forwarding enhancements
- Capability for Calling Name and Number Delivery with privacy using access codes and feature keys
- EKTS virtual key
- Fixed feature keys
- ISDN Electronic Key Telephone System (EKTS) cache
- Last number redial softkey
- Non-Initializing terminal
- Message waiting softkey
- Parameter downloading
- Single or shared Directory number for Packet and Circuit services
- Two simultaneous conferences

User installation information

This section describes information required by the user for successful installation of ISDN. In the past, users of operating company service only needed to know their directory numbers. This changes with ISDN as there is more addressing of the service involved for operation of customer premises equipment (CPE) on the loop. This addressing information is the service profile identification (SPID).

Service profile identifier

The service profile identification (SPID) uniquely identifies the CPE to the operating company switch. SPIDs only support dynamic terminal endpoint identifier (TEI) defined logical terminal identifiers (LTID). Static TEI LTIDs do not use a SPID. For a complete description of the SPID and its uses refer to Basic rate interface logical components chapter.

ISDN protocols

When ISDN was introduced, there were multiple versions of the protocol. There were many areas that were subject to interpretation when the initial specification was introduced. Nortel’s first protocol version is referred to as a permanent virtual circuit (PVC) 0. Subsequent to that PVC 1 was introduced which contained protocol changes and was closer to the NI-1 specification. The NI-1 version of Nortel’s ISDN is PVC 2. These different protocol versions, PVC 0, PVC 1, and PVC 2 can be configured on an ISDN device.

Many CPE devices can operate in several of these protocols. The CPE and switch must operate in the same protocol mode. Because vendors can use different configurations for their devices, the operating companies need to provide this information to make sure the CPE is compatible with the serving switch.

Physical connections

Users need to be aware of the physical connection of CPE to the ISDN line. Some CPE devices contain an NT1. This reduces the cost of the installation, An NT1 and power supply can be included more cost effectively into the device, but when the NT1 is included, you can lose the ability to connect multiple devices to the loop.

When CPE is plugged into an ISDN loop, there is some time required for the device to be recognized by the network. This can take several seconds to a full minute. During this time the protocol between the CPE and the serving switch exchanges information such as the SPID. Most CPE have lights that indicate when the SPIDs are established successfully.

Part III
Planning and engineering

"Part III: Planning and engineering" contains the following chapters:

6. Engineering ISDN BRI

7. Software description

8. Hardware description

9. DMS packet handler

10. ISDN real-time engineering guidelines

11. Engineering provisioning

12. Administration methodology

13. Planning considerations

6 Engineering ISDN BRI

Introduction

This part of the "National ISDN BRI Service Implementation Guide" is intended as an aid to

- planning and deploying ISDN basic rate lines on Nortel's DMS central-office switching system
- S/T loop requirements
- integrated building distribution network (IBDN)
- installation of ISDN S/T loops
- terminal power
- CM impacts of DMS packet handler (PH) calls
- real time call attempt capacity models
- a synopsis of the peripheral components that require real time engineering
- identification of the ISDN and non-ISDN call types that impact specific peripheral processors
- loop verification

Engineering and provisioning for ISDN BRI includes the following:

- ensuring that the DMS has the appropriate software packages
- setting the office parameters
- designing enough call paths within the DMS switch

Each aspect of engineering is important to the successful operation of the telephone switch.

This part of the document is not a substitute for following detailed engineering information available within the Northern Telecom publications (NTP). For specific engineering rules as they relate to call throughput of various Extended Peripheral Module (XPM) configurations, refer to the *Capacity Engineering Manual*, 297-1001-170.

7 Software description

ISDN BRI packaging

Nortel Networks introduced a new process for the delivery of DMS software after BCS36. Product computing loads (PCL) are the delivery vehicle that replaces custom load builds for each office. A limited number of PCLs are defined; each contains all generally available features for a particular market and office type. PCLs are grouped into releases according to global market regions. For example, North American PCLs are grouped into the “NA00x” release, such as NA008.

Product computing loads (PCL) represent the restructuring of DMS software into layers. The relevant PCLs for the U.S. and Canadian markets are termed “LEC” and “CDN” respectively. Each PCL contains a set of software layers that make up the whole and include base, telecom, product, and market layers. Features are activated in an office through the use of software optionality controls (SOC). This document incorporates PCL terminology where appropriate.

The following are summaries for ISDN basic rate interface (BRI) packaging for NA007 through NA010. Note the prerequisite of NI-1 package NI000008.

Figure 7-1 ISDN BRI 1997 and 1998 software packaging

1997	1998
NI-2/3 BRI Phase 1 - S/W Rls NA007 - Order Code **NI000050** Prereq: NI000008(NI-1)	**NI -2 BRI Services** - S/W Rls NA009 - Order Code **NI000052** Prereq: NI000051
NI-2/3 BRI Phase II - S/W Rls NA008 - Order Code **NI000051** Prereq: NI000050	**NI -1998 BRI Enhancement Phase I** - S/W Rls NA009 - Order Code **NI000060** Prereq: NI000051

For reference, Figure 7-2 gives a summary of NA007 and NA008 ISDN primary rate interface (PRI) packaging. This guide is focused on BRI, and does not provide further detailed description on PRI packaging content.

Figure 7-2 ISDN PRI software packaging

1997	1997
NI-2 PRI - S/W Rls NA007 - Order Code **NI000015** Prereq: TBD	**NI -2 Call by Call** - S/W Rls NA008 - Order Code **NI000017** Prereq: NI000015
NI-2 PRI D Channel Backup - S/W Rls NA007 - Order Code **NI000016** Prereq: NI000015	**NI -Enhancement 2B Channel Transfer** - S/W Rls NA008 - Order Code **NI000018** Prereq: NI000015

NI-2/3 capabilities

The following is a detailed description of ISDN BRI packaging for ISDN BRI for NA007 through NA010.

National ISDN-2/3 BRI Services Phase 1 (functional group NI000050)

This functional group adds enhanced ISDN capabilities with NI-2 and key NI-3 compliance. In NA007 this group introduced key NI-2 and NI-3 BRI requirements for uniform interface configurations in SR-2120 and SR-2457, packaged in PCLs LEC00007 and LET00007.

Key capabilities Beginning with NI-2, several standards-based BRI features are supported in a uniform manner to provide widespread service to subscribers. Nortel is bundling and introducing these features in NI000050 to expedite NI-2 and NI-3 compliance in the marketplace. Included in this release is support for the following interface configurations:

- **Single DN for BRI** enables an integrated terminal (a terminal that supports both voice- and circuit-switched data call types) to have one DN. This same number can be used for all circuit-switched call types and can simultaneously access both B-channels.
- **Single TEI for BRI** allows an integrated terminal to be operated using a single terminal endpoint identifier (TEI) regardless of the number of call types supported on that terminal and regardless of whether one B-channel or two B-channels are being used simultaneously.

- **Support for NITs (NI-3)** supports a non-initializing terminal (NIT) on a BRI line after the interface is provisioned. A NIT is a class of ISDN terminals that does not require a SPID for initialization. NITs not only have the ability to originate and terminate calls, but also have access to a range of National ISDN features and capabilities.
- **Assignment of Feature Keys to Default TSP for NITs** permits the assignment of fixed feature identifier values to the default terminal service profile/logical terminal identifier (TSP/LTID) so NITs can use feature keys for feature activation and deactivation. This enhancement allows NITs to access additional capabilities, such as conference calling, call transfer, and message waiting indicator.

Principal benefits National ISDN-2/3 BRI Services increase the operational versatility of BRI line interface configurations and expand the BRI service options available to users. With a single DN supporting all circuit-mode call types as well as simultaneous access to both B-channels on an integrated voice/data terminal, users improve the return on their investment in ISDN equipment and add flexibility to the way BRI lines are assigned and used. Support for NITs expands operations and equipment options while improving user access to multiple BRI services. Feature key access to services for NITs not only makes service activation and deactivation easier to use, but brings greater choice and flexibility to the assignment of terminal features.

National ISDN-2/3 BRI Services Phase II (functional group NI000051)

In NA008, this group further expands National ISDN compliancy on the DMS-100 system with a broad range of NI-2 and NI-3 services. This group provides considerable revenue-generating opportunities with new ISDN services, and is packaged in PCLs LEC00008 and LET00008.

Key capabilities A host of new features and enhanced functions are added with the release of the N1000051 software package. Some of the key ISDN features in this release include the following:

- **Electronic Key Telephone Service (EKTS) and Virtual Key Application** provide call handling flexibility for multiple appearances of the same directory number using Call Appearance Call Handling (CACH). This features allows calls to originate from and terminate to any combination of call appearances; and user provisioning of the call offering sequence.

- **Call Forward Enhancements** support a variety of call forwarding types (Universal, Busy, Don’t Answer) for incoming calls to an ISDN set. Additional enhancements include the following:
  - — call forward keylist for each directory number/call type (DN/CT)—universal
  - — feature key activation/deactivation for each DN/CT—universal
  - — call forward activation/deactivation outside call context—universal
  - — single or double feature key invocation for each DN/CT—universal
  - — call forward reminder notification
  - — call forward courtesy call
  - — remote DN validation during programming
  - — call forward dial activation/deactivation for each DN/CT
  - — prevention of redirection information to originating party
- **Music on Hold** provides access to a music source when incoming calls to the ISDN group subscribing to this feature are placed on hold.
- **Calling Number Delivery** allows the calling party DN and the time and date of the call to display on the customer premises equipment (CPE).
- **Calling Name Delivery** offers Bellcore-compliant name delivery to the called party from the ISDN set using a CCS7 network protocol. Per call blocking and unblocking of calling name/number delivery from the ISDN set is also supported.
- **Flexible Calling Enhancements** allows an ISDN user to establish and control two or more concurrent calls using one B-channel, as well as select the size (simultaneous 3- and 6-way calling) of a given ISDN conference call.
- **Service Protection—Essential Line** provides preferential dial tone to selected ISDN BRI lines when severe overload conditions occur. When this preference is given to essential ISDN BRI lines, non-essential lines can experience service delays.
- **ISDN Interworking with Standard Announcements** allows NI-1 and NI-2 terminals that send digits in band to work with features that typically expect out-of-band digits.
- **Support of More than Two B-channel Terminals** allows NITs or seven NITs and one FIT to be supported with one B-channel used for each type of terminal.

- **Associated Group Assignment (AGA)** allows a DN/CT or a group of DNCTs to be restricted to the use of a single B-channel. This option is only valid for circuit-switched BRAF terminals.
- **Parameter Downloading** enables the user's ISDN terminal to read certain parameters directly into its memory, synchronizing terminal and switch databases. The downloading capability can only be invoked from an initializing terminal. The terminal requests a download from the switch, and the switch responds by sending the parameter values. The terminal ends the downloading process by transmitting an acknowledgment to the switch. This minimizes the number of parameters a user is required to manually enter into an ISDN terminal.
- **Automatic Message Accounting (AMA) Billing** supports AMA records for the following ISDN features:
  - — new ISDN NI-2 ACB/AR functionality
  - — new ISDN NI-2 flexible calling functionality
  - — new ISDN NI-2 calling name delivery capabilities
- **Provisioning Enhancements** provides the following enhancements to ISDN service provisioning:
  - — simplifies particular add, change, and delete service order procedures for NI-2/3 BRI services
  - — adjusts the parameter naming discrepancy between service order, table control, query commands, and the NI-1 data dictionary
- **Primary Interexchange Carrier/IntraLATA Primary Interexchange Carrier (PIC/LPIC)** enhances the capability to assign an intraLATA carrier different from the interLATA carrier associated with an ISDN BRI DN/CT so that an ISDN BRI subscriber can select a carrier other than the pre-subscribed carrier.
- **Automatic Call Back/Automatic Recall (ACB/AR)** allows the last DN an ISDN BRI subscriber called to be automatically redialed. AR allows the DN of the last incoming call to an ISDN BRI subscriber to be automatically dialed.
- **BRI Layer 2 Performance Monitor** uses access line counters to monitor the number and percentage of data link (Layer 2) transmission errors between the DMS-100 switch and the ISDN terminal equipment.
- **Terminal Maintenance for Multiple Terminals** supports up to eight NITs, using multiple commands, through a single maintenance interface.
- **BRI Layer 2 and Layer 3 Abnormality Counts** uses frame check sequence-based performance monitoring, protocol abnormality monitoring, logging and alerting, and protocol capture to perform data link (Layer 2) and network (Layer 3) maintenance between the DMS-100 switch and terminal equipment.

- **Logging and Processing TEI Abnormalities** allows the logging and retrieving (using DMS-100 MAP [maintenance and administration position] commands) of the total number of TEI assignment abnormalities.
- **BRI Multipoint Embedded Operations Channel** uses the DMS-100 switch MAP or operations system interfaces to maintain and monitor the performance of up to six intermediate line units when they are used to extend the existing U-loop range beyond 18 000 ft. from the DMS-100 switching office.
- **E911 BRI Enhancements (XPM warm SWACT)** provides a set of enhancements to reconnect and maintain emergency calls on ISDN lines after a warm switch of activity (warm SWACT) of the XPM or line trunk controller (LTC).
- **Two B-channel Enhancement** supports the following interface configurations:
  - — Two FITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. This supports common setups for work-at-home and small business ISDN users. FITs in this configuration can support EKTS.
  - — One FIT and up to seven NITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. The NITs support DN/CT sharing with contention. FITs in this configuration can support EKTS.
  - — Up to eight NITS, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI, and supporting DN/CT sharing with contention.
- **Interface Configuration Phase III** completes National ISDN-2 interface configuration support and provides key National ISDN-3 capabilities for the following interface configurations:
  - — up to eight terminals in any combination of FIT/NIT types, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. NITs will support DN/CT sharing with contention.
  - — Enhanced support of associated groups, which was first delivered in NA008.
- **Single DN on Single Integrated Voice Data Terminal (IVDT)** allows the use of a single DN on a FIT that supports circuit-mode voice, circuit-mode data, and D-channel packet mode data. This capability allows the use of a single DN or single dynamic TEI across voice-, circuit-mode data, and D-channel packet service.
- **Single DN with Different CTs on Single IVDT NIT** enables the use of a single DN on an NIT device that supports circuit-mode voice, circuit-mode data, and D- and B-channel packet-mode data services (that is, an

integrated voice and data terminal that does not use SPID registration procedures). The DMS system supports integrated voice, circuit-mode data, and packet-data services for an NIT on a BRI loop, and permits access to multiple bearer services with single dynamic TEI.

Principal benefits NI-2/3 BRI Services Phase II offers multiple benefits to service providers, including the following:

- adds revenue opportunities for ISDN sales
- assists service providers in reducing the cost of maintaining the DMS-100 ISDN BRI product base
- expands the ISDN feature set for business use

National ISDN-2/3 BRI Services Phase III (functional group NI000052)

In NA009, this functional group adds new features and enhances capabilities for NI-2 and NI-3 services on the DMS-100 system. This group also expands ISDN terminal capabilities and supports additional interface types and configurations for users. This group of new features is packaged in PCLs LEC00009 and LET00009.

Key capabilities Nortel continues with its rollout of National ISDN with support for the following NI-2, NI-3, and NI Enhancement capabilities:

- **Two B-channel Enhancement** supports the following interface configurations:
  - Two fully initializing terminals (FIT), each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. This supports common set-ups for work-at-home and small business ISDN users. FITs in this configuration can support EKTS.
  - One FIT and up to seven NITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. The NITs support DN/CT sharing with contention. FITs in this configuration can support EKTS.
  - Up to eight NITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. The NITs support DN/CT sharing with contention.
  - Two B-channel access for EKTS terminals allows a DMS-100 NI-2 TSP with EKTS or EKTS and CACH to have both B-channels active on any combination of VI and CMD calls. This capability applies to simultaneous use of B-channels for voice calls on Basic or CACH EKTS DNs in shared on non-shared configurations.
- **BRI Verification (BRIV) Office Equipment** allows normal call control procedures for retrieving the office equipment identifier of the line card

associated with an ISDN BRI line. BRIV can be used by field personnel to verify that the user's access line is connected to the correct switch port. BRIV is applicable to voice and circuit-mode data type calls. BRIV supports access line installation and maintenance with line-side (customer premise) verification and testing.

- **Interface Configuration Phase III** allows the use of a single DN on a FIT that supports circuit-mode voice, circuit-mode data, and B- or D-channel packet-mode data. This capability allows the use of a single DN or single dynamic TEI across voice, circuit-mode data, and D-channel packet service.
- **OA&M Multi-terminal Maintenance** completes National ISDN-2 interface configuration support and provides key National ISDN-3 capabilities for the following interfaces and configurations:
  - Up to eight terminals in any combination of NITs and FITs, each allowed to access both B-channels using any combination of circuit-mode call types simultaneously using a single TEI. The NITs support DN/CT sharing with contention.
  - Enhanced support of Associated Groups, that were first delivered in NA008.
- **Single DN on Single Integrated Voice Data Terminal (IVDT)** supports the sharing of DNs across two physically separate devices, one being a voice or circuit-mode data terminal and the second being a packet-only terminal. The DMS switch supports one packet terminal for each BRI loop and allows the packet NIT to access D-channel packet services with a dynamic TEI.
- **Shared DN with Different call types (CT) on Multiple Terminals** supports the sharing of DNs across two physically separate devices, one being a voice- or circuit-mode data terminal and the second being a packet-only terminal. The DMS switch supports one packet terminal for each BRI loop and allows the packet NIT to access D-channel packet services with a dynamic TEI.
- **Single DN with Different CTs on Single IVDT NIT** enables the use of a single DN on an NIT device that supports circuit-mode voice, circuit-mode data, and D- and B-channel packet-mode data services (an integrated voice and data terminal that does not use service provider identification [SPID] registration procedures). The DMS system supports integrated voice, circuit-mode data, and packet-data services for a NIT on a BRI loop, and permits access to multiple bearer services with a single dynamic TEI.

Principal benefits The automated allocation of a TEI to packet devices supports D-channel packet services without the need to provision packet mode TEIs and associated TEI assignments with a terminal programmer.

National ISDN-98 Enhancements Phase I (functional group NI000060)

In NA009, this functional group adds enhancements to existing DMS-100 National ISDN services. In addition, this functional group provides deployment simplification, reduces cost of ownership, and provides revenue-generating opportunities.

Key capabilities A host of new features are added to existing DMS-100 services following National ISDN enhancements identified and driven by the National ISDN Council (NIC). Some of the key ISDN features in this release include the following:

- Audible Voice Mail Message Indicator provides an audible indication to the user, upon call origination, whenever a message is waiting. The feature also enhances the current visual message waiting indication.
- Automatic SPID automates the terminal initialization procedures by having the switch send the SPID to the terminal, rather than having it entered by the user.
- B-channel Restrictions on a TSP Basis provides the ability to restrict a group of one or more Terminal Service Profiles (TSPs) to share a single B-channel, rather than allowing the TSP or group of TSPs to use both B-channels in a shared BRI environment. This prevents one user from using both B-channels simultaneously, which will prevent other users from making or receiving a call.
- BRI in a Residence Group for Single Line ISDN provides a simplification to the network provider to allow ISDN BRI lines to be provisioned in a Residential Enhanced Services (RES) group, eliminating the need to maintain special customer groups for deploying ISDN to residential users or for single line business users.
- BRI Verification-Office Equipment (BRIV-OE) allows normal call control procedures for retrieving the office equipment identifier of the line card associated with an ISDN BRI line. BRIV-OE can be used by field personnel to verify that the subscriber’s access line is connected to the correct switch port. BRIV-OE apples to voice-mode and circuit-mode data type calls and supports access line installation and maintenance with line side (customer premise) verification and testing.
- Flexible Calling: Deactivate Conference Facility When Only Two Parties Remain enables the deactivation (removal) of a conference resource when
  - — Only two parties remain on an established conference call.
  - — A connection to the third conference party is unsuccessful because of a no answer or busy condition.

Principal benefits This feature simplifies ISDN implementation for both the user and the service provider in the following ways:

- Removes users' concerns with manual SPID registration procedures.
- Eliminates the need for the service provider to build a business group to provision a Residential Enhanced Services (RES) line.
- Provides time-saving BRI line provisioning capabilities and installation tools.
- Increases service-revenue opportunities by freeing a conference bridge when only two parties remain on the call.

Principal benefits These enhancements offer significant service provider revenue-generation potential through flexible EKTS capabilities. National ISDN-2 Call Forward and Calling Number ID enhancements and usage-sensitive billing options.

Major dependencies Software NI000051 NI-2/3 BRI Services Phase II

National ISDN-2 BRI Functionality (functional group NI000052)
In NA010, this functional group adds new features and enhanced capabilities for NI-2 services on the DMS-100 system. National ISDN-2 BRI functionality provides valuable services in support of the SOHO/small and large business marketplace.

Key capabilities National ISDN-2 adds the following capabilities to Nortel's NI-2 feature set:

- Automatic Message Accounting (AMA) National ISDN-2 Enhancements
  - — Uniform Usage Measurements (Basic Business Group [BBG] subfeatures) provides the capability to bill for selected BBG dial access subfeatures on a usage-sensitive basis. The subfeatures are Intercom Dialing, Public Network Access, Private Facility/Network Access, and Facility Overflow.
  - — Calling Number Identification Services (CNIS) without Intra-BBF/Inter-BBG Segregations enable the BRI CNIS capability on a usage-sensitive basis without Intra-BBG/Inter-BBG segregation. This feature allows the DMS-100 system to create or not create an aggregate record of Calling Number Identification (CNI) delivery. Additionally, this software can create a detailed record for a specific

calling party that wants to deny or not deny (privacy) calling number delivery.

- Busy Idle Feature Interactions Enhancement
  - — B-channel manger improves robustness of the B-channel manager.
  - — 3 stage release provides improved handling of features which are triggered on B-channel busy.
- Electronic Key Telephone Service (EKTS) National ISDN-2 Enhancements
  - — Single DN for EKTS (CMD and PMD) provides a single DN for access to voice and circuit-mode data (CMD) and packet-mode data (PMD). Voice service is shared among all EKTS members. CMD and PMD are non-shared in that they exist on one terminal only.
  - — Call Forward Programming for Secondary Members allows any secondary MDN SCA or MDN CACH member to program where the DN is call forwarded.
  - — Two B-channel access for EKTS terminals allows a DMS-100 NI-2 TSP with EKTS or EKTS and CACH to have both B-channels active on any combination of VI and CMD calls. This capability applies to simultaneous use of B-channels for voice calls on Basic or CACH EKTS DNs in shared or non-shared configurations.
- Layer 2/Layer 3 Abnormality Counts and Logs - CM provides the following enhancements:
  - — QCOUNT command enhancements for reading, displaying, and resetting layer 2/3 packet abnormality counts
  - — L2LOGCTL and L3LOGCTL tool enhancements to read, display, and set packet handler related abnormality log controls on demand
  - — enhances the audit process to include layer 2/3 packet audit in periodic logs generated when abnormality thresholds are exceeded
  - — enhances layer 2/3 abnormality control by adding new variables for packet including:
    - – Layer 2 LAPD protocol abnormality on SAPI16 frames
    - – Layer 2 LAPB protocol abnormality on B-channel packet data
    - – Layer 3 Protocol abnormality for X.25 packet
    - – Layer 3 individual packet abnormality reports ABN14 through ABN21

Principal benefits These enhancements offer significant service provider revenue-generation potential through flexible EKTS capabilities.

Major dependencies Software NI000051 NI-2/3 BRI Services Phase II

National ISDN-98 Enhancements Phase II (functional group NI000061)

In NA010, this functional group adds enhancements to existing DMS-100 National ISDN services, encourages the use of ISDN services, and helps control costs.

Key capabilities A host of new features and enhanced functions are added with the release of this software package. Some of the key ISDN features in this release include the following:

- Auto Lamp Refresh provides an automatic update ISDN terminal feature indicators (lamps) after the terminal initializes, thus providing the user with accurate status displays for active features.
- Directory Number Sharing Among Multiple Terminals enables sharing of a DN over multiple terminals with different call types (CT). A user can have a single DN for separate voice-mode, circuit-mode data, and D-channel packet-mode data services.
- Rapid Messaging BRI monitors the rate of incoming Q.931 messages to a user from BRI terminals. If the pre-defined rate is exceeded, rapid messaging takes the terminal either temporarily or permanently out-of-service depending on the frequency of this rate being exceeded

Principal benefits These features simplify ISDN implementation for both the user and the service providers in the following ways:

- promotes and simplifies feature usage by automatically displaying to the user which features are activated
- encourages use of ISDN services by offering subscribers the economy of having a single DN assigned to several terminals with different call types
- lowers costs by monitoring and controlling terminal usage of ISDN lines, based on defined quotas

Major dependencies Software NI000052 National ISDN-2 BRI Functionality

National ISDN-2 Completion (functional group NI000052)

In NA011, progress towards NI-2 Completion continues with the addition of the following capabilities to Nortel's NI-2 feature set:

- EKTS MADN Interaction with Flex Call enables another EKTS member who is not the controller of the call to bridge on to active Flex Call. An

EKTS user can also conference more than two calls together and transfer the conference.

- EKTS MADN CACH Interaction with Automatic CallBack and Automatic Recall (ACB/AR) enables ACB/AR to be assigned to NI-2 EKTS terminals. When an NI-2 EKTS user invokes ACB from an EKTS DN, only that particular terminal is notified of the change in the busy/idle status of the monitored user. When an NI-2 EKTS user invokes AR from an EKTS DN, the call can be completed only from that particular EKTS.
- Call Forward National ISDN-2 Enhancements include
  - *Remote Access to ISDN Call Forward* enables ISDN Call Forward subscribers to remotely activate and deactivate the Call Forward feature.
  - *Redirecting Number and Reason Delivery (RND) for ISDN Call Forward* delivers two redirecting numbers and reasons for ISDN BRI and interswitch calls over the SS7 network. Operating company personnel can control the delivery of the RND on ISDN BRI lines through datafill in tables CUSTNWK,CUSTSTN, and RESFEAT.
  - This feature creates the SERVORD options RND and Aggregate RND Recording (ARR) which records RN availability by call type. This feature also creates the customer group option RNID. The RNID option allows the user to specify the type of network calls including ONNET, OFFNET, and INTRAGROUP for which the RND option applies. The RND can be restricted to selected members of a customer group by adding the RND option to these lines using SERVORD and then removing the RND option from the customer group.
  - *Redirecting Number Delivery for ISDN Call Forwarding*. When a call is redirected (forwarded) by the original called number, the network captures not only the calling number, but also the number that redirected the call. If a call is redirected multiple times, the DMS-100 switching system recognizes both the first and last redirecting numbers. This feature makes the redirecting number available to the Delivery of Redirecting Number feature which ultimately displays the number to the user.

    Note: Redirection display is not supported on ISDN BRI sets if the forwarded base station is a POTS line using POTS call forwarding.

  - *Redirecting Reason Delivery for ISDN Call Forwarding*. On forwarded calls, Redirecting Reason indicates to the Delivery of the Redirecting Number subscriber why a call was forwarded. An example of a reason why a call was forwarded is a Call Forward Variable or Call Forward Don’t Answer feature is active. When multiple forwarding occurs, the switching system provides the first and last redirecting reasons to the

Delivery of the Redirecting Number feature which ultimately displays the reason information to the user.

- Calling Number Identification Services (CNIS) National ISDN-2 Enhancements include
  - *Delivery of Redirecting Number*. As with Call Enhancements, when a call is redirected by the original called number, the network delivers not only the calling number but the number from which the call was redirected. If a call is redirected multiple times, the DMS-100 switching system delivers both the first and the last redirecting numbers.
  - *Delivery of Redirecting Reason*. As with Call Forward enhancements, the redirecting reason indicates to the CNIS user why a call has been forwarded. Examples of reasons displayed that indicate Call Forward Variable, Call Forward Interface Busy, or Call Forward Don't Answer feature is active. When multiple forwarding occurs, the DMS-100 switching system provides the first and last redirecting reasons to the CNIS user.
- CRBL (Call Reference Busy Limit) Key Decoupling eliminates the need to download to an NI-2 terminal a number of call appearances equal to the CRBL value for a DN/CT. The actual number of call appearances downloaded for a particular DN/CT is separately provisionable from the CRBL. This feature eliminates unused DN keys on an NI-2 terminal that uses soft keys for making data calls.

Principal benefits These features add the following enhancements for the ISDN users:

- delivers improved and marketable EKTS functionality for ISDN users in a centrex environment, including Flex Call, ACB/AR, and Remote Call Forwarding
- provides advanced Call Forwarding number and reason status on an ISDN telephone
- eases the provisioning and installation of ISDN lines and increases customer satisfaction by eliminating unused keys on a voice terminal

Major dependencies Software NI000051 National ISDN-2 BRI Functionality

National ISDN-2 BRI functionality additions (functional group NI000052)

In NA012, the following new features and enhanced capabilities for NI-2 services on the DMS-100 system were added.

- Call Forwarding Service Uniformity for NI-2 improves Call Forward Validation (courtesy call) by allowing Call Forward activation to occur even if the initial courtesy call is not answered. A second unanswered courtesy call is no longer required. This enhancement to Call Forward Validation makes it possible to automatically activate Call Forwarding after the completion of the first unanswered courtesy call.

- Calling Number Service Uniformity NI-2 supports the switch-wide delivery of the uniform delivery of Type of Number/Numbering Plan Indicator values. In addition, office parameters are added for Calling Number Delivery (CND) and Redirecting Number Delivery (RND).
- The EKTS Service Uniformity for NI-2 feature enables the DMS-switching system to provide the following additional options for members of Electronic Key Telephone Service (EKTS) bridged call sessions:
  - EKTS MADN members can enter a bridged call before the call is answered.
  - If an EKTS MADN member on a bridged call activates the Hold feature, another MADN member can exclude the first member from re-entering the call by activating the Privacy feature.
- The Layer 3 Service Disruption feature supports network (layer 3) maintenance for ISDN BRI circuit switched services. The Layer 3 Service Disruption feature supports the following capabilities necessary for network maintenance between the DMS-100 switch and terminal equipment:
  - frame-checking
  - sequence-based performance monitoring
  - protocol abnormality monitoring
  - generation of logs to alert maintenance personnel when the layer 3 service disruption threshold is exceeded
  - protocol capture
- The Redirecting Number Privacy (RNP) feature enables ISDN-2 BRI subscribers with the capability to deliver or suppress the display of their telephone number when their calls are redirected. The provisioning of this feature provides the flexibility to suppress the delivery of the redirecting DN for each type of call forwarding including:
  - Call Forward Universal (CFU)
  - Call Forward Don’t Answer (CFD)
  - Call Forward Busy (CFB)

  For example, as a result of provisioning, the DN of a call which is redirected as a result of CFU can suppress the redirection number, but the DN of a call redirected as a result of CFB can be delivered.

- The SS7 Procedures for ISDN Call Forward feature enhances the CFD feature by providing continued ringing treatment, rather than a busy signal, for CFD destinations that are busy when a forwarded call attempts to terminate. In the past, if an ISDN phone with CFD activated transferred a call to a phone that was in the busy state, the caller heard ringing followed by a busy signal.
- The User Loop Testing (X.25 Echo Station) feature enables field technicians to initiate loopback testing for packet data on a BRI line. The User Loop Testing feature enables a technician to set up a test session by calling a directory number that directly terminates on the packet handler in the central office.

Principal benefits These features add the following enhancements for the ISDN users:

- The ability to control whether or not their caller IDs are displayed enables users to manage call privacy more efficiently resulting in an increased satisfaction with ISDN services.
- More convenient Call Forwarding programming for the end-user encourages more frequent use of this Call Forwarding feature and enhances customer satisfaction.
- The delivery of more accurate caller ID information for international calls promotes increased convenience and satisfaction for ISDN customers.
- EKTS members participating in bridged call sessions are offered greater privacy.
- The monitoring and maintenance of layer 3 service promotes fast resolution of actual and potential problems in the network resulting in the reduction of the chance of service disruption to the subscribers.
- Faster and more direct resolution of packet-data problems on ISDN BRI lines provides more efficient use of resources.

Major dependencies Software NI000051 National ISDN-2 BRI Functionality

National ISDN-2 BRI functionality additions (functional group NI000052)

In NA014, Nortel Networks added the following new features and enhanced capabilities for NI-2 services on the DMS-100 system:

- The On-Demand B-Channel X.25 Packet Mode Data Service feature provides switched B-channel high-speed packet service between the user's ISDN NI-2 terminal and the DMS-100 packet handler.

  While one B-channel is being used for packet mode data, the second B-channel can be used for a simultaneous voice or circuit switched data session. On completion of the B-channel packet mode data call, that B-channel can be used for a circuit mode data call.

- The Uniform Display Text for ISDN NI-2 Uniform Service feature expands the text information that appears on the display of the end user's ISDN telephone. The ISDN telephone displays text messages that give the user information on various call states and prompt the user for additional feature information before, during, and after a call.

  Display text for features includes ACB, Basic Call Control, Calling Name and Number (CNIS), Additional Call Offering, Call Forwarding, Call Hold, Flexible Call, and EKTS.

Principal benefits These features add the following enhancements for the ISDN users:

- The DMS-100 packet handler can transmit packet data at a high rate of speed using the same ISDN line the subscriber already has in service.
- The user can direct an X.25 data call to any destination because B-channel packet transport is now a dialable service. Previously, the subscriber needed a dedicated nailed-up data connection aimed at a single location.
- Subscribers can take advantage of many ISDN voice and data features because the ISDN telephone displays dynamic information during all phases of a call. The expanded text display helps the user understand the status of the current call, and non-call activity such as feature status.

Major dependencies Software NI000051 National ISDN-2 BRI Functionality

8 Hardware description

D-channel handler

The D-channel handler (DCH) provides the main interface to all BRI D-channels that are time-division multiplexed (TDM) in a ratio of 4:1 at the ISDN line concentrating modules enhanced (LCME). The D-channels are routed through DS30A interfaces to the following XMS-based peripheral modules (XPM):

- ISDN line trunk controller (LTCI), line group controller (LGCI)
- remote cluster controller (RCC2)
- enhanced subscriber carrier module-100 urban (ESMU)

Once at the DCH, the system sorts all link access procedures on the D-channel (LAPD) frames according to their service access point identifier (SAPI) values. For SAPI 0 and SAPI 63, the DCH acts as a termination point for the logical links. The system routes SAPI 0 frames to the unified processor (UP) through the ISDN signaling preprocessor (ISP). The system handles SAPI 63 frames within the DCH and responds to the originating ISDN loop with the appropriate commands, or response bits, inserted in the address field sets.

The enhanced D-channel handler (EDCH) is an upgraded version of the DCH. The EDCH provides extended performance by incorporating a 20-MHz 68020 processor with full 32-bit data bus capability and increased RAM (4 Mbyte as opposed to 1 Mbyte for the DCH). The enhancements result in an approximate 44% improvement in throughput over the DCH circuit pack.

DCH and EDCH sparing

DCHs or EDCHs are spared in an n+1 arrangement. It is recommended that you spare DCHs or EDCHs in a 4+1 arrangement. When the system detects a DCH or EDCH failure on the active card, the system moves the ISG channel assigned to that DCH or EDCH to the spare DCH or EDCH and that spare becomes the active DCH. You can mix DCH and EDCH in the same peripheral. The one restriction is that you can only use an EDCH with an EDCH load as a spare to another EDCH with an EDCH load in it.

EISP ISDN signaling processor

The EISP uses LAPD in communicating with the DCH over a 64-kbit/s HDLC channel in BRI, and accesses the UP through direct memory access (DMA). It also provides maintenance functions to the DCH and the single link between them.

The system routes messages with SAPI 0 between the DCH and UP, through the ISP, destined for their layer 3 (Q.931) target. The DCH sends an acknowledgment (RR) to the logical terminal for each message received by the DCH as part of the LAPD protocol. The EISP and DCH exchange a similar acknowledgment for messages received. However, the ISP does not acknowledge messages coming from the UP because LAPD is not used between it and the ISP.

Each ISDN peripheral contains two EISP cards; one for each shelf. Only one card, however, is active at a time and the duplication is used for reliability.

The EISP card can support a maximum of 32 channels, each of which provides a 64 kbit/s data path. Two types of channels are supported:

- DCH messaging channels that carry call processing frames associated with BRI B-channels (SAPI 0)
- D-channels that carry call processing messages associated with PRI B-channels (SAPI 0)

With ISDN BRI, the DMS-100 provides a maximum of 10 channels for DCH card interface. There are, 32 channels for physical D-channels in PRI and a combination of both in a mixed application.

For ISDN BRI, the enhanced ISDN signaling processor (EISP) functions between the DCH and the master processor (MP) or UP in an XMS-based peripheral product life upgrade strategy (XPM Plus). For ISDN PRI, the EISP functions as a main interface to D-channels carrying call control messages.

For ISDN BRI, the enhanced ISDN signaling processor (EISP) functions between the DCH and the master processor (MP) or unified processor (UP) in an XMS-based peripheral. In NA012, the Power PC (PPC) NTSX05 card is the required processor card. For ISDN PRI, the EISP functions as a main interface to D-channels carrying call control messages.

ISDN line group controller and ISDN line trunk controller

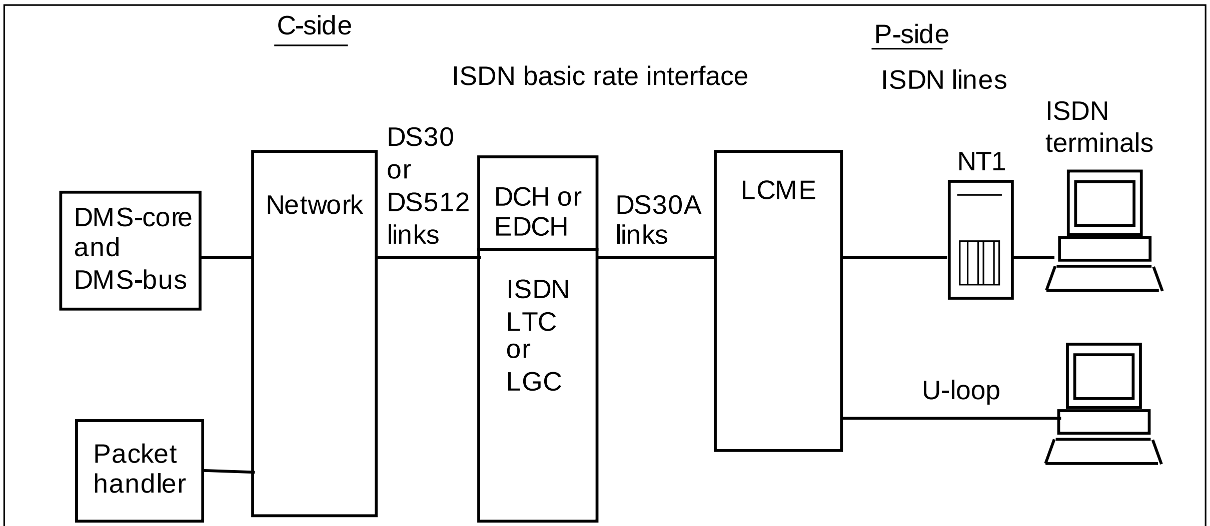
The following describes the LGCI and the LTCI.

ISDN line group controller

The LGCI (see Figure 8-1) provides access for customer voice and data traffic to the circuit-switched and packet-switched networks. The LGCI is a peripheral module, that provides:

- D-channel handling and processing
- call processing for different types of lines (ISDN, EBS, POTS, and Datapath), including Q.931 call processing
- maintenance and diagnostic capabilities

Figure 8-1 ISDN line group controller layout



Legend
- DCH   D-channel handler
- EDCH   Enhanced D-channel handler
- LCME   Enhanced ISDN line concentrating module
- LGC   line group controller
- LTC   line trunk controller
- NT1   Network termination 1

ISDN line group controller

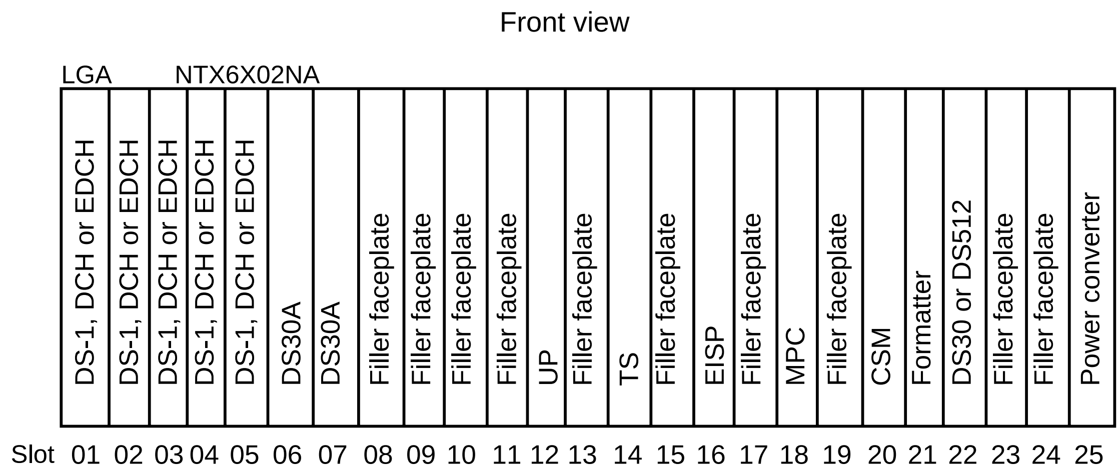
The following table lists the product engineering codes (PEC) for each card in the LGCI. Figure 8-2 shows the card locations in an ISDN line group array

(LGA). For a full description of the cards, refer to the *Hardware Description Reference Manual*, 297-8991-805.

Table 8-1 ISDN line group controller (6X02NA)

Product equipment code	Component
NT6X50AA	DS-1 Interface card
NT6X41AA	Speech bus formatter card
NT6X42AA	Channel supervision message card

Figure 8-2 Card locations in an ISDN LGA shelf with EISP and UP cards



Legend:

CSM Channel supervision message card
DCH D-channel handler
EDCH Enhanced D-channel handler
EISP Enhanced ISDN signaling preprocessor
LGA Line group array
MPC Message protocol and tone generator
TS Time switch
UP Unified processor

Note 1: Each LGC is provisioned with a minimum of two DCH or EDCH cards, one in each LGA.
Note 2: The SX05 card is the required UP card in NA012.

ISDN line trunk controller

The cards in each shelf of the LTCI are identical to the cards on an LGCI except that slot 17, between the EISP and the MPC card, contains a universal tone receiver (UTR) card (NT6X92).

LTCI/LGCI C-side blockage (NT6X44AA time switch)

The following is an example of the number of call paths available for call processing with all 16 DS30 C-side links allocated (XPM equipped with an NT6X44AA time switch).

```
  16 DS30 Links
 x32 Channels per link
 ----
 512
 -32 (2 per DS30A none reserved)
 ----
 480
 -96 (Number of TDM connections on C-side)
 ----
 384  available channels between the XPM  C-side and the network.
```

```
Based on 192 LCs
192/4 = 48
192  line cards at 4 LENs per TDM connection.
```

Based on this information, the LGCI C-side is the limiting factor in determining blockage for ISDN BRI. These calculations assume no X.25/X.75/X.75' link interface unit (XLIU) connections. For each additional XLIU link, a C-side channel is used and thus unavailable for circuit-switched calls.

LTCI/LGCI P-side blockage (NT6X44AA time switch)

The following is an example of the number of call paths available for call processing when all 20 DS30A P-side links are allocated (XPM equipped with an NT6X44AA time switch).

```
  20 DS30A Links
  -3 DCHs (2 active and 1 spare)
 ----
  17 DS30A links
 x32 Channels per link
 ----
 544
 -34 (2 per DS30A reserved)
----
 510
  -1 (reserved for LCME messaging)
 ---
 509
509
-57 (Number of TDM connections)
 ----
 452  available channels between the XPM  P-side and the LCME
C-side

Based on 226 LCs
226/4 = 56.5 (round up to 57)
226 line cards at 4 LENs per TDM connection.
```

Based on this information, the determination is that origination and termination blocking will occur at the LGCI/LTCI level before it will occur at the LCME level. Reference the following section on the LCME for the blocking examples given.

NTAX78BA Universal enhanced time switch card

In NA010, the ISDN capacity enhancement (ICE) feature replaces the NT6X44AA time switch card with the NTAX78BA universal enhanced time switch card. The NTAX78BA doubles the P-side port capacity of the XPM from 20 to 40 ports numbered 0 through 39. The NTAX78BA allows direct P-side to P-side connects which prevents the wasting of C-side channels for time-division multiplexing (TDM) hair-pin connections between the DCH and the LCME. Digital test access (DTA) P-side to P-side connections are built without wasting C-side channels. These enhancements increase the number of ISDN lines and call traffic that can be handled for an XPM by allowing the engineering of two LCMEs to be associated with one LGC/LTC.

LTCI/LGCI C-side blockage (NTAX78BA time switch)

The following is an example of the number of call paths available for call processing with all 16 DS30 C-side links allocated (XPM equipped with an NTAX78BA time switch).

```
 16DS30 Links
 x32 Channels per link
 ----
 512
 -32 (2 per DS30A none reserved)
----
 480 available channels between the XPM C-side and the network.
```

Based on this information, the LGCI P-side is the limiting factor in determining blockage for ISDN BRI. These calculations assume no XLIU connections. For each additional XLIU link, a C-side channel is used and thus unavailable for circuit-switched calls.

LTCI/LGCI P-side blockage (NTAX78BA time switch)

The following is an example of the number of call paths available for call processing when all 20 DS30A P-side links are allocated (XPM equipped with an NTAX78BA time switch).

```
   20 DS30A links
  x32 channels per link
  ---
  640
  -40 (2 per DS30A reserved)
 ----
  600
   -1 (reserved for LCME messaging)
 ----
  599
 -160 (number of TDM connections) max.lines 2 LCMEs(640/4=160)
 ----
  439 available channels between the XPM P-side and LCME C-side
```

Based on this information, the determination is that origination and termination blocking will occur at the LCME level before it will occur at the LGCI/LTCI level. Reference the following section on the LCME for the blocking examples given.

XPM NTSX05 Universal Processor

The NTSX05, which is required in NA012, plugs in to the UP card slot in an ISDN LGA shelf. The NTSX05AA has a slot for an optional peripheral recovery (PRL) memory packlet. The PRL packlets include:

- NTSX06AA—a filler that has no functionality
- NTSX06BA—32 Mbyte PRL memory packlet
- NTSX06CA—64 Mbyte PRL memory packlet
- NTSX06DA—128 Mbyte PRL memory packlet

Limitations and restrictions The following limitations and restrictions apply to the XPM Processor Power PC (PPC):

- The NT7X05AA PRL card is not allowed when both units of the LTCI are equipped with an NTSX05 card. An optional NTSX06 PRL can be used instead.
- The NTSX05 is not supported when the mate unit is equipped with an NT6X45 processor.
- Upgrades from a 6X45 (MP/SP) directly to an SX05 are not supported.
- Downgrades from an SX05 processor directly to an NT6X45 (MP/SP) are not supported.

LCME

The LCME is a dual-unit XPM that terminates ISDN 2B1Q U-type lines, ISDN S/T-type lines, and POTS, EBS, and Datapath lines. It also provides access to the ISDN B-, D-, and M-channels. The LCME has the capacity for 480 U-type (single slot) line cards or 240 S/T-type (double slot) line cards. Alternatively, the LCME can support 480 POTS or EBS lines, or 240 Datapath lines (480 single slot Datapath line cards).

> ***Note:*** The LCME supports both 2B and NI-2 software.

ISDN enhanced line concentrating module

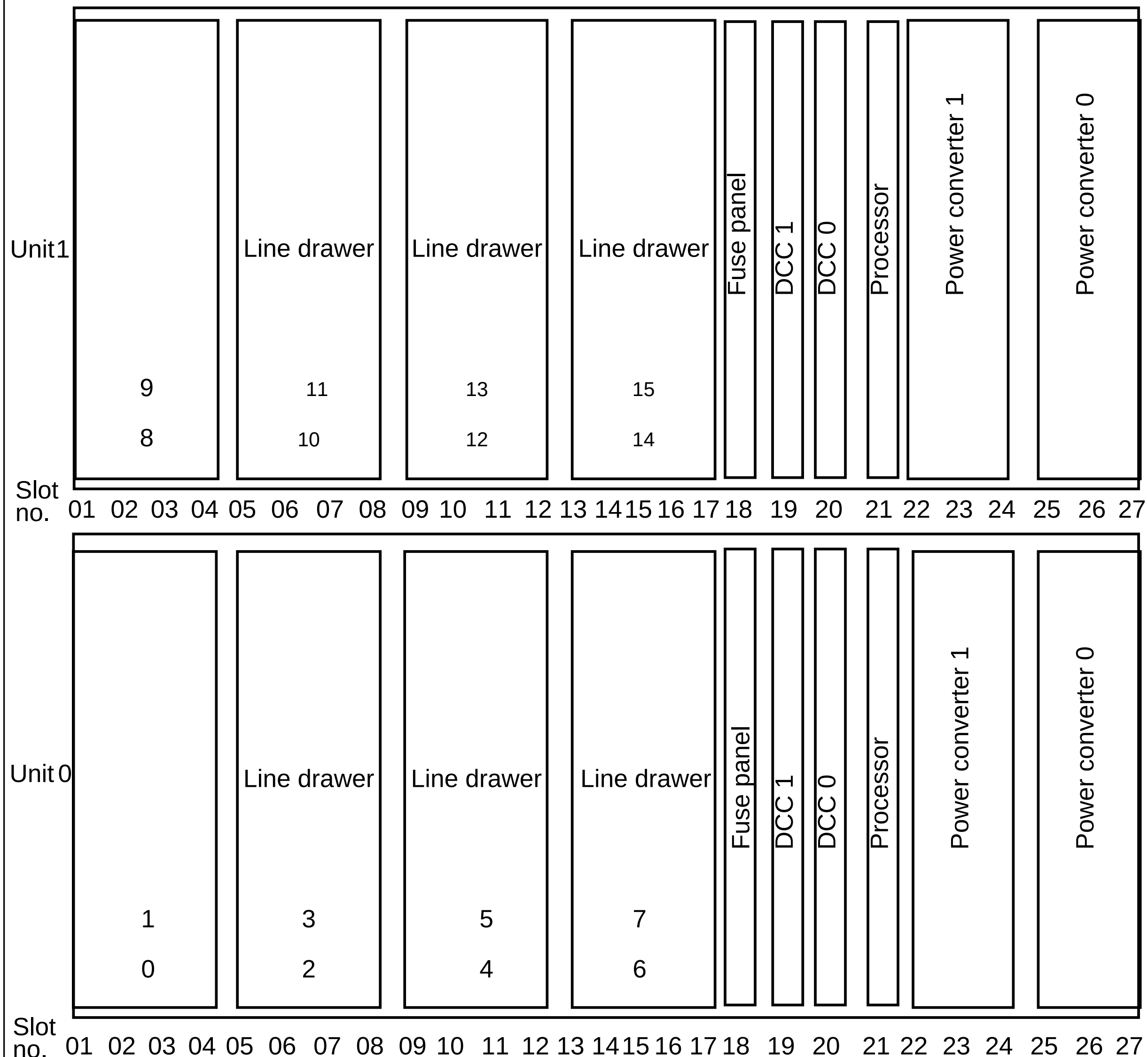
The following table lists the PECs for each card in the LCME. Figure 8-3 exhibits the physical layout of the cards in the LCME.

Table 8-2 PECs for LCME components

PECs for LCME components	Components
NT6X17AC	POTS line card
NT6X19AA	POTS message waiting card
NT6X20AA	Message waiting converter line card
NT6X53CA	LCME power converter
NT6X71AA	ISDN enhanced line drawer PUPS
NT6X76AD	Asynchronous I/F line card
NTBX26AA	ISDN S/T I/F line card
NTBX27AA	ISDN 2B1Q U I/F line card
NTBX34CB	LCME processor CP
NTBX35AA	LCMI digroup control CP
NTBX36BA	ISDN enhanced LCME BIC
NTBX71AA	ISDN enhanced line drawer PUPS
NTBX72AA	LCME battery and ring router

Figure 8-4 shows the physical and logical layout of the LCME line drawer.

Figure 8-3 Enhanced ISDN line concentrating module (LCME)

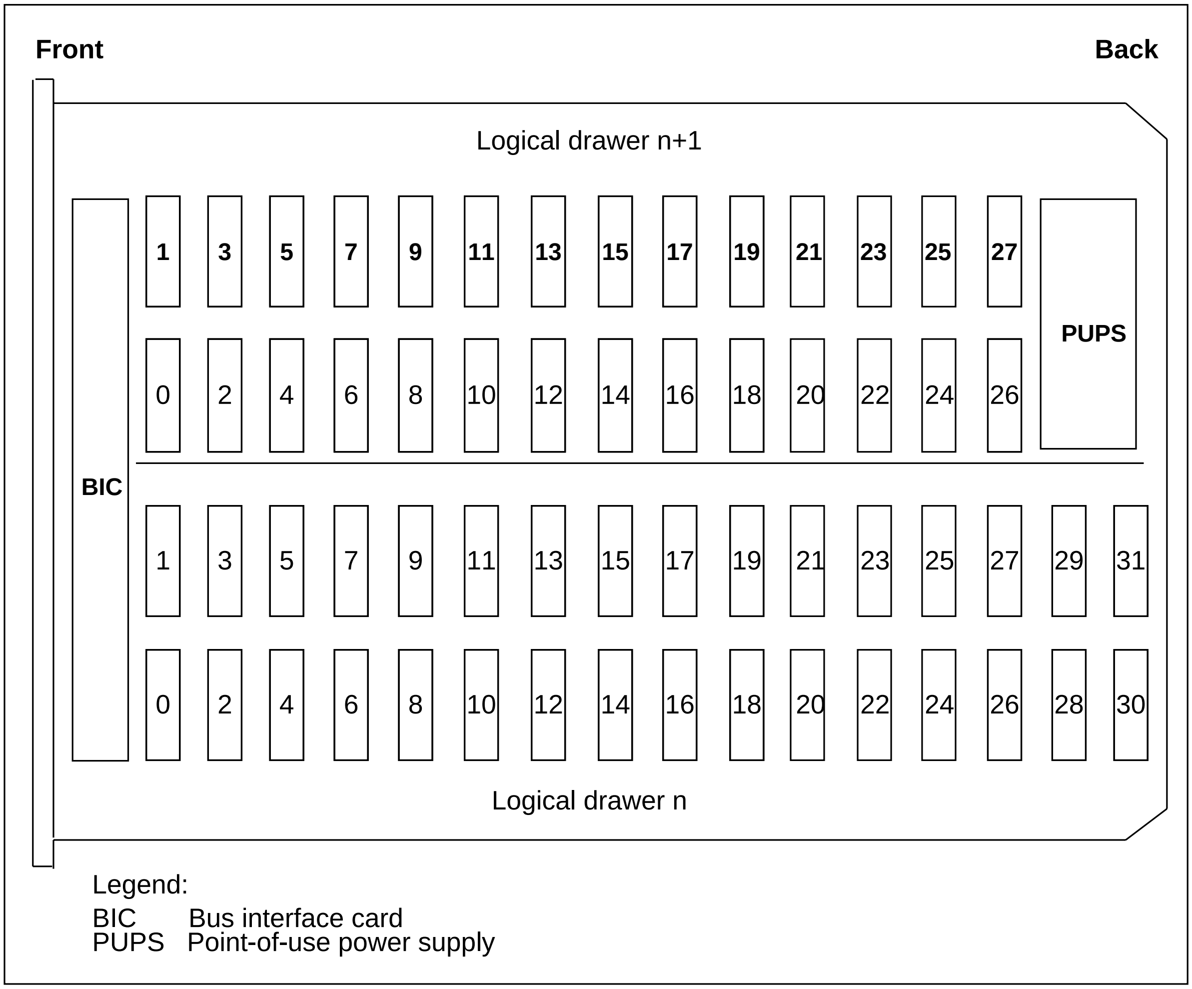


Legend:

DCC Digroup control card

Note: Slot positions 01–17 are approximate in the figure.
Line drawers do not necessarily occupy four slots.

Figure 8-4 Physical and logical layout of the LCME line drawer



ISDN line card provisioning rules

The following line card placement restrictions apply:

- Up to 60 U-line cards (BX27s) are equipped for each physical line drawer.
- Up to 32 U-line cards are equipped in an even-numbered logical drawer, and up to 28 U-line cards are equipped in an odd-numbered logical drawer.
- Up to 30 S/T-line cards are equipped for each physical drawer, with up to 16 cards in an even-numbered logical drawer, and up to 14 cards in an odd-numbered logical drawer.
- Positions 28, 29, 30, and 31 in the odd-numbered logical drawer are occupied by the PUPS cards.

Engineering an LCME drawer

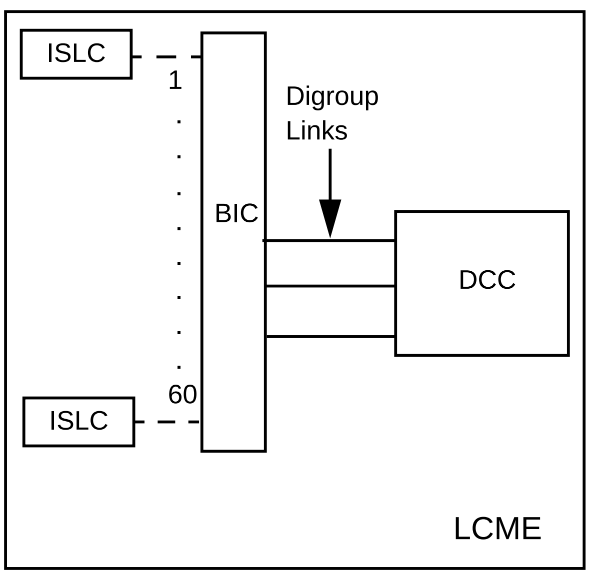
When engineering an LCME drawer, you must consider the number of line cards assigned to each drawer and the distribution of ISDN U-line cards (ISLC) across all available drawers.

Digroup link contention There are three digroup links between the BIC card and the DCC cards. The line drawer design reserves the first five channels in each digroup link for Dd assignment. Each digroup link has 27 channels reserved for B-channels. Therefore, there are 15 Dd channels and 81 B-channels reserved for each physical drawer.

The 2B1Q LCME physical line drawer has 60 single line card slots available for U-type 2B1Q ISLCs. Because each physical line card has access to two B-channels, there are 120 B-channels for each drawer. There is potential B-channel contention at the drawer level (not at the DS30A level), as the 120 physical channels compete for 81 logical links over the digroup links. See Figure 8-5 for the non-blocking service configuration.

> ***Note:*** Limit the number of U-type 2B1Q ISLCs to 40 for each drawer to eliminate B-channel contention at the LCME drawer level.

Figure 8-5 Non-blocking service



LCME RESTRICTIONS:

Each physical drawer can hold 60 single slot line cards

DIGROUP LINKS

- each BIC card has 3 links to DCC
- 32 channels per link
- ch 0–4 reserved for DCH
- ch 5–31 for call paths

32	channels per link
-06	reserved for DCH
27	available call paths per link
x 3	links per BIC
81	available call paths per physical drawer

81 / 2 = 40.5 (Note 1)

Note 1: BX27 line card supports 2 B-channel devices.
Note 2: One drawer can support 40 BX27 line cards and provide non-blocking service.
Note 3: One LCME (eight drawers) can support 320 BX27 line cards and provide non-blocking service.

D-channel contention does not occur because there are 60 D-channels available over the three digroup links. LCME line drawers with the maximum of 60 ISLCs, have a 1:1 correspondence of D-channels on the ISLCs to the D-channels available over the digroup links.

Due to constraints at the LGCI C-side, the maximum number of line cards that can provide non-blocking service is 192 BX27 line cards.

DS30A load sharing The DMS-100 switch allocates speech channels on the DS30As to the LCME differently than on an LCM. The DMS-100 switch has even-numbered links on the LCME (0,2,4,...) assigned to Unit 0 and uses the channels for calls to and from Unit 0 (LSGs 0–7). The DMS switch has odd-numbered links (1,3,5,...) assigned to Unit 1 and uses their channels for calls to and from Unit 1 (LSGs 8–15).

Both the LCM and the LCME have one interunit link consisting of 30 channels. This allows one unit to process 30 of the other units calls over its DS30A links. This capability for an LCME requires patch XJI14 to work correctly on pre-XPM01 LTCI/LGCIs.

If ISDN line cards are distributed sequentially (LSGs 0-1, then LSGs 2-3, and so on) rather than distributed evenly within both units of the LCME, call processing for these ISDN lines cannot access all of the available channels to both units of the LCME. This can cause originating and terminating call blocks.

Channel resources Unlike other line cards within the DMS switch, ISDN line cards (BX26 and BX27) datafilled as “WORKING” in table LNINV automatically reserve a channel resource. This resource is a time slot or TDM connection (over DS30A links) between the time switch in the host XPM and the LCME.One channel must be reserved for each TDM Quad. The DMS-100 switch multiplexes four ISDN line D-channels onto one TDM channel, which is mapped to a DCH channel in the host XPM.

Unused ISDN line cards datafilled as “WORKING” in an LCME, reserve communications channels that cannot be used for call processing by working line cards. An LCME loaded to its limit of 480 line cards, all datafilled as “WORKING,” reserves 120 channels (480/4), or nearly four DS30A links, as shown in the following example. The remaining channels not used for D-channel messaging or LCME messaging can be used for call processing.

> ***Note:*** ISDN line cards that are not inservice should be datafilled as hardware assigned software unassigned (HASU) in table LNINV.

Example 1 For an LCME with four DS30A links, two links to each unit, and 120 BX27AAs distributed evenly with 60 working BX27AAs for each unit, the channel availability for each unit is as follows:

```
1   2DS30A links
   x32 channels for each DS30A
   ---
   64 total channels

2   64 total channels
    -4 messaging channels (2 for each DS30A)
   ---
    60 channels for ISDN

3   60 ISDN line cards
     4 ISDN lines for each TDM quad
    ---
    15 channels reserved for TDM (60/4 = 15)


4   60 channels for ISDN
   -15 channels reserved for TDM
    ---
    45 available channels

5   45 available channels
    -1 reserved for LCME processor communications
   ---
    44 channels for call processing

6   60 ISDN line cards
    X2 maximum potential calls for each line
   ---
   120 total potential calls

7   44 channels for call processing
   +30 interunit link channels
   ---
    74 total possible calls for each unit
```

Each call using an interunit link channel uses a channel on the other unit to complete the call. For example, if all 30 interunit link channels are used, the other unit's channel availability is 30 less. This means that if 74 calls are completed from one unit, the other unit only has 14 channels available (44 - 30 = 14).

The previous example indicates that an LCME with 120 ISDN line cards spread evenly across LSGs 0-7 and LSGs 8-15 has a maximum of 120 potential calls per unit. Forty-four channels are available for call processing for one unit. If the number of calls on one unit exceeds 44, the mate unit can accommodate up to an additional 30 calls over the interunit link, if channels on the mate unit's DS30A links are unused.

Example 2 For an LCME with four DS30A links, two links to each unit, and 120 working BX27AAs all located on unit 0 (LSGs 0-7), the channel availability for unit 0 is as follows:

```
1   2 DS30A links
  x32 channels for each DS30A
   ---
   64 total channels

2  64 total channels
   -4 messaging channels (2 for each DS30A)
   ---
   60 channels for ISDN

3 120 ISDN line cards/4 ISDN lines for each TDM quad
  ---
   30 channels reserved for TDM

4  60 channels for ISDN
  -30 channels reserved for TDM
   ---
   30 available channels

5  30 available channels
   -1 reserved for LCME processor communications
   ---
   29 channels for call processing

6 120 ISDN line cards
   x2 maximum potential calls for each line
   ---
  240 total potential calls

7  29 channels for call processing
  +30 interunit link channels
   ---
   59 total possible calls on unit 0
```

The previous example indicates that an LCME with 120 ISDN line cards all in the same unit has a maximum of 240 potential calls. Only 29 channels are available for call processing for calls on that unit. If the number of calls on unit 0 exceeds 29, the matte unit can accommodate up to an additional 30 calls over the interunit link, if channels on the mate unit's DS30A links are unused.

Note: Call blocks can occur in Example 2.

The previous examples are only guidelines to assist in determining how many DS30As are required to provide adequate ISDN channels. Engineering should be performed under the engineering guidelines found in the *Capacity Engineering Manual*.

SMA Subscriber Carrier Module Access

Figure 8-6 represents the SMA unit and shows the card location for each type of card. Figure 8-7 illustrates the relationship between the EDCH cards and the number of IDTs.

Figure 8-6 SMA unit

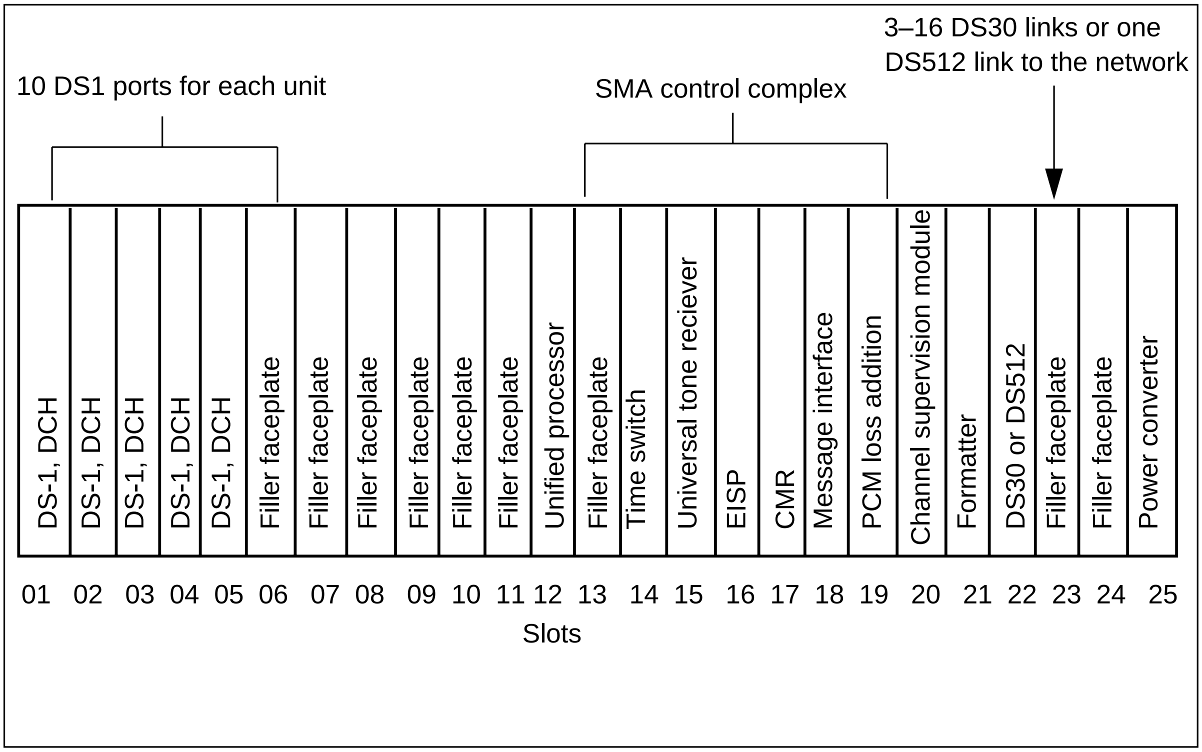
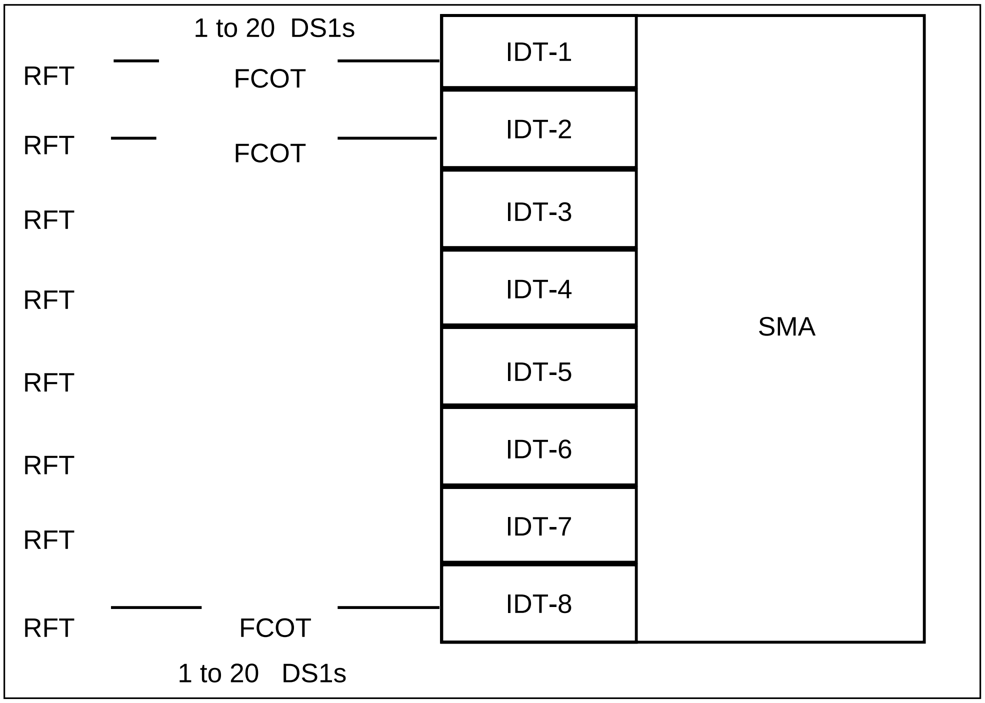


Figure 8-7 SMA P-side configuration



You can provision a maximum of ten EDCH cards on each SMA. Because both EDCH cards and DS1 cards share the same slots (01–15), each EDCH card displaces one DS1 card and reduces the number of DS1 links by two. The number of DS1 links available determines how many integrated digital terminals (IDT) you can provision. The relationship between the number of EDCH cards and the number of IDTs that you can configure is shown in Table 8-3.

Table 8-3 EDCH provisioning (Sheet 1 of 2)

Number of IDTs	Number of EDCHs
8 or less	0
7 or less	1
7 or less	2
7 or less	3
6 or less	4
5 or less	5
4 or less	6

Table 8-3 EDCH provisioning (Sheet 2 of 2)

Number of IDTs	Number of EDCHs
3 or less	7
2 or less	8
1 or less	9

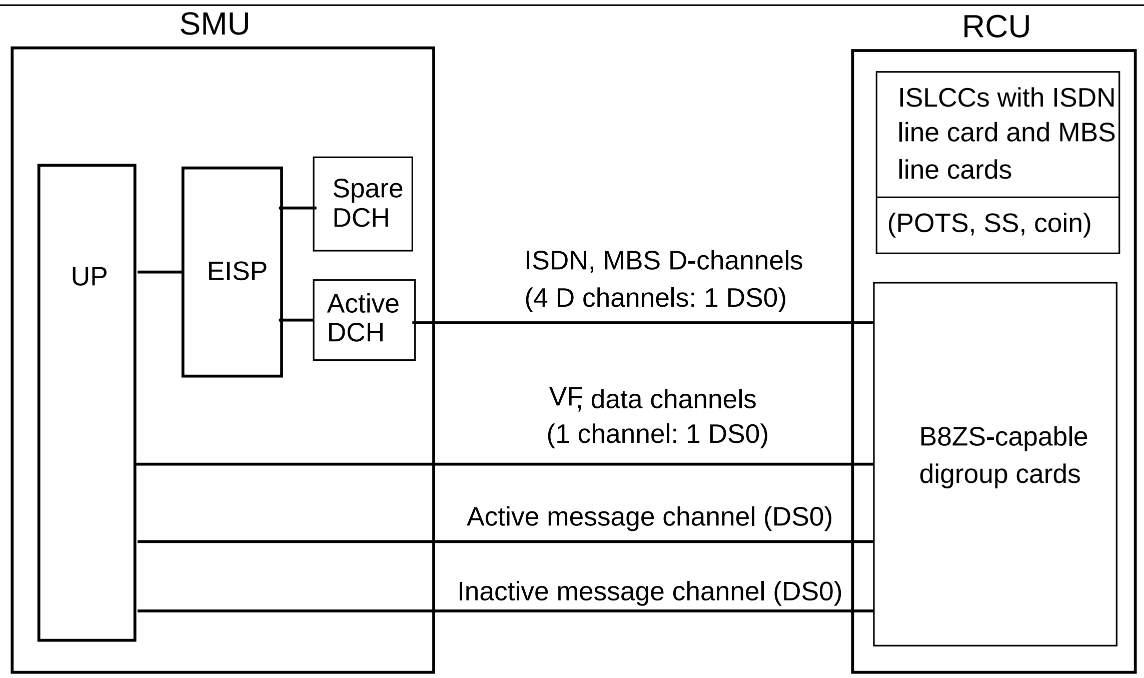
Enhanced subscriber carrier module-100 urban

The SMU provides a digital interface to the DMS-100 switch for DMS-1 urban remote terminals in a digital loop carrier system. When integrated into the DMS-100 switch, Nortel refers to the DMS-1 urban remote terminal as the remote carrier urban (RCU). Refer to Figure 8-8 and Figure 8-9.

An ESMU is an SMU that contains the enhanced software and hardware necessary for supporting ISDN and MBS terminals for residential or business communities along with the existing features described previously. The SMU must undergo a backplane modification, the addition of one or more DCH or EDCH circuit cards, and the addition of an EISP circuit card to support these features.

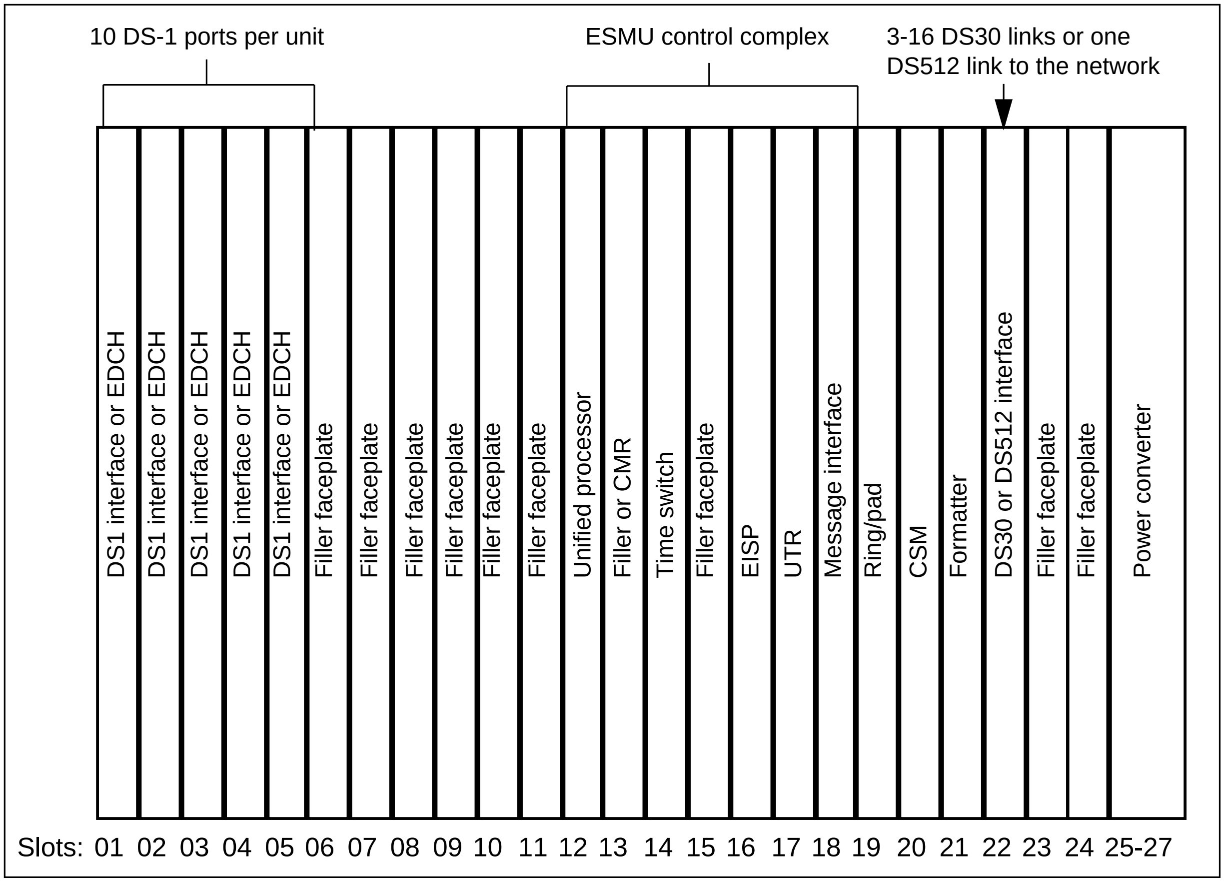
For complete details regarding engineering ISDN loops off of an ESMU, refer to *“Extended Peripheral Module Logs Reference Manual*, 297-8321-840.

Figure 8-8 SMA P-side configuration



Note: The RCU must contain ISDN and MBS line cards in the integrated services line card carrier (ISLCC). Special service line cards may also be equipped in the ISLCC.

Figure 8-9 SMU unit supporting ISDN MBS capability (NT6X02EL)



Remote concentrating unit

The engineering process requires mapping services onto ISDN line cards, with one RCU line equipment slot allocated for every seven lines. The RCU ISDN line card PEC code is NT7A31AA.

Physical line capacity

One RCU provides a maximum of 66 line equipment slots. In an ISDN only configuration, four cards for each equipment slot, the physical capacity is 264 (4 x 66). ISDN line cards fit into slots 1, 2, and 3 for 2B + D service, slot 4 for 1B + D service. Thus, assuming three cards at 2B + D service, there are six B-channels for call processing. Add the one remaining B-channel and there is the capacity for seven B-channels for call processing for each line equipment slot. There are 462 (7 x 66 = 462) possible call paths from the RCU back to the ESMU. Therefore, blocking does not occur at the RCU. Blocking occurs on the DS-1s back to the ESMU.

DS-1 link channel capacity

Each RCU contains up to eight digroup cards that provide DS-1 links to the SMU. When all digroups are equipped, 192 channels are available (8 x 24). But, one channel is reserved for each of the two SMU message processors installed in the RCU. For redundancy, each messaging channel is on a separate DS-1 link. Therefore, a maximum of 190 channels are available for traffic. Because at least 2 DS-1 links are equipped, the minimum number of channels available is 46.

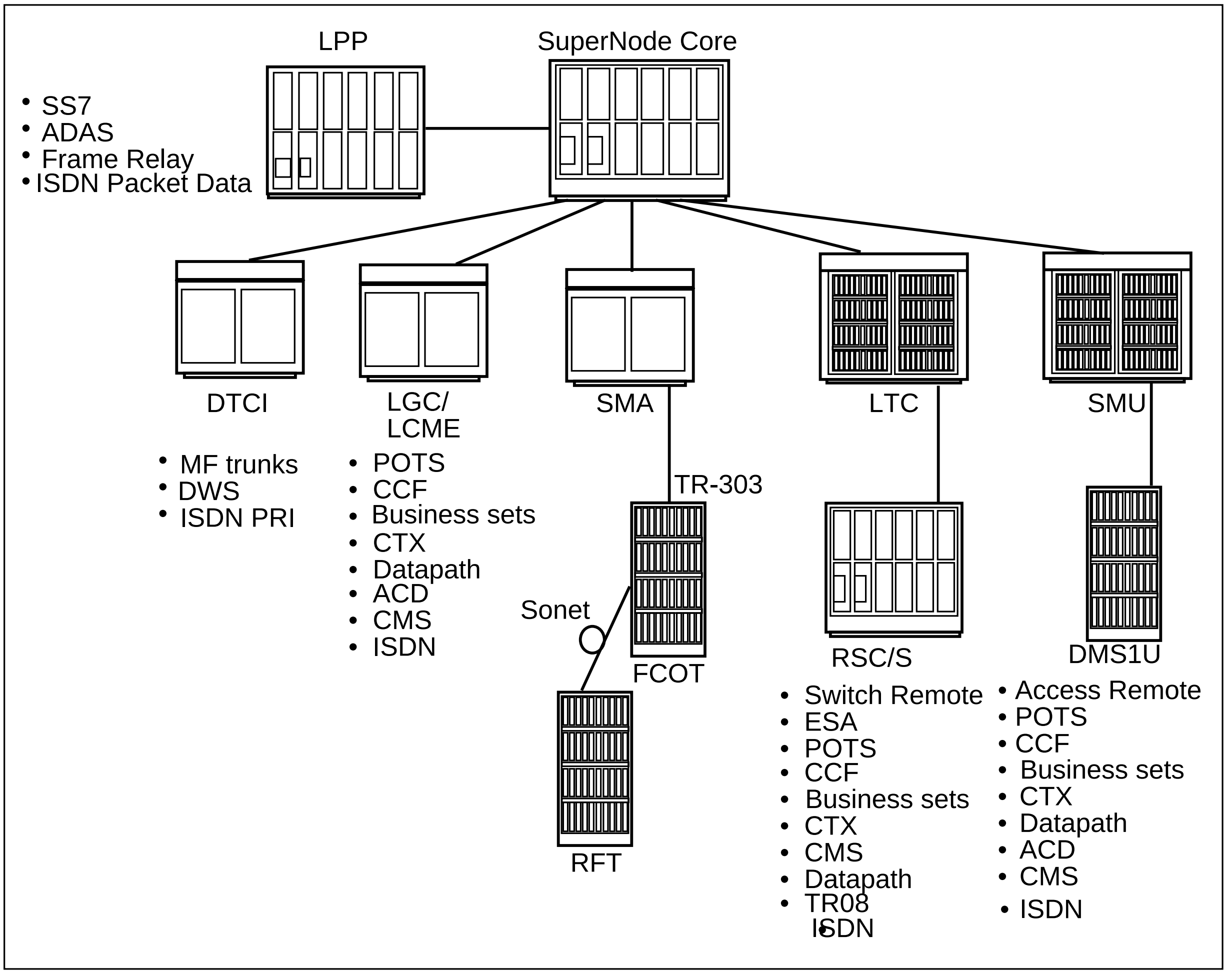
Conference size

Please refer to the section entitled “Conference size” in the “SERVORD procedure” chapter of this guide for further information on conference 3-port and conference 6-port circuits.

Current family of ISDN capable remotes

Figure 8-10 is a diagram showing ISDN as supported through NA006. With NA007, all LCM-based remotes support ISDN.

Figure 8-10 DMS-100 Family ISDN through NA006



Common peripheral module

The common peripheral module (CPM) is a family of peripheral types used in the DMS-100 Family. If used as a remote unit, the CPM is identified as the Remote Cluster Controller 2 (RCC2) at a remote switching center–SONET (RSC–S) site.

The CPM family is based on two shelves:

- CPM main shelf: containing all common circuitry and capable of supporting small size installations of lines and trunks
- CPM extension shelf: containing Octal T1 (Digital Signaling with DS1 carrier) and DCH packs and is used to expand the CPM capacity and P-side port capability to support larger remote applications
- integrating ISDN functionality into RCC2 base software to support an ISDN LCME

ISDN line drawer (available in NA007 and up)

Nortel introduced a low-cost, comprehensive solution that extends ISDN capabilities to DMS-10 host offices and remotes and to all DMS-100 remotes. Supporting standard National ISDN BRI U-interface line cards, Nortel's ISDN line drawer is an ideal entry vehicle for deploying small numbers of ISDN lines.

Note: The ISDN line drawer only supports NI-1 software.

The ISDN line drawer enables network providers to cost-effectively deliver popular Internet access, work-at-home, telecommuting, and transaction-based applications to residential and small-business subscribers in rural areas and areas served by remote equipment. With the ISDN line drawer, network providers can deploy remote ISDN service without having to invest in external channel-bank equipment.

Remote ISDN deployment

The ISDN line drawer can be provisioned in any of the following DMS-100 remotes:

- remote line concentrating module (RLCM)
- outside plant module (OPM)
- outside plant access cabinet (OPAC)
- remote switching center (RSC)
- remote switching center–SONET (RSC–S)

Deployed in existing DMS-100 remote LCMs, the ISDN line drawer directly replaces a 64-line POTS drawer in an LCM. The ISDN line drawer houses up to 28 standard DMS-100 ISDN line cards (NTBX27), plus power supply and controller equipment. You can provision each LCM with up to two ISDN line drawers. You can provision up to seven ISDN line drawers for each RSC or RSC–S (14 for each dual DMS-100 RSC or RSC–S).

The ISDN line drawer offers further cost-savings by combining the functions of the BIC, EDCH, and EISP into a single ISDN drawer controller (IDC). The ISDN line drawer also uses the existing PUPS card (NTBX71), housed in the line drawer.

To provide 64-kbit/s clear-channel capability, you can equip the switch with a DS-1 interface card (NT6X50AB) and an LCM processor pack (NT6X51DA). In remote deployments, the ISDN line drawer does not support emergency stand-alone (ESA) or intra-switching capabilities.

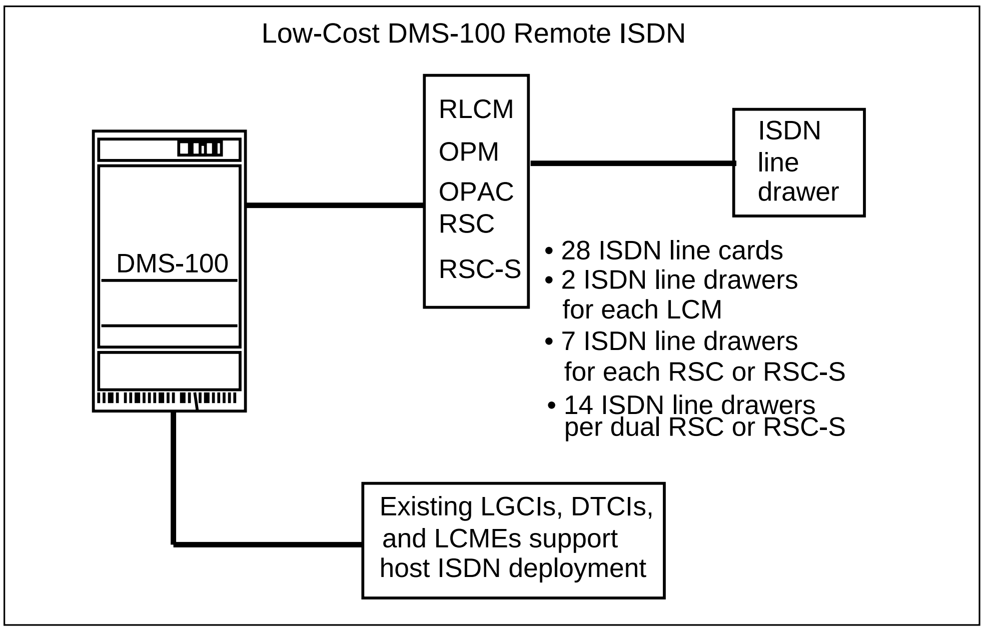
In addition to the normal communication channels between the host switching network and a remote, each ISDN line drawer requires two DS-0 communication channels to the LCM. A third DS-0 is required if a permanent D-channel packet connection is used.

ISDN capabilities extended to all DMS-100 remotes

DMS-100 offices currently support ISDN service that uses the LGCI, ISDN Digital Trunk Controller (DTCI), and LCME. The RSC–S provides a cost-effective remote ISDN solution for larger line-size deployments. Refer to Figure 8-11.

Note: The RSC-S supports 2B and NI-2 software.

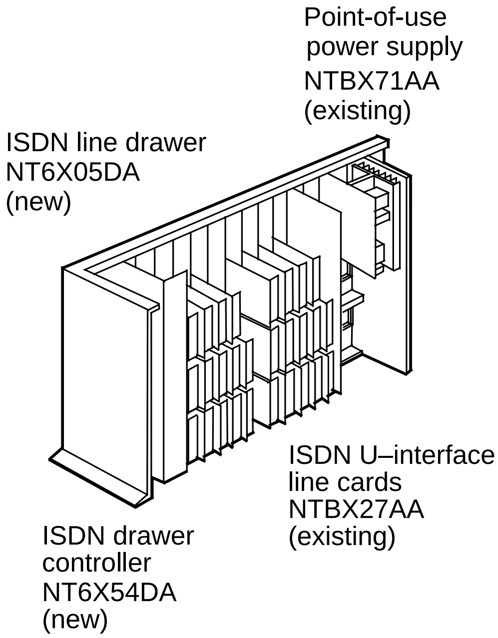
Figure 8-11 ISDN line drawer



In lower line-size applications, the ISDN line drawer offers cost-effective delivery of ISDN to smaller numbers of subscribers served by other DMS-100 remotes. The ISDN line drawer also reduces cost of ownership through a common operations, administration, maintenance, and provisioning (OAM&P) and common line-drawer equipment sparing across DMS-10 and DMS-100 platforms.

Using this ISDN configuration, network operators can deliver ISDN BRI service from any LCM-based DMS-100 remote, with minimal hardware required at the host switch. The ISDN line drawer makes use of packet switching through the DMS SuperNode link peripheral processor (LPP) packet handler. Refer to Figure 8-12.

Figure 8-12 ISDN line drawer



All features of the ISDN line drawer are planned to be included in software package ISDN0003. The ISDN line drawer was introduced with NI-1 features as part of the NA007/XPM08 software stream.

9 DMS packet handler

Introduction

The DMS packet handler (DMSPH) is a full featured X.25/X.75 packet service for ISDN B- and D-channels for the DMS-100 SuperNode central office. It allows the DMS-100 switch to be compliant with National ISDN 1 standards. The DMSPH is an integral component of the DMS switch and is based on the link peripheral processor (LPP) platform.

The DMSPH requires a DMS SuperNode equipped with ISDN and LPP or link interface shelf (LIS). In BCS34 and BCS35, the DMSPH can co-exist with the line interface unit for CCS7 (LIU7) in the same LPP. In addition, in BCS35, the XLIU can co-exist with the frame relay interface unit (FRIU). It can also co-exist with a data packet network packet handler (DPNPH) with the restriction that an individual logical terminal identifier (LTID) can only be serviced by either the DPNPH or the DMSPH. In this configuration, an X.75 link would be required between the DMSPH and the DPNPH. Refer to Figure 9-1. XLIU hardware is also supported on the single shelf link peripheral processor (SSLPP).

The packet handler consists of X.25/X.75 link interface unit (XLIU) that resides in the LPP. Physical, data link, and network level protocol services are handled by the XLIU. Packet handler call control, operations, and maintenance responsibilities are addressed by both the XLIU and DMS-core. Data traffic is carried between the data terminals and the XLIU by the way of dedicated DMS network connections over DS30 links. (Refer to Figure 9-2.) The LPP connection to the DMS switch network is accomplished by the network interface unit (NIU). A description of each of these components follows.

Figure 9-1 DMS packet handler network connections

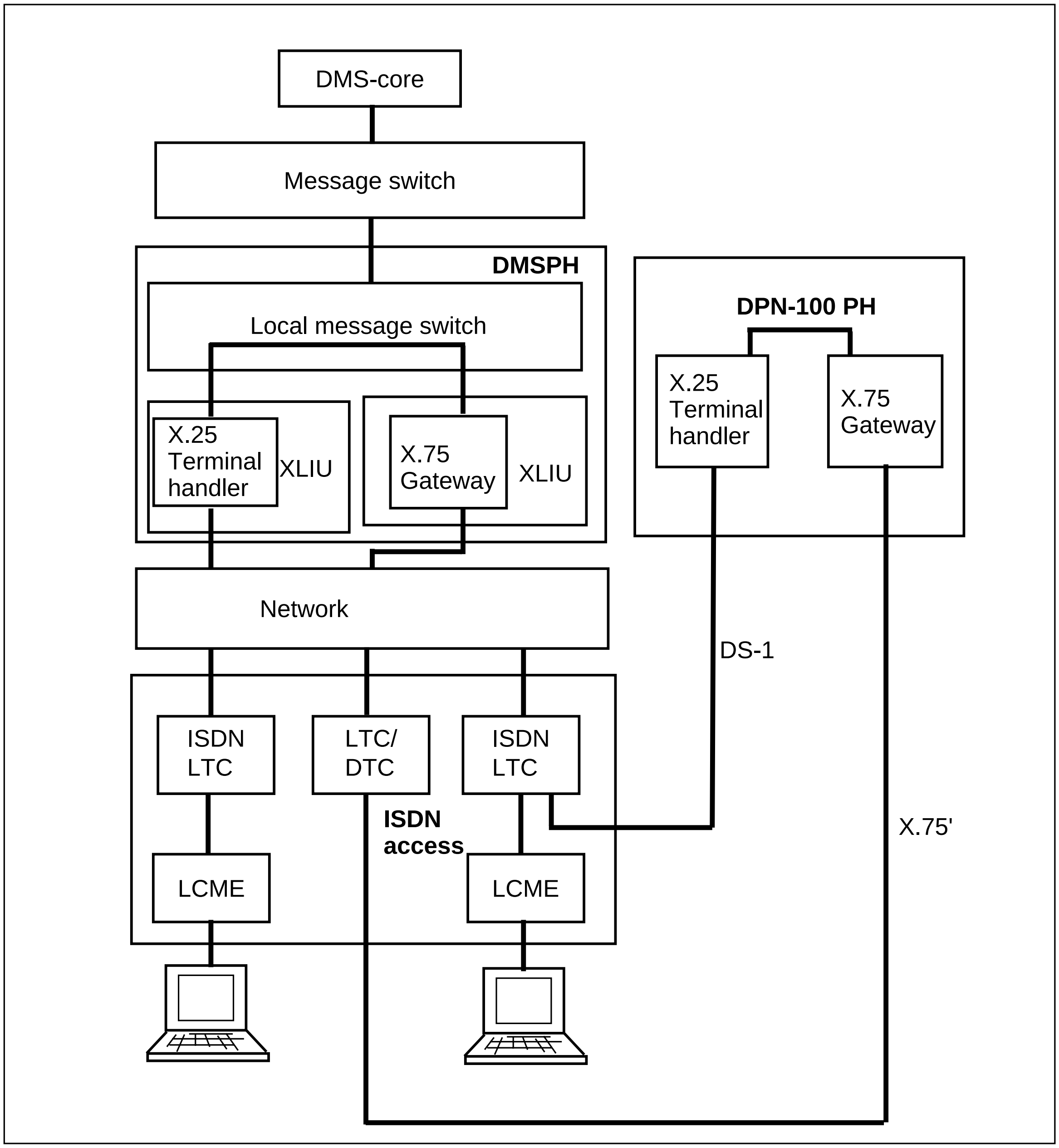
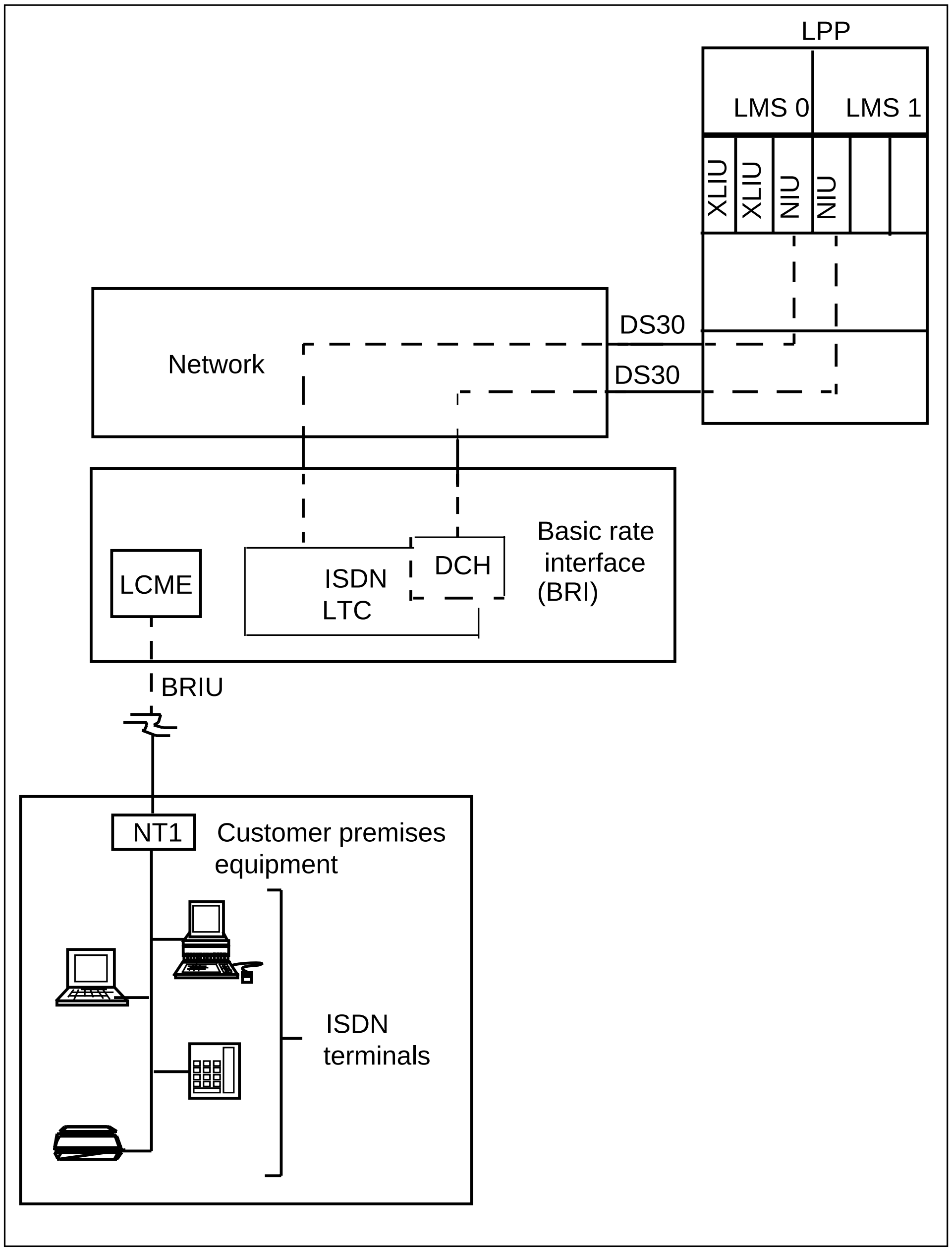


Figure 9-2 Link peripheral processor

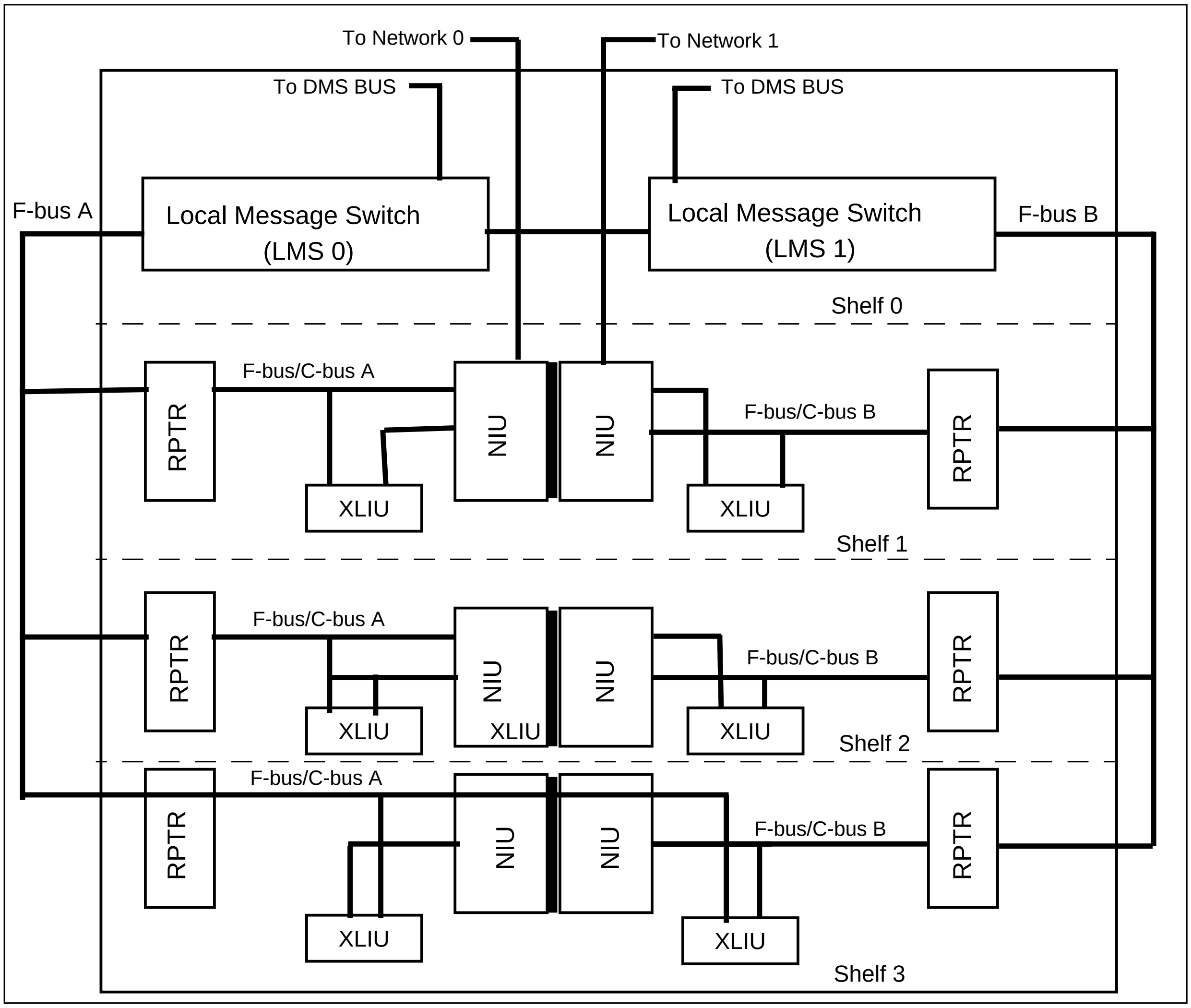


Link peripheral processor

The LPP was originally developed to support the DMS signaling transport point (STP). The LPP was designed to support a number of applications by DMSPH through the addition of application specific units (ASU). The XLIU is the ASU for the DMS packet handler application.

The control component of the LPP is known as the local message switch (LMS). (Refer to Figure 9-3.) The LMS provides message switching and control for the entire LPP. The LMS contains a 128 Mbit/s T-bus that connects to the ASUs using a 32 Mbit/s F-bus. The component combination of LMS, F-bus, and F-bus Repeaters (RPTR) to ASUs is called the link interface module (LIM).

Figure 9-3 LPP block diagram



Link interface unit

The X.25/X.75 XLIU consists of an integrated processor and F-bus (IPF) NTEX22BB card responsible for Layer 3 (X.25/X.75 packet) processing and F-bus access.

A high-level data link control (HDLC) frame processor (HFP) NTFX10AA terminates the physical and data link layers (LAPB, LAPD) for the DMSPH.

A C-bus Interface Paddleboard (CIP) NTFX09AA terminates and provides access to the C-bus for the LIU.

The minimum recommended configuration of XLIUs is 2 XLIUs, one to support X.25 service, and the second to support X.75 service. Up to 30 XLIUs can be provisioned in a DMS-100 switch; however, configurations higher than 11 XLIUs in BCS35 must be approved by Nortel.

In BCS36, this approval level was removed. All XLIUs must be provisioned on the same LPP. Provisioning rules for the XLIU can be found in the “Engineering Provisioning” chapter in this guide.

Network interface unit

The network interface unit is a dual unit component that terminates DMS network links. The NIU can only mount on a LIS that has been equipped for C-bus access. This requires the F-bus repeater NT9X74DA. Refer to Figure 9-3.

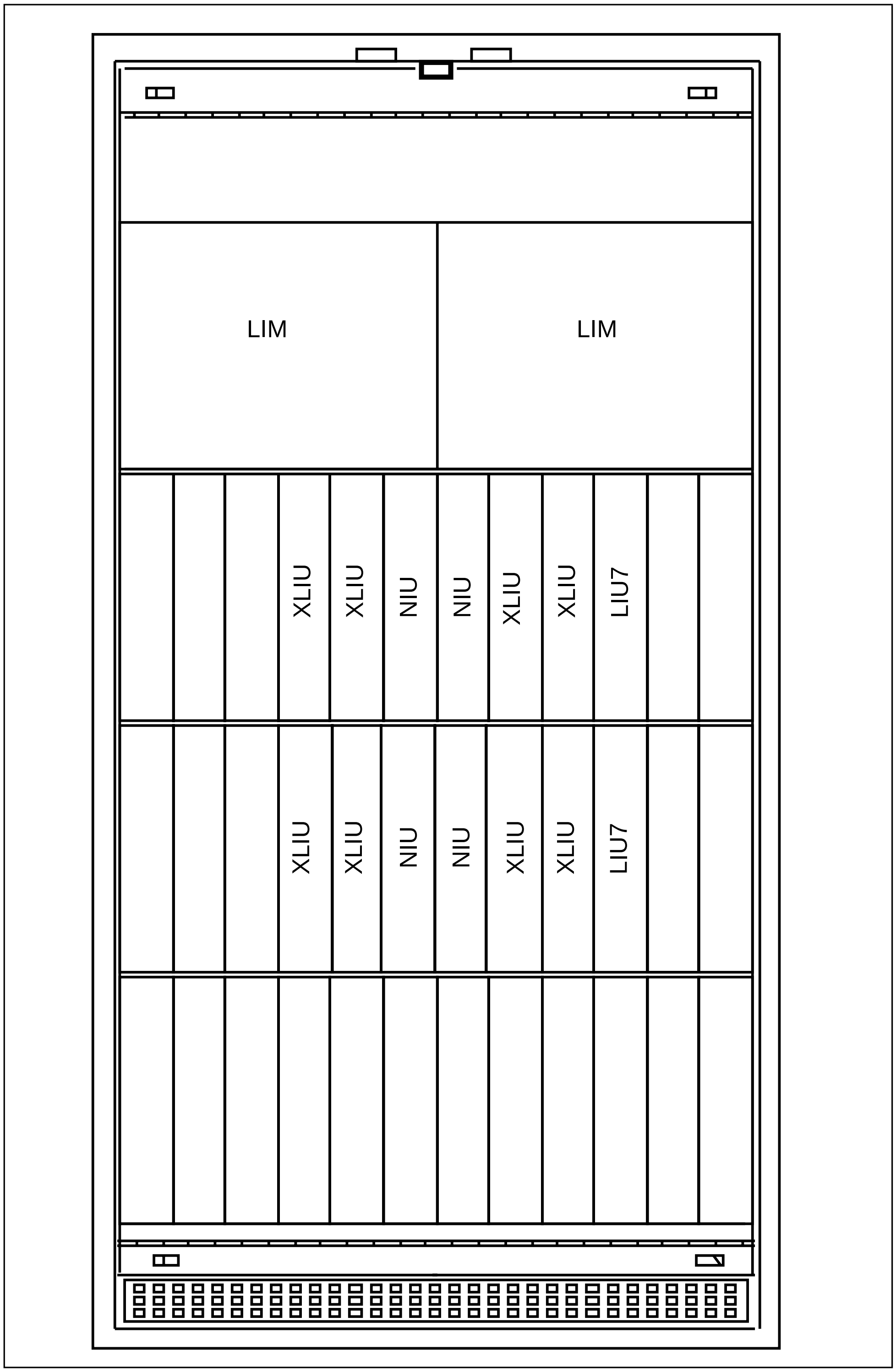
Each unit of the NIU consists of three cards, an IPF card NTEX22BB, a C-bus controller (CBC) NTEX25AA for unit 0 and NTEX25BA for unit 1, and a DS30 Paddleboard NTEX28AA. It provides the XLIU with access to network channels using the 512 channel C-bus.

The NIU currently provides access for up to four DS30 links, providing a maximum of 120 DS30 channels. An NIU occupies two ASU positions (four slots) in the middle of an LPP shelf. (Refer to Figure 9-4.)

The C-bus controllers (CBCs) drive the C-buses. The CBCs receive data from both network planes and select the plane to receive based on received integrity and parity. Network plane selection is done on an individual channel basis. The data from the network link is then put on the C-bus in C-bus format.

In the opposite direction, the CBC takes data from the C-bus and sends it to both planes of the network with parity and integrity added to each channel. The CBC provides error free switching of active C-buses during fault conditions.

Figure 9-4 LPP hardware



10 ISDN real-time engineering guidelines

Introduction

This section supplies the following information:

- CM impacts of DMSPH calls
- a synopsis of the peripheral components that require real-time engineering
- identification of the ISDN and non-ISDN call types that impact specific peripheral processors
- real time call attempt capacity models

CM impact of DMSPH calls

Call routing and transmission for DMSPH services are the same as for ISDN circuit-switched services; that is, DMSPH uses the same software base and data tables as DMS ISDN and DMS circuit-switched calls. This ensures that there is a consistent and integrated process for all DMS services, minimizing the impact of call processing on the performance of the DMS-core and providing functions, such as digit translation and hunt group processing. DMSPH call processing also provides

- X.25 and X.75/X.75' Layers 2 and 3 processing in the XLIU
- call routing and translation functions identical to DMS circuit-switched services

System overload controls in the XLIU prevent a single terminal from being able to flood the CM with origination messages. Specifically, the controls allow no more than 15 call setup requests from an individual XLIU within a 6-s period. Call setup requests exceeding this threshold are blocked at the XLIU, preserving CM resources.

CM impact for the DMSPH call types is detailed in the following table. These timings can be placed in the Supplemental Additives section of the REAL::TIME Calculation tool. In software releases before NA001, a count of packet calls can be obtained by QCOUNTS (a CI level command) for

B-channel and D-channel terminals, and the TRK operational measurement (OM) for X.75 trunks. Release NA001 introduced new OM groups that peg processor occupancy, L2 and L3 frame and packet counts.

Table 10-1 DMS PH CM call timings (BCS35)

Call type	Timing	AMA additive
Local BRI to BRI	10ms	+9ms
Local BRI to X.75	11ms	+9ms
Local BRI to X.75'	12ms	+9ms
X.75 to local BRI	9ms	+9ms

Peripheral real-time engineering methodology synopsis

The peripheral Real::Time Calculation tool Real::Time mechanizes real-time engineering of the following:

- LCME
- ISDN LGCI
- ISDN LTCI
- DTCI
- RCC2/DRCC2

Real-time engineering methodology of ISDN type peripherals is identical to that of standard, non-ISDN peripheral processors. Refer to the latest issue of *XPM07 and Higher Peripheral Real-Time*, SEB 96-11-001, for the manual calculation of call attempt capacity of peripheral controllers.

Peripheral real-time engineering requirement synopsis

This section is an overview of identified peripheral components that require real-time engineering. In addition, the specific call types, both ISDN and non-ISDN, that impact each peripheral component are identified.

The pertinent peripheral processors are as follows:

- LCM (with ISDN Line Drawer) and LCME
- ISDN LGCI unified processor (UP)
- ISDN LTCI UP
- DTCI UP

- RCC2 UP
- XLIU integrated processor and F-bus (IPF) and HDLC frame processor (HFP)

LCM and LCME

Real-time engineering for the LCME is important as the type of lines supported increased at BCS32 to include MBS, Datapath, and POTS in addition to ISDN.

The real-time impact of the MADN feature assignment to ISDN lines has little impact on the LCME processor. All per call timing additives associated with the assignment of MADN to non-ISDN line types such as MBS, Display MBS, and MDC are listed in SEB 96-11-001.

ISDN LGCI

In BCS35, the UP was introduced in the ISDN-LGCI. This processor combines the functionality of the master processor (MP), and the signaling processor (SP). Real-time engineering of the UP is required and can be accomplished by using the information found in *XPM07 and Higher Peripheral Real-Time*, SEB 96-11-001

Currently, real-time engineering for the ISDN LGCI EISP is not viewed as a requirement. For typical applications, EISP real-time utilization does not exceed 40%.

Real-time engineering for the ISDN LGCI DCH is only a requirement for D-channel packet-switched calls (SAPI 16) and is currently viewed as not required for circuit-switched calls.

ISDN LTCI

In BCS35, the unified processor was introduced in the ISDN-LTCI. Real-time engineering of the UP is required and can be accomplished by using the information found in *XPM07 and Higher Peripheral Real-Time*, SEB 96-11-001.

Real-time engineering for ISDN LTCI EISP is not viewed as a requirement. For a typical BRI application, EISP real-time utilization does not exceed 40%.

Real time engineering for the ISDN LTCI DCH is only a requirement for D-channel packet calls (SAPI 16) and is currently not required for circuit-switched calls.

DCH

The DCH is currently engineered only for packet-switched traffic. If only circuit-switched traffic is handled by the DCH, the DCH is limited by physical connections (channels). However, if the DCH also handles the D-channel packet traffic, engineering by throughput is required. The DCH is rated for a maximum capacity of 50 FPS. This assumes 128-byte packets with 0% piggybacking. As an alternative, the DCH can also be engineered by real time, as the limiting component in the DCH when handling packet- and circuit-switched traffic is the DCH processor. The DCH timings appear in the following tables.

Table 10-2 DCH processor occupancy allocations

Overhead	Buffer	Available for call processing
24%	10%	66% (2 376 000 ms)

Table 10-3 DCH per call timing table

Call type	Per call timings in milliseconds	
	Originating	Terminating
Circuit switched	110	110
D-channel packet	14	14

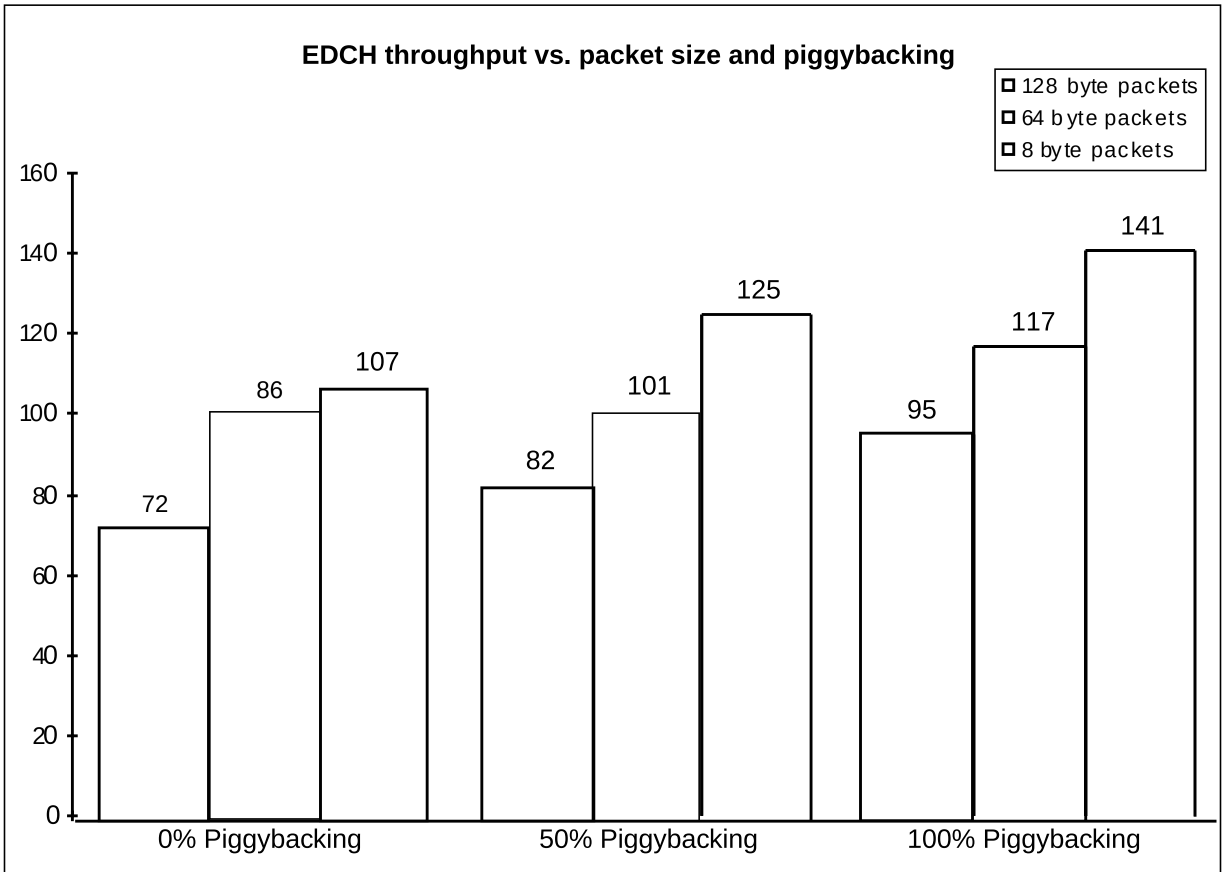
Note: This represents the time required to process one 128-byte packet. To calculate the DCH time required to process an average DPPS throughput for a sustained hour, multiply the timing shown by the throughput rate, then multiply by 3600 (seconds in one hour).

EDCH

The EDCH is engineered similarly to the DCH. Due to its faster processor, its throughput is approximately 44% higher, at 72 FPS for 128-byte packets, 0% Layer piggybacking, and 11% overhead. The effect of varying packet size and Layer 3 piggybacking on EDCH throughput is shown in the Figure 10-1. The factors that vary EDCH overhead follow Figure 10-1.

> ***Note:*** Piggybacking occurs when control data is transmitted as a part of a regular frame carrying a data transmission. For example, an acknowledgment of frames received is sent as part of a frame which is being used to transmit regular data.

Figure 10-1 EDCH throughput



The provisioning rules use the throughput for the standard 128 byte packet size with 0% piggybacking.

For those who wish to engineer the EDCH by real time instead of throughput, call timings appear in the following tables.

Table 10-4 EDCH processor occupancy allocations

Overhead	Buffer	Available for call processing
11%	10%	79% (2 844 000 ms)

The base overhead for the EDCH is 5%. The number of terminals serviced by the EDCH will vary the overhead. The 11% gives a typical figure, and represents a configuration of 100 B-channel terminals and 30 D-channel terminals assigned to a single EDCH. The 11% can be used for planning purposes. If desired, the overhead in percent for a particular configuration can be calculated by the following formula: 5 + (.046*) (number of terminals).

Table 10-5 EDCH per call timing table

Call type	Per call timings in milliseconds	
	Originating	Terminating
Circuit switched	76	76
D-channel packet*	10.9	10.9

Note: This represents the time required to process one 128 byte packet. To calculate the EDCH time required to process an average DPPS throughput for a sustained hour, multiply the timing shown by the throughput rate, then multiply by 3600 (seconds in one hour).

DTCI

In BCS35, the UP was introduced in the ISDN-DTC. Real-time engineering of the UP is required and can be accomplished by using the information found in *XPM07 and Higher Peripheral Real-Time*, SEB 96-11-001.

Currently, real-time engineering of the EISP is not necessary due to traffic tests revealing real-time utilization of the processor not exceeding 50% for a typical application.

RCC2

Real-time engineering for the remote cluster control 2 (RCC2) UP is required. Real-time engineering of the RCC2 DCH is only required for D-channel packet calls (SAPI 16). For details on real-time engineering for the RCC2, refer to XPM07 and Higher Peripheral Real-Time, SEB 96-11-001.

XLIU

Call setup, takedown, and billing are done by the DMS computing module, and the real-time impact is specified in the earlier section on CM impact. The XLIU does perform work; however, to process each packet, a different scheme must be employed to properly engineer the XLIU. Note that explicit grade of service standards do not currently exist for packet service because congestion typically results in delay rather than loss of service. (TR-301 currently recommends 55 ms per node delay for PPSNs with no indication as to the percentage of calls that can exceed this figure.) Packet throughput is typically expressed in data packets per second (DPPS), with terminals rated at their high quarter-hour or half-hour throughput. The XLIU processor capacity is determined by the sum of the packet rates for all of its subtending terminals.

Nortel (Northern Telecom) expresses XLIU capacity based on laboratory measurements using the following conservative assumptions:

- intra-XLIU packet traffic
- 128-byte packets
- 0% Layer 3 piggybacking

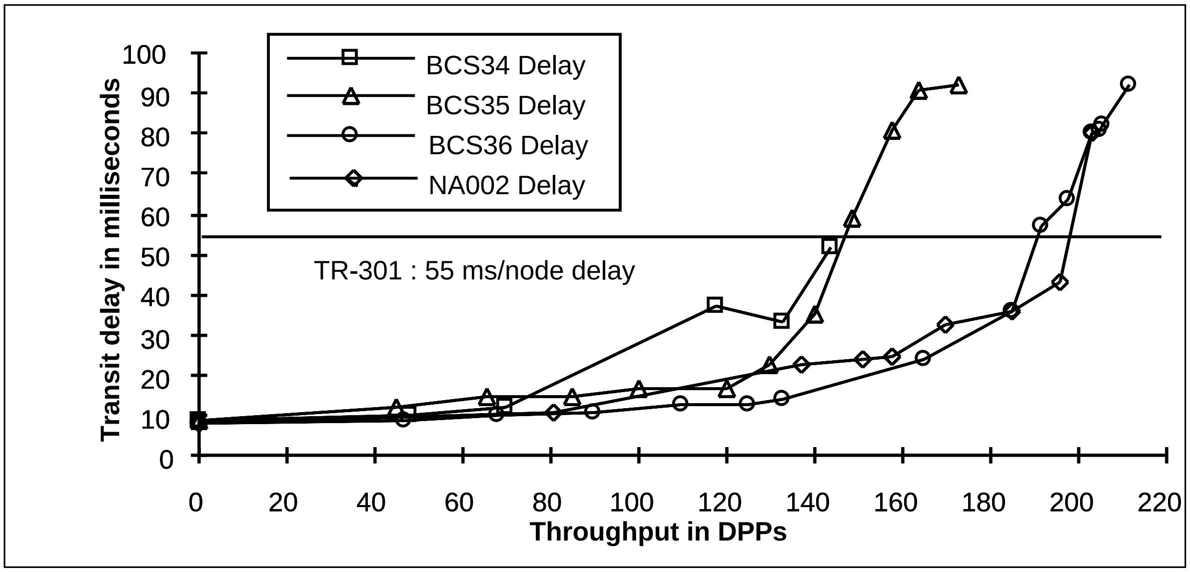
Real-time engineering of the XLIU in BCS34 is not required where the total DPPS load is kept below the engineering default value of 130 DPPS. This figure allows a buffer for peakedness of data as well as call setup through the XLIU, while maintaining packet delay within conservative levels.

BCS35 enhancements improved XLIU performance, as shown in Figure 2-21. The chart shows the relationship between throughput and transit delay. The DMS packet handler meets the TR-301 PPSN proposal of 55 ms per node delay at 150 DPPS (intra-XLIU), with the optimal region extending beyond 170 DPPS. The Nortel engineering default value for each individual XLIU is 150 DPPS in BCS35. Higher throughput values can be substituted for the default value; however, Nortel recommends this value not exceed the 170 DPPS upper value of the optimal region.

In BCS 36, further performance enhancements were made in the XLIU. These are represented in the chart in Figure 10-2. Figure 10-2 demonstrates that the XLIU meets and exceeds the recommendation of 55 ms delay at its rated capacity of 160 DPPS, while extending the stable range to beyond 200 DPPS.

Figure 10-2 also shows the performance curve for release NA002. Note that the data for NA002 includes the results of work that was undertaken to improve both the robustness of packet delivery and grade of service for packet XLIU traffic. This work has resulted in a marginal increase in delay time on a per packet basis at certain throughput rates. Note, however, that the recommended engineering point remains at 160 DPPS because the stable range for release NA002 is well in excess of 200 DPPS.

Figure 10-2 DMS PH delay vs. throughput



As discussed previously, the data presented refers to INTRA-XLIU data traffic. Note that the performance of the DMSPH in an INTER-XLIU packet scenario is considerably better. Testing done in BCS36/NA002 showed that an XLIU could sustain over 300 DPPS in an INTER-XLIU configuration and still remain within the TR-301 recommendation (less than 55 ms delay/packet).

Real-time engineering impacts by call type

The call types that must be considered when calculating real-time requirements in affected ISDN related processors are as follows:

- existing non-ISDN (such as, POTS, MDC, and MBS)
- ISDN B-channel circuit-switched voice and data
- ISDN B-channel provisioned high-speed packet data (B_b)
- ISDN D-channel call signaling associated with the B-channel
- ISDN D-channel low-speed packet data (B_d)

Not all of the previous mentioned call types impact all processors. In fact, ISDN B-channel provisioned high-speed packet data through a Bb link contributes only to the real-time utilization of the XLIU processor, other than at the establishment of the Bb’s dedicated path.

Refer to Table 10-6 for call type impact on real-time utilization of previously identified processors.

Table 10-6 DMS ISDN processor real-time engineering impact by call type

Call type	CPU	LCME	ISDN LGCI	ISDN LTCI	DTCI	RCC2	XLIU
Existing non-ISDN	Y	Y	Y	Y	Y	Y	N
B-channel circuit-switched voice/data	Y	Y	Y	Y	Y	Y	N
Dedicated B-channel packet data (Bb)	N	N	N	N	N	N	Y
D-channel packet data (SAPI 16)	N	N	Y	Y	N/A	Y	Y
D-channel signaling (SAPI 0)	Y	N	Y	Y	Y	Y	N

It is important to note the following:

- Packet services through either the B- or D-channel do not contribute to real-time utilization of the CM, other than call setup, as noted under “CM impact of DMSPH calls,” earlier in this chapter.
- Although the D-channel call signaling associated with the N-channel impacts real-time utilization, the capture of its component increment is achieved in the per call timing associated with the B-channel circuit-switched call.
- Real-time engineering is currently not required if DPPS default limits are observed.

LCM and LCME real-time engineering algorithm

As stated in previous sections, real-time engineering methodology for ISDN type peripherals is identical to that of existing peripheral types with the exception of the addition of unique ISDN call types.

Manual calculation of real-time utilization of the LCME is not required because **Real::Time** mechanizes the process. Discussion of manual calculation is included in SEB 96-11-001 in case the reader wants to be familiarized with the process used in the **Real::Time** program.

As shown in Table 10-6, only circuit-switched calls, whether ISDN or non-ISDN, contribute to real-time utilization of the LCME processors. Packet-switched calls, both B- and D-channels, do not require LCME processor resources and therefore are not considered when performing real-time engineering of the LCME.

For non-ISDN lines, per call timing calculation is identical to that of existing LCMs.

Calculation of per call timing for ISDN lines is the same as for non-ISDN lines with one exception. The exception is that there is no additive to an ISDN circuit-switched per call timing in the LCME for the application of the MADN feature.

ISDN LGCI BRI real-time engineering algorithm

Manual calculation of real-time utilization of the BRI in the ISDN LGCI is not required because **Real::Time** mechanizes the process. Discussion of manual calculation for the BRI ISDN LTCI is included in SEB 96-11-001 and can be applied on the BRI ISDN LGCI for the sake of familiarizing the reader with the process used in the **Real::Time** program.

As shown in Table 10-7, real-time utilization of the BRI ISDN LGCI is impacted by the following call types:

- ISDN B-channel circuit-switched voice and data
- existing non-ISDN circuit-switched voice and data
- D-channel call control signaling

Table 10-7 DMS ISDN administration/discipline ISDN LGCI/ISDN LTCI real time

Component	Impact	OM	Resident tool	Eng/plan tool
B-channel CS (Note 1)	Yes	LMD, RTLTSUM	PERFORM	Real::Time
B-channel PS (Note 2)	No (Provisioned)	XLIUL3	N/A	N/A

Note 1: CS = circuit-switched

Note 2: PS = packet-switched

Note 3: SAPI 0 = signaling associated with B-channel CS

Note 4: SAPI 16 = packet-switched data

Note 5: D-channel PS traffic impacts the DCH

Real-time engineering of the EISP in the ISDN LGCI is currently viewed as not required because its call attempt capacities exceed that of the unified processor.

Real-time engineering of the DCH is not required for call control signaling associated with B-channel circuit-switched calls (SAPI 0).

ISDN LTCI BRI and PRI real-time engineering algorithm

Manual calculation of real-time utilization in the ISDN LTCI is not required because **Real::Time** mechanizes the process. Discussions of manual calculation for basic and primary rate interfaces in the ISDN LTCI are included in SEB 96-11-001.

As shown in Table 10-7, real-time utilization of the ISDN LTCI is impacted by the following call types:

- ISDN B-channel circuit-switched voice and data
- existing non-ISDN circuit-switched voice and data
- D-channel call control signaling

Real-time engineering of the DCH is not required for call control signaling associated with B-channel circuit-switched calls (SAPI 0).

Machine resident tools

The following is a description of the machine resident tools.

ET tools

CPU activity tool (ACTIVITY)

Impact capture of ISDN related call types, both BRI and PRI, has been fully integrated into the CPU activity tool that measures real-time utilization of the CPU. CPUSTAT also recognizes ISDN-related call types. For further information on the ACTIVITY tool, refer to *Users Guide Activity/Analysis CPU Measurement Tools*, SEB 86-11-005.

XPM activity and performance tool (PERFORM)

The XPM activity and performance tool is used to monitor performance and real time utilization of individual DMS peripheral controller types.

The tool provides measurements for the master processor (MP), signal processor (SP), ISDN signaling preprocessor (ISP), and DCH processor.

At present, the ISDN LGCI, ISDN LTCI, RCC2, DTCI, SRSC, and Dual RCC2 are also supported by the tool.

For further information on the tool, refer to *DMS100 New Peripheral Activity and Performance Tool*, SEB 87-002-04

Non-resident tools

The following is a description of the non-resident real-time planning tool.

Real-time planning tools

The non-resident tool **Real::Time** can be used to calculate real-time utilization for both the computing module and peripherals of affected processors in inservice offices. The tool should be used for the real-time engineering component of provisioning initial ISDN applications and planning additions to in-service switches.

Administration methodology

The methodology described in this section addresses administration of performance engineerable components defined throughout this document as requiring capacity management. This section is not intended to serve as a definitive guideline for use of all available operational measurements. A synopsis of the areas requiring performance related engineering for the ISDN product is provided in Table 10-8.

Table 10-8 Performance engineering areas for ISDN controllers

ISDN LGCI/ISDN LTCI/RCC2 real time	Impact
Unified processor	Yes
ISDN signal preprocessor	No (Note 1)
D-channel handler	Yes
DTCI real time	**Impact**
Signal processor	Yes
Unified processor	Yes
ISDN signal preprocessor	No (Note 1)
XLIU real time	**Impact**
XLIU processor	Yes (Note 2)

Note 1: Current view is that real-time engineering is not required for the ISP.

Note 2: Current view is that the XLIU is engineered by DPPS throughput and is not real-time engineered.

Further references for information on calculating capacity

The following may be referenced for additional information on capacity engineering

- System Engineering Bulletins (SEB)
- Engineering Planning Manuals (PLN)
- *Capacity Administration Manual*, 297-1001-304

> ***Note:*** All of the above documentation is available on Helmsman beginning with NA005.

11 Engineering provisioning

Introduction

This section describes ISDN BRI provisioning guidelines.

D-channel handler

D-channel handlers (DCH) are provisioned on a per channel basis with allowance made for the packet capacity of 50 FPS for the DCH or 72 FPS for the EDCH. This packet capacity is stated using 128-byte packets and 0% Layer 3 piggybacking. The throughput limit of 50 FPS per DCH (72 FPS for EDCH) assumes the per line traffic figures are for 100% simultaneous usage of all terminals. Refer to the *Provisioning Manual*, PLN-89910104, which contains the rules and guidelines for provisioning DMS-100 family for DCH engineering rules.

Note: Beginning with NA005 the *Provisioning Manual* can be found on Helmsman.

DMS packet handler link interface unit

The DMS packet handler (PH) X.25/X.75/X.75' link interface unit (XLIU) must be provisioned for either X.25 lines or X.75/X.75' trunks in BCS35 and below. Beginning in BCS36, a single XLIU can serve both X.25 lines and X.75 trunks. For X.25 service, a mixture of B-channel and D-channel terminals can be provisioned on the same XLIU. Each B-channel port uses one of the 31 XLIU channels. D-channel terminals can be statistically multiplexed at a ratio of up to 64 on each XLIU channel to the maximum of 512 terminals for each XLIU. Note that NIU capacity is limited to 120 channels per pair due to DS 30 connections. Therefore, a maximum of 120 XLIU channels can be provisioned in a single LIS and 360 XLIU channels in an LPP.

Both X.75 and X.75' trunks can be terminated on the same XLIU, one trunk for each XLIU channel. Trunk traffic should be estimated on a per-channel basis and then channel allocation can be done on a per-XLIU basis. For an

XLIU handling only X.75/X.75' trunk traffic, the limiting factors are as follows:

- the default XLIU throughput capacity
- the physical XLIU limit of 31 channels
- the LIS limit of 120 channels
- and the overall LPP limit of 360 channels

To provision an office where both X.25 and X.75 service are provided, provision the X.25 service first, then provision the X.75 trunks.

Refer to the Provisioning Manual, PLN-8991-104, for XLIU engineering rules.

Logical channel numbers

Calls in the DMSPH, whether permanent virtual-circuit (PVC) calls or switched virtual-circuit (SVC) calls, are represented in datafill by logical channel numbers (LCN). All active calls are assigned an LCN. Thus each active PVC or SVC call will have an LCN associated with it for the life of the call. DMSPH datafill defines limits on the number of LCNs allowed for XLIUs and their associated channels. LCN limits for components are further refined by defining maximums for PVCs and three SVC types (incoming, outgoing, and unrestricted) per XLIU channel. These limits are enforced by DMSPH call processing to ensure operating company defined packet service availability according to the standard International Telegraph and Telephone Consultative Committee (CCITT) service types. LCN datafill limits are listed in Table 11-1.

Table 11-1 LCN datafill limits (Sheet 1 of 2)

Service type	LCN maximum
XLIU	4096 LCNs maximum
LAPB	512 LCNs maximum per terminal, consisting of 512 PVCs 512 incoming or outgoing VCs

Table 11-1 LCN datafill limits (Sheet 2 of 2)

Service type	LCN maximum
LAPD	64 LCNs maximum per B_d link, consisting of 64 PVCs 64 incoming or outgoing VCs
X.75	512 LCNs maximum, consisting of 512 PVCs 512 incoming or outgoing VCs

Call condense blocks

Packet calls use call condense blocks (CCB) to store dynamic data associated with a packet call. There are 64 000 (65 536) CCBs maximum allowed per DMS office. The same CCB pool is used by the DMS for voice call processing (one CCB per call). Note that very few, if any, offices will approach the 64 000 CCB limit; therefore, the DMSPH will not be competing against any type of call processing for access to these CCBs. This is because an office would be limited by the switching network if it, in fact, approached the 64 000 CCB limit based on circuit-switched voice calls alone.

The *Capacity Engineering Manual*, 297-1001-170, states that an XLIU can process 4000 (4 x 1024 = 4096) calls. This should be interpreted as follows: an XLIU can process up to 4000 CALL ATTEMPTS (or 2000 simultaneous calls). Note that the 4000 limit is a theoretical datafill limit based on the initial high level design of the DMSPH. This theoretical limit is not yet a part of the current DMSPH design (see the following paragraph).

The data store I/O space of the XLIU is currently limited to about 2000 call attempts (such as, call processing timers, buffers), even though other data parameters (such as CCBs and XLIU call slots) can theoretically support up to 4000 attempts. The current upper limit of calls for an XLIU is thus approximately 1000 (1024). The current Nortel recommendation for XLIU CCBs is based on this figure. For intra-DMSPH calls, 1000 is a sufficient quantity of CCBs because a single CCB can represent both the originating and terminating leg of the call. However, note that for a worst-case scenario in which all the terminals within the DMSPH were terminating to a distant packet handler, that up to 2000 CCBs are required (per XLIU). For further details, see the “Engineering provisioning” chapter in this guide.

For information purposes, it can be useful to note that line access XPMs are typically provisioned with approximately 600 CCBs. Voice calls typically have short holding times (120-180 seconds at busy hour). Packet calls, on the other hand, can have either extremely short holding times (equivalent to one swipe of a debit card for the POSlink service - X.25 Fast Select) or very long holding times (days or weeks). Therefore, from a statistical point of view, it would be difficult to exceed the 2000 CCB/XLIU recommendation.

CM memory

Each CCB uses 124 words of memory (2 bytes/word). Therefore, the impact to memory on a per XLIU basis (2048 CCBs) is as follows:

2048 x 124 x 2 = 507 904 bytes, or just under 1/2 Mbyte per XLIU.

Office parameters

There are several office parameters that can be set as a part of DMSPH provisioning, including XLIU CCBs, as shown in Table 11-2. These are documented in the *Office Parameters Reference Manual*, 297-8001-855. However, note that the NTP contains a minimum number of guidelines for provisioning.

Table 11-2 Recommended office parameter settings

OPARM	Nortel recommended value
NCCBS	Number of Call Control Blocks. 2048 per XLIU (see preceding text).
CRS_PRU_POOL2_SIZE	Billing recording units. 2048 per XLIU.
CRS_SUBRU_POOL4_SIZE	Billing recording units. 2048 per XLIU.
Note: If recording units are not available in sufficient quantity (CRS_PRU_POOL2_SIZE, and CRS_SUBRU_POOL4_SIZE) PVC calls are rejected by call processing, while SVC calls complete, but billing information is not captured	

MAX_LAPB_TERMINALS/ MAX_LAPD_TERMINALS

These two parameters specify maximums for LAPB and LAPD terminals, which are the two types of packet terminals for ISDN. All ISDN terminals require an LTID and all that is being done is setting the limit for packet terminals. Up to 32 000 ISDN LTIDs can be assigned per office. This includes the sum of all ISDN B-channel voice terminals as well as the sum of all LAPB and LAPD terminals.

Provision MAX_LAPB_TERMINALS based on typical high speed B-channel penetration per office. This should not exceed 10% of the total number of ISDN B-channels per office. Up to 31 LAPB terminals can be assigned per XLIU.

Provision MAX_LAPD_TERMINALS based on the following guidelines:

1. Maximum eight LAPD terminals per ISDN BRA (2B + D) physical interface. Typically there will be 1-2 LAPD terminals per interface.
2. Maximum 511 LAPD terminals per XLIU/XPM.
3. Set the value for this parameter based on the highest projected average number LAPD terminals per interface multiplied by the highest projected number of ISDN line cards for the given office. Note the 32 000 LTID limit.

MADN engineering rules

The engineering rules for MADN, as they apply to ISDN, are as follows:

- no more than 16 members of the same MADN group can appear on a single ISDN LGC or LTC
- no more than eight members of the same MADN group can appear on a single LCME or LCMI
- no more than four members of the same MADN group can appear on the same LCME or LCMI drawer
- all members of a MADN group must belong to the same customer group

12 Administration methodology

Operational measurements

Administration of the identified areas discussed below is accomplished through the use and analysis of operational measurements (OM). Operational measurements occur as either existing non-ISDN specific, or ISDN specific.

The operational measurement groups that are pertinent in the administration of existing and the planning of future ISDN applications are listed in the following paragraphs as well as in the *Operational Measurements Reference Manual*, 297-8001-814. Unless otherwise specified, all OM groups are available in BCS32 and later loads.

> ***Note:*** There are no new ISDN OM groups added in NA014.

Existing non-ISDN specific OMs

The following describes non-ISDN specific OMs.

LMD

This group captures B-channel circuit-switched call attempts and usage. B-channel circuit-switched call attempt information is required for the following disciplines:

- LCME real time
- ISDN LGCI/ISDN LTCI/RCC2/DRCC2 real time
- central control real time

B-channel circuit-switched usage information is required for the following disciplines:

- LCME traffic
- ISDN LGCI/ISDN LTCI/RCC2/DRCC2 traffic

XPMOCC (available as of NA002)

The information reported by this group consists of XPM+ occupancy, along with total originating and terminating (circuit-switched) calls. The XPMOCC OM contains one tuple per processor (UP or EEISP only) for each XPM.

XPMOCC measures and reports CPU occupancy each minute in the following registers listed in Table 12-1.

Table 12-1 XPMOCC registers

Register	Description
CPUCP30	number of times call processing occupancy was in the range 0 to 30%
CPUCP40	number of times call processing occupancy was in the range 31 to 40%
CPUCP50	number of times call processing occupancy was in the range 41 to 50%
CPUCP60	number of times call processing occupancy was in the range 51 to 60%
CPUCP70	number of times call processing occupancy was in the range 61 to 70%
CPUCP80	number of times call processing occupancy was in the range 71 to 80%
CPUCP85	number of times call processing occupancy was in the range 81 to 85%
CPUCP90	number of times call processing occupancy was in the range 86 to 90%
CPUCP95	number of times call processing occupancy was in the range 91 to 95%
CPUCP100	number of times call processing occupancy was in the range 96 to 100%
CPUTOTL	total number of samples (total number of pegs in previous registers)
AVGCPOCC	average call processing occupancy
AVGLPOCC	overage low priority (overhead) occupancy
NUMRPTS	number of 15 minute reports added to accumulations registers to normalize counts in AVGCPOCC and AVGLPOCC
PMORIGS	total call origination attempts/originating seizures
PMTERMS	total call terminating calls/incoming seizures

The preceding registers are used to track usage counts averaged over the sample period.

PMSTAT (available as of BCS35)

This group captures LCME occupancy. Registers are included to determine idle overhead, call processing peak and average occupancies, and total peak and average occupancy.

NCMCPUST (available as of BCS34)

NCMCPUST provides information about the CPU occupancy of each XLIU. NCMCPUST contains seven registers that record the following CPU occupancies:

- call processing class
- scheduler class
- scheduler SYSTEM6 and SYSTEM7 class
- maintenance class
- non-guaranteed background class
- idler class
- input/output interrupt class

TRK OM group (modified for X.75 packet handler trunks as of BCS34)

Table 12-2 lists and describes the functions of registers in OM group TRK.

Table 12-2 TRK OM group (Sheet 1 of 2)

Register	Description
TRK_INCATOT	The number of originations recognized on this group. This register would be a peg count of the number of X.75 call attempts.
TRK_TRU:	Usage count of the number of trunks found to be in: tk_cp_busy and tk_cp_busy_deload
TRK_SBU:	Usage count of the number of trunks found to be in: tk_pm_busy, tk_carrier_fail, and tk_deloaded states
TRK_MBU:	Usage count of the number of trunks found to be in: tk_man_busy and tk_seized
TRK_TOTU:	Total trunk group usage. The sum of: TRK_TRU, TRK_SBU, and TRK_MBU
TRK_PRERTEAB	Incoming abandoned: the number of incoming calls from trunks that are abandoned by the originating agent. This counter should be pegged at the same place as the OFZ_ORIGABDN. This register should be pegged when the originating trunk agent clears the call by sending an abandon message to CM.

Table 12-2 TRK OM group (Sheet 2 of 2)

Register	Description
TRK_GLARE:	The number of times a selected trunk has to be dropped because all LCNs are used up. This counter should be pegged when the last LCN is used up before the terminating agent seizes it.
TRK_NATTMPT:	The number of times this particular trunk group was searched for a possible terminating agent. This counter should be pegged every time an incoming call is entering a trunk group to search for a terminating agent.
TRK_NOVFLATB: (X.75 to X.75)	The number of times this particular trunk group was searched for a possible terminating agent and was unable to find an idle trunk to terminate on. This counter is incremented every time a trunk group has no idle trunk available.

ISDN specific OMs

The following is a listing of ISDN related operational measurements with a description of each.

ISGBD

This OM group is used to monitor the traffic handling of the B_d channels. It captures SAPI 16 messaging associated with the B_d links to the packet handler and can be used for load balancing of the DCH in the ISDN LGCI/ISDN LTCI. The registers measure on a per B_d link per DCH basis for the ISDN LGCI/ISDN LTCI. The registers in this group are listed in Table 12-3.

Table 12-3 ISGBD registers (Sheet 1 of 2)

Register	Description
DBDRXPH	Number of frames received from the packet handler
DBDTXPH	Number of frames transmitted to the packet handler
DBDRXDSC	Number of frames received from the packet handler that were discarded by the DCH

Table 12-3 ISGBD registers (Sheet 2 of 2)

Register	Description
DBDTXDSC	Number of frames destined to the packet handler that were discarded by the DCH
DBDCRC	Number of frames discarded by the DCH due to a CRC failure

ISGBRA

This OM group captures messaging associated with the logical D-channel. Individual registers within this group capture SAPI 0, circuit switched call signaling, and SAPI 16 D-channel packet data messages. This OM group can be used for the following disciplines:

- ISDN LGCI/ISDN LTCI real time
- ISDN LGCI/ISDN LTCI DCH load balancing
- DTCI real time

The registers of this group are described in the following paragraphs.

ISGBRA

This OM group is used to monitor the traffic handling of the BRI D-channels terminated on a DCH. Pegged for each individual DCH, the registers in this group are listed in Table 12-4.

Table 12-4 ISGBRA registers (Sheet 1 of 2)

Register	Description
DBRS16TX	Number of SAPI 16 frames transmitted by the DCH
DBRS16RX	Number of SAPI 16 frames received by the DCH
DBRS0TX	Number of SAPI 0 frames transmitted by the DCH
DBRS0RX	Number of SAPI 0 frames received by the DCH
DBRSATX	Number of SAPI 17 and SAPI 63 frames transmitted by the DCH
DBRSARX	Number of SAPI 17 and SAPI 63 frames received by the DCH

Table 12-4 ISGBRA registers (Sheet 2 of 2)

Register	Description
DBRTXDSC	Number of frames destined to be transmitted that were discarded by the DCH
DBRRXDSC	Number of frames received that were discarded by the DCH
DBRCRC	Number of frames discarded by the DCH due to a CRC error on a BRI designated channel
DBRLKRED	Number of link resets by the DCH
DBRLKREP	Number of link resets by the peer (the peer being the device to which the DCH is connected)
DBRRNRD	Number of receiver not ready frames sent by the DCH
DBRRNRP	Number or receiver not ready frames sent by peer
DBRREJTX	Number of reject frames transmitted by the DCH. A reject frame is sent when an incoming sequenced frame is lost. The DCH sends out a reject frame asking for the lost frame.
DBRREJRX	Number of reject frames received by the DCH. A reject frame is received when the peer lost a sequenced frame. The peer sends out a reject frame when it receives a frame with the sequenced number not being what it expected. It then sends a reject frame containing in it the number of the frame that was expected.

ISGCPU and ISGOVLD (available as of BCS33)

These OMs collect the performance OMs for ISGs (DCHs). ISGCPU measures the CPU occupancy of an ISG (DCH). This is specified over a collection period and reports the number of seconds the DCH occupancy is greater than 10, 20, 30, 40, 50, 60, 70, 80, or 90%. ISGOVLD measures the number of times and amount of time the DCH is in congestion or overload. It also collects the number of SAPI 16 frames discarded due to overload controls.

TRMTCU2

This OM group counts the use of call treatment CALL-NOT-ACCEPTED (CNAC) given to the originator of a call when the bearer capabilities (BC) of the originator and the terminator are not compatible. This treatment notifies the subscribers that their actions are inappropriate for reasons of authorization. This OM is pegged on an office-wide basis. The only ISDN register in this group is described in Table 12-5.

Table 12-5 TRMTCU2 register

Register	Description
TCUCNAC	Number of calls routed to the CNAC treatment due to the originator's bearer capability being incompatible with that of the terminator

BCAPCG

This OM group is incremented when the call originator is unsuccessful in reaching a desired call appearance(s) due to its customer group bearer capability. The call originator is then routed to CNAC treatment. Pegged on an office-wide basis, the only register in this group is CGWRNGBC.

Table 12-6 BCAPCG register

Register	Description
CGWRNGBC	Number of uncompleted calls due to the bearer capability of the call originator not being compatible with called party's bearer capability. This register ONLY pegs when the originator party belongs to a customer group. If the originator is a POTS station, then this register is not incremented.

CPICG

This OM group provides measurements of calls that are entirely within the ISDN and calls in which only one party is within the ISDN. Pegged on a customer group basis, the registers in this group are described in Table 12-7.

Table 12-7 CPICG OM registers

Register	Description
EENOTISN	Incremented whenever the originator or terminator of a call involving an ISDN terminal is from outside the ISDN
DENOTISN	Incremented whenever an originating ISDN terminal makes a call to a non-ISDN terminal within the same node
ORNOTISN	Incremented whenever an originating non-ISDN terminal makes a call to an ISDN terminal within the same node
RTRNISN	Incremented whenever a call originating from an ISDN terminal has been forwarded from a non-ISDN terminal to an ISDN terminal due to call forwarding don't answer being activated
INTRAISN	Incremented whenever an originating ISDN terminal makes a call to another ISDN terminal

HFPOM (available as of NA001)

This OM group measures the percentage CPU occupancy in the various HFP tasks. These registers peg for each individual XLIU. The percentage of time that the HFP spends in each CPU task can be calculated by dividing each of the following registers by 1000 (the sum of all the following registers divided by 1000 will equal 100%). These registers are described in Table 12-8.

Table 12-8 HFPOM registers (Sheet 1 of 2)

Register	Description
HFPL1	Represents the percentage of time spent processing the layer 1 task
HFPL2	Represents the percentage of time spent processing layer 2 frames (LAPB, LAPD)
HFPIPF	Represents the percentage of time spent interfacing with the IPF (layer 3)
HFPMAINT	Represents the percentage of time spent processing maintenance tasks

Table 12-8 HFPOM registers (Sheet 2 of 2)

Register	Description
HFPUTIL	Represents the percentage of time spent processing utility tasks
HFPTOOL	Represents the percentage of time spent running maintenance tool tasks
HFPIDLE	Represents the percentage of HFP CPU time which is idle time
HFPOTHER	Represents the percentage of time spent processing tasks other than those previously listed (currently there are no other tasks; therefore, this value is always 0)
FRAMERX	Total number of layer 2 frames received by the HFP (includes I, RR, RNR, SABME, DM, DISC, FRMR, REJ frames, as well as incomplete, bad CRC, aborted, invalid length, and continuity test frames)
FRAMETX	Total number of layer 2 frames transmitted by the HFP (includes I, RR, RNR, SABME, DM, DISC, UA, FRMR, REJ, and continuity frames)
BADFRAME	Number of incomplete, bad CRC, aborted, and invalid length frames received by the HFP.

In addition to the previous registers, OM group HFPOM also provides layer 2 throughput data for the HFP. The three registers (FRAMERX, FRAMETX, and BADFRAME) peg for each individual XLIU.

XLIUL3 (available as of NA001)

This OM group provides layer 3 throughput data for the IPF. This performance data can be used directly to engineer XLIUs and to manage DMSPH network capacity, because the performance metric used by Nortel for the XLIU is layer 3 DPPS. The following registers, described in Table 12-9, peg for each individual XLIU.

Table 12-9 XLIUL3 registers (Sheet 1 of 2)

Register	Description
PKTRXRNR	Number of receiver not ready (RNR) packets received by the IPF
PKTRXRR	Number of receiver ready (ACK) packets received by the IPF
PKTRXDAT	Number of data packets received by the IPF

Table 12-9 XLIUL3 registers (Sheet 2 of 2)

Register	Description
PKTTXRR	Number of receiver ready (ACK) packets transmitted by the IPF
PKTRXRNR	Number of receiver not ready (RNR) packets transmitted by the IPF
PKTTXDAT	Number of data packets transmitted by the IPF
VCORIG	Number of originating virtual call attempt call request packets sent to the CM from the IPF; includes both successful and unsuccessful call attempts
VCTERM	Number of terminating virtual call attempt call request packets received from the CM by the IPF; includes both successful and unsuccessful call attempts
VCBLOCK	Number of blocked (unsuccessful) call attempt packets for switched virtual calls (call attempt blocked before call request packet sent due to no LCN, no CCBs, etc.)
VCDENY	Number of denied (unsuccessful) call attempt packets for switched virtual calls (blocked by terminator due to no CCB available, etc.)
VCCLEAR	Number of cleared (unsuccessful) call attempt packets for switched virtual calls due to a protocol violation
VCOVLD	Number of call request packets for SVCs or PVCs discarded due to CM based system overload control (SOC)

ISDNPDOM

OM group ISDN parameter downloading (ISDNPDOM) is based on Bellcore TR-001281 requirement 3-73. This OM group allows comparisons to be made between service profile management (SPM) and parameter downloading (PD). OM group ISDNPDOM counts the number of download attempts, download failures, and download completions that occur on a switching system basis. The registers in OM group ISDNPDOM are described in Table 12-10.

Table 12-10 ISDNPDOM registers

Register	Description
PDATTMPT	Number of parameter download attempts on a switching system basis
PDFAILRE	Number of failures of parameter downloading on a switching system basis
PDCOMPLT	Number of parameter download completions on a switching system basis

AUTSPID

OM group AUTSPID measures usage data associated with the AUTOSPID feature. Currently, this measurement occurs for each XPM only for North American ISDN BRAFS.

OM group AUTSPID records the number of

- valid automated SPID requests received (ATSPDREQ)
- successful automated SPID requests (SUCCREQS)

OM group AUTSPID records the following number of automated SPID failures:

- due to a SPID being unavailable on the interface (SPDUNVAL)
- due to no initializing LTID or terminal service profile (TSP) provisioned on the interface (NO_TSP)
- due to unnecessary automated SPID requests (UNSPDREQ)

The registers in OM group AUTSPID are described in Table 12-11.

Table 12-11 AUTSPID registers (Sheet 1 of 2)

Register	Description
ATSPDREQ	Number of valid automated SPID requests received on an XPM basis
SUCCREQS	Number of automated SPID requests that are successfully processed and a SPID sent to the requesting LTID
SPDUNVL	Number of automated SPID request failures due to a SPID not being available on the interface

Table 12-11 AUTSPID registers (Sheet 2 of 2)

Register	Description
NO_TSP	Number of automated SPID request failures due to an initializing BRAFS LTID not being provisioned on the interface
UNSPDREQ	Number of automated SPID requests that are not necessary

RMSGOMGP

OM group RMSGOMGP measures events relating to ISDN Rapid Messaging (RM). Register RMBRIOOS counts the number of times RM places a BRI logical terminal identifier (LTID) RM out-of-service.

The register in OM group RMSGOMGP is described in Table 12-12.

Table 12-12 RMSGOMGP register

Register	Description
RMBRIOOS	Counts the number of times BRI LTIDs are placed rapid messaging (RM) out-of-service

RND

OM group RND provides ISDN BRI Redirecting Number Delivery traffic measurements for the switch. These measurements include deliveries of one or two redirecting or non-delivery events. This OM group is new as of NA011.

The registers in OM group RND are described in Table 12-13

Table 12-13 RND registers (Sheet 1 of 2)

Register	Description
RNDDEL	Pegs once for each redirecting number delivered as an actual ten-digit DN. Increments when a redirecting number is sent to an ISDN BRI set, but not for a private or not available number.
RNNDEL2	Serves as an extension register for RNDDEL.
RNDPDEL	Pegs for each private (P) redirecting number. Increments when a private redirecting number indication is sent to an ISDN BRI set.
RNDPDEL2	Serves as an extension register for RNDPDEL.

Table 12-13 RND registers (Sheet 2 of 2)

Register	Description
RNDODEL	Pegs each time an outside (O) indication appears in the calling number field. Increments when a not available redirecting number indication is sent to an ISDN BRI set.
RNDODEL2	Serves as an extension register for RNDODEL.
TRNDDEL	Pegs each time two redirecting numbers are delivered to a terminating set.

ISDN logs

The following is a listing of some useful ISDN log reports. This is not a complete listing of all logs. For a complete listing of all DMS logs, consult the following NTPs, *Log Report Reference Manual*, 297-8001-840, and the *Extended Peripheral Module Logs Report Reference Manual*, 297-8321-840.

Note: There are no new ISDN logs added in NA014.

Table 12-14 ISDN logs (Sheet 1 of 3)

Log number	Description
ISDN 100	Generated when the DCH has detected that a terminal is unavailable for message traffic
ISDN 101	Generated when the DCH with which the loop is associated can not be put into traffic level
ISDN 102	Generated when the DCH has detected a duplicated TEI on the same loop and has removed it from service
ISDN 103	Generated whenever a manual intervention has changed the state of a B_d channel
ISDN 104	Generated whenever sync is lost on the B_d channel, causing it to be removed from service
ISDN 106	Generated whenever layer 1 of a specified BRI D-channel has failed autonomously
ISDN 107	Generated whenever a previously removed BRI TEI fails to be restored by the system

Table 12-14 ISDN logs (Sheet 2 of 3)

Log number	Description
ISDN 108	Generated whenever a previously removed BRI TEI is restored successfully by the system ***Note:*** If the XPM software executes National ISDN Logical Link Manager (NI LLM) introduced in XPM81, ISDN 108 logs are not generated. Software loads using older versions of Logical Link Manager generate ISDN 108 logs.
ISDN 109	Generated whenever a previously failed BRI D-channel is restored successfully by the system
ISDN 115	Generated when the datafilled number of ISDN terminals (on a loop basis) has been exceeded by CPE requests
ISDN 116	Generated when an unidentified TEI on a loop performs an action
ISDN 120	Routine test (abnormality detected during an id_check)
ISDN 121	Identity verify message (peer initiates an id_check with an incorrect TEI value)
ISDN 122	Unsolicited response (peer sends an unexpected frame to the host for the current lapd state)
ISDN 131	Generated whenever the LCME reports Bipolar violation (BPVO) at the ISDN line card or the NT1
ISDN 145	Generated whenever a sync status change is detected and reported to the CC
ISDN 200	Daily report for up to 10 ISDN terminals indicating the percentage of received or transmitted frames in error
ISDN 201	Daily report showing the overall switch percentage of frames received in error and retransmitted, the number of LENs on the switch reporting these type of errors, and the number of LENs experiencing high protocol abnormality rates
ISDN 202	Indicates that the RLAYER command reset layer 1, 2 or 3 protocol abnormality registers for a posted LEN
ISDN 203	Daily report showing up to 10 LENs with a high layer 2 protocol abnormality rate
ISDN 204	Daily report showing up to 10 LENs with a high layer 3 protocol abnormality rate

Table 12-14 ISDN logs (Sheet 3 of 3)

Log number	Description
ISDN 205	Generated when the layer 2 transmission performance exceeds the value set for office parameter LAYER2_PEGS_THRESHOLD_LEVEL in table OFCVAR
ISDN 301	Generated when a layer 3 protocol abnormality is detected
ISDN 302	Generated each time PDFAILRE OM register is pegged. Describes parameter downloading error.
ISDN 303	Generated when layer 3 packet abnormality counters exceed capacity on a basic rate interface (BRI) line
ISDN 304	Generated when a layer 2 protocol abnormality is detected
ISDN 305	Generated when an ISDN line exceeds the service disruption threshold. This threshold is defined in table OFCVAR by office parameter LAYER2_SERVICE_DISRPT_THLD.
ISDN 306	Generated when layer 2 packet abnormality counters exceeds capacity on a basic rate interface (BRI) line
ISDN 307	Generated when the HDLC frame processor (HFP) encounters a layer 2 packet abnormality
ISDN 308	Generated when the count of layer 2 service disruptions exceeds the value set for office parameter LAYER2_SERVICE_DSRPT_THLD in table OFCVAR
ISDN 309	Generated when the count of layer 3 service disruptions exceeds the value set for office parameter LAYER3_PACKET_SVC_THLD in table OFCVAR
ISDN311	Generated when the layer 3 circuit switched service disruption count for a basic rate interface (BRI) line exceeds its threshold value.
ISDN312	Generated when the layer 3 service disruption counter for circuit switched services reaches its capacity on a BRI line.
ISDN 313	Generated after a layer 3 packet protocol abnormality is detected

Rapid messaging

The following is a list of the rapid messaging (RMSG) log reports.

Table 12-15 Rapid Messaging logs

Log number	Description
RMSG 600	Generated each time RM places a BRI LTID in the temporary out-of- service state
RMSG 601	Generated each time RM places a BRI LTID in the permanent out-of-service state
RMSG 602	Generated when RM returns a BRI LTID to RM in-service from either RM temporary out-of-service or RM permanent out-of-service
RMSG 603	Generated as a report only log to inform operating company personnel that an LTID is in an overload condition. This report occurs when the data entered for the LTID in table LTDEF includes either the option ELN set to Y or the option OCT set to REPORT ONLY.

Overload indicators

Following are the overload indicator references for ISDN peripherals and their associated processors.

PMOVLD

This OM group counts originations and terminations that are denied by the ISDN peripherals LCME, ISDN LGCI, ISDN LTCI, DTCI, and RCC2 due to an overload condition. This data can be used to monitor the performance of peripherals to determine if they are over-configured.

XPMOVLD (available as of NA002)

This OM group is an enhancement to the older PMOVLD OM group and provides a significant amount of information on the type of overload condition present in XPM+ peripherals. Registers in XPMOVLD listed in Table 12-16 contain the following information.

Table 12-16 XPMOVLD registers (Sheet 1 of 2)

Register	Description
PORGDLY	Number of originations delayed
PTRMDLY	Number of terminations delayed
PORGMSG	Number of originations tossed due to congestion in the flow control system

Table 12-16 XPMOVLD registers (Sheet 2 of 2)

Register	Description
PTRMMSG	Number of terminations tossed due to congestion in the flow control system
PORGIPC	Number of originations tossed due to IPC buffer congestion
PMSGIPC	Number of non-originations tossed due to IPC buffer congestion
PORGPTQ	Number of originations tossed due to individual terminal flow control message limits
PTRMPTR	Number of terminations tossed due to individual terminal flow control message limits
PORGSLC	Number of originations tossed due to site line load control
PORGLCM	Number of originations tossed due to LCM/LCME overload
PORGMISC	Number of originations tossed due to invalid IPC index, etc.
PTRMMISC	Number of terminations tossed due to invalid IPC index, etc.

PMTYP

Registers in this OM group count RCC2 peripheral module errors, faults, and state transitions.

ISGOVLD

ISGOVLD measures the number of and the amount of time the ISG is in congestion or overload. It also collects the number of SAPI 16 frames discarded due to overload controls.

PM 128

This log report is generated when the ISDN peripheral goes into the in-service trouble (ISTB) state. The reason for the change of condition is included with the log.

PM 106

This log report is generated when the ISDN peripheral goes back into the normal state. A message ISTB CLEARED is generated with the log.

PM 270

This log report is issued at the time the DCH changes states as follows:

- goes into congestion with DCH CONGESTION message included with the log
- returns to normal condition with CONGESTION ABATED message included with the log

13 Planning considerations

S/T loop requirements

More and more customer premise equipment is being designed to directly interface with the ISDN U-interface, thereby eliminating the need for a separate network termination 1 (NT1). Thus, the S/T loop becomes non-existent. If the U-loop is terminated at the customer premise to an NT1, S/T wiring considerations are required.

There are two aspects to S/T loop implementation: the logical layer and the physical layer. The logical layer deals with information flow between the NT1 and the terminals and is referred to as “Mode of Operation” in CCITT recommendations. The physical layer describes the physical media and the electrical interfaces between the NT1 and the terminals and is referred to in CCITT recommendations as the “Wiring Configuration.”

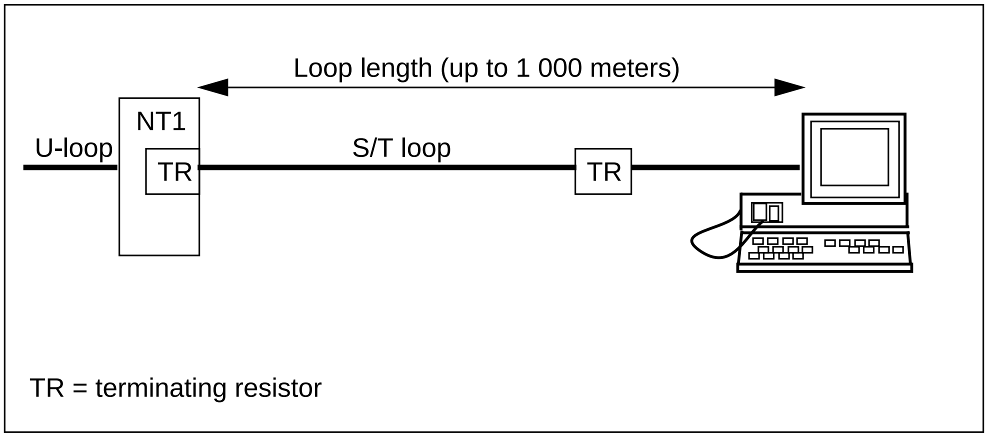
Modes of operation

Two modes of operation are specified by ISDN standards: point-to-point and point-to-multipoint. In point-to-point operation, only one source (transmitter) and one sink (receiver) are active at any one time in each direction of transmission on the S/T loop. Point-to-multipoint operation allows more than one TE (terminal equipment-source and sink pair) to be simultaneously active. Multipoint operation can be accommodated with either point-to-point or point-to-multipoint wiring configurations.

The CCITT standards recognize four basic wiring configuration types for S/T loops: point-to-point, NT1-star, short passive bus, and extended passive bus. The point-to-point and the NT1-star wiring configurations will be described here. Refer to *ISDN U-loop and S/T Bus Engineering*, 297-2451-182 for information on the short passive bus and the extended passive bus.

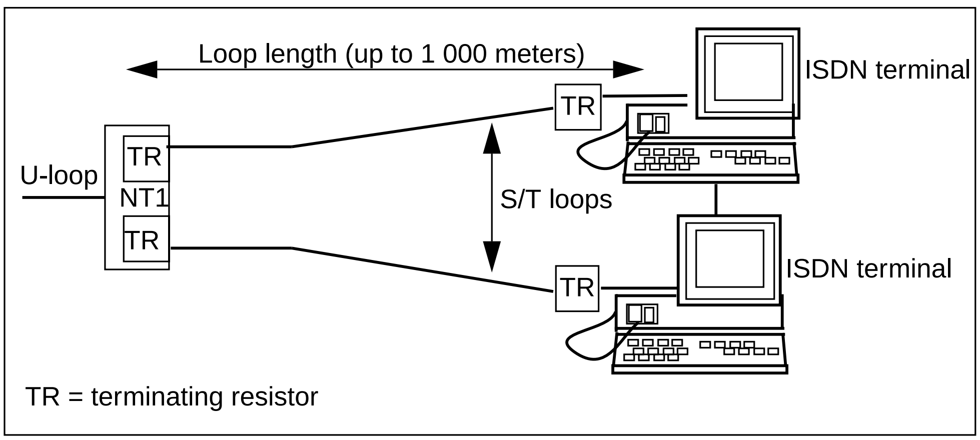
The point-to-point configuration allows only one TE to be connected on an S/T loop. Refer to Figure 13-1.

Figure 13-1 S/T loop point-to-point



The NT1-star configuration has two electrically independent S/T loops for multiple configurations connected to one U-loop through the NT1. Refer to Figure 13-2.

Figure 13-2 Star configuration



Cable requirements

CCITT S/T loop standards call for a four-pair unshielded twisted pair (UTP) cable to connect the NT1 to the terminal. However, in practice it can be operated using three pairs if the terminal is loop powered or two pairs are sufficient if phantom power is used, or if the terminal is powered through an AC outlet.

Physical layer limitations

The CCITT recommends that a general objective for the operational distance between TE and NT1 in a point-to-point configuration is 1000 m (3280 ft) with a maximum cable attenuation of 6 dB at 96 kHz. Each individual point-to-point circuit of the NT1-star configuration conforms to this recommendation. A maximum of 33 ft of cable is allowed between the communication outlet and the TE.

Wiring polarity integrity

For correct operation, the integrity of the wiring polarity between the NT1 and TE must be maintained by adhering to the color coding scheme specified for this purpose.

Pair termination

Each S/T loop can be terminated with a 100W terminating resistor (TR) connected between tip and ring of both the transmit and receive pair. Terminating resistors are generally not required on S/T loops less than 230 ft in length. In all configurations, unterminated branches can be a source of transmission problems and are not permitted. For details, refer to *Network Termination 1 (NT1) and S/T Bus Installation Guide*, 297-2451-207.

Terminal power

Two methods are available for providing power to terminals recognized in CCITT I.430, and a third method in the ANSI T1.XYZ-198Y standard. These methods are

- **Phantom**: the two pairs used for the bi-directional signal transmission also provide a phantom circuit for power transfer from NT1 to TE power source 1 or (PS1).
- **Auxiliary 1**: a third pair can be used for additional power transfer from NT1 to TE power source 2 or (PS2).
- **Auxiliary 2**: a fourth pair is provided for power transfer to an NT1 or TE in TE-to-TE connections power source 3 or (PS3); however, use of this pair is not part of the CCITT recommendation and is not supported by Nortel's NT1 product.

A fourth mode of providing power is implicit: a terminal powered directly from an AC outlet.

Integrated building distribution network

Traditional voice and data in-building communications networks located in the same building were designed independently of each other. Today, unshielded twisted pair copper cable is the universal transmission medium for voice services while a variety of transmission media, such as shielded and unshielded twisted pair, coaxial, twinax, and fiber optic cable, are used to carry data services to the workstations.

Nortel, through its commitment to the OPEN World concept, has designed, developed, and tested a structured cabling system capable of supporting industry standard local area networks (LAN), such as 10 Mbit/s Ethernet, IEEE 802.5 token ring, FDDI, and Nortel synchronous and asynchronous communications and discrete data systems, including IBM 3270, IBM system 3x, and Wang VS/OIS.

This cabling scheme, called the integrated building distribution network (IBDN), uses unshielded twisted pair and fiber optic cables as transmission media to sustain current and long term networking solutions. It is designed to support the evolution of integrated services, such as ISDN and video transmission and to be compatible with virtually all current and developing systems.

IBDN system components

Nortel’s IBDN is a comprehensive line of products and guidelines for networking a variety of existing and future communication devices. IBDN is designed to make the distribution network transparent to the services it supports. IBDN can be treated as an aggregate of major components or building blocks. Following are seven major components of IBDN:

- building entrance system
- main distribution terminal system
- riser cable system
- riser terminal system
- horizontal distribution system
- communication outlet
- terminal connection system

The building entrance system is the interface between the outside network and the internal distribution network. A key function of this system is to protect the building distribution network from potentially damaging electrical discharges.

Cables from the building entrance system, the communication equipment, and the riser system terminate on common cross-connect hardware in the main distribution terminal system. The cross-connect hardware allows reconfiguring the distribution network through rerouting communication circuits. The main distribution terminal system is the central point of the IBDN star topology.

The riser cable system consists of cables that carry services to other floors where they terminate in riser terminals and/or fiber interconnects.

The riser terminal system connects riser cables and the horizontal distribution cables. Usually there is a riser terminal for each floor, although one terminal can serve several small floors or several terminals can serve one large floor.

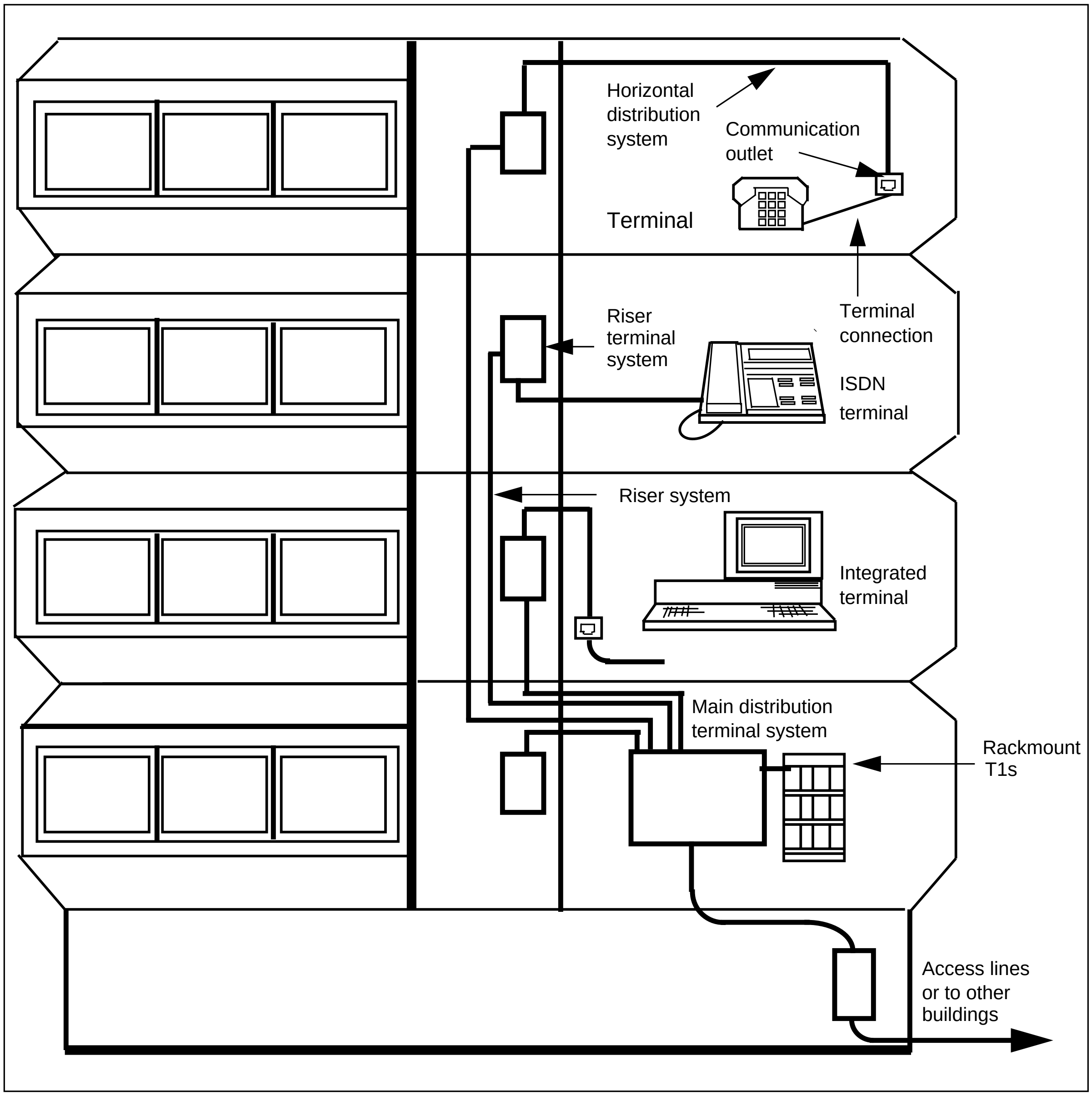
Cables from equipment in the riser closet are also terminated at the riser terminal.

The horizontal distribution system includes the wires, cables, connection devices, and structures necessary to link the riser terminal to the communication outlet at the workstation.

The communication outlet is the interface through which the workstation connects to the horizontal distribution network and ultimately to a private automatic branch exchange (PABX), computer, LAN, or ISDN interface. A major objective of IBDN is to provide universal connectivity at the workstation in a multi-vendor environment. IBDN communication outlets are based on the eight-position modular jack specified for ISDN service.

The terminal connection system includes the line cords, adapters, and baluns required to connect terminals to the communication outlet. Interface electronics, such as ISDN NT1s can also be part of the terminal connection system. Refer to Figure 13-3.

Figure 13-3 IBDN major network components



S/T loop installation

The design of Nortel’s NT1 interface and the structured wiring of IBDN combine to make ISDN implementation an easy process, provide performance guarantees, and enhance subsequent network administration. ISDN S/T loops can also be deployed in non-IBDN buildings provided minimum loop requirements are met.

Implementation

Nortel provides the ISDN user with a choice of three NT1 implementations. For deployment in the main equipment room or riser closet, there are two types of module (rackmount) NT1 cards; a stand-alone NT1 is provided for the work area. Nortel's NT1s support all CCITT point-to-point and point-to-multipoint configurations, including the newly defined NT1-star configuration.

The point-to-point and NT1-star configurations (which will be used in nearly all applications because of their simple implementation and maintenance) are described in this section.

When considering the deployment of NT1s in the main equipment room, riser closet, or work area, the following factors can affect equipment location:

- AC power availability
- space available for equipment, such as NT1s, cross-connects, and uninterruptable power supply (UPS)
- loop lengths
- existing cables
- operations, administration & maintenance requirements
- building structure

In campus environments, it is not recommended that the S/T loop leave the building. Inter-building connections should be provided over the U-loop, which provides full outside plant protection. This means that the NT1 should always be located in the building where the ISDN service will be terminated.

When deploying NT1s in point-to-point or NT1-star wiring configuration, the following simplified rules should be followed for the S/T loop:

- maximum reach for point-to-point is 540 m (1870 ft) on 26 AWG (S/T loop reach can be extended to 790 m (2590 ft) on 24 AWG outside PIC cable or 1110 m (3640 ft) on 22 AWG outside PIC cable). Refer to *ISDN U-Loop and S/T Business Engineering*, 297-2451-182, and *Network Termination 1 (NT1) and S/T-Bus Installation Guide*, 297-2451-207, for details.
- one communication outlet (wall jack) per S/T loop
- maximum of two S/T loops on an NT1-star
- bridged taps need to be removed, if necessary, in old non-IBDN installations
- NT1 timing set to adaptive
- terminating resistor at both ends of the loop
- maximum 10 m (33 ft) for TE connection cord

NT1 in the equipment room or riser closet

For operations, administration, and maintenance simplicity, it is recommended that NT1s be deployed in the main equipment room (MER) when possible. In point-to-point configurations, the maximum S/T loop length is 540 m (1870 ft) on 26 AWG cables. This allows for non-engineered deployment of ISDN. If horizontal distribution is limited to a maximum of 90 m (300 ft) as IBDN recommends, then virtually any building could be served from a central location (that is, for a straight up and down riser system in a building with 3.5 m [12 ft] between floors, the S/T loop reach would be 130 floors).

In high-rise or industrial type buildings where the riser cables are long, locating the NT1 in the MER means doubling or tripling the number of riser cable pairs per ISDN loop. In such cases, it can be more cost-effective to deploy NT1s in the riser closet of the floor where the ISDN terminals will be located. Additionally, in a multi-tenant building, it is desirable to locate subscriber's NT1 equipment in their own section of the building.

Whether the NT1s are deployed in the MER next to the building entrance or in the floor riser closet, the NT1 wiring configuration is identical. When maximum flexibility is required for easy rearrangements, patchcord connections can be used.

All S/T pair wiring follows a straight-through convention for transmit and receive pairs. Transmit to receive crossover is provided within the terminal equipment. This allows easier polarity verification of the building wiring, because all cross-connections and interconnect cords must be of the non-reversing type. Refer to Figure 13-4, Figure 13-5, and Figure 13-6.

Figure 13-4 NT1 in the equipment room

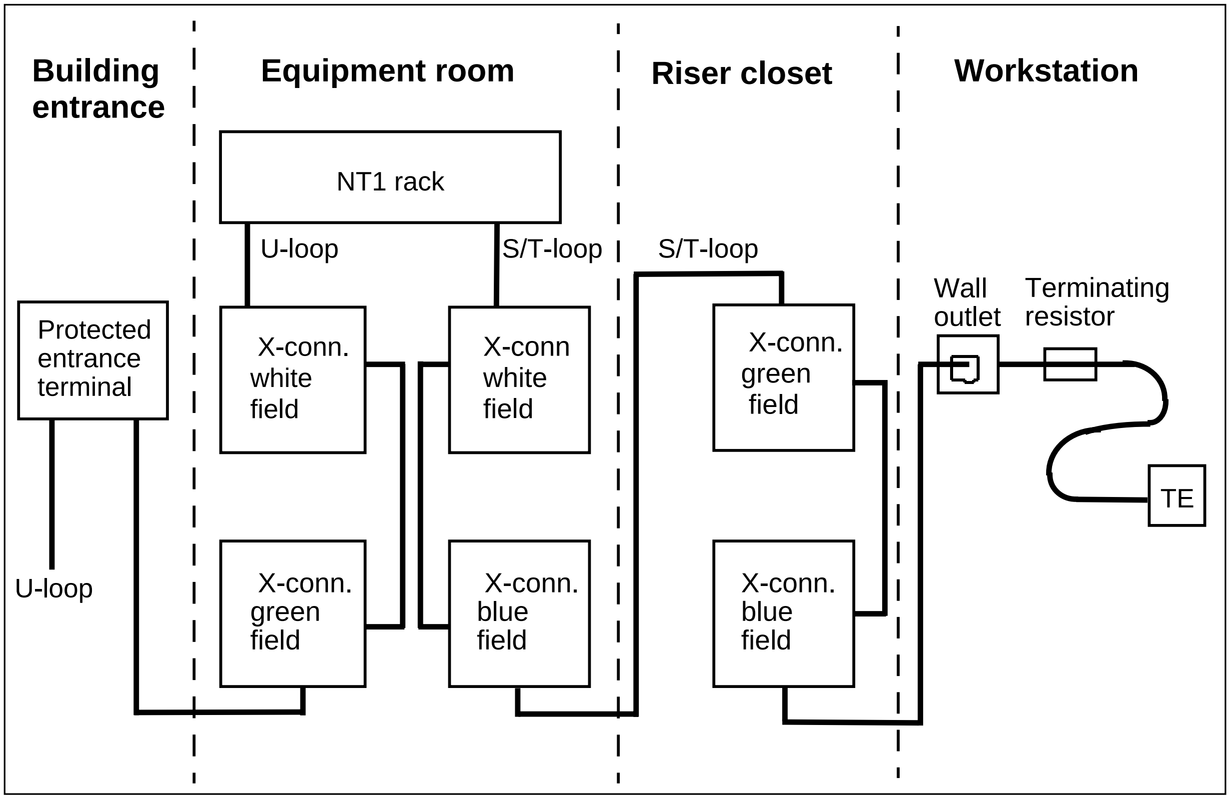


Figure 13-5 Wiring configuration for rackmount NT1 in riser closet

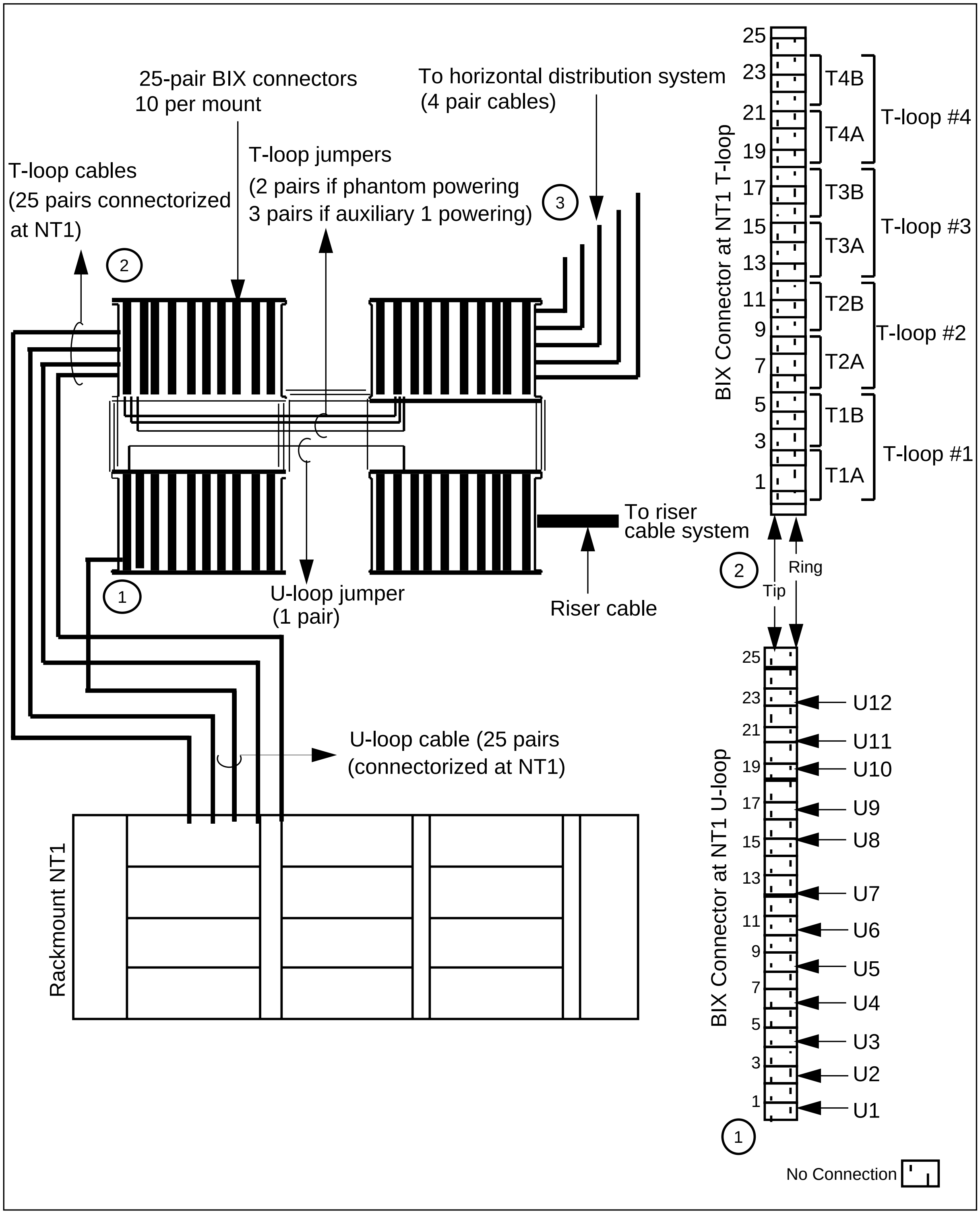
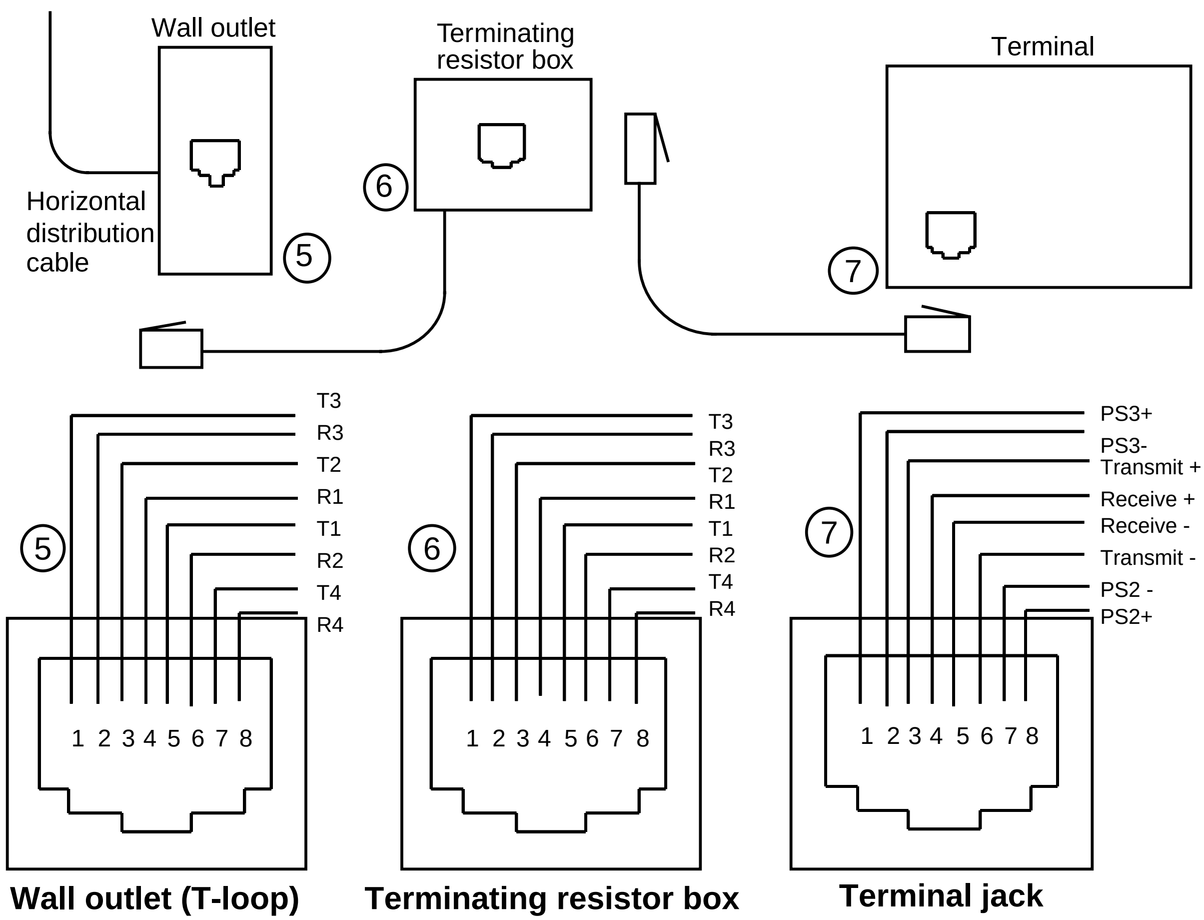


Figure 13-6 Wiring configuration at the workstation



Note: The contacts of the JACKS are numbered from left to right looking at the front end of the jack. The contacts of the PLUGS are numbered from right to left looking at the front end of the plug.

Network Termination 1 at the workstation

Deployment of the NT1 in the riser closet requires that AC power and space be available at the riser closet. If this is not the case, and if deployment in the MER is not possible, stand-alone NT1s must be considered for deployment at the workstation itself.

Network termination 1

Nortel's NT1 supports all CCITT wiring configurations. Three NT1 versions are available: stand-alone, a single S/T loop output module card (basic module NT1), and a dual S/T loop output module card (star module NT1). All three versions support point-to-point and point-to-multipoint configurations, but only the dual S/T loop output module card supports the NT1-Star configuration.

> ***Note:*** Use of terminating resistors is intentionally not shown in these conceptual block diagrams. TRs can be required for S/T loops greater than 230 ft. Refer to *ISDN U-Loop and S/T Business Engineering*, 297-2451-182, and *MDCNT1 & S/T-Bus Installation Guidelines* for more details.

Each NT1 provides on-board configuration jumpers for:

- terminating resistor options
- the power polarity reversal
- fixed/adaptive timing
- power modes
- back up power jumper

Module (rackmount) Network Termination 1

The single S/T loop version will typically support one terminal on a single point-to-point circuit, while the star S/T loop version will typically support up to two terminals on two point-to-point circuits.

Stand-alone Network Termination 1

The stand-alone NT1 is a desktop, floor or wall-mountable unit that provides an interface between the central office (over the U-loop) and the customer premises terminal equipment (over the S/T loop).

Fixed and adaptive timing

Fixed and adaptive timing are timing recovery schemes used by the S/T transceiver on board. When using third party NT1s, consult their respective guidelines for S/T-bus reach limits.

Terminating resistor

Proper operation of the S/T-bus requires that both the transmit and receive pairs be terminated with 100W resistors at the NT1 and terminal ends of the bus. Where possible, it is recommended that the on-board NT1 terminating resistors be used. However, in point-to-point configurations, one TR must be at the workstation. Refer to *Network Termination 1 (NT1) and S/T Bus Installation Guide*, 297-2451-207, for configuring on-board terminating resistors and for fixed versus adaptive timing considerations.

Cross-connect systems

The BIX system is a modular cross-connect system for in-building use only. A BIX module consists of a mount, ten BIX connectors, and five designation strips with the associated colored designation labels.

Power

In both point-to-point and NT1-star configurations, Nortel NT1s are designed to simplify ISDN cabling. First, loop power is applied through the NT1 and does not require any special jumper arrangement. Second, for the module NT1, selection of the power mode is done at the NT1 itself through on-board configuration jumpers making it easy to change modes to satisfy TE requirements. For the stand-alone NT1, power to the TE is hard wired and can not be changed.

S/T line card

The S/T-bus can be provided by an S/T line card (NTBX26) where the ISDN line frame equipment is located in the building requiring ISDN service. In-building line frame equipment can be provided by either remote equipment frames or a local switch.

The S/T line card supports all S/T-bus configurations and capabilities previously described for the NT1, with the exception of the star configuration and auxiliary power.

Loop verification

The NT1 provides LED status indicators for monitoring functions and loops. These indicators also serve in analyzing and localizing failures. The LEDs indicate the following information.

Stand-alone Network Termination 1

Power LED: GREEN, ON = power available, OFF = no power

Test LED: RED, ON = test mode, FLASH = self-test fail, OFF = normal

This test can be initiated from the DMS MAP position, or by terminal request (customer initiated over S/Q bits), and can affect service depending on the test being performed.

U-Loop LED: RED, ON = no sync., FLASH = high errors, OFF = good loop

This LED indicates that NT1 has achieved frame synchronization with the line card at the central office (CO) over the U-loop.

S/T Loop LED: RED, ON = no sync., FLASH = high errors, OFF = good loop

This LED indicates that NT1 has achieved frame synchronization with at least one TE on the S/T loop.

Verifying configuration jumpers

To verify the settings of the NT1 configuration jumpers without removing the cover of the stand-alone package, check the status LEDs immediately after power is applied to the NT1 as the unit goes through the following procedure:

At the NT1 verify the following

1 All LEDs light up for approximately 1 s.

2 The configuration jumper settings are displayed by the S/T, U, and test LEDs, as indicated in Table 13-1, for approximately 1 s. (The power LED remains off during this interval.)

3 All the LEDs operate normally as the NT1 begins its self-test.

Table 13-1 shows the jumper configuration for the LED display.

Table 13-1 Configuration jumper LED display

Status LED	Configuration setting	
	LED on	LED off
	always off	
S/T	adaptive timing	fixed timing
U	TR1 IN	TR1 OUT
	TR2 IN	TR2 OUT

Module NT1

Power LED: GREEN, ON = AC input, FLASH = battery input, OFF = no power

Battery LED: RED, ON = bad battery, OFF = good battery or not provided

Test LED: RED, ON = test mode, FLASH = test fail, OFF = normal

This test can be initiated from the DMS MAP position, or by terminal request (customer initiated over S/Q bits), and can affect service depending on the test being performed.

U-Loop LED: RED, ON = no sync., FLASH = high errors, OFF = good loop

This LED indicates that NT1 has achieved frame synchronization with the line card at the CO over the U-loop.

S/T Loop LED: RED, ON = no sync., FLASH = high errors, OFF = good loop

This LED indicates that NT1 has achieved frame synchronization with at least one TE on the S/T loop.

TE power LED: RED, ON = current limited, OFF = normal

This LED indicates that -48V power to the S/T loop is being current limited. This condition should be corrected immediately as powered terminal operation will be lost.

NT1 1-12 (12 LEDs): RED, ON = alert, FLASH = select status, OFF = normal

The ON condition of the LED for a particular NT1 alerts maintenance personnel to a problem with that NT1. By then selecting the NT1 using the UP/DOWN switches, the status (S/T, U, TEST, TE PWR) display will correspond to the status of that particular NT1.

> ***Note:*** Verify that configuration jumpers and terminating resistor jumpers are correctly set.

For various operating modes, the LED status are as shown in Table 13-2.

Table 13-2 Module NT1 status lights

Condition	Power	Battery	S/T	U	Test	TE power
Normal operation	on	off	off	off	off	off
Under test	on	off	*	*	on	off
Self-test failed	on	off	*	*	flash	off
No U-loop sync	on	off	*	on	off	off
U-loop data errors	on	off	*	flash	off	off
No S/T loop sync	on	off	on	*	off	off
S/T loop data errors	on	off	flash	*	off	off
TE power overload	on	off	*	*	off	on
AC power failure	flash	off	off	off	off	off
Battery failure	on	on	off	off	off	off

Note: (*)Status light can be either on or off.

Service operation/maintenance

Central office maintenance capabilities offered on the NT1 include B-channel loopback (B1, B2 or both towards the network), notify of corrupted CRC, request corrupted CRC, and return to normal.

The status lights on the NT1 can be used to determine likely causes for a failure. The checklist given in Table 13-3 can be used to localize a failure.

Table 13-3 Checklist for status indicator conditions (Sheet 1 of 2)

Problem	Checklist (ensure the following)
No Power Indication	AC power is available at the wall outlet
	Power connector is securely installed in the NT1
	-48V source is operational if customer powered and status inputs are correct
	NT1 power module is operational
	Rackmount NT1 card securely seated in shelf
	Batteries are sufficiently charged if AC power off (optional)
No U Sync Indication	U-loop is properly connected at the NT1 U Jack on connector or X-or High Errors connect
	Compatible ISDN service is being provided by the central office, including the suitability of the CO loop for ISDN service
	Configuration jumpers are in the normal position and the test indicator is not lit
No S/T Sync Indication	S/T bus is properly connected at the NT1 S/T jack or X-connect
High Errors	ISDN TE is connected to S/T bus and powered
	S/T bus termination's are correctly selected at the NT1 switches and/or installed on the bus
	S/T bus timing correctly set on the NT1 switch to short or long bus
	S/T bus configuration parameters are within the limits supported by the NT1
	S/T bus wiring does not contain any polarity reversals
	Refer to *Network Termination 1 (NT1) and S/T Bus Installation Guide*, 297-2451-207, for further S/T bus fault isolation

Table 13-3 Checklist for status indicator conditions (Sheet 2 of 2)

Problem	Checklist (ensure the following)
Test Indication	Configuration jumpers are in normal position
	Test not activated at MAP or terminal
	If test LED is flashing, reapply power and if it persists, replace NT1
Overload Indication	PS1/PS2 power jumper set-up match loop terminals configuration
	Terminal power requirements do not exceed NT1 capacity
	S/T loop does not contain short circuits, or foreign voltage
	Terminating resistors installed correctly
Battery Indications	Battery has had sufficient time to re-charge after power failure or first start-up
	Battery connectors is securely installed in the power unit

Point-to-multipoint configurations

Nortel's NT1s support all CCITT point-to-multipoint wiring configurations. Among those, the simplified branched passive bus is the most practical for deployment in the majority of buildings. Other more complex configurations are supported and can be implemented to meet special application needs.

When considering the deployment of NT1s in the main equipment room, riser closet, or work area, the following factors can affect equipment location:

- AC power availability
- space available for equipment, such as NT1s, cross-connects, and uninterruptable power supply
- loop lengths
- existing cables
- operations, administration, and maintenance requirements
- building structure

Refer to *ISDN U-Loop and S/T-Bus Engineering*, 297-2451-182 for more information on point-to-multipoint deployment and loop engineering guidelines.

Simplified branched passive bus

The simplified branched passive bus (SBPB) using adaptive timing mode supports up to two secondary branches with each supporting up to two terminals.

The main branch can be as long as 220 m (720 ft), which is sufficient for most office buildings. The length of the branches can vary as long as the total loss does not exceed 3.8 dB at 96 kHz. This limit recognizes the potential existence of bridged taps in riser cable pairs. Deployment within these limits does not require the removal of the bridged taps.

Each secondary branch can have a length up to 50 m (165 ft). The critical parameter in the performance of the system is the differential round-trip delay between terminals. For ease of maintenance, it is recommended that both branches be on the same floor and serve adjacent workstations or offices.

The SBPB is most useful when the NT1 is deployed in the MER and the branching is done in the riser closet. This configuration requires that an external TR be placed in the riser closet.

The wiring for the SBPB is very similar to that of the point-to-point. The NT1 cabling and installations are the same; however, a multiplying cross-connect field is added at the riser closet for branching and connecting the TR. Figure 13-7 illustrates the equipment configuration.

Figure 13-7 Simplified branched passive bus

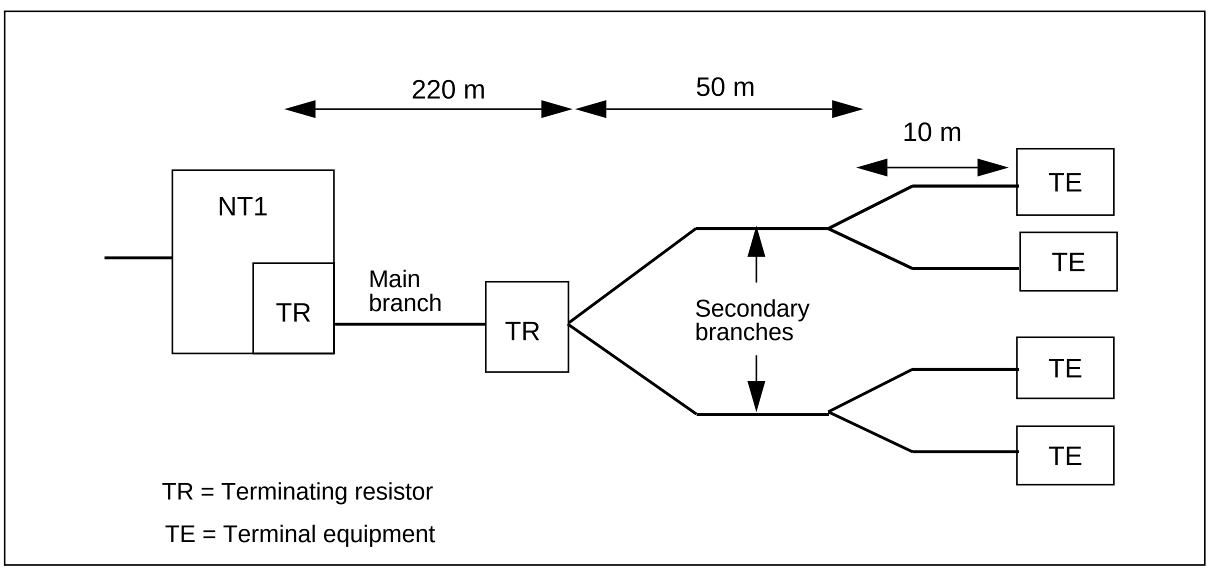
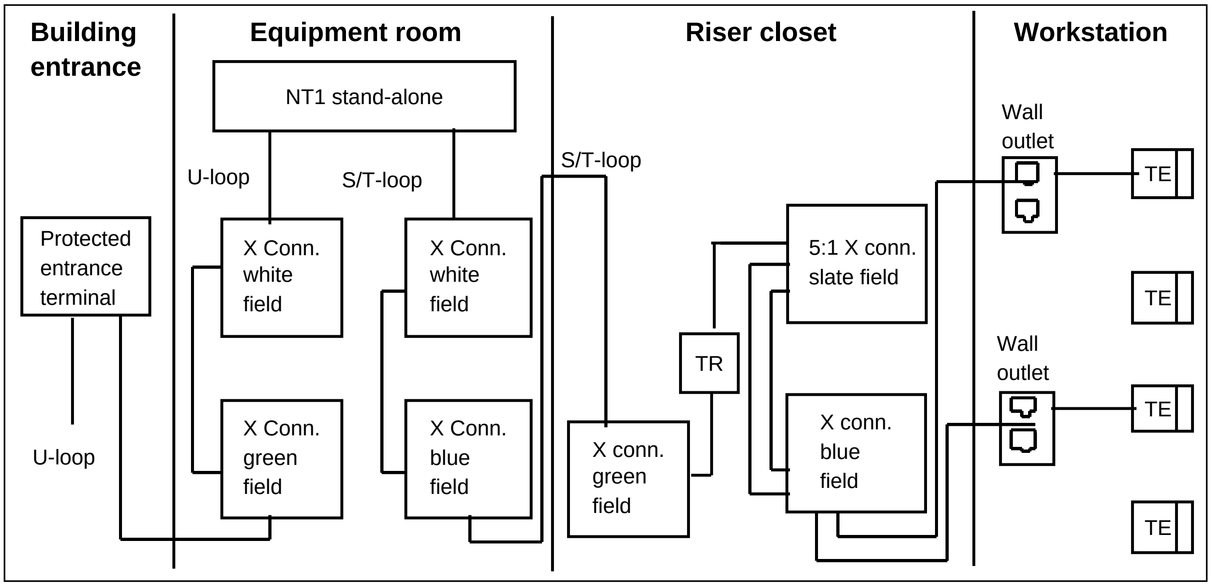


Figure 13-8 Simplified branched passive bus building layout



Simplified short branched passive bus

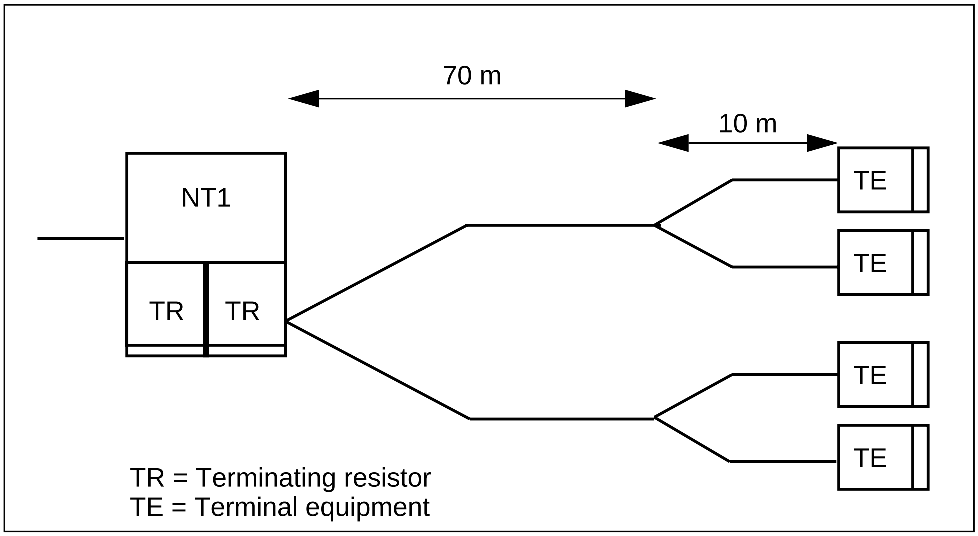
It is possible to extend the length of the secondary branches by reducing the length of the main branch to zero. This configuration is called the simplified short branched passive bus, which is illustrated in Figure 13-9.

In this configuration, using fixed timing mode, each secondary branch can be up to 70 m (230 ft) long. This restriction on branch length limits this configuration to cases where the NT1 is deployed in the riser closet. This configuration is functionally identical to the NT1-star configuration except that the NT1-star (if each star bus is point-to-point with two terminals) configuration has almost nine times the reach (up to 540 m on 26 AWG).

In this configuration, the NT1 and the multiplying cross-connect field are in the same room (either the MER or riser closet). The second TR in the NT1 must be enabled. No external TRs are required.

As for the SBPB, the NT1 cabling and installations are the same as for the point-to-point configuration. The branching is done on a multiplying cross-connect field.

Figure 13-9 Simplified short branched passive bus



Terminal power options

Terminal and wiring deployment for ISDN depends on established facilities in the majority of cases, as most subscribers are located in existing buildings. This requires a flexible deployment scheme to minimize service introduction costs while supplying increased service capabilities. Nortel's ISDN products are designed for this purpose, with a complete range of CCITT and ANSI defined loop configurations, and various terminal power options to meet every building need.

Terminal power requirements are decided in large part by the customer's current wiring layout, cost constraints, and service needs. In general, two power options are available, local power, which is supplied from AC outlets, and centralized power, which is usually supplied to a group of terminals from one supply and can provide power backup via a dedicated battery system. For the majority of customers, some method of uninterruptable power will be necessary where voice service is provided over ISDN access.

Local power of ISDN devices on customer premises is usually provided by commercial AC power supplies or AC generating equipment. These are generally not uninterruptable.

Nortel's ISDN terminal products can be powered directly from commercial AC power. Individual units are provided with wall transformers to convert to the low voltage requirements. The module (rackmount) NT1 system has a modular power supply for the shelf. This power supply is powered by commercial AC input and provides -48V DC output for the NT1 modules. It also has an optional battery backup system for power failure protection. Product power units are listed in Table 13-4.

> ***Note:*** NTI recommends the use of a third wire isolated ground to reduce AC power distribution problems. The use of a power conditioner is recommended for areas where utility-supplied power contains variations outside the tolerance limits. Consult the specifications for the specific terminal equipment used to determine individual tolerance limits.

Table 13-4 Local power equipment

Terminal product	Power supply model	Connection	DC output
M5317TDX	NPS50220-07L9 A0352932	S/T loop connector	-40V
M5209T	NPS50220-07L9 A0352932	S/T loop connector	-40V
Stand-alone NT1 Power unit	NTBX81AA	U-loop jack	-48V
Modular NT1 Power unit	NTBX86AA	Power cable	-48V

Centralized power

Centralized power of ISDN devices on customer premises is usually provided by commercial -48V DC power supplies. Centralized power is distributed over the S/T loop using either PS1 (phantom power feeding using the transmit and receive pairs of the S/T-bus as power carriers) or PS2 (auxiliary power feeding using one of the non-signal pairs of the S/T-bus as a power carrier).

PS1 power provides an efficient power distribution system because the paired loop provides less resistance and less overall loss due to distance from the power source. PS1 also allows ISDN service to the terminal including centralized power over existing two pair building wiring providing economical service in existing non-compliant subscriber buildings.

PS2 power provides an alternate output distribution system than PS1. The output is not maintained over the full length of the S/T loop because resistance depends on individual loop conductors and distance from the power source is a significant factor.

Nortel's ISDN terminals can be powered from a central source over S/T loop wiring. Individual voltage, mode, and power consumption requirements are listed in Table 13-5.

Table 13-5 Terminal power requirements

Terminal product	Power	Input	Connector	Power mode
M5317TX				
- basic	1.4 W	24 -	S/T loop	PS1, PS2
- data option	1.9 W	56.5 V		
M5209T				
- basic	2.0 W	24 -	S/T loop	PS2
- data option 2	3.0 W			

Stand-alone Network Termination 1

The stand-alone NT1 provides a -48V output path for both PS1 (phantom) and PS2 (auxiliary) power on the S/T loop. Power limiting and voltage protection must be provided by the power source itself. Power input can be by way of the U-input or T-output teledapt connectors at the NT1 itself, or at some point along the building wiring path, such as the riser cross-connect field. The stand-alone NT1 power supply (NTBX81AA) provides sufficient output to power the NT1 plus 10 W additional for terminal power.

> ***Note:*** The S/T ports on the stand-alone NT1 are not designed to accommodate the I-adapter connector on the external power supply provided with the M5317TDX and the M5209T. The 2-W power supplies are not intended to provide terminal power on the S/T-bus. This power supply is designed to power the stand-alone NT1 unit only.

Table 13-6 Power sources

Power Source	Capacity	Stand-alone NT1	Available for terminal power
NTBX81AA	12 W	1.6 W	10.4 W
A0381081	2 W	1.6 W	(negligible)

Rackmount Network Termination 1

The rackmount NT1 provides -48V output for both PS1 (phantom) and PS2 (auxiliary) power output on the S/T loop. Power output is protected against overloads and foreign voltage by a current limiting circuit. The power output configuration, and limiting factor on each loop is jumper selected on the card.

Power availability along the S/T loop for the various power options is provided in the *Network Termination 1 (NT1) and S/T-Bus Installation Guide*, 297-2451-207. The values given in the example are theoretical, and actual values can vary. Power values below the maximum (10 W) indicate the maximum power available due to loop current carrying capacity.

Terminal power and deployment must be done with consideration of the terminal power requirement and power option and distance from the source. For example, a terminal requiring 5.2 W using PS2 on 24-gauge building wiring can not be located farther than 600 m (1968 ft) from the rack. Additional distance limitations can be imposed by S/T loop engineering criteria.

> ***Note:*** NTBX86AA NT1 rackmount power module provides a maximum of 150 W at -48V.

Battery systems

When battery backup is required, system loading and minimum backup time determine the size and cost of providing service on the line. The following table provides some examples of system requirements for a fully loaded NT1 shelf (12 units per shelf, 10 W per unit). In actual practice system loads would be less than these maximum values and typical values are assumed to be 75% of maximum output per shelf. Estimated maximum power can be determined easily for a working unit by observing the active power configurations for each card.

Battery systems providing DC output are recommended for most applications, because system cost and efficiency are greater than those achievable with an AC output system. Battery systems can be located anywhere within a building, assuming fully-sealed battery units are used. Battery units should be located adjacent to the NT1s and near the served terminals where available space and sufficient line quantities exist. This will minimize loop resistance effects on power availability. Alternately, power supply and NT1 units can be located at the building wiring entrance for more efficient maintenance where system riser capacity and loop length are not limiting factors.

Power calculations

Power requirements can be calculated from Table 13-7 based on the equipment installed and the TE power jumper setting on the NT1 cards.

Power module capacity and battery back-up capacity determine the quantity of modules required (refer to Table 13-8).

Table 13-7 Power load factor

NT1 card	Low TE power	High TE power
1.6 W	2.5 W	10 W

Table 13-8 Back-up power capacity

NT1 power module 2.2	One battery module	Two battery modules
150 W	5.1 hrs at 50 W	11.1 hrs at 50 W

Building power and grounding

The best electronic equipment can not function normally in an abnormal environment. No amount of repair and maintenance can cure a system problem that is supplied with “dirty” power. Studies have shown that up to 80% of electronic component failures can be attributed to AC power distribution problems.

Many existing subscriber sites have poor environmental conditions that create hard-to-find, intermittent, abnormal system problems. These types of problems often cause lengthy down-time, which in order to resolve, require ongoing investigation and subsequent resource strain. The most effective way to prevent this situation from occurring is to perform pre-site inspections and system installations with a great degree of care and attention.

It should be noted that any recommendations for dedicated branch circuits and isolated ground receptacles related to ISDN are directed primarily toward rackmount NT1 units and not necessarily stand-alone NT1 units. However, stand-alone NT1 integrity can be significantly enhanced by a clean power environment.

Although this publication is designed as a reference source for ISDN implementation, all the information it contains is applicable to most data applications.

Introduction

The purpose of this section is to familiarize the telecommunications support engineer with the subject of power and grounding. With the increasing complexity in telecommunications circuit and system design, the need to understand the influence of power environments is becoming ever more urgent. Power and grounding interference can adversely affect virtually any electronic equipment on any site. Grounding techniques can also severely impact equipment performance.

A clean, dependable power source is essential for continued efficient operation of any telecommunications system, whether small or large. The quality of power supplied to any system is dependent on the generating source (about which the support engineer can do very little), the in house wiring (which is directly related to installation techniques) and the number and size of electrical loads attached to the power lines. The presence of power fluctuations does not always necessitate a conditioning instrument. Many power problems can be corrected by proper wiring and grounding techniques. Subsequently, thorough pre-installation analysis can often eliminate potential system problems.

Power system disturbances

A trend in AC power sources is toward more highly loaded public utility systems. When peek demand occurs and non-critical loads are switched off and on, or if line voltage is deliberately reduced in the form of “brownouts,” the resulting line voltage disturbances and aberrations will be particularly bad for electronic equipment operation.

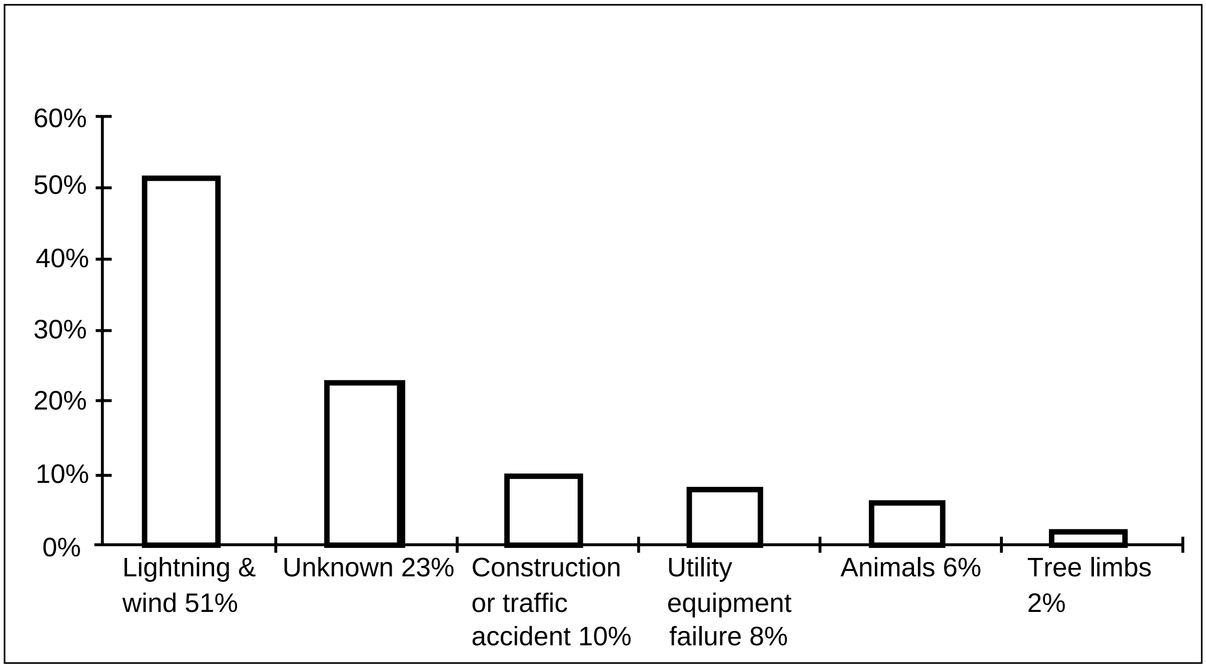
Utility companies make a valiant and continuous effort to maintain voltages and frequency wave-forms on their lines within acceptable standards, but many factors beyond their control still exist.

Types of power line disturbances fall into several different categories:

- blackouts—complete power failure
- dropouts—short term (1ms to 3 s) intermittent loss of power
- impulses—spikes, noise, and interference on the line
- sags—low voltage
- surges—high voltage
- brownouts—planned voltage reduction
- line losses
- frequency shift

Figure 13-10 illustrates the causes of major power disturbances.

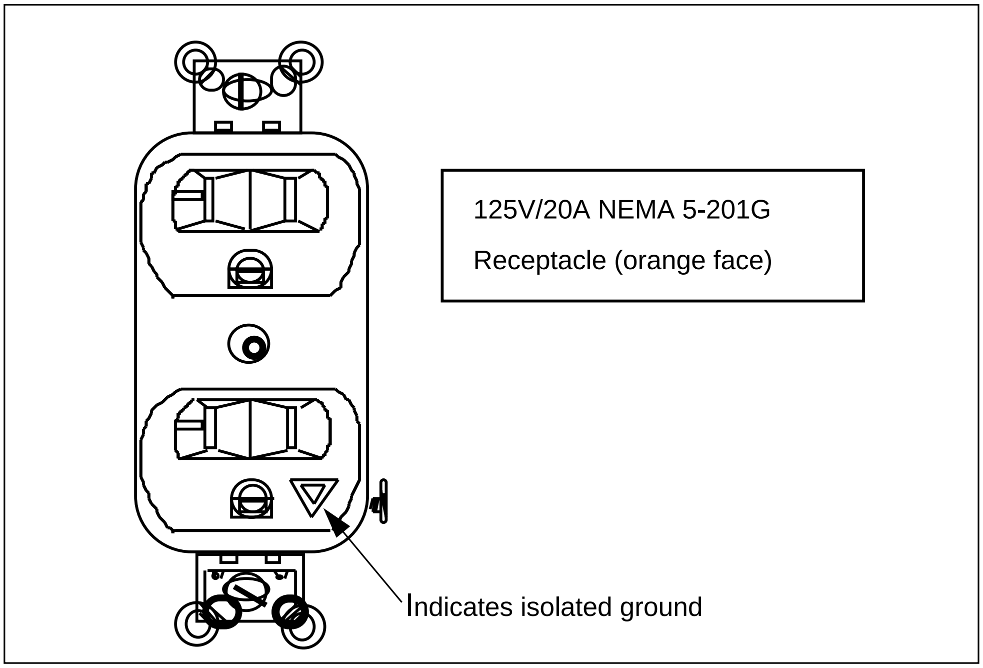
Figure 13-10 Causes of major power disturbances



Power receptacles

The type of primary power receptacle used by ISDN equipment depends upon the requirements of the country in which the system is located. In the United States, power lines terminate, where possible, in NEMA isolated ground (IG) receptacles. This type of receptacle is shown in Figure 13-11.

Figure 13-11 Power receptacle



Grounding

Grounding accomplishes multiple functions, all of which must be considered in the design and installation of an ISDN system. Persons concerned with only one or two of these functions can violate the other functions due to lack of knowledge or because these functions are not their responsibility. Grounding is required both for safety reasons and because of the need for communications circuits to operate reliably. Safety takes top priority, but the ISDN system must be simultaneously safe and operationally reliable. There must be no compromise.

Effective grounding path

There are four major purposes for establishing a ground connection to equipment and systems:

- Safety—to prevent a shock hazard in the event that an equipment chassis, frame, or housing carries a hazardous voltage due to an accidental breakdown of wiring or components.
- Lightning—to protect a building and its contents from lightning-strike damage by providing a very low impedance path from the building to earth.
- Electrical compatibility—to provide a reference voltage for all electrical and electronic systems and equipment. This both avoids a shift in operating

voltage levels and prevents circulating ground-current loops (resulting in common-mode impedance coupling).

- Electromagnetic compatibility—to reduce susceptibility to interference, equipment chassis are ground-referenced at a common point, which also serves to provide a discharge path for electrostatic discharge (ESD).

Note 1: When a subscriber's site is unsuitable for installing a dedicated branch to ISDN equipment, or where large-scale modifications are required to implement the wiring modifications, the satisfactory installation of a power conditioning device to general-purpose power receptacles is acceptable in place of a fully-dedicated branch. However, good grounding is still required for the installation to be considered reliable.

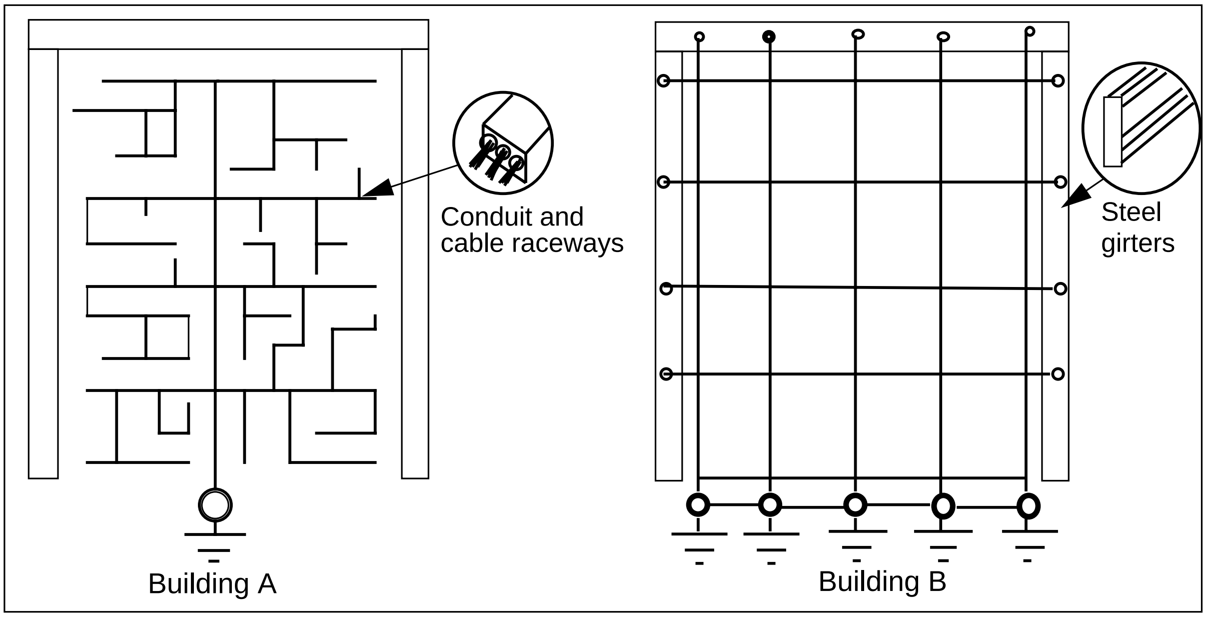
Note 2: In extreme circumstances, where the surrounding environment is highly prone to electromagnetic interference (EMI), filtered or isolated power mains and radio frequency shielding (or both) can be required.

Types of buildings

Figure 13-12 shows the two most common grounding-system designs in buildings. Building A represents the old style of construction that is still prevalent on subscriber sites. Buildings that were constructed over 50 years ago only used two wire (ungrounded) receptacles. Consequently, few older sites made provision for effective grounding. As three-wire receptacles became necessary, grounding systems were patched up from existing conduits, cable raceways, and isolated ground wires. This grounding system is referred to as common grounding, and supplies a grounding path from each floor of the building to the service entrance ground reference point.

Building B is commonly referred to as a distributed grounding system. Most modern office buildings in the United States are constructed with a framework of electrically-connected steel girders that provide an excellent grounding path. This grounding path is usually supported by installing ground stakes at intervals around the building. The grounding network is connected together at the service entrance to provide the ground reference point. It can be seen that this system provides very low impedance between ground and neutral as well as good shielding from EMI for the entire building. It is acceptable to use just the building steel for the grounding return path, provided that this path is directly connected to the main service entrance grounding point.This isolates the system from noisy ground paths used by lighting and general-purpose circuits.

Figure 13-12 Grounding designs in buildings



Typical site considerations

The installation of a system is a critical period in the life cycle of the equipment. Many “teething troubles” during installation lead to breakdowns and intermittent faults throughout the life of the equipment. This is largely because of a lack of attention to problems in the system environment.

For example, a newly-installed system can be found to be static-prone because of poorly grounded power distribution. When a “hard” fault occurs with one component, usually many more components within the new system have degraded to some extent, and the system will be much more likely to fail through its life.

General responsibilities

The public utility is responsible for the power equipment leading to the building service entrance for the site. Any major deficiencies in supplied power become the responsibility of the power company.

The subscriber is normally responsible for employing contractors to prepare the site for correct power requirements, adequate equipment space, and inter-system cabling.

Subscriber induced problems

Probably the most common problem introduced by subscribers is the use of non-standard equipment on the dedicated circuit designated for ISDN equipment. For example, whenever a custodian plugs in a floor polisher, or vacuum cleaner to an ISDN-designated receptacle, the resulting effect on the system can be unpredictable. It is important to appropriately label each receptacle so that only ISDN equipment is used on its dedicated branch or power conditioner outlet.

Electrician induced problems

Electricians who are not familiar with the noise-sensitivity of data equipment sites will often daisy-chain dedicated branch neutrals (and/or grounds) with general-purpose neutrals (and/or grounds). Another common practice is to connect all neutrals to a neutral bus and all grounds to a ground bus at the local distribution panel. It means that the neutral (and/or ground) is connected to other, general-purpose, “noisy” branches. This noise can very often transfer to the “dedicated” branch. Weak dedicated lines of this nature can often require rewiring so that both neutral and ground are isolated from all other general-purpose branches.

Often, electricians miswire sockets. The most common miswiring practice is that of hot and neutral orientation. The resulting effect of reversing hot and neutral (or neutral and ground—especially on equipment situated between floors) on most systems is the intermittent service interruption and hangs.

What can be done?

Test results combined with cost estimate of actual system down-time are used to determine what action should be taken to correct power-line problems.

After it has been determined that the power line is the source of the system problem, a corrective device can be specified. No matter what type of device is required, it is imperative that a good building ground exists. All filtering and conditioning devices operate on a principle that shunts the unwanted noise to ground. If a good ground does not exist, the device will be limited in its operation.

> ***Note:*** An isolated ground is a separate ground wire running from the individual receptacle to the main ground bus for the building. The use of the isolated ground can eliminate the possibility of high resistance found in typical grounding pathways that normally utilize conduit and cable raceways and often form complex pathways. These pathways can enhance the antenna effect that can interfere with sensitive equipment.

The type of device used to correct power interference is usually determined by first analyzing the information obtained from an analyzer printout. If the disturbances are strictly impulses, a line filter should be sufficient. If there are voltage fluctuations, brownouts, or low line voltage conditions, a power conditioner can be required. The size of the transformer must be determined. Transformers are selected to operate somewhere near maximum rating in order to obtain maximum efficiency.

There are several methods of dealing with power problems. Four types of line conditioning equipment will be discussed in the following paragraphs.

Isolation transformers

Isolation transformers attenuate common-mode noise and prevent high frequency power line noise from being picked up by the transformer secondary and delivered to the load. However, they perform no voltage regulating function. Sags or surges or high or low voltages will be reproduced faithfully on the transformer secondary.

Line voltage regulators

Line voltage regulators maintain reasonably constant output voltage to the load during variations in power line voltage. There are many different ways to accomplish this and among the basic types, there are innumerable variations, all with their own advantages and limitations.

Power conditioners

Power conditioners combine the functions of isolation transformers and line voltage regulators and consequently, they are able to both attenuate line noise and regulate output voltage. Power conditioners can protect against the principal types of power line disturbance except for voltage dropouts and line interruptions. It is possible to create a power conditioner by placing separate voltage regulators and isolation transformers in series. But properly matching the two can be tricky, and the package is bulkier and generally more expensive than using a single unit designed to perform the power conditioner function.

Uninterruptable power supplies

When continuity of load operation is demanded—in the face of line voltage interruptions that last for more than one-half cycle, then the only choice is to go to an uninterruptable power supply (UPS). The basic UPS consists of a rectifier/battery charger that takes AC line power and rectifies it to DC; an inverter that takes the DC and converts it back to AC power of the proper voltage and frequency; and a battery bank that takes the place of the rectified DC power source if line power fails. UPS systems are complex, expensive, somewhat inefficient, have a high output impedance, and large units that frequently require special installation facilities and increased air conditioning capacity to dissipate the heat. But if assured continuity of operation is imperative, then the best possible UPS for the situation must be chosen. The proper UPS will protect load equipment from all types of power line disturbances.

Testing power

Power line problems are a common occurrence and many subscribers who have power line problems are not technically inclined and do not understand what can cause transients, sags, surges, and dropouts, nor do they understand the effects. The subscriber will often ask for information on the cause and effects of power interference, especially when investment in expensive conditioning equipment is required.

As shown in previous sections of this manual, intermittent system failures or errors can be induced by any one of the following problems:

- hardware failure
- poor cable connections
- static electricity discharge
- interference from nearby electrical equipment
- power line disturbances
- poor building ground

Attempting to determine which of the these problems is the cause of the subscriber's problem is probably the most difficult thing to determine. The fact that power line disturbances are present does not always conclude they are the source of the problem. If a subscriber asks, “What magnitude transient, sag or surge will cause a problem in an ISDN System?” The answer is “There is no single answer.” Every system is affected differently, depending on what is taking place internally in the machine, the environmental conditions, the condition of the equipment, the impedance of the power line, and a multitude of other variables. The same piece of equipment can produce an error due to a power line disturbance, but function properly at a different time when subjected to an identical disturbance.

What can be checked, measured, and tested?

Power line disturbances can be divided into several categories. The usual symptoms of power line disturbance can be seen on systems as intermittent failures. Because power line disturbances are usually transitory in nature, a glitch in the line can cause slight degradation in equipment components. This degradation can then also manifest itself as an intermittent hardware failure. Therefore, the real problem is in how to approach intermittent system failures. Before assuming that an intermittent failure on a system is power induced, the engineer should make certain checks in order to ensure that the system is not failing through other means.

Finding the source of the problem can require several days of investigation and careful observation. For example, a copying machine being used at the same time an ISDN call is taking place can cause a call failure or static, but only if the events occur at the same time. Depending on how often the set is used and how often a copy is made, the probability of an error occurring can be as much as twice an hour or as little as once a week. The important thing to remember in this case, is that the events must occur at the same time.

The only way to be sure a power line disturbance has caused an error is to record the time of the equipment error and the time of the power line disturbance; when the two coincide, the power line is usually the problem. How do you record the two events? First, ask the subscriber to keep a record of all unexplained errors that occur. Second, obtain a power line analyzer and use the captured data from the analyzer to associate the two events. After a correlation can be made between power disturbances and equipment problems or failures, an assessment should be made by a trained power specialist or vendor as to which device is best suited for your particular subscriber site.

Part IV
Provisioning

"Part IV: Provisioning" contains the following chapters:

14 Data schema

System datafill sequence

Before datafill is entered in tables to provide basic rate interface (BRI) services, ensure that the appropriate ISDN hardware and software are installed.

After the hardware and software components are provisioned, datafill requirements involve the following four main areas of functionality:

- datafill for facility interface tables to configure the ISDN hardware, provision for the physical connections, and specification of the default service parameters
- datafill for service tables to provide ISDN services to individual lines
- datafill for table TMTCNTL (Treatment Control) to provide call treatments, such as no terminal responding (NTRS) and call rejected (CREJ), which produce line 138 logs

  Note: The log bool in subtable LNS must be set to “Y” to generate a line 138 log.

- datafill for bearer capability tables to identify bearer services and datafill for system tables to provide digit translation and call routing

BRI services and capabilities are typically datafilled in the following sequence:

- facility interface tables
- customer groups
- BRI base service
- BRI supplementary services
- bearer capability routing
- call processing and ISUP interworking

This document concentrates on the facility interface tables, base service, supplementary service, and bearer capability routing. Key points of interest in other areas are covered when required. Detailed descriptions of these tasks and tasks listed, but not covered, can be found in the *Translations Guide*, 297-8001-350, the *Customer Data Schema Reference Manual*, 297-8001-351, and the “ISDN Basic Rate Interface Translations” course taught at Raleigh Technical Education Center (RTEC).

Office parameters used for ISDN

NA014 does not introduce any new office parameters.

Table 14-1 shows the office parameters used by the facility interface tables associated with ISDN BRI services. For more information about office parameters, refer to the *Office Parameters Reference* Manual, 297-8001-855.

Table 14-1 Office parameters used by BRI facility interface tables (Sheet 1 of 2)

Table name	Parameter	Explanation and action
OFCENG	DCH_BD_STATMUX_RATIO	This parameter specifies the maximum number of logical terminals that can be statistically multiplexed onto one Bd channel on the DCH. The number is determined by the number of packet terminals required, the level of traffic expected, and the amount of data packets per second. Default = 64 Maximum = 64
OFCENG	MAXNUCS	For an office equipped with the junctored network (JNET), this parameter specifies the maximum number of nailed up connections required of the switch. This parameter is not required for offices equipped with the enhanced network (ENET). A warm restart is required to activate this parameter. Default = 0 Maximum = 9126

Table 14-1 Office parameters used by BRI facility interface tables (Sheet 2 of 2)

Table name	Parameter	Explanation and action
OFCENG	NUM_RC_EXT_BLKS	When entering data for packet calls, the value of entry NUM_RC_EXT_BLKS in table OFCENG should be increased by 5 over the existing value for voice calls. Default = 0 Maximum = 32766
OFCOPT	MAX_BRA_LINE	Specifies the maximum number of ISDN lines in the office. Default = 1 000 Maximum = 32 766

Table 14-2 shows the office parameters used by Base Service.

Table 14-2 Office parameters used by Base Service

Table name	Parameter	Explanation and action
OFCENG	BC_CHECKING_SCOPE	This parameter is set to control the bearer capability (BC) screening performed between stations in IBN and ISDN environments. If no BC checking is required, leave the parameters default value of NONE. If calls terminating on ISDN terminals are to be screened for BC compatibility, enter ISDN. If calls terminating on ISDN terminals and IBN terminals with bearer capabilities are to be screened, enter IBN.

Table 14-3 shows the office parameters used by Flexible Calling.

Table 14-3 Office parameters used by Flexible Calling

Table name	Parameter	Explanation and action
OFCENG	MAX_NO_OF_3_PORTS_IN_CHAIN	This parameter is set to control the maximum number of 3-port conference circuits allowed in a flexible calling chain. The maximum number of conferences in the FC chain is equal to this parameter + 2. Enter a value between 2 and 20 (the default is 3).
OFCENG	NO_OF_MEDIUM_FTR_DATA_BLKS	This parameter ensures that sufficient software resources are available to conference calls. It is typically set to 500 (the range is 0 to 32767, and the default is 50). The number of medium feature data blocks required for flexible call chaining is a value three times the number of 3-port conference circuits allowed (as defined in MAX_NO_OF_3_PORTS_IN_CHAIN. Add this value of NO_OF_MEDIUM_FTR_DATA_BLKS, and enter the total value. (For example, if the current value of NO_OF_MEDIUM_FTR_DATA_BLKS is 500, and MAX_NO_OF_3_PORTS_IN_CHAIN is 3, the value of this parameter should be 509).

Table 14-4 shows the office parameters used by Bearer Capability Routing.

Table 14-4 Office parameters used by Bearer Capability Routing

Table name	Parameter	Explanation and action
OFCENG	NUM_RC_EXT_BLKS	This parameter (number of routing characteristics extension blocks) specifies the number of extension blocks required for translation and routing of calls based on routing characteristics. The default for the parameter is 0 (zero), but it is recommended that the operating company calculate the value as one block for each call based on the probable number of simultaneous calls using ISDN translations. Note that such calls include calls on any trunk group that does not have the default BC (for instance, a PTS trunk group datafilled with a non-default BC).
OFCENG	DEFAULT_BEARER_CAPABILITY	This parameter defines the office-wide default bearer capability, which is the value applied to an incoming trunk if no BC is defined in table TRKGRP. The default for DEFAULT_BEARER_CAPABILITY is SPEECH. If the default BC is changed, the new default is applied only to trunk groups datafilled after the change. Any trunk groups datafilled before the change retain the previous default BC value. This situation can cause problems, because these trunks become non-default BC trunk groups and require RC extension blocks. If NUM_RC_EXT_BLKS is set too low to accommodate these extra trunk groups, calls can be dropped. To solve the problem, the non-default BC trunk groups must have datafill entered again.

BRI ISDN office parameters located in table ISDNVAR

Table 14-5 lists the ISDN office parameters located in table ISDNVAR. The table also shows the range of value settings for each parameter. Table ISDNVAR was added in NA008. Office parameter AUTOSPID was added to table ISDNVAR in NA009. Office parameters DEFOML, TMEAS, LAPD16_ABN_LOG, and LAPB_ABN_LOG were added in NA010. Office parameters MAX_ASYNC_ISDN_DIAGS and SDT_SUBSCRIPTION_LIMIT_EXCD were added in NA011. Office parameters CND_BRI_OFFICE, RND_BRI_OFFICE,

L3_SVC_DSRPT_CTRL, ECHO_STAT_BILL_PARM, and L3_SVC_DSRPT_THLD were added in NA012.

Table 14-5 Office parameters in table ISDNVAR (Sheet 1 of 3)

VARNAME	VARVAL
Q931_ABN_LOG	ON or OFF
L3_DISCONNECT_MSG_RCVD	ON or OFF
L3_DISCONNECT_MSG_TRANS	ON or OFF
L3_RELEASE_MSG_RCVD	ON or OFF
L3_RELEASE_MSG_TRANS	ON or OFF
L3_RELEASE_COMPL_MSG_RCVD	ON or OFF
L3_RELEASE_COMPL_MSG_TRANS	ON or OFF
L3_STATUS_MSG_RCVD	ON or OFF
L3_STATUS_MSG_TRANS	ON or OFF
L3_PROGRESS_MSG_TRANS	ON or OFF
L3_MSG_RCVD_BAD_LENGTH	ON or OFF
L3_MSG_RCVD_INVALID_INFO	ON or OFF
L3_MSG_RCVD_INVALID_CR_VALUE	ON or OFF
L3_MSG_RCVD_INVALID_CR_FLAG	ON or OFF
PKT_ABN_LOG	ON or OFF
L3_RESTART_REQ_TRANS	ON or OFF
L3_RESTART_REQ_RCVD	ON or OFF
L3_RESET_REQ_TRANS	ON or OFF
L3_RESET_REQ_RCVD	ON or OFF
L3_CLEAR_REQ_TRANS	ON or OFF
L3_CLEAR_REQ_RCVD	ON or OFF
L3_DIAG_PKT_TRANS	ON or OFF
L3_DIAG_PKT_RCVD	ON or OFF
LAPD_ABN_LOG	ON or OFF

Table 14-5 Office parameters in table ISDNVAR (Sheet 2 of 3)

VARNAME	VARVAL
L3_SVC_DSRPT_CTRL	ON or OFF
L3_SVC_DSRPT_THLD	1 to 1 000. Default value is 8.
TEI_SUBSCRIPTION_LIMITS_EXCD	ON or OFF
TEI_NO_RESPONSE	ON or OFF
TEI_ROUTINE_TEST	ON or OFF
TEI_MULTIPLE_RESPONSE	ON or OFF
TEI_IDENTITY_VERIFY_MSG	ON or OFF
TEI_UNSOLICITED_RESPONSE	ON or OFF
TEI_NOT_ASSIGNED	ON or OFF
L2_DM_FRAME_RCVD	ON or OFF
L2_DM_FRAME_SENT	ON or OFF
L2_FRAME_RCVD_CNTRL_UNDEF	ON or OFF
L2_FRAME_RCVD_INVALID_INFO	ON or OFF
L2_FRAME_RCVD_INVAL_SEQ_NUM	ON or OFF
L2_FRAME_RCVD_EXCD_INFO	ON or OFF
L2_FRAME_RCVD_UNEXPECTED	ON or OFF
L2_FRMR_FRAME_RCVD	ON or OFF
L2_PROPER_RESPONSE_NOT_RCVD	ON or OFF
L2_INVALID_FRAME_RCVD	ON or OFF
LAPD16_ABN_LOG	ON or OFF
LAPB_ABN_LOG	ON or OFF
MAX_ASYNC_ISDN_DIAGS	0 to 10 ***Note:*** An entry of 0 deactivates asynchronous diags for the office.
SDT_SUBSCRIPTION_LIMIT_EXCD	ON or OFF

Table 14-5 Office parameters in table ISDNVAR (Sheet 3 of 3)

VARNAME	VARVAL
TMEAS	0, 30 to 900 set in increments of 30 ***Note:*** An entry of 0 deactivates Rapid Messaging checks for all LTIDs in the office.
DEFOML	0, 15 to 150 set in increments of 15 ***Note:*** An entry of 0 deactivates Rapid Messaging checks for all LTIDs in the office except for those that are assigned option OML.
AUTOSPID	ON or OFF
CND_BRI_OFFICE	ON or OFF. Default is OFF.
RND_BRI_OFFICE	ON or OFF. Default is OFF.
ECHO_STAT_BILL_PARM	ON or OFF. Default is OFF.

Table 14-6 describes the office parameters in table ISDNVAR associated with the BRI Layer 2/3 Surveillance Monitoring feature that enable or disable the generation of LAPD abnormality log reports on an office-wide basis. For more information about office parameters, refer to the *Office Parameters Reference Manual*, 297-8001-855.

Table 14-6 Office parameters in table ISDNVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 1 of 7)

Parameter name	Explanation and action
LAPB_ABN_LOG	This parameter enables or disables the generation of LAPB log reports for related layer 2 abnormality log reports on an office-wide basis. OFF is the default value.
LAPD_ABN_LOG	This parameter enables or disables the generation of ISDN Link Access Protocol for the D-channel (LAPD) abnormality log reports on an office-wide basis.
LAPD16_ABN_LOG	This parameter enables or disables the generation of ISDN LAPD16 log reports for layer 2 protocol abnormalities on an office-wide basis.

Table 14-6 Office parameters in table ISDNVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 2 of 7)

Parameter name	Explanation and action
PKT_ABN_LOG	This parameter enables or disables the generation of ISDN abnormality log reports for X.25-packet data for related layer 3 protocol abnormalities on an office-wide basis. OFF is the default value.
TEI_SUBSCRIPTION_LIMITS_EXCD	This parameter enables or disables the generation of ISDN115 Layer 2 Protocol Abnormality log reports with “Subscription limits exceeded” displayed in the Subscription limits exceeded field on an office-wide basis.
TEI_NO_RESPONSE	This parameter enables or disables the generation of ISDN100 Layer 2 Protocol Abnormality log reports with “Terminal Unavailable” displayed in the Terminal Unavailable field on an office-wide basis.
TEI_ROUTINE_TEST	This parameter enables or disables the generation of ISDN120 Layer 2 Protocol Abnormality log reports with “Routine Test” displayed in the Routine Test field on an office-wide basis.
TEI_MULTIPLE_RESPONSE	This parameter enables or disables the generation of ISDN102 Layer 2 Protocol Abnormality log reports with “TEI Removed” displayed in the TEI Removed field on an office-wide basis.
TEI_IDENTITY_VERIFY_MSG	This parameter enables or disables the generation of ISDN121 Layer 2 Protocol Abnormality log reports with “Identity Verify Message” displayed in the Identity Verify Message field on an office-wide basis.
TEI_UNSOLICITED_RESPONSE	This parameter enables or disables the generation of ISDN122 Layer 2 Protocol Abnormality log reports with “Unsolicited Response” displayed in the Unsolicited Response field on an office-wide basis.
TEI_NOT_ASSIGNED	This parameter enables or disables the generation of ISDN116 Layer 2 Protocol Abnormality log reports with “TEI not assigned” displayed in the TEI not assigned field on an office-wide basis.

Table 14-6 Office parameters in table ISDNVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 3 of 7)

Parameter name	Explanation and action
L2_DM_FRAME_RCVD	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Disconnect Mode frame Rcvd” displayed in the Abnormality field on an office-wide basis.
L2_DM_FRAME_SENT	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Disconnect Mode frame sent” displayed in the Abnormality field on an office-wide basis.
L2_FRAME_RCVD_CNTRL_UNDEF	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Frames Rcvd with cntrl field not defined” displayed in the Abnormality field on an office-wide basis.
L2_FRAME_RCVD_INVALID_INFO	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Frame Rcvd with invalid info field” displayed in the Abnormality field on an office-wide basis.
L2_FRAME_RCVD_INVALID_SEQ_NUM	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Frames Rcvd with invalid seq num” displayed in the Abnormality field on an office-wide basis.
L2_FRAME_RCVD_EXCD_INFO	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Frames Rcvd with info field exceeding max established length” displayed in the Abnormality field on an office-wide basis.
L2_FRAME_RCVD_UNEXPECTED	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Unexpected frames received” displayed in the Abnormality field on an office-wide basis.
L2_FRMR_FRAME_RCVD	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “FRMR frame received” displayed in the Abnormality field on an office-wide basis.

Table 14-6 Office parameters in table ISDNVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 4 of 7)

Parameter name	Explanation and action
L2_PROPER_RESPONSE_NOT_RCVD	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Proper response not Rcvd to estab or reset link after N200 SABME sent” displayed in the Abnormality field on an office-wide basis.
L2_INVALID_FRAME_RCVD	This parameter enables or disables the generation of ISDN304 Layer 2 Protocol Abnormality log reports with “Invalid Frames Rcvd” displayed in the Abnormality field on an office-wide basis.
Q931_ABN_LOG	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports on an office-wide basis.
L3_CLEAR_REQ_RCVD	This parameter enables or disables the generation of Layer 3 Protocol Abnormality log reports for X.25 packet data with “CLEAR REQUEST received” displayed in the Abnormality field on an office-wide basis. ON is the default value.
L3_CLEAR_REQ_TRANS	This parameter enables or disables the generation of Layer 3 Protocol Abnormality log reports for X.25 packet data with “CLEAR INDICATION transmitted” displayed in the Abnormality field on an office-wide basis. ON is the default value.
L3_DIAG_PKT_RCVD	This parameter enables or disables the generation of Layer 3 Protocol Abnormality log reports for X.25 packet data with “DIAGNOSTIC PACKET received” displayed in the Abnormality field on an office-wide basis. ON is the default value.
L3_DIAG_PKT_TRANS	This parameter enables or disables the generation of Layer 3 Protocol Abnormality log reports for X.25 packet data with “DIAGNOSTIC PACKET transmitted” displayed in the Abnormality field on an office-wide basis. ON is the default value.
L3_DISCONNECT_MSG_RCVD	This parameter is enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “DISCONNECT received” displayed in the Abnormality field on an office-wide basis.

Table 14-6 Office parameters in table ISDNVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 5 of 7)

Parameter name	Explanation and action
L3_DISCONNECT_MSG_TRANS	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “DISCONNECT transmitted” displayed in the Abnormality field on an office-wide basis.
L3_RELEASE_MSG_RCVD	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “RELEASE received” displayed in the Abnormality field on an office-wide basis.
L3_RELEASE_MSG_TRANS	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “RELEASE transmitted” displayed in the Abnormality field on an office-wide basis.
L3_RELEASE_COMPL_MSG_RCVD	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “REL COMPLETE received” displayed in the Abnormality field on an office-wide basis.
L3_RELEASE_COMPL_MSG_TRANS	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “REL COMPLETE transmitted” displayed in the Abnormality field on an office-wide basis.
L3_RESTART_REQ_RCVD	This parameter enables or disables the generation of Layer 3 Protocol Abnormality log reports for X.25 packet data with “RESTART REQUEST received” displayed in the Abnormality field on an office-wide basis.
L3_RESTART_REQ_TRANS	This parameter enables or disables the generation of Layer 3 Protocol Abnormality log reports for X.25 packet data with “RESTART REQUEST transmitted” displayed in the Abnormality field on an office-wide basis. ON is the default value.
L3_RESET_REQ_RCVD	This parameter enables or disables the generation of Layer 3 Protocol Abnormality log reports for X.25 packet data with “RESET REQUEST received” displayed in the Abnormality field on an office-wide basis. ON is the default value.

Table 14-6 Office parameters in table ISDNVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 6 of 7)

Parameter name	Explanation and action
L3_RESET_REQ_TRANS	This parameter enables or disables the generation of Layer 3 Protocol Abnormality log reports for X.25 packet data with “RESET INDICATION transmitted” displayed in the Abnormality field on an office-wide basis. The default value for this parameter is ON.
L3_STATUS_MSG_RCVD	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “STATUS received” displayed in the Abnormality field on an office-wide basis.
L3_STATUS_MSG_TRANS	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “STATUS transmitted” displayed in the Abnormality field on an office-wide basis.
L3_PROGRESS_MSG_TRANS	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “PROGRESS transmitted” displayed in the Abnormality field on an office-wide basis.
L3_MSG_RCVD_BAD_LENGTH	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “MSG Rcvd less than min length” displayed in the Abnormality field on an office-wide basis.
L3_MSG_RCVD_INVALID_INFO	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “MSG Rcvd with inval protocol discriminator” displayed in the Abnormality field on an office-wide basis.
L3_MSG_RCVD_INVALID_CR_VALUE	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “MSG Rcvd with inval CR value” displayed in the Abnormality field on an office-wide basis.
L3_MSG_RCVD_INVALID_CR_FLAG	This parameter enables or disables the generation of ISDN301 Layer 3 Protocol Abnormality log reports with “SETUP Rcvd with CR flag incorrectly set to 1” displayed in the Abnormality field on an office-wide basis.

Table 14-6 Office parameters in table ISDNVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 7 of 7)

Parameter name	Explanation and action
L3_SVC_DSRPT_CTRL	This parameter enables or disables the generation of ISDN311 Layer 3 Service Disruption log reports for circuit switched services on an office-wide basis.
L3_SVC_DSRPT_THLD	This parameter sets the threshold value for Layer 3 Service Disruptions for circuit switched services. The default value for this parameter is 8. If the layer 3 service disruption abnormality counts exceed the value set in this parameter, log report ISDN311 is generated. Generation of log report ISDN311 occurs provided the log generation control for both office-wide and individual line log generation are set to ON. However, if the override bit is set to ON, log report ISDN311 is generated even if the log generation control for office-wide generation is set to OFF and that for individual line basis is set to ON.
SDT_SUBSCRIPTION_LIMIT_EXCD	This parameter enables or disables the generation of ISDN305 Layer 2 Protocol Abnormality log reports with “Service Disruption Exceeded” displayed on an office-wide basis. The default for this parameter is OFF.

Table 14-7 describes the office parameters in table ISDNVAR that are not used with the Layer 2/3 Surveillance Monitoring feature.

Table 14-7 Office parameters in table ISDNVAR not used by BRI Layer 2/3 Surveillance Monitoring (Sheet 1 of 2)

Parameter name	Explanation and action
AUTOSPID	This parameter activates or deactivates the automated SPID feature.
CND_BRI_OFFICE	This parameter enables or disables Calling Number Delivery (CND) for BRI terminals in an office. The default for this parameter is OFF.
RND_BRI_OFFICE	This parameter enables or disables Redirecting Number Delivery (RND) for BRI terminals in an office. The default for this parameter is OFF.

Table 14-7 Office parameters in table ISDNVAR not used by BRI Layer 2/3 Surveillance Monitoring (Sheet 2 of 2)

Parameter name	Explanation and action
DEFOML	This parameter dictates the default value for how many messages are required during a one minute period before an LTID is considered to be in a rapid messaging state. The default value for this parameter is 0.
ECHO_STAT_BILL_PARM	This parameter determines whether or not an Echo Station call is billed. If this parameter is set to ON, calls to an Echo Station DN will be billed. The default value for this parameter is OFF.
MAX_ASYNC_ISDN_DIAGS	This parameter specifies the maximum number of asynchronous diagnostics that can run concurrently in a DMS office. The default value for this parameter is 5. A value of 0 deactivates asynchronous diagnostics for the entire office.
TMEAS	This parameter dictates the measurement interval for monitoring D-channel traffic for the Rapid Messaging feature. The default value for this parameter is 0.

Table 14-8 describes the office parameters in table OFCVAR associated with the BRI Layer 2/3 Surveillance Monitoring feature. Parameter DAILY_ISDN_L2L3_PEG_AUDIT_TIME sets the time of day that all ISDN layer 2/3 peg counts are audited and reset. The other four parameters set the high abnormality threshold for layer 2/3 circuit and packet abnormality peg counts.

Table 14-8 Office parameters in table OFCVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 1 of 2)

Parameter name	Description
DAILY_ISDN_L2L3_PEG_AUDIT_TIME	This parameter specifies the time of day that all ISDN layer 2 and layer 3 peg counts are audited and reset.
LAYER2_CIRCUIT_ABN_PEGS_THLD	This parameter sets the high abnormality rate threshold number for allowable layer 2 protocol abnormalities on any circuit-switched ISDN line over a 24-hr period. Once this threshold number is exceeded, a high abnormality rate is declared and audit registers are pegged.

Table 14-8 Office parameters in table OFCVAR used by BRI Layer 2/3 Surveillance Monitoring (Sheet 2 of 2)

Parameter name	Description
LAYER2_PACKET_ABN_PEGS_THLD	This parameter sets the high abnormality rate threshold number for allowable layer 2 protocol abnormalities on any packet switched ISDN line over a 24-hr period. Once this threshold number is exceeded, a high abnormality rate is declared and audit registers are pegged.
LAYER3_CIRCUIT_ABN_PEGS_THLD	This parameter sets the high abnormality rate threshold number for allowable layer 3 protocol abnormalities on any circuit switched ISDN line over a 24-hr period. Once this threshold number is exceeded, a high abnormality rate is declared and audit registers are pegged.
LAYER3_PACKET_ABN_PEGS_THLD	This parameter sets the high abnormality rate threshold number for allowable layer 3 protocol abnormalities on any packet-switched ISDN line over a 24-hr period. Once this threshold number is exceeded, a high abnormality rate is declared and audit registers are pegged.
LAYER3_PACKET_SVC_THLD	This parameter sets the threshold for layer 3 service disruptions of X.25 packet data on any ISDN line over a 24-hr period. Once the office parameter value exceeds the threshold, log report ISDN 309 is generated.

Facilities interface tables

Facility interface tables contain information that defines the physical facilities used to provide services. For ISDN BRI services, these tables are used to configure the ISDN hardware, provide the physical connections through software, and specify default parameters.

Datafill sequence for ISDN BRI with the DMS packet handler

Table 14-9 shows the facility interface tables that must have data entered to provide ISDN BRI service with the DMS packet handler. The tables are listed in the order in which they are to be datafilled.

For more information on any of the tables discussed here, refer to the *Customer Data Schema Reference Manual*, 297-8001-351.

Table 14-9 Office parameters used by Bearer Capability Routing

Table name	Parameter	Explanation and action
OFCENG	N UM_RC_EXT_BLKS	This parameter (number of routing characteristics extension blocks) specifies the number of extension blocks required for translation and routing of calls based on routing characteristics. The default for the parameter is 0 (zero), but it is recommended that the operating company calculate the value as one block for each call based on the probable number of simultaneous calls using ISDN translations. Note that such calls include calls on any trunk group that does not have the default BC (for instance, a PTS trunk group datafilled with a non-default BC).
OFCENG	DEFAULT_BEARER_CAPABILITY	This parameter defines the office-wide default bearer capability, which is the value applied to an incoming trunk if no BC is defined in table TRKGRP. The default for DEFAULT_BEARER_CAPABILITY is SPEECH. If the default BC is changed, the new default is applied only to trunk groups datafilled after the change. Any trunk groups datafilled before the change retain the previous default BC value. This situation can cause problems, because these trunks become non-default BC trunk groups and require RC extension blocks. If NUM_RC_EXT_BLKS is set too low to accommodate these extra trunk groups, calls can be dropped. To solve the problem, the non-default BC trunk groups must have data entered again.

Rapid Messaging office parameters

Table 14-10 shows the office parameters associated with the Rapid Messaging feature and the office parameter tables where they are located.

Table 14-10 Office parameters used by Rapid Messaging (Sheet 1 of 2)

Table name	Parameter name	Explanation and action
ISDNVAR	DEFOML	The DEFOML parameter dictates how many messages a minute over a normalized TMEAS interval are required to consider a terminal in a rapid messaging (RM) state. The DEFOML parameter value is an office-wide default and can be overridden by the LTID option OML. The table control CHA command is the only valid command for this tuple. Increase or decrease the DEFOML parameter value in increments of 15. A value of zero deactivates the DEFOML parameter. Default = 0 Maximum = 150 When RM active recommended value is 120
ISDNVAR	TMEAS	The TMEAS parameter dictates the measurement interval used to monitor Q.931 D-channel traffic for the Rapid Messaging feature. The table control CHA command is the only valid command for this tuple. Increase or decrease the TMEAS parameter in increments of 30. A value of zero deactivates the TMEAS parameter which disables Q.931 message monitoring for all terminals. Default = 0 Maximum = 900 When RM active recommended value is 90
OFCVAR	RMSG_MAJALARM	The RMSG_MAJALARM parameter dictates the LNS minor, major, and critical thresholds for the "OMaj" alarm indicator. This alarm indicates when the number of lines in the office with the "O" diagnostic indicator exceeds the threshold. The "O" alarm indicator specifies when RM takes two or more LTIDs on a single ISDN line out-of-service. Use the ALMSTAT command at the LTP level to change the parameter value. **De**fault value = 10 20 30 Maximum = 32767 Minimum = 0

Table 14-10 Office parameters used by Rapid Messaging (Sheet 2 of 2)

Table name	Parameter name	Explanation and action
OFCVAR	RMSG_MINALARM	The RMSG_MINALARM parameter dictates the LNS minor, major, and critical thresholds for the “OMin” alarm indicator. This alarm indicates when the number of lines in the office with the “o” diagnostic indicator exceeds the threshold. The “o” alarm indicator specifies when RM takes one LTID on a single ISDN line out-of-service. Use the ALMSTAT command at the LTP level to change the parameter value. **De**fault = 10 20 30 Maximum = 32767 Minimum = 0
OFCENG	RM_SYNC_BURST	The RM_SYNC_BURST parameter dictates the number of messages to send in one sync audit cycle. Each message contains 20 lines of data. Use the table control to change the RM_SYNC_BURST value. Default = 1 Maximum = 5 Minimum = 0
OFCENG	RM_SYNC_DELAY	The RM_SYNC_DELAY parameter dictates the number of seconds between RM synchronization audit cycles. Use the table control to change the RM_SYNC_DELAY value. Default = 30 Maximum = 60 Minimum = 15

Table LTCINV

Table LTCINV (Line Trunk Controller Inventory) contains the inventory data assignment (except the assignment for the P-Side links done in table LTCPSINV) for each bay associated with the various peripheral module (PM) types.

Table LTCINV identifies the following:

- exact location of the PM in the central office
- product engineering code (PEC) of the PM
- load name of its software
- control-side (C-side) links

- optional cards equipped
- optional attributes of the PM

For additional information on table LTCINV, see the *Customer Data Schema Reference Manual*, 297-8001-351. Figure 14-1 shows an example MAP display of table LTCINV.

Figure 14-1 MAP display example of table LTCINV

```
LTCNAME   ADNUM  FRTYPE FRNO  SHPOS   FLOOR  ROW  FRPOS  EQPEC    LOAD
                                                                EXECTAB
                                                                CSLNKTAB
                                          PROCPEC
                                                              OPTCARD
                                       E2LOAD
TONESET
                                                              OPTATTR
PEC6X40                                             EXTINFO
----------------------------------------------------------------------
LTC    1
  2   LTE 1        18      1     D        18   6X 02 NA EL108AN
                           (     POTSPOTSEX)  (KEYSET KSETEX)4
(0 10 20)(0 10 21)(0 10 22)(0 10 23)(0 10 24)(0 10 25)
(0 10 26)(0 10 27)(0 10 28)(0 10 29)(0 10 210)(0 10 211)
(0 10 212)(0 10 213)(0 10 215)(0 10 214)(UTR 15)(MSGMX76)(CMR13 CMR07A)
(ISP 16)$ NORTHAM SX05AA PRL $ SX05AA PRL $ 0 SXFWAF01 $ 6X40AC N
```

Table CARRMTC

Table CARRMTC (Carrier Maintenance) contains DS-1 maintenance control information on peripherals, out-of-service limits for alarms, and in-system return-to-service occurrences.

Up to 16 entries exist for each type of peripheral that is capable of providing carrier links in the switch. One entry for each peripheral type is allotted as a default entry.

For additional information on table CARRMTC, see the *Customer Data Schema Reference Manual*, 297-8001-351.

> ***Note:*** Datafill table CARRMTC directly before table LTCPSINV.

Table CARRMTC contains the maintenance control information for DS-1 carriers on the DTC. A default entry for SF and ZCS comes with the DTC.

If required for 64 kbit/s trunks, an entry called “64KESF” (example name) must be added for ESF and B8ZS. Also, these carrier options require the NT6X50AB card. Figure 14-2 shows an example MAP display of table CARRMTC.

Figure 14-2 MAP display example of table CARRMTC

```
CSPMTYPE   TMPLTNM    RTSML    RTSOL
                                                                 ATTR

LTC    DEFAULT    255     255    DS1 NT6X50AA MU_LAW  SF    ZCS BPV  NILDL    N
-------------------------------------------------------------------------------
                                 250  1000 50 50 150  1000  3  6 864  100    17
                                 511  4    255
LTC    64KESF     255     255    DS1 NT6X50AB MU_LAW  SF  B8ZS BPV  NILDL    N
                                 250  1000 50 50 150  1000 3  6 864   100    17
                                 511  4    255
LGC    DEFAULT    255     255    DS1 NT6X50AA MU_LAW  SF    ZCS BPV  NILDL    N
                                 250  1000 50 50 150  1000  3  6 864  100    17
                                 511  4    255
```

Table LTCPSINV

Table LTCPSINV (Line Trunk Controller P-side Link Inventory) contains the assignment of P-side links for the peripheral modules. An entry in this table is automatically added when an XPM-based peripheral is added to table LTCINV. For ISDN, the DCHs are datafilled as “DCH” in the AREASELECT subfield starting from the P-side port 19.

For DS-1 interface card port assignments, a maximum of ten cards can be placed in the LGC/LTC, each card providing a maximum of two T-1 spans. The port assignment begins with port 0 and increases sequentially, using available ports that are not occupied by the DCH cards. The ports can not be assigned if already assigned to a DCH circuit pack.

The DS30A ports must be selected from those ports that remain after the assignment of port circuits to DCHs and DS-1 circuits. Assign ports to DS30A starting at the highest port number not used by DCH and follow this sequence: 19, 17, 18, 16, 15, 14, 12, 11, 9, 10, 8, 7, 5, 6, 4, 3, 1, 2, and 0 (if unused by DCH or DS-1). Figure 14-3 shows an example MAP display of table LTCPSINV.

> ***Note:*** The reason for assigning the DS30A ports starting at the highest available port is the use of hairpin connections by the DCHs. If the assignment of the DS1s and DS30As does not follow the recommended algorithm, the hairpin connections required by the DCHs can be removed or corrupted causing an outage.

Figure 14-3 MAP display example of table LTCPSINV

```
LTCNAME                                                  PSLNKTAB
-----------------------------------------------------------------
L TC 2

N ( 0 DS1 D EFAULT N )( 1 DS30A )( 2 DS1 DEFAULT N )
  ( 3 DS1 DEFAULT N )( 4 DS1 DEFAULT N )( 5 DS1 DEFULT N )
  ( 6 DS1 DEFAULT N )( 7 DCH ) ( 8 DS30A )
  ( 9 DS1 DEFAULT N )( 10 DS30A )( 11 DS30A )( 12 DS30A )
  (13 DS1 DEFAULT N)(14 DS1 DEFAULT N)(15 DS30A )
  ( 16 DS30A)(17 DS30A)(18 DS30A ) (19 DCH)$
```

Table LCMINV

Table LCMINV (Line Concentrating Module Inventory) maintains a list of enhanced line concentrating modules (LCME) datafilled in the ISDN switch. The table identifies the exact location of the LCMEs, and describes C-side link assignments, product engineering codes (PEC), and other information. Figure 14-4 shows a MAP display example of table LCMINV.

For additional information on table LCMINV, see the *Customer Data Schema Reference Manual*, 297-8001-351.

> ***Note:*** Datafill table LCMINV after table LTCPSINV and before table LNINV.

Figure 14-4 MAP display example of table LCMINV

```
LCMNM FRTYPE SHPOS FLOOR ROW FRPOS EQPEC   LOAD    CSPMNO

BICTST ADNUM   MEMSIZE                              LCMTYPE
-----------------------------------------------------------
HOST 01 0   LCEI   4  1  B    5 BX3OAB  LCME08AA   LTC 2

    N      3 256K 256K
LCME N ( 0) ( 1 ) ( 16 ) ( 18 ) $
```

Table DCHINV

Table DCHINV (D-channel Handler Inventory) contains engineering information for DCHs and EDCHs on PMs with ISDN capabilities. This information includes the DCH/EDCH identification number, the host PM, the card code to distinguish initial and load file name, and the DS-1 slot location to be occupied. Table 14-11 shows an example of datafill for table DCHINV.

Note: Datafill table DCHINV after tables LTCPSINV and LCMINV, and before tables ISGDEF, LNINV, SPECCONN, and LTMAP.

Table 14-11 Datafill example for table DCHINV

DCHNO	PMTYPE	PMNO	DCHPEC	LOAD	PORT
1	LTC	6	BX02BA	EDH10AT	15
2	LTC	6	BX02BA	EDH10AT	17
3	LTC	6	BX02BA	EDH10AT	19
13	LTC	5	BX02BA	EDH10AT	13
15	LTC	5	BX02BA	EDH10AT	15
17	LTC	5	BX02BA	EDH10AT	17
19	LTC	5	BX02BA	EDH10AT	19

Table ISGDEF

Table ISGDEF (ISDN Service Group Definition) maintains the service and channels data for the DCHs for ISDN installations. It contains information on the ISG numbers, PM type, services provided, and allocation of services to channels.

For additional information on table ISGDEF, refer to the *Customer Data Schema Reference Manual*, 297-8001-351.

Note 1: Enter datafill for table ISGDEF after table DCHINV and before table LNINV.

Note 2: Reserve one DCH for use as a hot spare. For example, if you have four DCHs in DCHINV, only datafill three in table ISGDEF. The fourth DCH is the hot spare.

Bd channels start at DCH port 31 and are datafilled backwards, for example, 31, 30, 29, 28, and so on. BRA channels are datafilled from DCH port 1 forward. Figure 14-5 shows an example of the MAP display of table ISGDEF.

Figure 14-5 MAP display example of table ISGDEF

```
  ISGN0    PMTYPE PMN0 SERVICE          CHNLTAB
---------------------------------------------------------

   O        LTC    11      (BRA) (PD)$
(0 RESERVED)(1 BRA)(2 BRA)(3 BRA)(4 BRA)(5 BRA)(6 BRA)
(7 BRA)(8 BRA)(9 BRA)(10 BRA)(11 BRA)(12 BRA)(13 BRA)
(14 BRA)(15 BRA)(16 BRA)(17 BRA)(18 BRA)(19 BRA)(20 BRA)
(21 BRA)(22 BRA)(23 BRA)(24 BD)(25 BD)(26 BD)(27 BD)
(28 BD)(29 BD)(30 BD)(31 BD)$

   1        LTC    10      (BRA) (PD)$
(0 RESERVED (1 BRA)(2 BRA)(3 BRA)(4 BRA)(5 BRA)(6 BRA)
(7 BRA)(8 BRA)(9 BRA)(10 BRA)(11 BRA)(12 BRA)(13 BRA)
(14 BRA)(15 BRA)(16 BRA)(17 BRA)(18 BRA)(19 BRA)(20 BRA)
(21 BRA)(22 BRA)(23 BRA)(24 BRA)(25 BRA)(26 BRA)(27 BRA)
(28 BRA)(29 BRA)(30 BD)(31 BD) $
```

Base service

Basic customer group translations are the same for ISDN customer groups as they are for Meridian Digital Centrex (MDC) customer groups. Thus, if basic customer group datafill is required, refer to the *Customer Data Schema Reference Manual*, 297-8001-351.

The base service capability enables basic call processing to occur on a BRI terminal.

The following tables with an (*) beside them are automatically datafilled by the DMS switch using Service Order System (SERVORD) commands to enable the base service capability:

- LTGRP
- LTDEF
- KSETINV*
- KSETLINE*
- KSETFEAT*
- DNATTRS*
- DNCTINFO*
- DNCHNL*
- SPECCONN
- LTMAP*

The base service capability includes the following packages:

- ISDN basic rate access
- functional mode BRA services
- ISDN integrated packet handler
- DMSPH SERVORD

LTID parameters

In non-ISDN applications, only one terminal can be connected on a line to the switch, so the identification of the line card is sufficient to identify the terminal connected to the card. In DMS installations, the line card is identified by the LEN.

LTIDs are used to uniquely identify the service profile of each ISDN terminal in the exchange termination. LTID parameters identify the terminal, its associated features, and the type of service it provides. These are the first parameters defined for the base service capability.

An LTID consists of

- a logical terminal group name of up to eight characters
- a logical terminal number within a group

Defining LTID parameters for base service involves entering data for logical terminal group names in table LTGRP, and defining individual terminals in table LTDEF using SERVORD. A detailed description of the SERVORD commands used to build an LTID can be found in circuit-switched services section of the ISDN SERVORD chapter.

Figure 14-6 shows a MAP display example of table LTGRP.

Figure 14-6 MAP display example of table LTGRP

```
GROUP GROUPNO         OPTIONS
------------------------------
ISDN         0       (SAPI16) $
```

NA010 added two LTID options: overload messaging limit (OML) and overload condition treatment (OCT). Options OML and OCT are associated with the Rapid Messaging feature. The OML and OCT options are assigned to an LTID in table LTDEF using the table editor command ADD or CHA. These two options can not be added to an LTID using SERVORD. All other LTID options are automatically entered in table LTDEF as a result of SERVORD activity. Options OCT and OML apply to BRI basic rate access functional (BRAFS) circuit switched (CS) LTIDs, but do not apply to Meridian feature transparency (MFT) and stimulus LTIDs. Options OCT and OML are only supported by protocol control version (PVC) functional issue 2 or greater.

Figure 14-7 shows a MAP display example of table LTDEF where LTID ISDN 100 has options OML and OCT.

Figure 14-7 MAP display example of table LTDEF

```
 LTKEY    LTAP                         CLASSREF
 ---------------------------------------------------
ISDN 100 2B   BRAFS (NITYPE NI2) (PVC FUNCTIONAL 2)
 (DTEI) (TSPID 6137234500) (OML 60) (OCT REPONLY)
```

Table DNATTRS

The following parameters are entered using SERVORD into table DNATTRS (Directory Number Attributes):

- bearer capability (BC), which overrides the default bearer capability specified by the LTID parameter authorized bearer services (ABS)
- bearer capability PIC (BCPIC), which specifies a PIC for each bearer capability
- call type CT, which is either voice band (VBINFO) information or circuit-mode data (CMDATA)
  - — CTPIC call type primary inter-LATA carrier
  - — CTLPIC call type intra-LATA carrier
  - — CTLPIC_Choice
- call type BC, which is speech 3_1khz, 7_khz, 56kdata, and 64kdata
  - — BCPIC bearer capability primary inter-LATA carrier
  - — BCLPIC call type intra-LATA carrier
  - — BCLPIC_Choice

Table DNATTRS can be used to specify whether subaddress and compatibility information elements (IE) are transported in the SETUP message for ISDN calls. Table DNATTRS also enables the user to specify multiple bearer capabilities for a DN, and to associate a different primary inter-LATA carrier (PIC) and intra-LATA (LPIC) with each BC (bearer capability). Alternatively, if the user wants one PIC for all voice calls and one for all data calls associated with that DN, the PICs can simply be datafilled on the basis of call type (voice or data), rather than BC. The following three examples show sample datafill for Base Service in table DNATTRS.

Figure 14-8 shows a DN call appearance datafilled to ensure that all of the subaddress and compatibility information elements are transported for voice calls.

Figure 14-8 MAP display example for table DNATTRS

```
 KEY                                                      DATA
                                                          OPTDATA
------------------------------------------------------------------
513 838 1432
(PUBLIC (NONUNIQUE)$)$
(CT (VBINFO (PROVCDS) (PROVLLC) (PROVHLC)$)$)$
PROVCGS
```

Figure 14-9 shows a DN call appearance datafilled with one PIC for voice calls and one for data calls.

Figure 14-9 MAP display example for table DNATTRS

```
 KEY                                                      DATA
                                                          OPTDATA
------------------------------------------------------------------
613 838 1445
(PUBLIC (NONUNIQUE)$)$
(CT (VBINFO (CTPIC ITT)$)
(CT (VBINFO )CTLPIC MCI N ) $ )$)
(CMDATA (CTPIC MCI)$)$)$
```

Figure 14-10 shows a DN call appearance datafilled with one PIC for voice calls and two PICs for data calls, with each of the later specified by BC.

Figure 14-10 MAP display example for table DNATTRS

```
KEY                                                       DATA
                                                          OPTDATA
------------------------------------------------------------------
613 838 2545
(PUBLIC (NONUNIQUE) $) $
(BC (56KDATA MCI N (ATT)$) (64KDATA MCI N (ATT)$)$)$
```

Bearer capability routing

Bearer capability (BC) routing enables the operating company to route BRI calls on facilities that are compatible with the originator’s bearer capability. The following tables are datafilled to enable the BC Routing capability:

- BCDEF
- TRKGRP
- RCNAME

- RTECHAR
- IBNRTE, IBNRTE2, IBNRTE3, and IBNRTE4
- OFRT, OFRT2, OFRT3, and OFRT4
- HNPACONT.RTEREF
- IBNMAP
- OFRTMAP
- HNPACONT.RTEMAP
- XLAMAP
- PXLAMAP
- STDPRTCT.STDPRT
- IBNXLA
- LTCALLS
- DNCTINFO
- LATAXLA

The tables are classified into the following packages:

- TR-448 ISDN Digit Analysis
- TR-448 ISDN Digit Analysis (Toll Office)

Routing characteristics

The routing characteristic information from the Q.931 SETUP message is analyzed to derive an ISDN routing characteristic name (RCNAME), which helps to determine the translation path of the call.

The call routing system uses data from the BC IE to access table BCDEF and obtain a BCNAME, which represents those transmission characteristics. The BCNAME is used to access table RTECHAR, which contains sets of routing characteristics assigned to RCNAMEs. Comparing the BCNAME to the content of RTECHAR gives the routing system an RCNAME, which is then used to represent the call's routing characteristics throughout the rest of the translation and routing process.

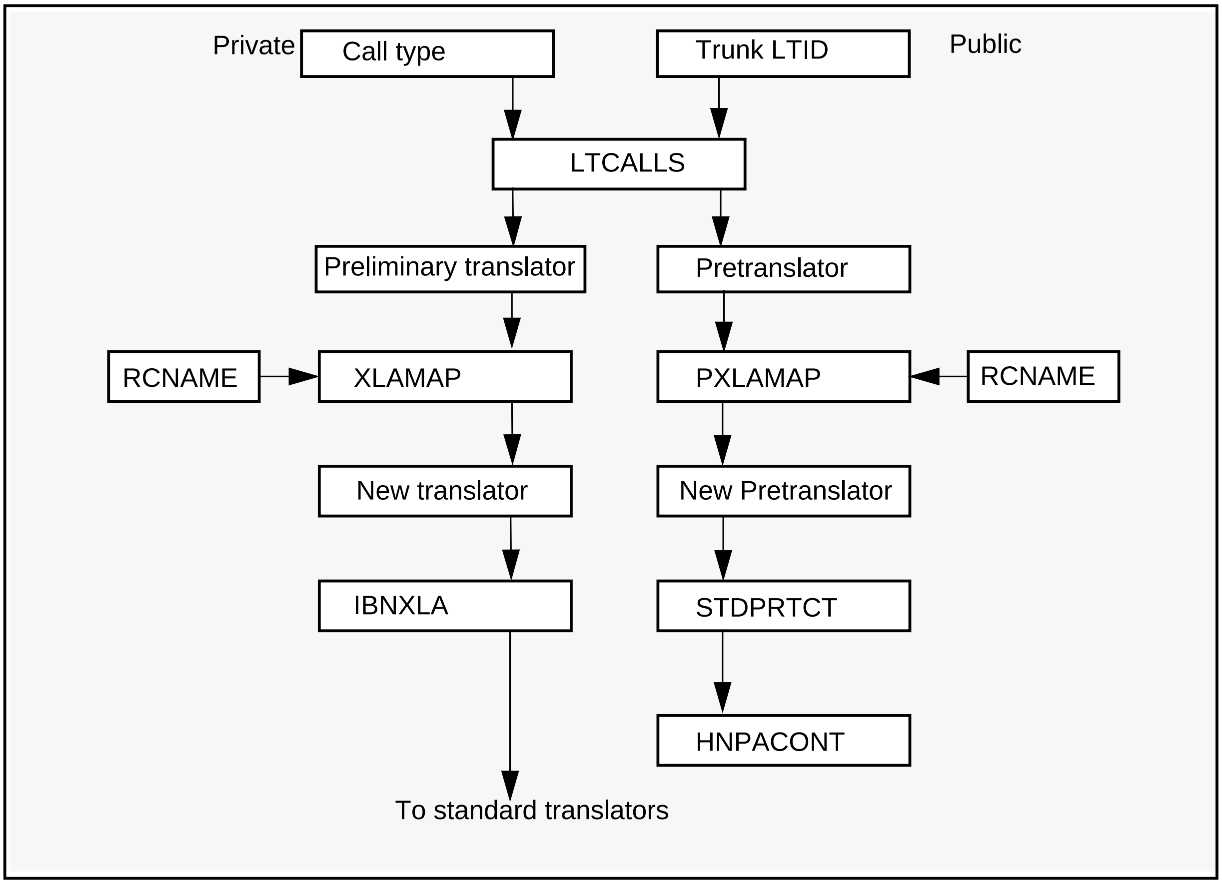
Table RTECHAR also enables routing on the type of number (TON) specified in the CDN IE. The TON specifies whether a number is local, national, international, a private network number, or an abbreviated number typically used in feature access.

For incoming calls on a per trunk signaling (PTS) trunk, a bearer capability can be obtained from the value datafilled in table TRKGRP.

Routing the call

After the SETUP message has been analyzed and an RCNAME obtained, the translation system tables route the call. Figure 14-11 shows a flow diagram with a simplified translations process for call terminations.

Figure 14-11 BRI call terminations



The translations process is as follows:

1. Call termination processing in the DMS switch begins with the trunking tables, which define the attributes of the trunk group. Table TRKGRP contains the trunk group LTID. The LTID is one of the keys used to access table LTCALLS, which provides the initial information for translating the

call. The other key to table LTCALLS is the call type from the SETUP message.

2. Table LTCALLS begins the translations process differently depending on whether the call is private or public.
   - For a private call, the NCOS code or the customer group name from table LTCALLS is used to obtain a preliminary translator name from table NCOS or CUSTHEAD.
   - For a public call, the line attribute index from table LTCALLS is used to obtain a pretranslator for the call in table LINEATTR.
3. For a private call, the preliminary translator and the RCNAME derived from table RTECHAR are the keys to table XLAMAP. Table XLAMAP can be datafilled with a new translator to enable alteration of the route based on bearer capability. For a public call, the pretranslator and an RCNAME are used to access table PXLAMAP, which can be datafilled with a new pretranslator.
4. For private calls, the new translator from table XLAMAP (or from table CUSTHEAD, if there is no datafill in table XLAMAP) is used to access table IBNXLA. For public calls, the pretranslator from PXLAMAP (or from table LINEATTR, if there is no datafill in table PXLAMAP) is used to access table STDPRTCT.
5. For private calls, table IBNXLA provides the NPA and office code required to obtain the DN on which to terminate the call. For public calls, table STDPRTCT calls table HNPACONT, which provides the keys to the DN tables.

Translation and routing for X.25 packet calls with X.121 address formats

Beginning in NA010, the DMS-PH X.121 Full Address Translations feature provides full digit analysis and translations for ISDN X.25 packet calls with X.121 address formats. This feature applies to routing X.121 call originations in the packet handler (PH) of the DMS-100 switch.

Before this feature, X.121 calls routed out of the DMS-100 switch to the packet public-switched network (PPSN). The PPSN gateway then performed full digit translations and routing for the call. This feature allows the DMS-PH to continue digit analysis and attenuations of X.121 calls. The DMS-PH conducts full address translations of X.121 calls by

- analyzing the call request packet
- routing the call
- defining the LATA attribute

Analyzing the call request packet

For packet service, the call request packet defines the routing characteristics for a call. The call request packet generated by a BRI terminal contains the

- calling party address
- called party address
- optional registered private operating agency (RPOA) code

> ***Note:*** An RPOA code is the 4-digit data network identification code (DNIC) of an interexechange carrier.

The DMS-PH identifies packet calls by the call address. Packet call addresses have two formats: E.164 and X.121. E.164 is the addressing system used for ISDN packet-switched networks in North America. X.121 is the addressing system of the PPSN.

Because there are two addressing systems for packet calls, a subscriber can access the X.121 network by dialing a prefix digit. The prefix digit for X.121 calls is 0.

The format for the X.121 addressing system is DNIC-NTN. Table 14-12 explains the components of the X.121 addressing system.

Table 14-12 X.121 addressing system

Component		Explanation
DNIC		Data network identification code is a 4-digit network identifier. The first three digits represent a country code. The last digit represents a network number. ***Note:*** A country can have more than one country code if the number of networks in the country exceeds nine.
NTN		National terminal number is a 10-digit code with the format DNPA-DCO-XXXX.
	DNPA	Data numbering plan area is a 3-digit code equivalent to the area code in the E.164 address system.
	DCO	A 3-digit code that identifies the data network central office.
	XXXX	A 4-digit code that identifies a line or terminal within the central office.
Note: The maximum number of digits permitted in an X.121 address is 14 (plus the prefix digit 0).		

Routing X.121 calls

Datafill in translations tables determines the routes of calls. To continue routing X.121 calls within the DMS-PH, tables IBNXLA and STDPRTCT.STDPRT require the correct datafill.

Table IBNXLA

Table IBNXLA (IBN Translation) stores data for digit translation calls. Table IBNXLA determines a call is X.121 by the prefix digit and then routes the call out of the DMS-PH or continues translations. Table IBNXLA has the switch format (SFMT) selector that indicates a change in address format for a call. This format change provides X.121 support for translations with in the DMS-PH. Selector SFMT provides information about whether to continue translations for the call or route the call out of the DMS-PH. Subfield XLA_OR_ROUTE of selector SFMT controls whether to translate or route the call. The two options for subfield XLA_OR_ROUTE are X to translate or R to route.

Before this feature, the standard datafill for X.121 calls in subfield XLA_OR_ROUTE was the R option only. The R option routes X.121 calls out of the DMS-PH and to a PPSN gateway to continue translations. This feature continues to support the R option for X.121 calls.

This feature provides X.121 support for the X option as datafill for subfield XLA-OR_ROUTE. To continue X.121 call routing in the DMS-PH, enter selector SFMT and the X option in table IBNXLA. The use of selector SFMT with the X option allows a line attribute index datafill in table LINEATTR. Table LINEATTR provides a pretranslator name for the call to index table STDPRTCT.

When setting up X.121 call routing, use an unused line attribute index in table LINEATTR. If this is not done, X.121 call routing will clash with existing translations in table STDPRTCT. This is because table STDPRTCT is referenced through table LINEATTR from table XLAPLAN. Therefore, in addition to a new line attribute index in table LINEATTR, corresponding tuples must be added in tables XLAPLAN and STDPRTCT in order to define new X.121 translations.

For example, if the X selector is used with SFMT in table IBNXLA to reference an existing line attribute such as E.164, the E.164 translations datafilled in table STDPRTCT will be applied to an X.121 call. As a result the X.121 call will not route correctly or the translation itself can fail.

The X selector used with SFMT introduces the independent capability of the DMS to partially translate and route X.121 calls. Therefore, it is incorrect to use a line attribute in table LINEATTR that is not assigned for X.121 call routing. It is advisable to add datafill in tables LINEATTR, XLAPLAN, and STDPRTCT that define X.121 line attributes and translations.

> ***Note:*** For a complete explanation of fields and subfields for table IBNXLA, refer to “Datafilling table IBNXLA” found in “Datafilling NI0 NI-98 Enh Ph II” in the *Translations Guide*, 297-8001-350.

Table STDPRTCT

Like table IBNXLA, the standard pretranslator table requires the correct datafill to continue X.121 translations. Table STDPRTCT (Standard Pretranslator Control) is the main translations table used by X.121 packet calls. Table STDPRTCT analyzes the digits of calls to determine a route. Subtable STDPRT (Standard Pretranslator) conducts the actual pretranslation by screening for prefix or control digits of calls.

Table STDPRTCT.STDPRT has a pretranslator route selector that defines the next stage of translations. For X.121 calls, the pretranslator route selector can have two values, T or F. Selector T routes translations to an office route table. Selector F indexes another pretranslator table to analyze more digits before routing the call. The value a technician enters depends on whether additional digit analysis is necessary to route calls correctly. A technician sets up digit analysis in the pretranslations tables in one stage or multiple stages.

One stage translations If analysis of the DNIC only can route calls correctly, a technician enters selector T for the pretranslator route selector.In example 1 found in Figure 14-12, calls with the DNIC 1234 route to OFRT 50 in table OFRT. Because the pretranslator route is T, translations occurs in one stage as the call accesses table STDPRTCT.STDPRT once.

Figure 14-12 Example 1 of datafill for one stage translations in table STDPRTCT.STDPRT

FROMDIGS	TODIGS	PRETRTE
1234	1234	T DD 0 OFRT 50 2 14 NONE

One stage translations is workable for up to 14 digits. If analysis of the DNIC only does not route calls correctly, a technician can enter additional digits after the DNIC. In example 2 found in Figure 14-13, calls route to OFRT 53. In this example, table STDPRTCT.STDPRT analyzes two segments of the dialed number, the DNIC and DNPA. Because the call accesses the pretranslator table once, the analysis of the two segments occurs in one stage. An option to this type of one stage translations is multiple stage translations explained in the next section.

Figure 14-13 Example 2 of datafill for one stage translations in table STDPRTCT.STDPRT

FROMDIGS	TODIGS	PRETRTE
4444723	4444723	T DD 0 OFRT 50 2 14 NONE

Multiple stage translations If DNIC analysis only does not route calls correctly, a technician can use multiple stages to analyze the digits after the DNIC. Multiple stage translations means that a call indexes the pretranslator tables more than once before routing the call. A technician enters selector F to have the dialed segments of a call analyzed in multiple stages. Selector F has recursive functionality to support analysis of the dialed segments (DNIC, DNPA, DCO, and XXXX) OF X.121 calls. Multiple stage translations is useful if analysis of a dialed segment provides more than one route.

Examples 3, 4 and 5 found in Figure 14-14 through Figure 14-16 show the recursive analysis of the DNIC, DNPA, and DCO in multiple stages.

Figure 14-14 Datafill example 3 for multiple stage translations in table STDPRTCT.STDPRT

FROMDIGS	TODIGS	PRETRTE
7777	7777	F 4 NONE DNICDNPA

Example 4 shows the analysis of calls where DNIC-DNPA is 777-454. To continue digit analysis in another stage, the technician enters selector F and the pretranslator DNICC as datafill. Calls where DNIC-DNPA is 7777-454 then index to another pretranslator table shown in example 5.

Figure 14-15 Datafill example 4 for multiple stage translations in table STDPRTCT.STDPRT

FROMDIGS	TODIGS	PRETRTE
7777454	7777454	F 4 NONE DNICDNPADCO

Example 5 shows the analysis of calls where DNIC-DNPA-DCO is 7777-454-677. The technician enters selector T to route calls with these digit segments to OFRT 50.

Figure 14-16 Datafill example 5 for multiple stage translations in table STDPRTCT.STDPRT

FROMDIGS	TODIGS	PRETRTE
7777454677	7777454677	T DD 0 OFRT 50 2 14 NONE

Note: For a complete explanation of fields and subfields for table IBNXLA, refer to “Datafilling table STDPRTCT.STDPRT” found in “Datafilling NI0 NI-98 Enh Ph II” in the *Translations Guide*, 297-8001-350.

Defining the LATA attribute

Table LATAXLA (Local Access and Transport Area Translation) defines the attributes of calls as intra-LATA or inter-LATA, and intrastate or interstate. X.121 calls are either intra-LATA or inter_LATA. Calls that originate and terminate in the same local access and transport area (LATA) are intra-LATA calls. Calls that originate from one LATA and terminate in another are inter-LATA calls, If table LATAXLA determines that a X.121 call is inter-LATA, the assignment of a registered private operating agency (RPOA) is necessary. An RPOA code is the 4-digit DNIC of an interexchange carrier. To select an interexchange carrier, subscribers can dial the RPOA code before the number. In the following example, 1235 is the RPOA code for the dialed number 051686137238494:

1235 051686137238404

If the subscriber does not dial the RPOA, table DNCTINFO provides the RPOA code. Table DNCTINFO (Directory Number Call Type Information) stores the preselected service data for the subscriber. The Service Order System (SERVORD) provides datafill content in table DNCTINFO.

As translations continue, the RPOA code becomes part of the RPOA selection utility of the call request packet. Table STDPRTCT.STDPRT selector T maps the RPOA to an office routing table.

Translations table flow for X.121 calls

The DMS-PH X.121 Full Address Translations tables are described in the following list:

- Table IBNXLA translates the call or routes the call out of the DMS-PH. Selector SFMT switches the address format to X.121. Option X with selector SFMT continues digit analysis by routing the call to table LINEATTR (Line Attribute). Option R with selector SFMT routes the call out of the DMS-PH to a routing table.
- Table OFRT defines the common -language location identifier (CLLI) of a trunk. The call routes to the CLLI.

- Table LATAXLA determines the LATA attribute of the call.
  - — If the call is intra-LATA, RPOA indexing is not necessary. The call uses the previous route from table OFRT, and the call completes.
  - — If the call is inter-LATA, RPOA indexing is necessary, and the call routes to table STDPRTCT.
- Table STDPRTCT and STDPRTCT.STDPRT map the RPOA to a routing table. If the subscriber does not dial the RPOA code, table DNCTINFO provides the RPOA code.
- Table OFRT provides a new route based on RPOA translations, and the call completes.

> ***Note:*** DMS-PH X.121 Full Address Translations does not support full digit analysis and translations for X.75 tandem calls.

The DMS-PH X.121 Full address translations process is shown in the flowchart contained in Figure 14-17.

Figure 14-17 Table flow for DMS-PH X.121 Full Address Translations

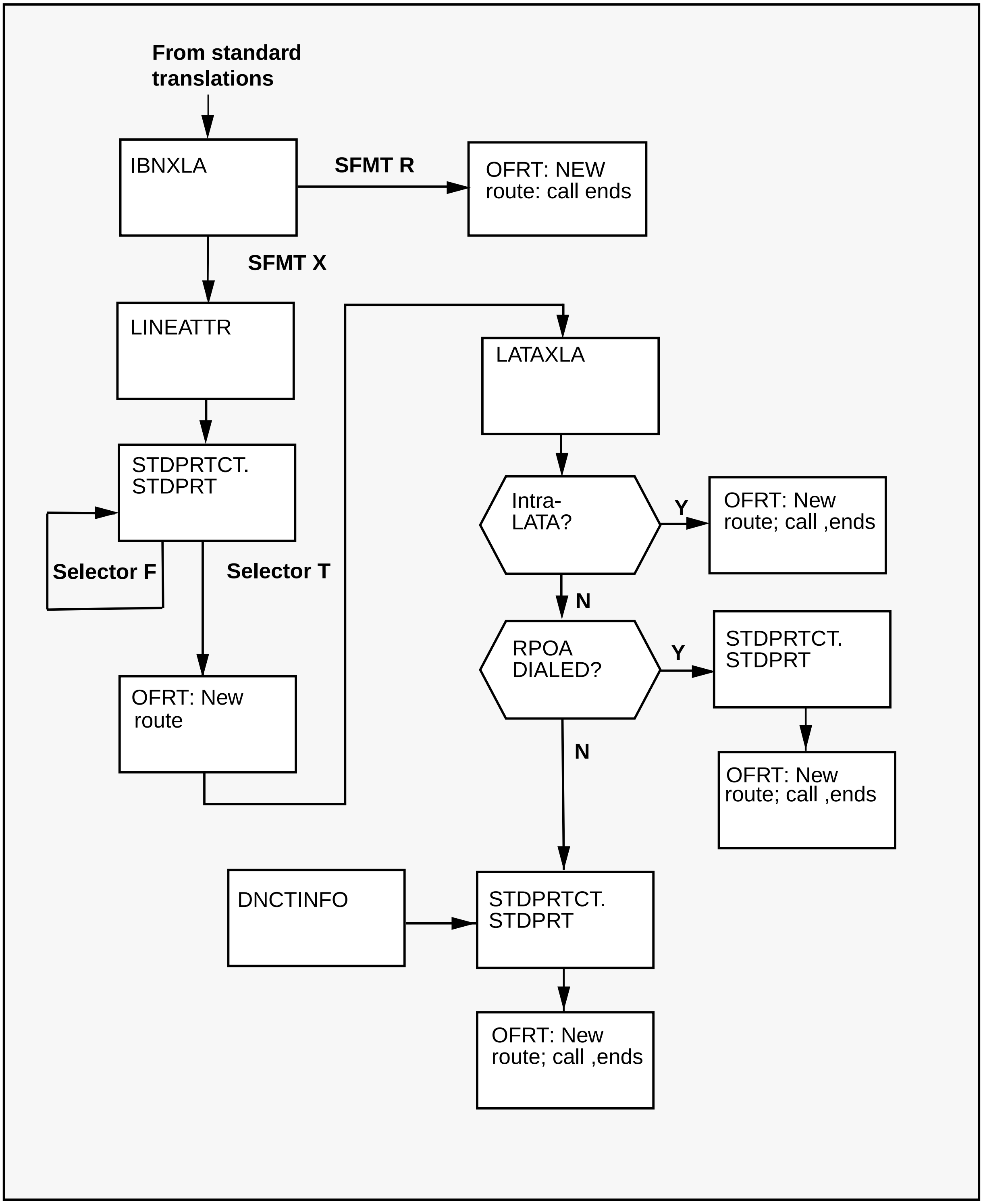


Table 14-13 provides an example of the datafill for DMS-X.121 Full Address Translations

Table 14-13 Datafill example for DMS-PH X.121 Full Address Translations

Datafill table	Example data
IBNXLA	PKT 0 SFMT 1 15 1 x 81
LINEATTR	81 IBN NONE NT NSCR 1 613 X121 NLCA NONE 0 NIL NILSFC LATA1 0 NIL NIL 12 N $
STDPRTCT	X121 (10 (0) 2
STDPRT	5168 5168 T DD O OFRT 50 2 134 N0NE
OFRT	50 N D PKTOUTX121A 3 N N
LATAXLA	LATA1 05168 INTER INTER STD
STDPRTCT	RPOA (1) (65021) 0
STDPRT	1235 1235 T DD OFRT 50 2 14 NONE
OFRT	50 N D PKTOUTX121B 3 N N

Table 14-14 lists the tables that require datafill to implement DMS-PH X.121 Full Address Translations. The tables are listed in the order in which they are to be datafilled.

> ***Note:*** For a description of all datafill tables required for BRI routing of X.121 calls and calls based on other routing characteristics, refer to “ISDN BRI Routing” in *Translations Guide*, 297-8001-350.

Table 14-14 Datafill tables required for DMS-PH X.121 Full Address Translations (Sheet 1 of 2)

Table	Purpose of table
IBNXLA	Integrated Business Network Translation provides a translator for the call. This table contains selector SFMT, which switches the call to the X.121 address format. Also, this table contains the X and R options to translate or route the call.
SRDPRTCT. STDPRT	Standard Pretranslator, a subtable of STDPRTCT, is the main translations table used for the call. Table STDPRTCT.STDPRT conducts the actual pretranslation by screening for control digits. Table STDPRTCT.STDPRT then defines the next translations stage. Table STDPRTCT.STDPRT contains selectors T and F. Selector T routes the call to an office route table. Selector F recycles the call to another pretranslation table to analyze more digits.

Table 14-14 Datafill tables required for DMS-PH X.121 Full Address Translations (Sheet 2 of 2)

Table	Purpose of table
LATAXLA	Local Access and Transport Area Translation determines whether the call is either intra-LATA or inter-LATA.
DNCTINFO	Directory Number Call Type Information contains the default RPOA for the originating DN when there is no RPOA specified in the call request packet. SERVORD provides datafill content for this table; no example datafill is provided.

Table BCDEF

Table BCDEF contains all the valid bearer capability names. Each tuple in the table lists a BCNAME and its associated transmission characteristics, which include the transfer capability, transfer mode, and coding standard.

The BCNAME is used in table RTECHAR to represent its associated transmission characteristics. At installation, table BCDEF is datafilled with the ten default tuples described in Table 14-15. The tuples are datafilled in the order shown, and can not be altered by the operating company. If the operating company needs to define additional BCs, additional tuples can be datafilled in BCDEF following the existing tuples, in any order.

Table 14-15 BCDEF defaults (Sheet 1 of 2)

BC	Uses
SPEECH	used primarily for speech transport. Can be used to transport voiceband data if no voice compression techniques will be used on the data.
64KDATA	64-kbit/s clear channel data. This BC can cause problems with North American repeaters when 16 consecutive zeroes are received (techniques, such as B8ZS can be used to alleviate the problem).
64KX25	used for X.25 packet data in which the data is encoded using X.25 protocol
56KDATA	56-kbit/s channel data most commonly used in North America, as the data structure can not call the all-zero octet problem that occurs with 64 kbit/s data
DATAUNIT	equivalent to 56KDATA, developed for specific data equipment
64KRES	a non-compliant BC developed for a specific application
3_1KHZ	used for speech and voiceband data

Table 14-15 BCDEF defaults (Sheet 2 of 2)

BC	Uses
7_KHz	can be used for audio or voiceband data. It is typically used for high-quality audio applications, such as music.
VOICE_DATA	used for specific DMS-250 applications
64K_RATE_AD_DATA	used for applications in which the data rate is less than 64 kbit/s (for example, 2400 bit/s, 9600 bit/s, 48 kbit/s) and the remaining bandwidth is stuffed according to CCITT protocols for rate adaptation

Table TRKGRP

The BCNAME subfield of the OPTION field in table TRKGRP is used to assign a BC to a trunk group that uses PTS. Refer to Figure 14-18.

Figure 14-18 MAP display example of table TRKGRP datafill

```
GRPKEY                        GRPINFO
---------------------------------------------------------------
AL15IBNT2CGAO
IBNT2 0 EL0 NCRT CGA 0 MIDL 0 9097509503 ANSDISC 2 Y NNNNYN00
NOOOONNNYNNNNNNATL (BCNAME 64KDATA  )$
```

The following notes apply to Figure 14-18.

Note 1: For the trunk option BCNAME, enter any valid BC name defined in table BCDEF.

Note 2: If no BC is datafilled for a trunk group, the office default applies.

Note 3: If the datafilled BC is not supported on the outgoing protocol, the call is routed to treatment.

Note 4: If the datafilled BC for a trunk group is the same as the office default, it will not appear in the listed tuple when the TRKGRP tuple for the trunk is listed.

Table RCNAME

This table contains the valid routing characteristic names. Each tuple in this table lists an RCNAME under field name NAMEKEY, which is associated with a group of routing characteristics defined in table RTECHAR.

Figure 14-19 shows sample datafill for the Bearer Capability Routing in table RCNAME.

Figure 14-19 MAP display example datafill of table RCNAME

```
NAMEKEY
------------------------------------------
64KDATA
```

Table RTECHAR

Table RTECHAR defines an RCNAME by assigning it a set of routing characteristics. The table associates an RCNAME with one of the following routing characteristics:

- a bearer capability name (BCNAME) as defined in table BCDEF, which represents the BC IE in the SETUP message
- a type of number (TON) specified in the CDN IE
- both a BCNAME and a TON

For each RCNAME, up to seven sets of routing characteristics can be listed. The table permits call routing based on the transmission service identified by BCNAMEs.

> ***Note:*** Datafill table RTECHAR after tables BCDEF and RCNAME.

Figure 14-20 shows sample datafill of bearer capability routing in table RTECHAR. The tuple defines RCNAME 64KDATA, which allows routing based on a transmission type of 64 kbit/s data identified by BCNAME 64KDATA.

Figure 14-20 MAP display example for table RTECHAR

```
RCKEY          GROUPRC
------------------------------------------
64KDATA        (BC 64KDATA $) $
```

Table IBNRTE

Subfield OPTION in table IBNRTE allows us to assign a routing characteristic to the IBNRTE that is being datafilled. Option is RC and then a valid RCNAME that is defined in table RCNAME.

Figure 14-21 shows sample datafill using the RX selector for the bearer capability routing in table IBNRTE.

Figure 14-21 MAP display example of table IBNRTE with RX selector

```
RTE                                RTELIST
----------------------------------------------------------
 20 ( RX BNR 0 0 104 ( RC 64KDATA ) $ ) $
```

Tables IBNMAP, OFRTMAP, and RTEMAP

These tables map calls from IBNRTE, OFRT, or HNPACONT.RTEREF based on the RCNAME associated with the ISDN call.

The mapping tables contain a routing index for ISDN calls with an associated RCNAME. The tables are accessed with the RCNAME associated with the call and the original routing index, and provide an index to their corresponding routing table:

- Table IBNMAP contains the mapping for routing table IBNRTE.
- Table OFRTMAP contains the mapping for routing table OFRT.
- Subtable HNPACONT.RTEMAP contains the mapping for routing subtable HNPACONT.RTEREF.

Figure 14-22 shows sample datafill for the bearer capability routing in table IBNMAP, OFRTMAP and HNPACONT subtable RTEMAP. Datafill is entered in these tables in the same way.

Figure 14-22 MAP display example for tables IBNMAP, OFRTMAP, and HNPACONT subtable RTEMAP

```
KEY         NEWINDEX
-----------------------------------------------------------
64KDATA     1          100
```

Table XLAMAP

Table XLAMAP is a pretranslation table that associates the original MDC translator name from table NCOS or CUSTHEAD and the call’s RCNAME with a new translator name, a line attribute, or a routing index. This enables the call to translate differently based upon ISDN routing characteristics. Two sets of new translations data can be associated with each original translator and RCNAME.

Three selectors in the SEL field of table XLAMAP determine the next stage of translations for the call:

- The XLA selector provides a new translator name to be used in table IBNXLA.
- The LINEATTR selector provides a line attribute index.
- The ROUTE selector operates only when there are no called digits in either the CDN or keypad IE, and is typically used as the second of two sets of translations data. The first set, with selector XLA, provides a translator to be used when there are called digits. The second set, with selector ROUTE, provides a route to follow when there are no digits.

Figure 14-23 shows sample datafill for the bearer capability routing in table XLAMAP. This tuple provides two sets of translations data, a translator name for table IBNXLA, and a route to follow when there are no digits.

Figure 14-23 MAP display example of table XLAMAP

```
XLAKEY          DATA
------------------------------------------

64KPRIP CXDK (XLA 64KCXDK) (ROUTE OFRT 25) $
```

Table PXLAMAP

Table PXLAMAP is a pretranslation table used for public calls, which associates the original pretranslator name and the call's RCNAME with a new pretranslator name, an operator position, or a routing index. Two sets of new translations data can be associated with each original pretranslator and RCNAME.

Three selectors in the SEL field of table PXLAMAP determine the next stage of translations for the call:

- The XLA selector provides a new pretranslator name to be used in table STDPRTCT.
- The POSITION selector provides an operator position.
- The ROUTE selector operates only when there are no called digits in either the CDN or keypad IE, and is typically used as the second of two sets of translations data. The first set, with selector XLA, provides a translator to be used when there are called digits. The second set, with selector ROUTE, provides a route to follow when there are no digits.

Figure 14-24 shows sample datafill for the Bearer Capability Routing in table PXLAMAP. This tuple provides two sets of translations data, a pretranslator name for table STDPRTCT, and a route to follow when there are no digits.

Figure 14-24 Datafill example for table PXLAMAP

```
PXLAKEY        DATA
------------------------------------------
64KPRIP CXDK (XLA P625) (ROUTE OFRT 25) $
```

TRAVER

Private originating call

The example in Table 14-16 shows the output from TRAVER when it is used to verify Bearer Capability Routing for a private voice call terminating in the DMS switch.

In a simulation, the TRAVER command replaces the SETUP message that the DMS switch would receive in a real situation, and provides all the information normally contained in the SETUP message. The TRAVER command shown at the top of the example contains the following indicators.

- | indicates that a directory number follows, and 7235101 is the originating line
- **b** indicates that the type of trace required is "both," meaning that both a table trace and a digit trace are to be performed

The routing process shown in the TRAVER example is as follows:

1. In lines 1 and 2, table KSETLINE is accessed to begin the translations of the call. The NPA and calling number from table KSETLINE are used to access table DNATTRS to check for any restrictions or subscription parameters including BC of the calling number.
2. In lines 16 to 19, tables NCOS and CUSTHEAD are accessed with the customer group name, BNR, from table KSETLINE, to find a translator name. The customer group translator from table CUSTHEAD, BNRXLA, is used to access table IBNXLA. In lines 20 to 21, the digit collection index (BNRDIG) from table CUSTHEAD is used to access table DIGCOL, which defines the number of digits to collect for this customer group.
3. Lines 21 to 25 provide a route index (LATTR 723) to table LINEATTR.
4. Lines 26 and 27 provide a route from table LINEATTR to table STDPRTCT using the STDPRT (pretranslator), BNR.
5. Lines 29 to 31 route the call from subtable STDPRT using the default translator N NP 0 NA (NATIONAL) to HNPACONT.
6. Lines 39 to 41 route the call from subtable HNPACODE to tables TOFCNAME and DNINV.

7. In line 47, tuple 613 723 5102 L NI2 2 in table DNINV is accessed keying off of the called DN. The call is routed on the basis of the L selector to table DNFEAT where it finds no features against the DN. The call is also routed to table DNATTRS to check the BC of the called party to see if it is compatible with that of the calling DN.

   Note: If no specific bearer capability (BC) is entered, the default is a BC of speech.

8. In line 60, the HNPA results are used to route the call to termination on line 613 723 5102.

Table 14-16 TRAVER example for BC routing, private terminating voice call (Sheet 1 of 4)

Line	Output
	>TRAVER L 7235101 7235102 B
1	TABLE KSETLINE
2	NI2 1 1 DN Y 7235101 BNR 0 0 613 (SFC) (ACB) (AR) $
3	TABLE DNATTRS
4	613 723 5101 $
5	(BC (SPEECH NILC N $) (3_1_KHZ NILC N $) (56KDATA NILC N $)
6	(64KDATA NILC N $) $)$
7	TABLE DNGRPS
8	TUPLE NOT FOUND
9	TABLE KSETFEAT
10	TUPLE NOT FOUND
11	TABLE CUSTSTN
12	TUPLE NOT FOUND
13	TABLE OFCVAR
14	AIN_OFFICE_TRIGGRP NIL
15	AIN Orig Attempt TDP: no subscribed trigger.
16	TABLE NCOS
17	BNR 0 0 0 UNREST (XLAS BNRXLA FEATXLA BNRDIG)$

Table 14-16 TRAVER example for BC routing, private terminating voice call (Sheet 2 of 4)

Line	Output
18	TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
19	BNR NXLA BNRXLA FEATXLA 1 BNRDIG
20	TABLE DIGCOL
21	BNRDIG 7 POTS Y
22	TABLE IBNXLA: XLANAME BNRXLA
23	BNRXLA 723 NET N N 0 Y BNRDIG N N GEN (LATTR 723)$ $
24	TABLE DIGCOL
25	BNRDIG 7 POTS Y
26	TABLE LINEATTR
27	723 IBN NONE NT NSCR 1 613 BNR NLCA NONE 0 NIL NILSFC NILLATA 0 NIL NIL 00 N $
28	LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
29	TABLE STDPRTCT
30	BNR (1) (65021) 1
31	. SUBTABLE STDPRT
32	WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE BILLING. CALL TYPE DEFAULT IS NP. PLEASE REFER TO DOCUMENTATION.
33	KEY NOT FOUND
34	DEFAULT VALUE IS: N NP 0 NA
35	SUBTABLE AMAPRT
36	KEY NOT FOUND
37	DEFAULT VALUE IS: NONE OVRNONE N
38	TABLE HNPACONT
39	613 Y 755 2 (43) (1) (0) (0) 2
40	SUBTABLE HNPACODE
41	723 723 DN 613 723

Table 14-16 TRAVER example for BC routing, private terminating voice call (Sheet 3 of 4)

Line	Output
42	AIN Info Collected TDP: no subscribed trigger.
43	AIN Info Analyzed TDP: no subscribed trigger.
44	TABLE TOFCNAME
45	613 723 $
46	TABLE DNINV
47	613 723 5102 L NI2 2
48	AIN Term Attempt TDP: no subscribed trigger.
49	TABLE DNFEAT
50	TUPLE NOT FOUND
51	TABLE DNATTRS
52	613 723 5102 $
53	(BC (SPEECH NILC N $) (3_1_KHZ NILC N $) (56KDATA NILC N $)
54	(64KDATA NILC N $) $)$
55	TABLE DNGRPS
56	TUPLE NOT FOUND
57	LNP00100 SOC Option is IDLE.
58	LNP Info: Called DN is resident.
59	LNP Info: Called DN has native NPANXX.
60	LNP Info: HNPA results are used.
61	
62	+++ TRAVER: SUCCESSFUL CALL TRACE +++
63	
64	DIGIT TRANSLATION ROUTES
65	
66	1 LINE 6137235102 ST
67	

Table 14-16 TRAVER example for BC routing, private terminating voice call (Sheet 4 of 4)

Line	Output
68	TREATMENT ROUTES. TREATMENT IS: GNCT
69	1 ATB
70	
71	+++ TRAVER: SUCCESSFUL CALL TRACE +++

Public originating call

The example in Table 14-17 shows the output from TRAVER when it is used to verify bearer capability routing for a public call originating in the DMS switch. In a simulation, the TRAVER command replaces the SETUP message that the DMS switch would originate in a real situation, and provides all the information normally contained in the SETUP message. The TRAVER command shown at the top of the example contains the following indicators.

- bc indicates that a BC IE follows, and 64kdata is the bearer capability
- b indicates that the type of trace required is “both,” meaning that both a table trace and a digit trace are to be performed

The routing process shown in the TRAVER example is as follows:

1. In lines 1 and 2 of the example, table RTECHAR is accessed with the transmission characteristics from the SETUP message, which are defined by the RCNAME 64KDATA.
2. In lines 3 and 4, table KSETLINE is accessed with the customer group CLLI, ISDN2, and provides the associated LTID, ISDN 790.
3. In lines 31 and 32 the call fails to find a translator in table IBNXLA and uses the default translator in table XLANAME, lines 33 through 35, which provides the index to table LINEATTR, 10.
4. In lines 38 through 40, table LINEATTR is accessed with the index from table XLANAME. The standard pretranslator name from table LINEATTR, POT1, is used to access table STDPRTCT, which strips off the leading digit of 1 from dialed digits.
5. Standard translations follow until the NPA of the terminating line is obtained in line 59, table HNPACONT.HNPACODE. Line 59 also defines a route choice number of 3.
6. Because table RTECHAR was used at the beginning of the call, subtable RTEMAP will be accessed to locate the associated bearer capability, line

62 and 63. Table RTEMAP will alter the route choice number from 3 to 40 directing the call to subtable RTEREF, lines 64 and 65.

7. Subtable RTEREF will define the trunk group to be used, S2S6T2C7.

Table 14-17 TRAVER example, routing outgoing BC public call (Sheet 1 of 4)

Line	Output
	>TRAVER L 2225368 19062264000 BC 64kdata B
	Warning: Routing characteristics are present. Originator must be able to send in characteristics specified.
1	TABLE RTECHAR
2	. RC64KD (BC 64KDATA $) (BC 56KDATA $)$
3	TABLE KSETLINE
4	ISDN 790 1 DN Y 2225368 ISDN2 0 0 902 (SFC) $
5	TABLE DNATTRS
6	TUPLE NOT FOUND
7	TABLE DNGRPS
8	902 222 5368 5368
9	(ISDNPRA (ADDRESS DDD NNN NNNN) $)$
10	TABLE KSETFEAT
11	TUPLE NOT FOUND
12	TABLE CUSTSTN
13	TUPLE NOT FOUND
14	TABLE OFCVAR
15	AIN_OFFICE_TRIGGRP NIL
16	AIN Orig Attempt TDP: no subscribed trigger.
17	TABLE NCOS
18	ISDN2 0 0 0 NCACD $
19	TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA VACTRMT, AND DIGCOL
20	ISDN2 NXLA CXLA1 FXRES 0 ISDGT1

Table 14-17 TRAVER example, routing outgoing BC public call (Sheet 2 of 4)

Line	Output
21	TABLE DIGCOL
22	ISDGT1 1 COL S 1
23	TABLE XLAMAP
24	. Tuple not found. Default is use original XLANAME.
25	NCOS PRELIM XLA name is NIL. Go to next XLA name.
26	TABLE XLAMAP
27	. Tuple not found. Default is use original XLANAME.
28	CUST PRELIM XLA name is NIL. Go to next XLA name.
29	TABLE XLAMAP
30	. Tuple not found. Default is use original XLANAME.
31	TABLE IBNXLA: XLANAME CXLA1
32	TUPLE NOT FOUND
33	Default from table XLANAME:
34	CXLA1
35	(NET N Y N 1 N POTS N N GEN (LATTR 10) $ $)$ 9
36	TABLE DIGCOL
37	POTS specified: POTS digit collection
38	TABLE LINEATTR
40	10 IBN NONE NT NSCR 0 902 POT1 NLCA RTE1 0 NIL NILSFC NILLATA 0 NIL NIL 00 N $ LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
41	TABLE PXLAMAP
42	. Tuple not found. Default to old pretranslator name.
43	. NOTE: ISDN Digit Conversion has been performed:
44	. Resulting digits are: 19062264000
45	TABLE STDPRTCT
46	POT1 (1) (1) 1

Table 14-17 TRAVER example, routing outgoing BC public call (Sheet 3 of 4)

Line	Output
47	. SUBTABLE STDPRT
48	WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
49	BILLING. CALL TYPE DEFAULT IS NP. PLEASE REFER TO
50	DOCUMENTATION.
51	. KEY NOT FOUND
52	. DEFAULT VALUE IS: N NP 0 NA
53	. SUBTABLE AMAPRT
54	. KEY NOT FOUND
55	. DEFAULT VALUE IS: NONE OVRNONE N
56	TABLE HNPACONT
57	902 Y 917 2 (58) (1) (0) (2) 0
58	. SUBTABLE HNPACODE
59	. 906 907 FRTE 3
60	AIN Info Collected TDP: no subscribed trigger.
61	AIN Info Analyzed TDP: no subscribed trigger.
62	. SUBTABLE RTEMAP
63	. . RC64KD 3 40
64	. SUBTABLE RTEREF
65	. 40 N D S2S6T2C7 0 N N
66	. EXIT TABLE RTEREF
67	EXIT TABLE HNPACONT
68	LNP00100 SOC Option is IDLE.
69	LNP Info: Called DN is not resident.
70	LNP Info: HNPA results are used.
71	
72	+++ TRAVER: SUCCESSFUL CALL TRACE +++

Table 14-17 TRAVER example, routing outgoing BC public call (Sheet 4 of 4)

Line	Output
73	
74	
75	DIGIT TRANSLATION ROUTES
76	
77	1 S2S6T2C7 9062264000 ST
78	
79	TREATMENT ROUTES. TREATMENT IS: GNCT
80	1 120TONE
81	
82	+++ TRAVER: SUCCESSFUL CALL TRACE +++

Translation verification for DMS-PH X.121

Table 14-18 shows the output from TRAVER when it is used to verify routing for an X.121 packet call originating in the DMS-100 switch.

In a simulation, the TRAVER command provides all the information normally contained in the call request packet. In the TRAVER command shown at the top of the following example

- **l** indicates that the DN of the originating line follows, and **7238201** is the DN
- **051686137238404** indicates the dialed digits
- **b** indicates that the type of trace required is “both,” meaning that both a table trace and a digit trace are to be performed

Table 14-18 TRAVER output example for DMS-PH X.121 Full Address Translations (Sheet 1 of 4)

Line	Output
	>TRAVER L 7238201 051686137238404 B
	Warning: Routing characteristics default to 64kx25
1	TABLE KSETLINE
2	PKT 201 1 DN 7238201 BNR 0 0 613 $ BRI PMD
3	TABLE NCOS

Table 14-18 TRAVER output example for DMS-PH X.121 Full Address Translations (Sheet 2 of 4)

Line	Output
4	BNR 0 0 0 UNREST (XLAS BNRXLA FEATXLA BNRDIG) $
5	TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
6	BNR NXLA BNRXLA FEATXLA 1 BNRDIG
7	TABLE DIGCOL
8	TUPLE NOT FOUND
9	Default is RPT
10	TABLE RTECHAR
11	.PACKET BNRXLA (XLA PKT) $
12	TABLE XLAMAP
13	.PACKET BNRXLA (XLA PKT) $
14	TABLE IBNXLA: XLANAME PKT
15	PKT 0 SFMT 1 15 1 X 81
16	ADDRESS FORMAT CHANGED TO X.121
17	TABLE LINEATTR
18	81 IBN NONE NT NSCR 1 613 X121 NLCA NONE 0 NIL NILSFC LATA1 0 NIL NIL 12 N $
19	LCABILL OFF - BILLING DONE ON BASIS OF CALTYPE
20	TABLE PXLAMAP
21	.Tuple not found. Default to old pretranslator name.
22	TABLE STDPRTCT
23	X121 (1) (0) 2
24	.SUBTABLE STDPRT
25	WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE. CALL TYPE DEFAULT IS NP. PLEASE REFER TO DOCUMENTATION
26	.5168 5168 T DD 0 OFRT 50 2 14 NONE
27	Originator is not an AIN agent, therefore AIN info is not processed.
28	..TABLE OFRTMAP

Table 14-18 TRAVER output example for DMS-PH X.121 Full Address Translations (Sheet 3 of 4)

Line	Output
29	...tuple not found. Default to old index.
30	..TABLE OFRT
31	..50 N D PKTOUTX121 3 N N
32	..EXIT TABLE OFRT
33	TABLE LATAXLA
34	lata1 05168 inter std
35	X121 preselected RPOA found in table DNCTINFO
36	Start RPOA translation
37	TABLE PXLAMAP
38	.Tuple not found. Default to old pretranslator name.
39	TABLE STDPRTCT
40	RPOA (1) (65021) 0
41	.SUBTABLE STDPRT
42	WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE BILING. CALL TYPE DEFAULT IS NP. PLEASE REFER TO DOCUMENTATION
43	.1235 1235 T DD 0 OFRT 50 2 14 NONE
44	..TABLE OFRTMAP
45	...Tuple not found. Default to old index.
46	..TABLE OFRT
47	..50 N D PKOUTX121B 3 N N
48	
49	+++TRAVER: SUCCESSFUL CALL TRACE+++
50	
51	DIGIT TRANSLATION ROUTES
52	1 PKTOUTX121B 51686137238404 ST
53	

Table 14-18 TRAVER output example for DMS-PH X.121 Full Address Translations (Sheet 4 of 4)

Line	Output
54	TREATMENT ROUTES. TREATMENT IS: GNCT
55	1 T120
56	
57	+++TRAVER: SUCCESSFUL CALL TRACE+++

For a complete list of BC routing examples, refer to the *Translations Guide*, 297-8001-350.

User-defined MAP sublevels

Table LTPAUX (Line Test Position Auxiliary Commands) contains entries for user-defined levels. Operating companies can create user-defined sublevels containing a subset of commands from other existing sublevels. Available commands in these sublevels can be displayed or hidden in the command menu. Each user-defined LTP sublevel is independent.

Limitations

User-defined levels are only implemented as sublevels to the LTP, not as sublevels to other existing default or user-defined sublevels. Command names in the user-defined levels must be unique. Two commands can not have the same command string.

Datafill sequence and implications

The following tables must be datafilled before table LTPAUX:

- LNINV
- LTPDEF

Table size

0 to 512 tuples

A maximum of 16 user-defined sublevels can be defined by the operating companies. A maximum of 64 commands can be defined for each sublevel. Because this table is datafilled at the user’s discretion, the number of tuples can range between 0 and 512 tuples.

Datafill example

Figure 14-25 shows sample datafill for table LTPAUX.

The example shows command NOISE assigned to menu position 6 at the LTPMAN sublevel of the MAP terminal. The LTPMAN tuple is identified as index 0.

Figure 14-25 Map display example for table LTPAUX

```
KEYAUX        COMMAND POSITION
-----------------------------------------
KURT 0 LTPMAN NOISE    6
```

User Customization of MAP LTP sublevel commands

Table LTPDEF (Line Test Position Default Commands) contains entries for the following maintenance sublevels of the LNS (lines) subsystem at a MAP (maintenance and administration position) terminal:

- LTPMAN
- LTPLTA
- LTPDATA
- LTPISDN

Table LTPDEF allows operating companies to customize existing line test position (LTP) default sublevels on the MAP display. Commands can be re-organized within the sublevel (commands can be moved or hidden but not displayed in different menu positions).

In this table, tuples identify the displayed and available commands in each LTP sublevel and the sublevel name that is displayed on the MAP terminal.

Limitations

Adding and deleting tuples in table LTPDEF is not allowed. Changing the tuples in table LTPDEF to hide a command is allowed. Commands are hidden by assigning the command to PF key 19 or above in the command menu. Each MAP terminal can only display a maximum of 17 commands. Tuples are replaced during dump and restore.

In data modification procedures (DMOPRO), the user creating the update file for the table LTPDEF must ensure that a tuple change request does not duplicate an established menu position. If the menu position is not unique, the tuple change request is rejected.

Default command names are fixed and can not be changed by the operating companies.

Commands in existing sublevels can only be hidden if they are not required. They are still available by typing the command string name at the MAP terminal. Existing default commands can not be deleted.

Datafill sequence and implications

Table LNINV must be datafilled before table LTPDEF.

Table size

22 to 256 tuples

This table can only be datafilled with default tuples after initial program load (IPL). Restart code exists to datafill these tuples if the table is empty. Currently, minimum table size is determined by the combined number of tuples for sublevels LTPLTA and LTPMAN (22 tuples). LTPDATA and LTPISDN are optional sublevels. The maximum table size for table LTPDEF (512 tuples) is based on a maximum of eight default sublevels, each of which has a maximum of 64 tuples.

Datafill example

Figure 14-26 shows sample datafill for table LTPDEF.

The first tuple in the example shows command TSTMTR assigned to menu position 3 at the LTPMAN sublevel of the MAP terminal. The LTPMAN tuple is identified as index 3.

The second tuple in the example shows command LOSS assigned to menu position 4 at the LTPMAN sublevel of the MAP terminal. The LTPMAN tuple is identified as index 4.

Figure 14-26 Map display example for table LTPDEF

```
KEYAUX          COMMAND POSITION
------------------------------------------
LTPMAN 3 LTPMAN TSTMTR    3
LTPMAN 4 LTPMAN LOSS      4
```

Changes to table LTPDEF in NA009

The following changes were made to table LTPDEF in NA009:

- a tuple entry was added to accommodate the TERMCHK command
- LTPDEF tuples for L2LOGCTL and L3LOGCTL commands were moved to the non-menu LTPISDN MAP display index
- range of values for CMDINDEX and POSITION fields were expanded from 0-31 to 0-63

For additional information on data entries in table LTPDEF, refer to the *Customer Data Schema Reference Manual*, 297-8001-351.

Redirecting Number and Reason Delivery for ISDN CFW for NA011

In NA011 Redirecting and Reason Delivery (RND) for ISDN Call Forward delivers two redirecting numbers and reasons for ISDN BRI and interswitch calls over the signaling system 7 (SS7) network. Operating company personnel can control the delivery of RND on ISDN BRI lines. This feature creates the SERVORD option RND and the customer group option RND. This feature also creates the SERVORD option Aggregate RND Recording (ARR), which records RN availability by call type. This feature applies to PVC Functional Issue 2 terminals only.

The SS7 ISUP trunks already support delivery of first and last redirecting number/reasons. The TERMINATE message now includes additional redirecting number and reasons for terminations to ISDN lines on the current switch. The DMS switching system pulls the information from either the incoming ISUP message or the current switch, or both.

Before this feature, the operating company had no control over the delivery of the redirecting number or reason. Provisioning of RND, like Calling Number Display (CND), controls the availability and delivery of the redirecting number.

Before this feature, RND was not controlled; that is, the RN was always delivered unless suppressed. This feature introduces separate RND controls: RND options in tables CUSTNTWK, CUSTSTN, and RESOFC. After the upgrade to NA011, the user can disable or remove the RND functionality. The RND option can be restricted to selected members of a customer group. To do this, first add the RND option to selected lines and then remove the RND option from the customer group.

For additional information on Redirecting and Reason Delivery for ISDN CFW including messaging and interactions, refer to datafilling “NIO NI-2 BRI-Services” in the *Translations Guide*, 297-8001-350.

Datafill for Redirecting Number and Reason Delivery for ISDN CFW

Redirecting Number and Reason Delivery for ISDN CFW can be provisioned in any of the following three ways

- assign RND as a customer group option
- assign RND as a line option

Translations table flow

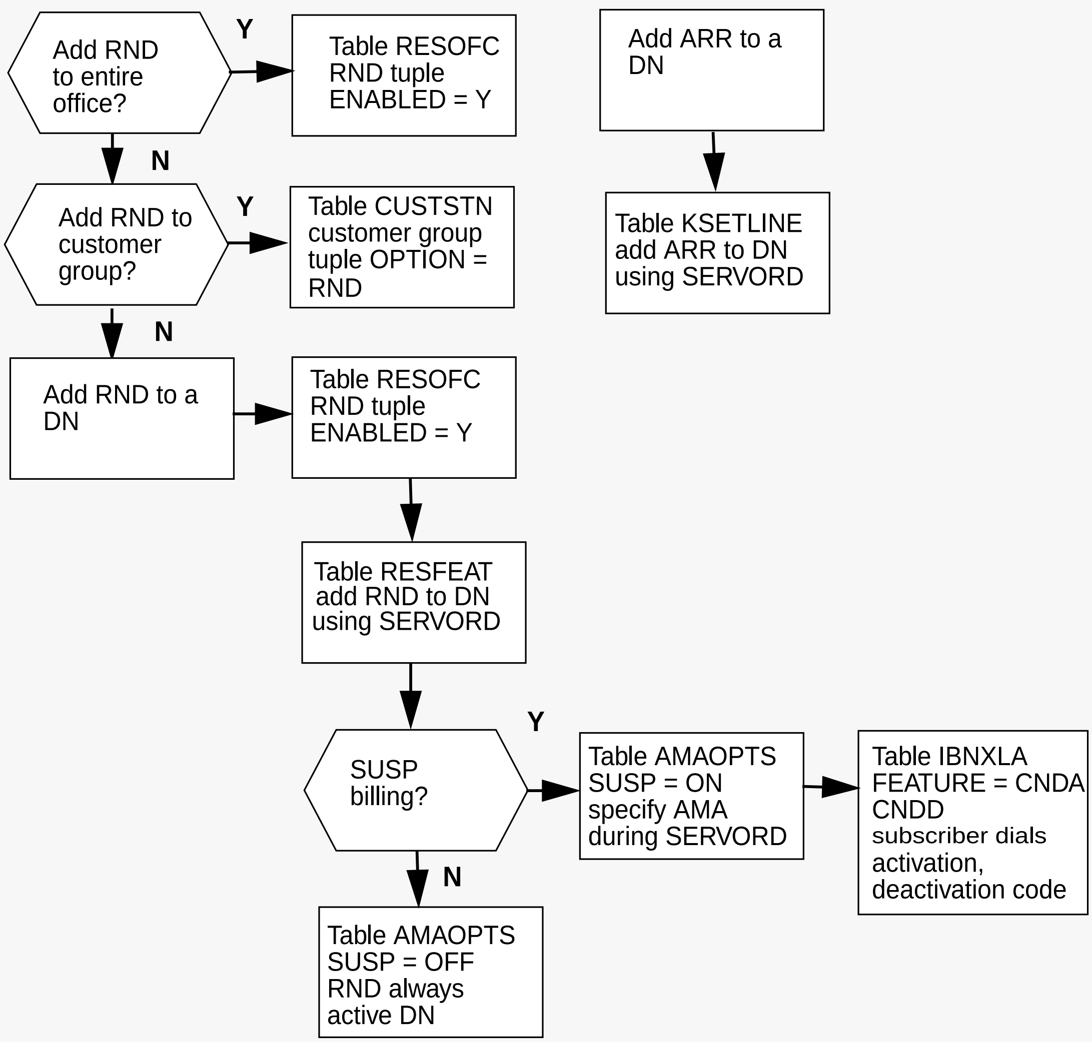
The Redirecting Number and Reason Delivery for ISDN CFW translations tables are described in the following list. The tables are listed in order of datafill.

- Table OFCENG contains data on engineering parameters for the office. Office parameter KSET_INTER_GRP_DISP overrides the value of field RNIDOPT in table CUSTNWK. For displays to work according to datafill in subfield RNIDOPT, set KSET_INTER_GRP_DISP to N. When KSET_INTER_GRP_DISP is set to Y, all redirecting numbers are available to the terminator. This parameter determines if calls that arrive from outside the customer group display information on the display set of the terminator.
- Table RESOFC controls office-wide availability of line option RND. Set field enabled to Y for RND to function when it is assigned to a DN. Enter SUSBSCR in subfield ACCESS, field FEATDATA for subscription access.
- Table CUSTSTN lists the station options assigned to each customer group. Add the RND option to the customer group to assign it to an entire business group. Enter RND in field OPTNAME and field OPTION.
- Table RESFEAT contains the assignment of custom local area signaling services (CLASS) features for residential lines, many of which apply to ISDN as well. SERVORD automatically updates or creates a tuple for RND.
- Table AMAOPTS controls the activation and scheduling of the recording options for automatic message accounting (AMA). Table AMAOPTS contains one tuple for every option, and initially contains the default values for each of these options. Enter SUSP in field OPTION.
- Table IBNXLA stores the data for digit translations of calls. This table stores the access codes for features that require them. Option RND uses the existing activation codes for CND.
- Table KSETLINE contains a tuple for each DN on a set indicating what features exist on the DN. SERVORD automatically updates or creates a tuple for ARR.
- Table CUSTNTWK allows the operating company to assign or deny calling features to customer groups. Option RNID controls whether number delivery is available for all BRI lines in the customer group. Enter RNID in field OPTIONS of the terminator's customer group tuple and a value of INTRAGRP, ONNET, or OFFNET in subfield RNIDOPT. This value, compared to the network of the call, determines the RN's availability.

Table flow for Redirecting Number and Reason Delivery for ISDN CFW

The following table shows the table flow for Redirecting Number and Reason Delivery for ISDN CFW.

Table flow for Redirecting Number and Reason Delivery for ISDN CFW



Note**:** RN is delivered if an availability mechanism is present and the SUPPRESS option is not on.

Table 14-19 lists the datafill content used in the flowchart. Refer to the *Customer Data Schema Reference Manual*, 297-8001-351 for additional information on the datafill for the following tables. Refer to the *ISDN Service Orders for ISDN Terminals*, 297-2401-310 for information about adding options ARR and RND to an ISDN terminal.

Table 14-19 Datafill example for Redirecting Number and Reason Delivery for ISDN CFW

Datafill table	Example data
RESOFC	RND Y RND SUBSCR $
CUSTSTN	ISDNGRP RND RND
RESFEAT	WITS 1 1 RND RND NOAMA ACT 0 0 0 0
AMAOPTS	CIDSUSPAUD ON
	SUSP ON
IBNXLA	ISDNXLA 17 FEAT N N CNDA
	ISDNXLA 18 FEAT N N CNDD
KSETLINE	WITS 1 1 DN Y 7235201 BNR 0 0 613 (ARR) $ BRI UNDEF

Calling and Redirecting Number Delivery with Office Parameter

NA012 enhancements to options CND and RND allow the activation of these two features on an office-wide basis. Two office parameters, CND_BRI_OFFICE and RND_BRI_OFFICE, allow the enabling of CND and RND on an office-wide basis.

Office parameters CND_BRI_OFFICE and RND_BRI_OFFICE are located in table ISDNVAR. The initial setting for office parameters CND_BRI_OFFICE and RND_BRI_OFFICE is OFF. The only valid command to use with office parameters CND_BRI_OFFICE and RND_BRI_OFFICE is the CHA command. Use the CHA command to change the datafill for office parameters CND_BRI_OFFICE and RND_BRI_OFFICE from OFF to ON or ON to OFF. For additional information on these two office parameters, refer to the “ISDN office parameter” chapter of this document or the *Office Parameters Reference Manual*, 297-8001-855.

Office parameter CND_BRI_OFFICE

The CND_BRI_OFFICE parameter applies to all ISDN BRI terminals in the office. There is no priority conflict between office parameter CND_BRI_OFFICE and the CND line and the CNDBRI customer group options. Subscribers with the CND line option or the CNDBRI customer group option are not prohibited from displaying the calling number when office parameter CND_BRI_OFFICE is set to OFF.

The CND_BRI_OFFICE parameter affects number delivery only. Automatic Message Accounting (AMA) and Operational Measurements (OM) pegs are available with the line provisionable CND, but not with office parameter CND_BRI_OFFICE.

Office parameter RND_BRI_OFFICE

The RND_BRI_OFFICE parameter applies to all ISDN BRI terminals in the office. There is no priority conflict between office parameter RND_BRI_OFFICE and the RND line and the RNDBRI customer group options. Subscribers with the RND line option or the RNDBRI customer group option are not prohibited from displaying the calling number when office parameter RND_BRI_OFFICE is set to OFF.

The RND_BRI_OFFICE parameter affects number delivery only. Automatic Message Accounting (AMA) and Operational Measurements (OM) pegs are available with the line provisionable RND, but not with office parameter RND_BRI_OFFICE.

NA012 enhancements for Call Forwarding Don't Answer Continue Existing Treatment with SS7

The Call Forwarding Don't Answer Continue Existing Treatment Enhancements with SS7 (CFDDCET-SS7) improves the operation of Call Forwarding Don't Answer (CFD) feature over SS7 trunks. CFD calls are not forwarded over SS7 trunks unless the remote station is available for termination and an idle SS7 trunk is available. If the remote station is determined to be busy, the base continues to provide audible ringing to the originator of the call.

CFDDCET-SS7 increases the DMS compliance for CFD as described in Telcordia Technologies requirement, GR-853-CORE ISDN Call Forwarding and TR-NWT-000972 Call Forwarding Subfeatures: Switching System Requirements Using Signaling System No. 7. The DMS is compliant by providing continued existing treatment over SS7 trunks when the base and remote are on different switches. The CFDDCET-SS7 feature makes no changes in Intraswitch CFD behavior. Intraswitch CFD remains not compliant with Telcordia Technologies requirement, GR-853-CORE ISDN Call Forwarding and TR-NWT-000972 Call Forwarding Subfeatures: Switching System Requirements Using Signaling System No. 7.

Limitations and restrictions

The following limitations and restrictions apply to the CFDCET-SS7 feature:

- CFDCET requires the assignment of CFD to the customer group base station in order for CFDCET to work for that base station.
- The CFDCET-SS7 feature is only used for base stations that CFD forward their calls over an SS7 trunk to a remote station.

- In order for a call to CFD over a trunk requires one of the following conditions be met:
  - Option Call Forwarding Don't Answer, Unrestricted (CDU) must be assigned to base station in addition to option CFD.
  - The fowarding trunk must have the INTRAGRP bool set to Y.
- Call Forward Call Waiting (CFCW) on 2500 and 500 sets does not interact with this feature. It is possible to forward a call to a busy remote with CFCW active on a 2500 or 500 set. If CFCW is enabled on a 2500 or 500 set, and the CFCW timer expires after call-waiting notification, the call is forwarded over the ISDN user part (ISUP) trunk using normal CFD. The CFDCET-SS7 feature is not used in this case.
- If an attendant console directly calls the base or extends a call to the base, the call forwards over the ISUP trunk using normal CFD. The CFDCET-SS7 feature is not used in this case.
- If a base station CFD forwards a call to an E800 DN, the CFDCET-SS7 feature does not activate and the call forwards using normal CFD. This limitation results from the base station forwarding to an E800 number without using an ISUP trunk. The call forwards before the E800 service determines that the DN requires a route over an ISUP trunk.
- No call forwarding re-attempt is made if glare occurs on the selected trunk member while the CFDCSET-SS7 is active. The call-forwarding attempt fails and the base station continues to ring if the CFDCET option is set to ALERT_BASE. If the CFDCET option is set to CLEAR_BASE, the base is cleared.
- When the CFDCET option is set to ALERT_BASE, the operation differs from normal intra-switch CFD processing. Normal intra-switch CFD processing continues to poll a busy remote station. Once the remote station becomes idle, the call is forwarded. Inter-switch operation with the CFDCET option set to ALERT_BASE makes only one attempt to forward a call over a trunk. If the remote station is busy, the base continues to ring without polling for an idle remote station.
- This feature is not compliant with GR-853 and does not affect current intra-switch functionality.
- When the base station is a Simultaneous Ringing (SimRing) pilot or member with CFDCET set to either CLEAR_BASE or ALERT_BASE, the call is forwarded over an ISUP trunk using normal CFD. The CFDCET-SS7 feature is not used in this case.
- Ringing timeout logs (LINE 160 INFO RINGING) are not generated for ringing timeouts when a base station with the CFDCET option set to CLEAR_BASE is cleared after attempting to forward a call to a busy remote. The call is dropped when the ringing timeout occurs, and no log is generated. Line 160 logs are only generated when the ringing set is

released. In this case the originator is getting audible ringing, but the base station is not actually ringing.

Datafill for option CFDCET in table CUSTSTN

NA012 added the option CFDCET to table CUSTSTN, which defines how Call Forwarding Don't Answer Continue Existing Treatment is to be applied.The CFDCET option can be set to one of the following three operational states in table CUSTSTN:

- **OFF—**This state disables the CFDCET-SS7 feature. This state allows CFD to operate as it did before the introduction of the CFDCET-SS7 feature in NA012. When the Call Forwarding Don't Answer Timer (CF-T2) expires, the call forwards over the trunk to a busy remote station. OFF is the default state when the CFDCET option is not provisioned for the customer group.
- **CLEAR_BASE—**This state enables the CFDCET-SS7 feature to operate in a way that stops audible ringing at the base station and allows the base to originate and receive other calls when the remote DN is busy. Once the base station is cleared, it is no longer possible for the base station to answer the call from the originator. This allows the base station to originate and receive calls while the originator continues to receive audible ringback treatment. This state is the Telcordia Technologies compliant solution for CFDCET.
- **ALERT_BASE—**This state enables the CFDCET-SS7 feature to operate in a way that continues to ring the base when the remote DN is busy. The ALERT_BASE state allows the station to complete the call from the originator after the forwarding attempt to the busy remote fails. This is very similar to the NA011 DMS implementation of intra-switch CFD with the exception of forwarding once the remote becomes idle. The NA011 CFD intra-switch operation allows the call to forward to the remote once the remote set becomes idle. The inter-switch operation continues to ring the base without querying the remote to determine if it has become idle. Therefore the DMS switching system will only attempt to forward the call once.

> ***Note 1:*** When the remote station is idle, the call forwards to the remote if there is an available SS7 trunk regardless of the CFDCET state setting.

> ***Note 2:*** For additional information on the datafill for option CFDCET in table CUSTSTN. refer to the *Customer Data Schema Reference Manual*, 297-8001-351.

ISDN and non-ISDN interactions with non-SS7 trunks

The CFDCET-SS7 feature allows ISDN base stations to be compliant with Telcordia Technologies GR-853 requirement. The CFDCET-SS7 feature provides the "look ahead" capability for non-ISDN base stations. When a non-ISDN base station attempts use CFDCET-SS7 to forward a call over a non-ISUP trunk, the attempt is not blocked. The DMS switch reverts back to using normal CFD processing. The DMS switch forwards the call without regard to the state of the remote station. The DMS switch blocks an ISDN base station that attempts to use CFDCET-SS7 to forward a call over a non-ISUP trunk from doing so. Table 14-20 summarizes the operation between agent and trunk types.

Table 14-20 Agent type and trunk interaction with trunk type CFDCET operation (Sheet 1 of 2)

Base station agent type	Trunk available	Operation
ISDN	ISUP (SS7)	Forwards the call over the ISUP trunk if the remote DN is idle. Continues existing treatment given to the originator if the remote station is busy.
non-ISDN	ISUP (SS7)	Forwards the call over the ISUP trunk if the remote DN is idle. Continues existing treatment given to the originator if the remote station is busy.
ISDN	non-ISUP (SS7)	Continues giving existing treatment to the originator. Does not forward the call over a non-ISUP trunk.
non-ISDN	non-ISUP (SS7)	Exits the CFDCET-SS7 feature and reverts back to normal CFD processing. The call forwards over the non-ISUP trunk with the possibility of termination to a busy DN. This result is the same operation as when the CFDCET option is set to OFF.

Table 14-20 Agent type and trunk interaction with trunk type CFDCET operation (Sheet 2 of 2)

Base station agent type	Trunk available	Operation
ISDN	no available trunks	Continues existing treatment to the originator.
non-ISDN	no available trunks	Same operation as ISDN base station and ISUP trunk.

Figure 14-27 shows a datafill example for option CFDCET with its state set to ALERT_BASE in table CUSTSTN.

Figure 14-27 MAP display example for table CUSTSTN

```
CUSTNAME      OPTNAME                  OPTION
- - - - - - - - - - - - - - -- - - - - - - - - - - - - -
AJAX         CFDCET                   CFDCET ALERT_BASE
```

15 Provisioning default service

Description

Default Service provides limited voice service for ISDN basic rate interface (BRI) lines in conditions when voice service is not otherwise available. These conditions can occur because of either provisioning or failure of layer 3 initialization at the customer premises equipment (CPE), and include the following:

- There are no provisioned logical terminals on an interface.
- A provisioned fully initializing terminal (FIT) exists on an interface without a provisioned default logical terminal. The terminal fails to initialize layer 3 after it establishes layer 2.
- A provisioned FIT or non-initializing terminal (NIT) does not have voiceband information (VI) DNs. That is, the terminal is not provisioned to support voice calls.
- One or two provisioned FITs (either initialized or non-initialized) exist, and a NIT is then attached. (The interface does not include a default logical terminal.)
- A provisioned NIT exists, but an attached terminal can not be associated with the NIT because the terminal limit parameter would be exceeded. For example, this condition can occur because of initialization failure.

Default Service provides the following capabilities for new and existing ISDN BRI lines using FITs or NITs:

- origination of voice calls (processing of and reply to a SETUP message sent by the CPE)
- access to Basic Rate Interface Verification (BRIV) testing

> ***Note:*** The BRIV feature provides dial access to allow operating company installation and maintenance personnel to identify the

termination of an access line. The BRIV feature is accessible over the BRI access line at the customer premises from a FIT or NIT.

- access to any three-digit (BRIV or 611), seven-digit, or ten-digit telephone numbers that the local exchange carrier (LEC) provisions for the feature

These capabilities are intended to be used to originate voice calls when voice calls would not normally be possible.

As a minimum, Default Service works with regional Bell operating company (RBOC) test equipment supporting the VI call type. The operating company can expand Default Service to support calls to emergency, LEC repair, or service numbers. Subscribed features on the terminal do not affect Default Service, and Default Service does not affect normal operation of subscribed features.

Provisioning steps

To implement Default Service, the operating company performs the following provisioning steps:

At a MAP terminal perform the following steps

1 Use the table editor to provision a new Default Service customer group or a network class of service (NCOS) off an existing customer group. This customer group or NCOS restricts the DNs on which calls from the Default Service DN can terminate. These DNs normally include 611 and three-digit, seven-digit, and ten-digit DNs targeted for BRIV testing. The following BRI translations tables define the customer group or NCOS:

- DIGCOL
- XLANAME
- CUSTENG
- CUSTHEAD
- NCOS
- IBNRTE
- IBNXLA

2 Use the command interpreter (CI) DEFSVCCI tool to provision Default Service data on all interfaces that support Default Service.

At this point all BRI lines having WORKING status in table LNINV are made capable of supporting Default Service calls.

3 Use the table editor to provision the Default Service DN in table DNROUTE. The DSVC selector in this table identifies the Default Service DN. Each switch can contain only one Default Service DN.

Any BRI lines set to WORKING status in table LNINV will also become capable of supporting Default Service.

Table DNROUTE

Default Service adds the DN selector value DSVC to table DNROUTE. The DSVC selector identifies a DN as the Default Service DN. The Default Service tuple also contains the customer group, subgroup, and NCOS of the Default Service DN.

> ***Note:*** Table DNROUTE can contain only one Default Service tuple.

Removal of the Default Service DN and entry of a new Default Service DN in table DNROUTE triggers static data download messages. These messages update the DN information to each X-based peripheral module (XPM) that is in service and supports BRI lines.

Table LNINV

Table control support for table LNINV consists of triggering the creation of Default Service logical terminal data and static data messaging to the XPM. This messaging establishes the time-division multiplexing (TDM) D-channel connection for a BRI line for interfaces that change from the hardware assigned, software unassigned (HASU) state to WORKING state. Default Service requires an established D-channel connection (an interface state of WORKING). This requirement applies whether or not the interface contains provisioned terminals.

To provide Default Service, the XPM needs data normally found in table LNTDM. This information is normally sent to the XPM during execution of the Service Order System (SERVORD) SLT ATT command. (The SLT ATT command attaches a DN to a logical terminal identifier [LTID].) Because Default Service does not wait for the creation of an LTID, Default Service is hard-coded to use an LTID byte of 131 (hex 83) and key 1 for Default Service calls. The XPM uses the table data to establish the TDM connections in the line concentrating module (LCM) for D-channel communications.

When the interface state goes from WORKING to HASU, the D-channel must be taken down. Taking down the D-channel is done as a side effect of the STATUS field toggle in table LNINV. It does not require additional activity by operating company personnel.

DEFSVCCI tool

Default Service introduces the CI tool DEFSVCCI. This tool allows the operating company to provision Default Service against all interfaces present in table LNINV that support Default Service.

The operating company can also use the DEFSVCCI tool to take down interface provisioning.

The DEFSVCCI tool is available at the CI level and provides the following four commands: SETUP, REMOVE, HELP, and QUIT.

SETUP command

The SETUP command provisions all the necessary data in table LNINV on each ISDN interface that supports Default Service. The operating company must use this command before provisioning the Default Service DN in table DNROUTE.

Figure 15-1 shows the warning message that displays after entry of the SETUP command, before provisioning occurs. To proceed with Default Service provisioning, the operating company must enter Y at the prompt. Figure 15-1 also shows the message that displays if the SETUP command is successful when a Default Service DN does not exist in Table DNROUTE.

Figure 15-1 Provisioning Default Service using DEFSVCCI tool SETUP command

```
CI:
>DEFSVCCI
DEFSVCCI:
>SETUP
*** WARNING WARNING WARNING ***
*** Provisioning Default Service on all eligible ISDN***
*** interfaces may take several minutes. During this ***
*** time you will NOT be able to enter any commands  ***
*** from this MAP terminal!
Are you sure you want to continue? (y/n)
>Y
*** Default Service is provisioned.
*** You may enter Default Service DN into Table DNROUTE
*** now.
```

The following error message displays if the SETUP command fails. In this event, the operating company should try the SETUP command again later.

*** Default Service Provisioning FAILED ***

The following message displays if the switch seizes a loop during execution of the SETUP command:

*** Default Service is preparing Loop LEN <n n n n> for provisioning.

REMOVE Command

The REMOVE command removes all provisioning established by the SETUP command. Before using this command, the operating company must remove the Default Service DN from table DNROUTE. Default service can not be removed if there are any active service calls in progress (CPB).

The following error message displays if the operating company attempts to use the REMOVE command before removing the Default Service DN from table DNROUTE:

Cannot remove Default Service while Default Service DN <nnnnnnnnnn> is in Table DNROUTE.

Figure 15-2 show the warning message that displays after entry of the REMOVE command if the operating company has removed the Default Service DN from Table DNROUTE. To proceed with the removal of Default Service provisioning, the operating company must enter Y at the prompt. Figure 15-2 also shows the message that displays if the REMOVE command is successful.

Figure 15-2 Removing Default Service using DEFSVCCI tool REMOVE command

```
CI:
>DEFSVCCI
DEFSVCCI:
>REMOVE
*** WARNING WARNING WARNING ***
This will remove Default Service provisioning
from all loops.
Are you sure you want to continue? (y/n)
>Y
Default Service has been removed.
```

The following error message displays if the REMOVE command fails. In this event, the operating company should try the REMOVE command again later.

*** Default Service could not be removed completely. ***

HELP command

The HELP command displays help information for the DEFSVCCI tool.

QUIT command

The QUIT command exits the DEFSVCCI tool.

Maintenance

Default Service has two classes of maintenance requirements.

The first requirement is to maintain static data correctly in the XPM. The XPM must receive the Default Service DN when the XPM enters one of the following states. The XPM must be in service to receive a static data download message.

- in-service (INSV)
- in-service trouble (ISTB)

When an XPM enters the INSV or ISTB state, a public procedure downloads the Default Service DN to the XPM.

The second class covers the behavior of interfaces equipped for Default Service in response to MAP (maintenance and administration position) maintenance commands. Assignment of a Default Service DN to an interface does not affect the interaction of the interface with maintenance commands. For example, assignment of a Default Service DN does not affect the following:

- busying an interface (BSY command)
- taking an interface out of service (BSY command)
- releasing an interface (FRLS command)
- returning an interface to service (RTS command)

Translations table flow

The Default Service translations tables are described in the following list:

- Table NCOS (Network Class of Service) allows the operating company to subdivide a customer group for purposes of digit translations and routing. Each entry in this table can have a different set of translators and digit collection rules. The switch accesses table NCOS using the NCOS value from table DNROUTE, and searches this table for a preliminary translator (PRELMXLA). The switch uses this preliminary translator value to access table IBNXLA.
- Table CUSTHEAD (Customer Group Head) contains basic translation characteristics for customer groups. These characteristics include the customer translator name and the digit collection rule name.
- Table DIGCOL (Digit Collection) defines digit collection rules. These rules include the number of digits to collect after the first digit and the timing between digits.
- Table IBNXLA (IBN Translation) defines the dialing plan for each translator defined in tables NCOS and CUSTHEAD.
- Table LINEATTR (Line Attribute) defines line attribute indexes that apply to an office.

The Default Service translation process is shown in the flowchart the following figure.

Figure 15-3 Table flow for Default Service

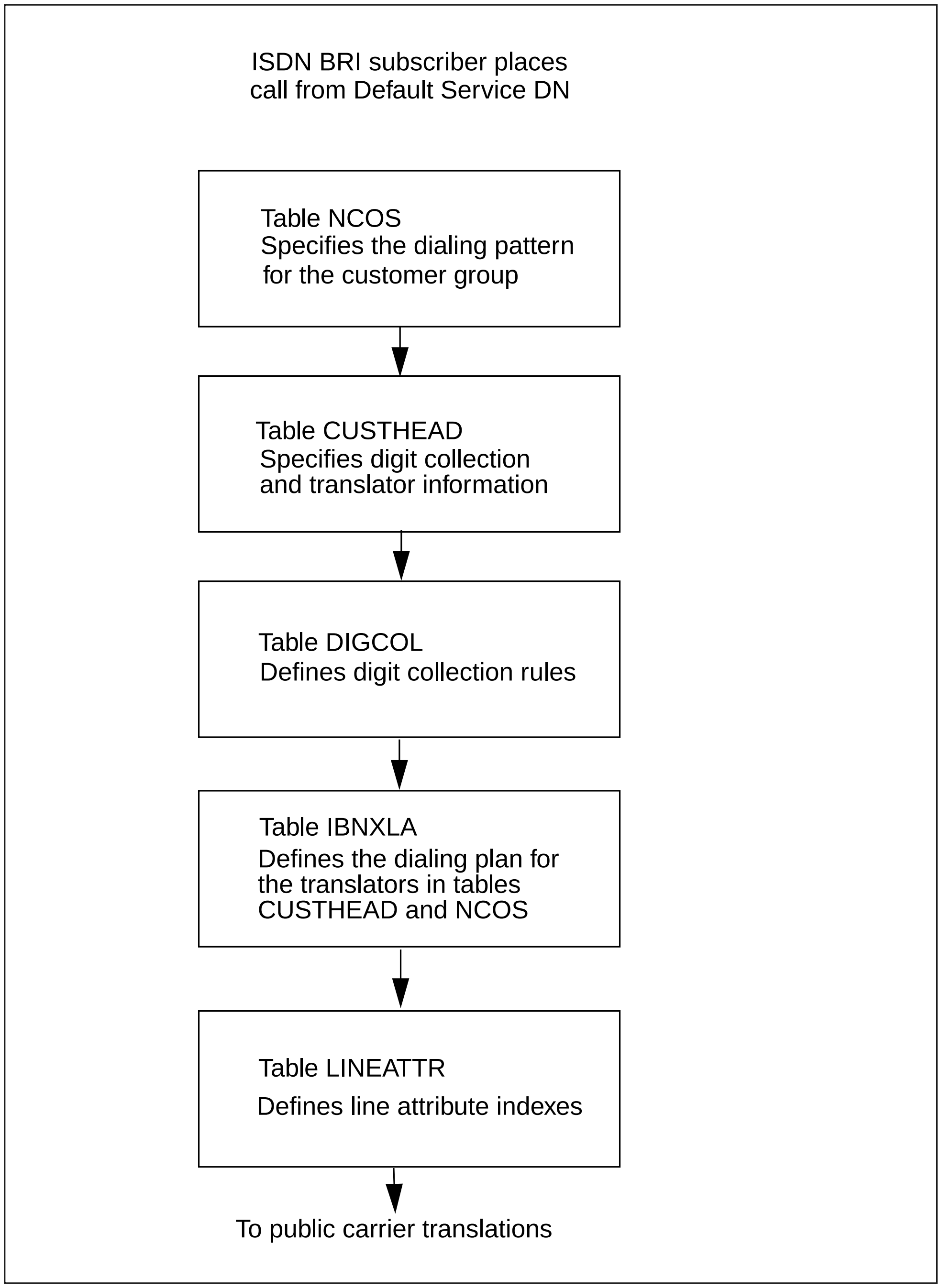


Table 15-1 lists the data entry content used in the flowchart in Figure 15-3..

Table 15-1 Data entry example for Default Service

Datafill table	Example data
NCOS	DEFSVCGRP 0 DSNCOS 0 00 (XLAS DEFSVCXL DEFSVCXL DEFSVCOL) $
CUSTHEAD	DEFSVCGRP DEFSVCXL DEFSVCOL NIL $
DIGCOL	DEFSVCOL 1 COL S 1
IBNXLA	DEFSVCXL 411 NET Y Y 1 Y POTS N N GEN (LATTR 91) $ $
LINEATTR	91 IBN NONE NT NSCR 1 613 BNR NLCA NONE 0 NIL NILSFC NILLATA 0 NIL NIL 00 N $

Limitations and restrictions

The following limitations and restrictions apply to Default Service:

- There can be at most one Default Service call on each interface at a time.
- Default Service requires that at least one B-channel be provisioned on the interface to function. In other words, interfaces with only D-channel access provisioned can not use Default Service functionality.
- Default Service is not available on an interface on which all B-channels are allocated or busy.
- Assume that a NIT is attached to the ISDN interface when the user removes the default logical terminal from provisioning. The user must detach the NIT and re-attach it back in order to receive Default Service on the interface.
- Default Service does not affect existing or future terminal endpoint identifier (TEI) restrictions on an interface. For example, assume that an interface allows a maximum of eight TEIs. The ninth terminal attached to the interface will not receive any service, including Default Service.
- Default Service does not plan to support the TRAVER (translations verification) tool. To test Default Service translations behavior, the operating company can create another DN with the same customer group, subgroup, and NCOS.
- The following XPM types are supported for Default Service:
  - — line trunk controller (LTC)
  - — line group controller (LGC)

— remote cluster controller 2 (RCC2)

— subscriber carrier module–100 access (SMA)

Within these peripherals, the following card types are supported: BX26AA, BX27AA, and RDTISDN.

- Assume that at least one interface has an active Default Service call when the operating company attempts to delete the Default Service DN. The table control command to delete the Default Service DN fails, and the DN is not deleted. The command displays a warning message that advises the operating company to try the deletion again later. If the operating company does not try the deletion again, the Default Service DN remains in the system.
- Assume that a caller places a 911 call from an interface using Default Service. If the caller goes on-hook, ringback from public servicing answering point (PSAP) does not occur.
- Calling name and number information provided by Default Service calls can not determine either of the following:

  — the specific calling party name

  — the location of the calling party
- Terminals that are provisioned as 2B NI-1 with only circuit-mode data (CMD) call types allowed, can not originate Default Service VI calls. NI-1 1B and NI-2 terminals do not have this restriction.
- Remote XPMs in emergency stand-alone (ESA) mode do not allow the origination of Default Service calls. Active Default Service calls are not dropped over the warm entry into ESA mode. No new Default Service originations are allowed.
- When adding the Default Service tuple to table DNROUTE, a line equipment number (LEN) without attached LTIDs require a setting of the line state as part of its setup. A LEN for which this process fails requires operating company intervention to activate Default Service functionality for that LEN.

  When provisioning fails for a LEN with out an LTID, an error message advises the operating company that the provisioning failed for the LEN. The operating company must do the following:

  — Position on the tuple for the LEN in table LNINV.

  — Toggle the STATUS from WORKING to HASU and back to WORKING.

Interactions

A Default Service call uses one B-channel, and like a normal ISDN voice call, affects functionality that relies on B-channel availability. Default Service does not have user-visible interactions with other functionalities.

Activation/deactivation by the end user

Default Service requires no activation or deactivation by the user.

Billing

Default Service does not affect billing.

A Default Service call may or may not be a billable call, depending on the translations that are set up to support Default Service.

Station Message Detail Recording

Default Service does not affect Station Message Detail Recording.

Data entry for office parameters

Default Service does not affect office parameters.

Data entry sequence

This document does not describe the data entries required to restrict Default Service calls to DNs that require special provisioning (for example, E911 numbers). The data tables involved will vary depending on the DN type and its required provisioning.

Table 15-2 lists the tables that require data entries to implement Default Service. The tables are listed in the order in which they are to be datafilled.

For more information on data entry for these tables, refer to the Translations Guide, 297-8001-350.

Table 15-2 Tables requiring data entries for Default Service (Sheet 1 of 2)

Table	Purpose of table
DIGCOL	Digit Collection. This table contains digit collection algorithms and sets the timing between digits.
XLANAME	Translator Names. This table stores the default data for each translator, including the acceptable digilator range.
CUSTENG	Customer Group Engineering. This table contains engineering parameters for customer groups.

Table 15-2 Tables requiring data entries for Default Service (Sheet 2 of 2)

Table	Purpose of table
CUSTHEAD	Customer Group Head. This table contains basic translation characteristics for customer groups. These characteristics include the customer translator name and the digit collection rule name.
NCOS	Network Class of Service. This table allows the operating company to subdivide a customer group for purposes of digit translations and routing. The operating company can assign each entry in this table a different set of translators and digit collection rules.
IBNRTE	IBN Route. This table contains route lists identified by a route reference index number: an IBN station, an attendant console, an incoming IBN trunk, and the incoming side of a two-way trunk group.
IBNXLA	IBN Translation. This table stores data for the digit translation of calls from the following sources:
DNROUTE	Directory Number Route. This table defines DNs that are not associated with an LTID. Provisioning Support for Default Service adds the DN selector value to DSVC to table DNROUTE. The DSVC selector identifies a DN as the Default Service DN. The Default Service tuple also contains the customer group, subgroup, and NCOS of the Default Service DN. Note: The operating company must use the DEFSVCCI tool SETUP command before provisioning the Default Service DN in table DNROUTE. Before using the DEFSVCCI tool REMOVE command, the operating company must remove the Default Service DN from table DNROUTE. For more information, see “DEFSVCCI tool” in this document.

Data entry for table DIGCOL

Table DIGCOL provides the digit collection algorithm for the customer group or NCOS. Digit collection is based on the digit collection selector (DGCOLSEL) field. For BRI applications, the following selectors are normally used:

- COL, to collect more than one digit
- RPT, to collect one digit (for example, 0 for attendant access)
- POTS, to transfer to POTS digit translation after the digit is received

Data entry example for table DIGCOL

Figure 15-4 shows example data entry for table DIGCOL.

Figure 15-4 MAP display example for table DIGCOL

```
DGKEY    DGDATA
------------------------------------------
DEFSVCOL 1 COL S 1
```

Data entry for table XLANAME

Table XLANAME contains a list of the translator names used for the customer group. This table defines the default translations used when no translations are defined in table IBNXLA for the access code dialed. The default translations data must take the same form as the original translations data in table IBNXLA. Field DEFAULT in table XLANAME is identical to field RESULT in table IBNXLA.

Under the following conditions, the switch applies the vacant treatment (VACTRMT) defined in table CUSTHEAD to the call:

- Translations data does not exist for an access code in table IBNXLA.
- Default data does not exist in table XLANAME.

Data entry example for table XLANAME

Figure 15-5 shows example data entry for table XLANAME.

Figure 15-5 MAP display example for table XLANAME

```
XLANAME   DEFAULT     MAXDIG
------------------------------------------
DEFSVCXL   $          9
```

Data entry for table CUSTENG

Table CUSTENG defines the engineering parameters for the customer group, including

- NONCOS, which is the number of NCOS numbers required
- NOIBNTMT, which specifies the number of treatments required

- CONSOLES, which specifies if the group can be equipped with attendant consoles
- CUSTTYPE, which defines the type of customer group as one of
  - — private, which indicates that the features affected by customer group limits can operate only within the customer group
  - — public, which indicates that the features can operate across customer group limits
  - — family, which indicates that the customer group belongs to either a private or public family (defined in table CUSTFAM)

Two of the options available in table CUSTENG apply to BRI customer groups:

- PKTSUP, which allows suppression of billing for packet service within a customer group
- CONF6C, which specifies the number of six-port conference circuits for the group

Data entry example for table CUSTENG

Figure 15-6 shows example data entry for table CUSTENG.

Figure 15-6 MAP display example for table CUSTENG

```
 CUSTNAME ADNUM NONCOS NOIBNTMT CONSOLES MASCON DOMAIN GROUPID OPTIONS
----------------------------------------------------------------------
DEFSVCGRP  97    10     10         N        N   PRIVATE   222     $
```

Data entry for table CUSTHEAD

Table CUSTHEAD defines the basic translation and routing characteristics for the customer group.

Field CUSTXLA defines the primary translator for the customer group. CUSTXLA is the name assigned to the data block in table IBNXLA that specifies digit translation for this customer group. This data includes any access codes that contain a leading numeric digit. In addition to the digit translator, table CUSTHEAD also specifies the feature (*) and octothorpe (#) translators with options FETXLA and OCTXLA. These translators indicate the areas in table IBNXLA that define feature and octothorpe translations, which translate any access codes beginning with a star or octothorpe, respectively. The operating company can also specific a preliminary translator (PLMXLA).

Table CUSTHEAD also specifies the method of digit collection required for the group. Field DIGCOLNM specifies the area in table DIGCOL that defines digit collection for terminals in the group.

Specify a treatment for conditions in which digit translation is not possible using option VACTRMT, which contains the number of the treatment in table IBNTREAT.

Data entry example for table CUSTHEAD

Figure 15-7 shows example data entry for table CUSTHEAD.

Figure 15-7 MAP display example for table CUSTHEAD

```
CUSTNAME CUSTXLA DGCOLNM IDIGCOL OPTIONS
----------------------------------------------
DEFSVCGRP DEFSVCXL DEFSVCOL NIL   $
```

Data entry for table NCOS

Table NCOS allows the operating company to define basic translation and routing characteristics based on a subset of the customer group lines. This table defines the characteristics of the NCOS group. Base service provisioning of BRI terminals allocates individual lines to the NCOS group.

For each NCOS, the operating company can define the following optional parameters:

- XLAS, which defines preliminary, feature (*), and octothorpe (#) translators, and a digit collection name for the NCOS
- FLSHXLA, which defines preliminary, feature, and octothorpe flash translators for the NCOS
- OCTXLA, which defines an octothorpe translator for the NCOS

If these options are datafilled, their values override the corresponding values datafilled in table CUSTHEAD during the call translation process.

Table NCOS also specifies code restriction based on the NCOS. The CRL option defines the code restriction level that applies to the NCOS. This option also determines if the codes in the code restriction level are allowed or blocked. (The codes belonging to the code restriction level are identified in table CODEBLK.)

Data entry example for table NCOS

Figure 15-8 shows example data entry l for table NCOS.

Figure 15-8 MAP display example for table NCOS

```
CUSTGRP NCOS NCOSNAME LSC TRAFSNO OPTIONS
-----------------------------------------------------------
DEFSVCGRP 0 DSNCOS 0 0 (XLAS DEFSVCXL DEFSVCXL DEFSVCOL) $
```

Data entry for table IBNRTE

Table IBNRTE provides a route for the translated digits in the IBN environment. Routing is based on the routing selector field (IBNRTSEL), which specifies the type of routing. The following selectors are used in the BRI environment:

- The DN selector routes the call to a DN on the switch.
- The IW selector routes an INWATS call.
- The N selector routes an outgoing call for which the dialed digits are not the same as the outpulsed digits. This type of call involves prefixing or deleting digits in table DIGMAN.
- The OW selector routes an OUTWATS call.
- The S selector routes an outgoing call to a trunk.
- The T selector routes the call to another route in table IBNRTE or another routing table.
- The TRMT selector routes the call to a treatment.
- The VFG selector routes the call to a virtual facility group (VFG).

Table IBNRTE contains route lists, each identified by a route reference index. Each route list contains up to eight different routes for the call.

> ***Note:*** There are four IBN routing tables, named IBNRTE, IBNRT2, IBNRT3, and IBNRT4. Each of these tables operates in the same way. In this document, IBNRTE refers to all of these IBN routing tables.

Data entry example for table IBNRTE

Figure 15-9 shows example data entry for table IBNRTE.

Figure 15-9 MAP display example for table IBNRTE

```
    RTE RTELIST

   -----------------------------------------------------
    972 VFG N N N 611VFG 830 $
    911 VFG Y Y N 911VFG 0 $
```

Data entry for table IBNXLA

Table IBNXLA translates the digits in calls that originate at BRI terminals or incoming trunks. The following identify each tuple (translator) in the table:

- a translator name assigned in table XLANAME
- a translation selector (TRSEL), which specifies the type of translation to perform

Depending on the type of translation, the RESULT field provides a route or treatment for the digits.

Datafill for the Customer Groups capability uses the following types of translation selectors:

- The ATT (attendant access) selector routes calls to the attendant.
- The EXTN (extension) selector routes calls on an extension basis when abbreviated numbers are dialed.
- The FLEXI (route to IBN treatment table) selector translates calls on special intercept lines and routes the calls to treatments.
- The NET (networks) selector handles translation of network calls. The NETTYPE field distinguishes between types of networks, for example, direct outward dial (DOD), private network (PVT), or OUTWATS (OWT) calls.

Within the NET translation selector for DOD calls, the CRL field allows the operating company to enable or disable code restriction or allowance.

If there is no datafill for the dialed digits, translation proceeds according to the default given in table XLANAME. If there is no default in table XLANAME, translation automatically defaults to the VACTRMT specified in table CUSTHEAD.

Data entry example for table IBNXLA

Figure 15-10 shows example data entry for table IBNXLA.

Figure 15-10 MAP display example for table IBNXLA

```
KEY       RESULT
-----------------------------------------------------

DEFSVCXL 411 NET Y Y 1 Y POTS N N GEN (LATTR 91) $ $
DEFSVCXL 911 NET Y Y 1 Y POTS N N GEN (LATTR 91) $ $
DEFSVCXL 991 NET Y Y 1 Y POTS N N GEN (LATTR 91) $ $
```

Data entry for table DNROUTE

Table DNROUTE directs DNs that are not associated with an LTID (for example, INWATS lines) to a route or treatment. Different DN selectors (in field DN_SEL) are used to specify different types of routing for calls to the specified DNs.

Provisioning Support for Default Service adds the DN selector value DSVC to table DNROUTE. The DSVC selector identifies a DN as the Default Service DN. Table DNROUTE can contain only one Default Service tuple.

> ***Note:*** The operating company must use the DEFSVCCI tool SETUP command before provisioning the Default Service DN in table DNROUTE. Before using the DEFSVCCI tool REMOVE command, the operating company must remove the Default Service DN from table DNROUTE. For more information, refer to "DEFSVCCI tool" at the beginning of this chapter.

Removal of the Default Service DN and entry of a new Default Service DN triggers static data download messages. These messages update the DN information to each XPM that is in service and supports BRI lines. In addition, BRI lines with a status already set to WORKING are equipped for Default Service.

Data entry example for table DNROUTE

Figure 15-11 shows example data entry for table DNROUTE.

Figure 15-11 MAP display example for table DNROUTE

```
 AREACODE OFCCODE STNCODE DNRESULT
--------------------------------------------
 919      991     9999    DSVC DEFSVCGRP 0 0
```

Error message for table DNROUTE

Table 15-3 shows the error messages that apply to table DNROUTE.

Table 15-3 Error message for table DNROUTE

Error message	Explanation and action
Only one Default Service DN per switch. The Default Service DN is nnn nnn nnnn.	Enter only one Default Service tuple in table DNROUTE.
Default Service has not been set up on all eligible ISDN loops. To set up all ISDN loops use the CI command DEFSVCCI and run SETUP. Then you will be able to add the Default Service DN to Table DNROUTE.	Use the DEFSVCCI tool SETUP command before provisioning the Default Service DN in table DNROUTE.

Translation verification tools

Provisioning Support for Default Service does not use translation verification tools. Translation verification tools do not support Default Service DN originations.

SERVORD

Provisioning Support for Default Service prevents the entry of a provisioned ten-digit Default Service DN as an input parameter for the following SERVORD commands:

- ABNN (add bridged night number)
- ADD (add line to an existing hunt group)
- ADDPH (add or change packet handler options)
- ADO (add option)
- CHAPH (change packet handler parameters)
- CHF (change feature information for pre-existing feature)
- CHG (change translation/routing information)
- DEL (delete line from a hunt group)
- DELPH (delete packet handler options)
- DEO (delete option)
- EST (establish a hunt group or call pickup group)
- NEW (establish service)

- OUT (remove service)
- SUS (suspend service)
- SWLT (swap logical terminals)

Table 15-4 shows the error message that displays if the operating company attempts to enter a Default Service DN in which “<nnnnnnnnnn>” is the Default Service DN.

Table 15-4 SERVORD error message for Default Service DN

Error message
Default Service DN: Invalid input <nnnnnnnnnn>

One exception exists. Assume the following:

- A switch has multiple numbering plan areas (NPA) and duplicate exchange codes (NXX).
- Translations restricts some DNs—for example, forwarding or hunt group overflow DNs—to seven digits.

The following condition allows entry of part of a Default Service DN at a SERVORD prompt.

The operating company attempts to enter a Default Service DN under one NPA. Under a different NPA, a forwarding or overflow DN shares the NXX and station code of the Default Service DN. That is, the seven digits of the forwarding or overflow DN are identical to those of the Default Service DN. In this event, SERVORD accepts the entry of the Default Service DN.

This behavior is in line with existing SERVORD behavior with normal DNs. SERVORD always accepts the entry of ambiguous DNs; if DN rejection occurs, the rejection is based on later feature-specific checks.

Changes to SERVORD QDN query command

Default Service modifies the SERVORD QDN (query DN) command output to identify Default Service DNs. The QDN command output does not include the BRI LENs associated with a Default Service DN.

Changes to SERVORD QDNSU and QDNWRK query commands

Default Service modifies the following SERVORD query commands to identify Default Service DNs in the command output:

- QDNSU (query software unassigned DNs)
- QDNWRK (query working [assigned] DNs)

The QDNSU or QDNWRK command output includes the Default Service DN when the R (range of DNs) and D (detailed printout) options are specified.

The command output omits the Default Service DN when the R and S (summary printout) options are specified.

The command output also omits the Default service DN when the following options are specified:

- ALL (all DNs) option with D option
- ALL option with S option

16 ISDN office parameters

Introduction to ISDN office parameters

NA014 does not introduce any new office parameters. Therefore, this chapter does not contain any office parameters.

For information about ISDN office parameters, refer to the *Office Parameters Reference Manual*, 297-8001-855, which includes the following information for each office parameter:

- Functional description
- Provisioning rules
- Range information
- Activation
- Dependencies
- Consequences
- Verification
- Memory requirements
- Dump and restore rules

Functional description

Describes the ISDN feature with which the office parameter is associated as well as the effect the parameter has on that ISDN feature.

Provisioning rules

Describes the scope and limitations of an office parameter.

Range information

Provides the acceptable minimum, maximum, and default settings or values for an office parameter.

Dependencies

Dependencies are used to indicate the following information:

- Whether any other office parameters are associated with this feature.
- A required feature package for the presence of an office parameter.
- Whether or not a feature is activated or deactivated by an office parameter.

Consequences

Describes the effect on the DMS, including the activation or deactivation of a feature resulting from setting the parameter to either on or off, or changing its default value.

Verification

Describes a means by which to verify the activation or deactivation of an office parameter.

Memory requirements

States the impact of this office parameter on office memory requirements.

Dump and restore rules

Provides instructions on how to treat an office parameter during a dump and restore process.

Parameter history

Indicates, in the software load, when the office parameter was introduced.

17 SERVORD procedures

Introduction

The Service Order System (SERVORD) is the DMS switch MAP (maintenance and administration position) method of making configuration changes to a line without having to use the DMS table editor. Through SERVORD, users can configure initial service, assign directory numbers (DN), assign or change options, move services, and perform many other functions.

This document assumes a general knowledge of DMS SERVORD and the reader needs to know how to use SERVORD to set up and modify ISDN services. If you are unfamiliar with DMS SERVORD, attendance in Nortel course number 0430 “DMS SuperNode System Line Data Modification by SERVORD” is recommended prior to attempting to make SERVORD changes in the DMS switch.

There are many different options available for integrated services digital network (ISDN) lines that are implemented through service order. In order to provision the line correctly and to avoid the costly tasks of re-entering service orders or troubleshooting errors, it is important to obtain certain information up front from the subscriber. This up front information includes the following:

- what options the subscriber’s equipment supports
- what options the subscriber wants
- which options, such as electronic key telephone service (EKTS), require a yes or no to be entered in the service order to reflect the subscriber’s request
- what keys are to be assigned to which features

To help with this process, ISDN capability packages (also now known as ISDN ordering codes [IOC]) have been introduced. Many subscribers order ISDN based on IOCs. These codes directly impact how the line is to be provisioned in SERVORD. Refer to the chapter titled “Simplification of ordering, provisioning, and installation” for information on ISDN ordering codes.

Because ISDN introduced the concept of a logical terminal (LT) to the DMS switch, the set logical terminal (SLT) was added to SERVORD to enable the system to address those LTs. The SLT command is used to establish an initial ISDN configuration or to make ISDN-specific changes to the logical terminal.

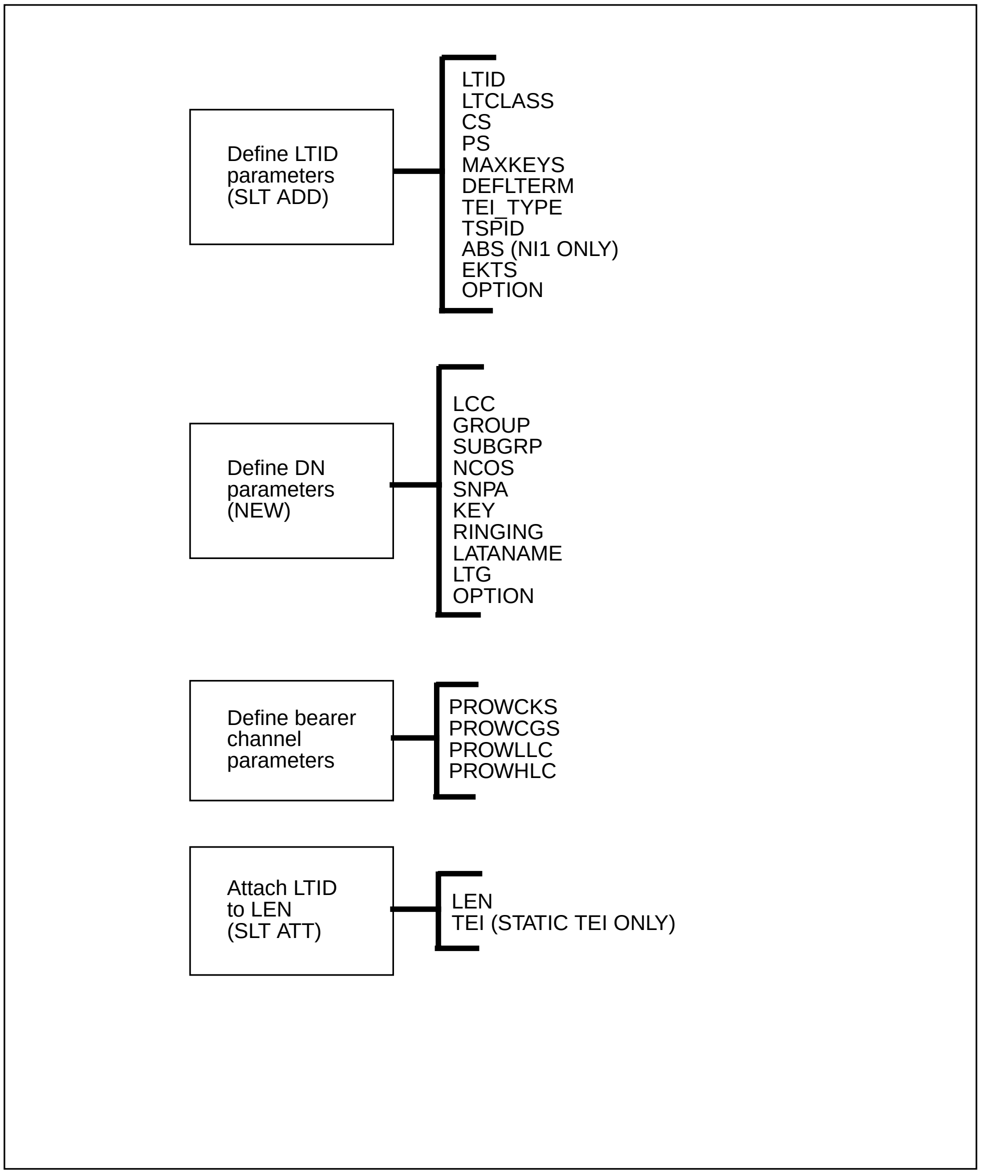
In addition to using the SLT command, ISDN services are also modified with the same commands used for plain ordinary telephone service (POTS) and analog Meridian Digital Centrex (MDC) lines. One item that the user can find confusing is that SERVORD will prompt the user for a DN_OR_LEN when it means directory number (DN), line equipment number (LEN), or logical terminal identifier (LTID). An example of this is found in the add option (ADO) command. When the user is working with an ISDN LT and the system prompts for a DN_OR_LEN, the user can actually enter the LTID rather than the DN or LEN.

ATTENTION

Prior to NA008, if a >$was entered at the service order prompt ABS (Authorized Bearer Services), the line was provisioned with all bearer services except PMD (Packet Mode Data). Beginning with NA008, if a “$” is entered, the user will receive VOICE, VBD and CMD. There is no indication given by the DMS switch that anything is different from past provisioning rules.

The flowchart in Figure 17-1 shows the SERVORD steps used to establish new ISDN service, and the parameters these steps can modify or input. (Note that some of these parameters are optional.)

Figure 17-1 SERVORD example



Defining the logical terminal and its service parameters

The logical terminal is defined using the SERVORD SLT ADD command. Depending on the access privilege specified (circuit switched or packet-switched), the following tables are automatically datafilled through SERVORD. Refer to Table 17-1.

Table 17-1 Tables automatically datafilled through SERVORD

Circuit-switched terminals	Packet-switched terminals
LTDEF	LTDEF
KSETINV	

The parameters defined during this step include

- LTID (logical terminal identifier), which identifies the logical terminal
- LTCLASS (logical terminal class), which specifies the type of physical terminal associated with the LTID
- CS (circuit-switched) or PS (packet-switched)—logical terminal access privileges that specify whether the service required is circuit-switched or packet-switched
- MAXKEYS (maximum keys), which states the number of keys on the terminal
- DEFLTERM (default logical terminal), which identifies an LTID as a non-initializing terminal, prompted Y or N. If set to Y the user- or network-assigned TEI (UNATEI) option is automatically assigned to the LTID.
- TEI_TYPE, which specifies the TEI as static, dynamic, user-assigned or UNATEI (unassociated TEI) can be assigned
- TSPID 1 to 18 digit terminal service profile identifier assigned to basic rate access functional set (BRAFS) terminals.
- ABS (authorized bearer services), which assigns the bearer capability for the DNs associated with this LTID (NI-1)
  - In NA008 there is no ABS prompt for 2B and NI-2 terminals. Default bearer capability (DBC) of DBC_SP is automatically assigned to each DN appearance or AFC key on NI-2 FIT terminals.
  - The default DBC is changed using the SERVORD CHF (change feature) command. The allowable DBCs are DBC_SP, DBC_3_1_K, DBC_56K, and DBC_64K.
- EKTS (electronic key telephone service), which specifies whether or not EKTS features can be assigned to the terminal
- options assigned at this step include the following:
  - SPIDSFX (service profile identifier suffix, which is a 1- to 4-digit number used in association with the service profile identifier (SPID) to

identify two ISDN circuit-switched devices on the same line with the same SPID, such as with MADN members. Beginning in NA009, option SPIDSFX only applies to meridian feature transparency (MFT).

— ELN (essential line) allows a line to be designated as essential. When emergency cutoff is activated, all nonessential subscribers originating calls are denied service. A line with option ELN is allowed to originate calls when the switching unit has line load control active.

— PVC (protocol version control), which identifies the protocol version used by the terminal is a required parameter for all ISDN lines. This parameter should be set to Functional Issue 2 for National ISDN 1 service. Functional Issue 0 and 1 are available but are not National ISDN compliant. PVC with a Functional Issue 2 is automatically assigned to NI-1 2B and NI-2 LTIDS.

— CACH (call appearance call handling) changes the protocol conventions for communications between the DMS and the CPE. Option CACH is only added to the line if the CPE attached to the line supports and is configured for CACH, which requires EKTS to be set to Y.

— TERML (maximum number of terminals) specifies the maximum number of NITs that can be supported in a range from 1 to 8. The default is 1. This applies only when DEFLTERM is equal to Y and CS is equal to NI2.

— AGA (associated group assignment) allows a directory number/call type (DNCT) or a group of DNCTs to be restricted to the use of a single B-channel. This option is only valid for circuit-switched BRAFS terminals. Option AGA allows 2B and NI-2 logical terminals to support up to nine associated groups.Option AGA can be added using the SLT ADD or SLT CHA commands.

— SLIBRI (single line ISDN) is assigned to each SLIBRI to identify the set as a single line ISDN and to support the additional datafill required for RES translations simplifications. Option SLBRI is assigned when an NI-2 LTID is provisioned using the SERVORD SLT ADD command. SLBRI can not be added or removed using the SLT CHA command.

— OML (overload messaging limit) dictates the maximum number of D-channel Q.931 messages allowed before Rapid Messaging log messages and or call processing controls are applied to a BRI terminal. This option overrides the office parameter DEFOML. Option OML only applies to BRAFS circuit switched LTIDs. It does not apply to Meridian Feature transparency (MFT) and stimulus LTIDs. Option

OML can not be added to an LTID using SERVORD. It must be added in table LTDEF using table editor commands ADD or CHA.

— OCT (overload condition treatment) dictates what treatment is applied to a BRI terminal that is in a Rapid Messaging state. BRI terminals assigned report and control treatment are taken out of service and log messages are generated when ina Rapid Messaging state. A log message is generated for those BRI terminals assigned report only treatment when they are in Rapid Messaging state. In this case, the BRI terminal is not taken out of service. Option OCT only applies to BRAFS circuit switched LTIDs. It does not apply to MFT and stimulus LTIDs. Option OCT can not be added to an LTID using SERVORD. It must be added in table LTDEF using table editor commands ADD or CHA.

Attaching the logical terminal to the appropriate LEN

The logical terminal is attached to its LEN using the SERVORD SLT ATT command, which associates the logical terminal with the LEN that identifies the line card to which it is connected. For B-channel packet terminals, the SLT ATT command can also be used to provision a B-channel connection to the DMS PH.

The data entries in the following tables are automatically entered through SERVORD. Refer to Table 17-2.

Table 17-2 Tables automatically datafilled through SERVORD

Circuit-switched terminals	Packet-switched terminals
LTMAP	LTMAP
	SPECCONN

Configure ISDN using SERVORD

The following section of this chapter reviews the SERVORD commands necessary to configure ISDN services. The following examples are given:

- SLT ADD command used to add a new LTID
- SLT CHA command used to change set attributes
- NEW command used to associate a DN with the LTID
- QLT command used to query the LTID to verify the datafill
- QLEN command used to query the LEN before the LTID is attached
- SLT ATT command used to attach the LTID to a LEN
- QLEN command used to query the LEN after the LTID is attached
- ADO command used to add an option to an existing non-NI-2 ISDN line

- ADO command used to add an option to an existing NI-2 ISDN line
- ADO command used to add option CFXVAL to an existing NI-2 ISDN line
- DEO command used to remove option CFXVAL from an existing NI-2 ISDN line
- SLT DET command used to detach an LTID from a LEN
- OUT command used to remove DN associated with LTID
- SLT REM command used to remove an LTID

This section is followed by specific examples for establishing ISDN service for the following types of ISDN set configurations:

- NI-1 1B FIT
- NI-1 1B NIT
- Dynamic TEI packet-only NIT
- NI-1 2B FIT
- NI-1 2B NIT
- NI-2 FIT
- NI-2 BRI RES
- NI-2 NIT
- NI-2 2BD

SLT command

The SLT (set logical terminal) command contains the subcommands required to establish new ISDN service and make ISDN-specific changes to existing service. The user can make two intentional incorrect entries to determine what information must be entered in response to a SERVORD prompt while using the SLT command.

Figure 17-2 and Figure 17-3 show examples of error messages that are displayed as a result of the intentional entry of incorrect responses to SERVORD prompts.

Figure 17-2 First intentional incorrect entry MAP display

```
CI:
>SERVORD
SO:
>SLT
SONUMBER: NOW 98 1 23 AM
>$
LTID:
>ISDN 1
FUNCTION:
>
***  ERROR  ***
|
TYPE OF FUNCTION IS SLT_COMMAND_FUNCTIONS
PLEASE ENTER:
FUNCTION:
>
```

The error message displayed in Figure 17-2 is the result of an intentionally incorrect entry that was made to see what command parameters are available at that point. Repeating an intentionally incorrect entry twice will usually prompt the switch to display the available command parameters at that level. Refer to Figure 17-3.

Figure 17-3 Second intentional incorrect entry MAP display

```
PLEASE ENTER:
FUNCTION:
>
*** ERROR***
TYPE OF FUNCTION IS SLT_COMMAND_FUNCTIONS
TYPE IS SLT_COMMAND_FUNCTIONS {ADD,REM,ATT,DET,CHA}
PLEASE ENTER:
FUNCTION:
>ABORT  <- Enter either abort to interrupt the service
order or one of the SLT command functions to continue it.
```

REM, ATT, DET, and CHA commands

The SLT command contains the following subcommands:

- ADD: Adds a new logical terminal to an existing logical terminal group. Table LTGRP must have been previously datafilled to support the logical terminal group to which you are going to add this logical terminal. In the previous example in Figure 17-2, LTID ISDN 1 did not exist in the switch. SERVORD will accept the entry because it needs to allow creation of the entry.
- REM: removes a previously created LTID
- ATT: attaches a previously created LTID to a LEN in the switch

- DET: Detaches an attached LTID from the LEN to which it is attached
- CHA: changes the ISDN parameters on the line

Add a new LTID using the SLT ADD command

Use the SLT command to add a new FIT (NI-2) LTID to the switch. Note the line being created is just an example. Each line may have a different configuration. Refer to Figure 17-4.

> ***Note:*** As of NA009, SERVORD prompts for the terminal service profile identifier (TSPID) during an SLT ADD command for NI-1 2B and NI-2 BRAFS (basic rate access functional set) LTIDs when a dynamic TEI (DTEI, UATEI, or UNATEI) is entered. The TSPID is not available as an ADD option. The TSPID value can be changed using the SLT CHA command.

Figure 17-4 Example of MAP display when using the SLT ADD command

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98 1 24 AM
>$
LTID:
>ISDN 1         <- This is new Logical Terminal
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM
>N
TEI_TYPE:
>DTEI
TSPID:
>6137235011
EKTS:
>Y <-  EKTS option will NOT always be set
to Y (Typically Y for phones, otherwise N).
OPTION:
>PVC <- A default PVC version of FUNCTIONAL and
PVC issue of 2 will be used with NI2 if option is not
entered here.
VERSION:
>FUNCTIONAL
ISSUE:
>2
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 1 24 AM ISDN 1 ADD BRAFS NI2 N 64 DTEI $Y
6137235011 PVC FUNCTIONAL 2 $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

MAXKEYS automatic updating

When adding an LTID using the SLT ADD command, the user is prompted to enter a value for the maximum number of keys (MAXKEYS) on an ISDN set used for circuit-switched service. The valid range for input in response to the

MAXKEYS prompt is 2 to 64. It is recommended that during an SLT ADD the MAXKEYS attribute be set to its maximum value, 64.

In software loads prior to NA009, SERVORD rejects an attempt to assign a feature to an ISDN set key where the key number entered is greater than the maximum number of keys specified for that set when the LTID was created. The only way to make such an assignment is to remove the ISDN line from service and re-establish it with an increased value for the MAXKEYS parameter. The value for MAXKEYS can only be specified through the execution of the SLT ADD command. The removal and re-establishment of an ISDN line requires execution of the following commands:

- OUT—remove service from the provisioned DN
- SLT DET—detach an LTID from a LEN
- SLT REM—remove an LTID
- SLT ADD—add an LTID with higher value for the MAXKEYS parameter
- SLT ATT—attach an LTID to a LEN
- NEW—provision service on an unassigned DN

As of NA009, it is no longer necessary to remove a BRI line from service in order to re-establish it with an increased value of MAXKEYS in order to allow feature assignment to unused keys.

The value for MAXKEYS automatically increases to its maximum value of 64 only when using one of the following commands:

- ADO command to add an option key resulting in the total number of keys exceeding the current value set for MAXKEYS
- CHF command to increase the number of AFC or CRBL keys resulting in the total number of keys exceeding the current value set for MAXKEYS

The value for MAXKEYS can not be increased to 64 using the ADO and CHF commands when the line is call processing busy.

An automatic update of the attribute MAXKEYS to 64 does not occur when using the following commands to initially provision a line:

- EST—establish a hunt group
- ADD—add a line to an existing hunt group
- NEW—provision new service and assign a feature to a key

This enhancement does not alter the operation of the SLT ADD command. It will still prompt for the entry of a value for MAXKEYS between 2 and 64. This entry is reflected in the query LTID command display. The SLT CHA command is not enhanced to prompt for MAXKEYS. The automatic updating of the value of MAXKEYS to 64 occurs only during the assignment of a feature to an established ISDN set key using either the ADO or CHF command.

Change set attributes using the SLT CHA command

Use the SLT CHA command to change one of the following ISDN set attributes:

- SPIDSFX
- ABS (Note 1)
- PVC
- CACH (Note 2)
- ELN
- TERML
- EKTS
- AGA
- SLBRI

Note 1: In software loads earlier than NA008, the ABS set attribute value can be changed to: NOVOICE, NOVBD, and NOCMD. The default is NOPMD. Beginning with the NA008 software load, the attribute values for ABS for non-NI-2 sets are: VOICE, CMD, and VBD. The default is VOICE, CMD and VBD when a $is used in SERVORD.

Note 2: In software loads earlier than NA008, option CACH is only available for change if the value for EKTS is set to Y. The value for EKTS can not be changed using the SLT CHA command. Beginning with NA008, the SLT CHA command is used to change the EKTS value from N to Y.

Note 3: Option SLBRI can not be added or removed using the SLT CHA command.

Refer to Figure 17-5 for an example of the MAP display when using the SLT CHA command to change status of EKTS from N to Y.

Figure 17-5 Example MAP display when using the SLT CHA command to change the status of EKTS from N to Y

```
CI:
>SERVORD
SO:
>SLT
SONUMBER: NOW 98 1   24 AM
 LTID:
 >ISDN 1
FUNCTION:
>CHA
SET_ATTRIBUTE:
>EKTS
EKTS:
>Y
SET_ATTRIBUTE:
>$
COMMAND AS ENTERED:
SLT NOW 98 1 24 AM ISDN 1 CHA (EKTS Y) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
```

Adding LTID options OCT and OML

As of NA010, add options OCT and OML associated with the Rapid Messaging feature to an LTID in table LTDEF using the table editor commands ADD or CHA. These LTID options can not be added to an LTID using the SERVORD SLT ADD or SLT CHA commands. Options OCT and OML are only supported by protocol control version (PVC) functional issue 2 or greater.

Refer to Figure 17-6 for an example of using the table editor CHA command to add the option OML to an LTID in table LTDEF.

Figure 17-6 Example MAP display when using the table editor CHA command to add OML option to an LTID in table LTDEF

```
CI:
>TABLE LTDEF
TABLE LTDEF:
>POS ISDN 5 2B
ISDN 5 2B
BRAFS (NITYPE NI2) (VBD) (CMD) (PVC FUNCTIONAL 2) (DTEI) $
>CHA
LTAP: 2B
>
LTCLASS:  BRAFS
>
OPTION:  NITYPE
>
NITYPE:  NI2
>
OPTION:  PVC
>VERSION:  FUNCTIONAL
>
ISSUE:  2
>OPTION:  DTEI
>
OPTION:  TSPID
>
TSPID:  6136236767
>
OPTION:
>OML
LIMIT:
>75
OPTION:
>$
TUPLE TO BE CHANGED:
 ISDN 5 2B
BRAFS (NITYPE NI2) (PVC FUNCTIONAL 2) (DTEI) (TSPID
6136236767) (OML 75) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
TUPLE CHANGED
```

Refer to Figure 17-7 for an example of using the table editor ADD command to add the option OML to an LTID in table LTDEF.

Figure 17-7 Example MAP display when using the table editor ADD command to add OML option to an LTID in table LTDEF

```
CI:
>ADD
LTKEY:
>ISDN 100
LTAP:
>2B
LTCLASS:
>BRAFS
OPTION:
>DTEI
OPTION:
>TSPID
TSPID:
>6136237878
OPTION:
>PVC
VERSION:
>FUNCTIONAL
ISSUE:
>2
OPTION:
>NITYPE
NITYPE:
>NI2
OPTION:
>OML
LIMIT:
>75
OPTION:
>$
TUPLE TO BE ADDED:
ISDN 100 2B BRAFS (DTEI) (TSPID 6136237878)
(PVC FUNCTIONAL 2)(NITYPE NI2) (OML 75) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>y
TUPLE ADDED
```

Refer to Figure 17-8 for an example of using the table editor CHA command to add the option OCT to an LTID in table LTDEF.

Figure 17-8 Example MAP display when using the table editor CHA command to add OCT option to an LTID in table LTDEF

```
CI:
>CHA
LTKEY:
>ISDN 100
LTAP:
>2B
LTCLASS:
>BRAFS
OPTION:
>DTEI
OPTION:
>TSPID
TSPID:
>6136237879
OPTION:
>PVC
VERSION:
>FUNCTIONAL
ISSUE:
>2
OPTION:
>NITYPE
NITYPE:
>NI2
OPTION:
>OCT
TREATMENT:
>REPONLY
OPTION:
>$
TUPLE TO BE ADDED:
ISDN 100 2B BRAFS (DTEI) (TSPID 6136237879)
(PVC FUNCTIONAL 2)(NITYPE NI2) (OCT REPONLY) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>y
TUPLE ADDED
```

Refer to Figure 17-9 for an example of using the table editor ADD command to add the option OCT to an LTID in table LTDEF.

Figure 17-9 Example MAP display when using the table editor ADD command to add OCT option to an LTID in table LTDEF

```
CI:
>ADD
LTKEY:
>ISDN 150
LTAP:
>2B
LTCLASS:
>BRAFS
OPTION:
>DTEI
OPTION:
>TSPID
TSPID:
>6136237880
OPTION:
>PVC
VERSION:
>FUNCTIONAL
ISSUE:
>2
OPTION:
>NITYPE
NITYPE:
>NI2
OPTION:
>OCT
TREATMENT:
>REPCTRL
OPTION:
>$
TUPLE TO BE ADDED:
ISDN 150 2B BRAFS (DTEI) (TSPID 6136237880)
(PVC FUNCTIONAL 2)(NITYPE NI2) (OCT REPCTRL) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>y
TUPLE ADDED
```

Refer to Figure 17-10 for an example of the MAP display when the QLT command is used on an LTID to verify the presence of options OML and OCT.

Figure 17-10 Example MAP display when using the QLT command on an LTID to verify presence of options OML and OCT

```
CI:
QLT ISDN 152
-----------------------------------------------------------
LTID ISDN         152
SNPA: 613
DIRECTORY NUMBER:              6237998
LT GROUP NO: 15
LTCLASS:   BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: N    CACH: N
SLBRI: N
CS: NI2 PS: N
OML: 120
OCT: REPCNTL
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID:          6136237888
LEN: HOST  02 0 07 03    TEI: DYNAMIC
CUSTGRP:             NORTEL   SUBGRP: 0  NCOS: 0  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ CMD BOTH $ $ KSMOH
AR NOAMA $ DCC CRBL 3 3 NDNAP 6 ACB NOAMA $ TRANSFER EXP
CTALL DROP FC 3 AFC 5
   KEY          DN                   CALLTYPE
   ---          --                   --------
     1          DN       6136237998  VI & CMD

   KEY       FEATURE
   ---       -------

     1           AR NOAMA $
     1          DCC
     1         ACOU  2 2
     1         CRBL  3 3
     1          DBC   DBC_SP
     1         NDNAP 6
     2          AFC   DBC_SP
     3          AFC   DBC_SP
     4          AFC   DBC_SP
     5          AFC   DBC_sp
     6          AFC   DBC_SP
     9           FC 3
    10         DROP
    11    TRANSFER     EXP  CTALL
    12          ACB NOAMA $
    24          RLS
```

Associate a DN with the LTID using the NEW command

Use the NEW command to associate a DN with the LTID. The LTID number is added in response to the SERVORD prompt “LEN_OR_LTID.” Refer to Figure 17-11 for an example of the MAP display when using the NEW command to associate a DN with an LTID. LTID ISDN 1 in example is and NI-2 LTID.

Figure 17-11 Example of MAP display when using the NEW command

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  1 24 AM
>
DN:
>5480001
LCC_ACC:
>ISDNKSET
GROUP:
>ISDN
SUBGRP:
>0
NCOS:
>0
SNPA:
>919
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:   0
>
LEN_OR_LTID:
>ISDN 1
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 1 24 AM 5480001 ISDNKSET ISDN 0 0 919 1 Y
NILLATA 0 ISDN 1 $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
CRBL values will default to VI=1 and CMD=1.
The CHF command can be used to modify CRBL values.
NDNAP will default to 2
The CHF command can be used to modify the NDNAP value.
```

NA011 DN Call Appearance Key Independence feature

Before NA011, the number of DN appearances for non-Multiple Appearance Directory Number (MADN) DNs equaled the sum of the values provisioned for the Call Reference Busy Limit (CRBL) option. The CRBL option allows the subscriber to limit the number of active calls for voiceband information (VI) and circuit-mode data (CMD).

As of NA011, the DN Call Appearance Key Independence feature lets subscribers specify the number of DN appearances downloaded to NI-2 sets by parameter downloading. This feature removes the link between the number of DN appearances and the CRBL. DNs assigned to NI-2 sets can have a number of key appearances assigned that is less than the CRBL total. As long as the user has at least one key allocated to the DN, the CRBL values remain unchanged.

This feature implements a new option, Number of DN Appearances (NDNAP), which specifies the number of keys a DN occupies on an NI-2 set. Option NDNAP is added to a DN using the NEW command. The CHF command is used to change the NDNAP value. The subscriber can still place the number of calls up to the limits set by CRBL values. The call limit remains unchanged even though the set is provisioned for a number less than the total CRBL value.

For example, a subscriber can have a CRBL VI=2, CRBL CMD=2, yet have only two keys occupying space on the set, and still be able to place four active calls. This DN key independence provides new flexibility to the user, who can now have additional keys available for features.

The following limitations and restrictions apply to DN Call Appearance Key Independence feature:

- User can not assign more DN appearances (NDNAP value) than the total of the CRBL values.
- For DNs assigned to EKTS CACH sets, the user can not assign a NDNAP value lower the CRBL VI value.
- CACH can not be assigned to an LTID using the SLT command unless the NDNAP option is greater than or equal to the CRBL value.
- The NDNAP option can not be assigned to MADN DNs.
- Option NDNAP is incompatible with options AFC, NUMC, and MDN.
- The value for NDNAP can only be 1 for DNs in a HUNT group.
- When the value for NDNAP is not specified in the NEW command, SERVORD automatically assigns a value equal to the sum of the CRBL values.
- The NDNAP option is automatically assigned to the DN when the MADN option is deleted with the DEO command.
- The NDNAP option is automatically deleted from the DN when the MADN option is added with the ADO command.

NA011 NDNAP SERVORD examples

Figure 17-12 shows an example of using the SERVORD command NEW to add NDNAP option to an NI-2 set.

Figure 17-12 Example of the MAP display when using the NEW command to add a DN with option NDNAP to an NI-2 LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER: NOW 98 11 4 PM
>
DN:
>5221000
LCC_ACC:
>ISDNKSET
GROUP:
>ISDN
SUBGRP
>0
NCOS:
>0
SNPA:
>919
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG: 0
>
LEN_OR_LTID:
>ISDN 113
OPTKEY:
>1
OPTION:
>CRBL
VI:
>2
CMD:
>2
OPTKEY:
>1
OPTION:
>NDNAP
NDNAP:
>2
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 11 4 PM 5221000 ISDNKSET ISDN 0 0 407 1 Y
NILLATA 0 ISDN 113 (1 CRBL 2 2 ) (1 NDNAP 2) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-13 shows an example of the MAP display when using the QLT command on an NI-2 LTID that is associated with a DN with option NDNAP assigned

Figure 17-13 Example of the MAP display when using the QLT command on an NI-2 LTID associated with a DN with option NDNAP assigned

```
CI:
>QLT ISDN 113
---------------------------------------------------------
LTID:  ISDN   113
SNPA:  407
DIRECTORY NUMBER:    5221000
LT GROUP NO: 0
LTCLASS:   BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS:  N    CACH: N
SLBRI: N
CS: NI2 PS: N   TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE 2
TSPID:        9195221000
CUSTGRP:          ISDN  SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 2 2 NDNAP 2 AFC 6
OFFICE OPTIONS:
AIN LNP

  KEY      DN                    CALLTYPE
  ---      --                    --------
    1      DN          9195221000 VI & CMD
  KEY    FEATURE
  ---    -------
    1      CRBL 2 2
    1       DBC  DBC_SP
    1      NDNAP 2
    2      AFC   DBC_SP
```

Swap logical terminals

The SWLT (swap logical terminals) command swaps two logical terminals by detaching and then reattaching the terminals to each other's line equipment number (LEN). You must uniquely identify both logical terminals by their directory numbers (DN), data network addresses (DNA), or logical terminal identifiers (LTID). Only compatible terminals can be swapped.

The following notes apply to the SWLT command:

- LTIDs must be the same type of terminal for swapping.
- D-packet LTIDs must belong to the same LTGRP for swapping.
- You can not use the SWLT command on B-channel packet (PB) terminals.
- You can not swap terminals with the PHI and LTBYTE options.
- When two logical terminals are swapped, the new TEIs can be different. In this case, the TEIs must be reprogrammed.

- As of the NA009 release, the Provisioning Support for Default Service feature prevents the entry of a Default Service DN at the DN1 and DN2 prompts. The following error message displays, where <nnnnnnnnnn> is the Default Service DN:

  Default Service DN: Invalid input

  <nnnnnnnnnn>

  The following exception exists. Assume that

  — A switching system has multiple numbering plan areas (NPA) and duplicate exchange codes (NXX).

  — Translations restricts some DNs—for example, forwarding or hunt group overflow DNs—to seven digits.

  The following condition allows entry of part of a Default Service DN at a SERVORD prompt.

  The operating company attempts to enter a Default Service DN under one NPA. Under a different NPA, a forwarding or overflow DN shares the NXX and station code of the Default Service DN. That is, the seven digits of the forwarding or overflow DN are identical to those of the Default Service DN. In this event, SERVORD accepts the entry of the Default Service DN.

  This behavior is in line with existing SERVORD behavior with normal DNs. SERVORD always accepts the entry of ambiguous DNs. If a DN rejection occurs, the rejection is based on later, feature-specific checks.

- The LTIDs to be swapped must be on the same interface.

NA010 changes in swap logical terminal command

As of NA010, the SWLT command includes changes in the SERVORD prompts when it is used to swap LTIDs in the following two instances:

- The two LTIDs being swapped share a common DN
- The Duplicate NXX feature is activated.

Shared DN

Before NA010, the entry of “DNS” in response to the prompt, “FUNCTION” did not result in a SERVORD prompt for LTIDs. As of NA010, if the two LTIDs being swapped share a common DN, SERVORD prompts for LTID numbers as well as DNs when the entry “DNS” for the SWLT function is made. If the LTIDs do not share a common DN, SERVORD does not prompt for LTIDS. The entry of “LTIDS” in response to the SERVORD prompt “FUNCTION” results in the user only being prompted for “LTID1” and “LTID2”.

Figure 17-14 shows an example of the MAP display from the use of the SWLT command to swap two LTIDs that do not share a common DN.

Figure 17-14 Example of the MAP display when using the SWLT command with two LTIDs that do not share a common DN

```
CI:
>SERVORD
SO:
>SWLT
SONUMBER:   NOW 98 6 14 PM
>
FUNCTION:
>DNS
DN1:
>7235600
DN2:
>7235757
COMMAND AS ENTERED:
SWLT NOW 98 6 14 PM 7235600 7235757
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-15 shows an example of the MAP display from the use of the SWLT command to swap two LTIDs that share a common DN.

Figure 17-15 Example of the MAP display when using the SWLT command with two LTIDs that share a common DN

```
CI:
>SERVORD
SO:
>SWLT
SONUMBER: NOW 98 6 11 PM
>
FUNCTION:
>DNS
DN1:
>7235400
LTID:  ISDN 1
>ISDN 400
DN2:
>7235400
LTID2:  ISDN 1
>ISDN 200
COMMAND AS ENTERED:
SWLT NOW 98 6 11 PM DNS 7235400 ISDN 400 7235400 ISDN 200
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-16 shows an example of the MAP display when using the SWLT command with its parameter, FUNCTION, set to LTIDS to swap two LTIDs.

Figure 17-16 Example of the MAP display when using the SWLT command

```
CI:
>SERVORD
SO:
>SWLT
SONUMBER       NOW 98 6 20 PM
>
FUNCTION:
>LTIDS
LTID1:
>ISDN 400
LTID2:
>ISDN 200
COMMAND AS ENTERED:
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Duplicated NXX

As of NA010, if the Duplicate NXX feature is activated, when the SWLT command parameter FUNCTION is set to DNS, the user is required to enter the full 10-digit national DN when prompted for “DN1” and “DN2”. Failure to enter the full 10-digit number results in the following error message being displayed:

This Local DN is not Unique.

Please Use the Full National DN.

6215862

*** ERROR ***

In an office where the Duplicate NXX feature is not activated, SERVORD accepts the entry of a 7-digit DN in response to the SWLT command prompt of DN1 or DN. Figure 17-17 shows an example of the MAP display resulting from the entry of a 7-digit DN in response to the SWLT command prompt of DN1 or DN2 in an office with the Duplicate NXX feature activated. Figure 17-18 shows an example of the MAP display resulting from the entry 7-digit national DNS response to the SWLT command prompt for DN1 or DN2 in an office where the Duplicate NXX feature is not activated.

Figure 17-17 Example of MAP display as a result of using 7-digit DN in SWLT command entry in office with Duplicate NXX feature activated

```
CI:
>SO:
>SWLT
SONUMBER 98 6 11 30 PM
>
FUNCTION:
>DNS
DN1:
>6215862

This Local DN is not Unique.

Please Use the Full National DN.

6215862

*** ERROR***

|

TYPE OF DN1 IS SO_DR

PLEASE ENTER:

DN1:

>6136215862
DN2:
>6215863

This Local DN is not Unique

Please Use the Full National DN.

6215863

***ERROR***

|

TYPE OF DN2 IS SO_DR

PLEASE ENTER:

DN2:
>6136215863
COMMAND AS ENTERED:
SWLT NOW 98 6 11 30 PM DNS 6136215862 6136215863
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-18 Example of MAP display as a result of using 7-digit DN in SWLT command entry in office where Duplicate NXX feature is not activated

```
CI:
>SO:
>SWLT
SONUMBER 98 6 11 30 PM
>
FUNCTION:
>DNS
DN1:
>6215862
DN2:
>6215863
COMMAND AS ENTERED:
SWLT NOW 98 6 11 30 PM 6215862 6215863
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Query the LTID to verify the datafill using the QLT command

Before attaching the LTID to a LEN just created, view the data entry for an LTID using the QLT (query logical terminal) command as shown in Figure 17-19.

Figure 17-19 Example of using the QLT command to view the data entry for an LTID

```
 CI:
>QLT ISDN 1
-----------------------------------------------------
LTID:  ISDN       1
SNPA: 919
DIRECTORY NUMBER:     5480001
LT GROUP NO: 0
LTCLASS:  BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: Y   CACH: Y
SLBRI: N
CS: NI2 PS: N   TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL  ISSUE: 2
TSPID: 6137235011
CUSTGRP:            ISDN  SUBGRP: 0  NCOS: 0  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

   KEY       DN                       CALLTYPE
   ---       --                       --------
     1        DN          6135480001 VI & CMD

   KEY     FEATURE
   ---     -------
     1       CRBL 1 1
     1       DBC DBC_SP
     1      NDNAP 2
     2       AFC DBC_SP
--------------------------------------------------------
```

Query the LEN to which the LTID is attached using the QLEN and QLT commands

Query the LEN before the LTID is attached to it as shown in Figure 17-20. Then attach the LTID to the LEN as shown in Figure 17-23. After attaching the LTID, query the LEN using the QLEN command as shown in Figure 17-21. Also query the LTID using the QLT command as shown in Figure 17-22. This provides an opportunity to verify that all of the datafill is correct.

Figure 17-20 shows an example of the MAP display when the QLEN command is used to query the LEN before the LTID is attached to it.

Figure 17-20 Example of MAP display response to the QLEN command before the LTID has been attached

```
CI:
>QLEN 2 1 6 6
-----------------------------------------------------------
LEN:     HOST  02 1 06 06
ISG: 2 DCH: 2 ISG BRA CHANNEL: 12
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    97
PM TERMINAL NUMBER :    199

  TEI      LTID      CS    PS     BCH/ISG Bd AG_information
  ---     --------- ---    --     ---------- --------------
 ----------------------------------------------------------
```

Figure 17-21 shows an example of the MAP display when the QLEN command is used to query the LEN to after the LTID has been attached.

Figure 17-21 Example of MAP display response to the QLEN command after the LTID has been attached

```
CI:
>QLEN 2 1 6 6
------------------------------------------------------------
LEN:     HOST  02 1 06 06
ISG: 2 DCH: 2 ISG BRA CHANNEL: 12
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    97
PM TERMINAL NUMBER :    199

 TEI      LTID      CS   PS    BCH/ISG Bd  AG_information
 ---     --------- ---  ---    ---------- ---------------
DYNAMIC   ISDN   1  NI2  N        -         AG_UNASSIGNED
-----------------------------------------------------------
```

Figure 17-22 shows an example of the MAP display when the QLT command is used to query the LTID after it is attached to the LTID.

Figure 17-22 Example of MAP display response to the QLT command after the LTID has been attached to a LEN

```
 CI:
>QLT ISDN 1
-------------------------------------------------------
LTID:  ISDN        1
SNPA: 919
DIRECTORY NUMBER:     5480001
LT GROUP NO: 0
LTCLASS:  BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: Y   CACH: N
SLBRI: N
BEARER SERVICE ALLOWED:    VOICE VBD CMD
CS: NI2 PS: N
ELN: N
VERSION: FUNCTIONAL  ISSUE: 2
TSPID:6137235011
LEN: HOST  02 1 06 06    TEI: DYNAMIC
CUSTGRP:            ISDN  SUBGRP: 0  NCOS: 0  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

   KEY       DN                    CALLTYPE
   ---       --                    --------
     1       DN         6135480001 VI & CMD

   KEY     FEATURE
   ---     -------
     1     CRBL 1 1
     1      DBC  DBC_SP
     1     NDNAP 2
     2      AFC  DBC_SP

-------------------------------------------------------
```

Attach the LTID to a LEN using the SLT ATT command

Refer to Figure 17-23 for an example of the MAP display resulting from the use of the SLT ATT command.

Figure 17-23 Example of MAP display when using the SLT ATT command to attach an LTID to a LEN

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  1 24 PM
>$
LTID:
>ISDN 1
FUNCTION:
>ATT
LEN:
>2 1 6 6
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 1 24 AM ISDN 1 ATT HOST 02 1 06 06 $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Recommended key assignments for features

When assigning a feature to an ISDN set, a key assignment may be required. Some features have a fixed or recommended key assignment. Table 17-3 lists the industry recommended feature key assignments for all vendors to adopt. However, it should be noted that not all vendors of CPE equipment comply with these recommendations.

Table 17-3 Recommended key assignments

Key	Feature
57	Call Forwarding Variable
60	Flex Call 3
61	Transfer
62	Drop
63	Call Forwarding Variable

Add an option to an existing non-NI-2 ISDN line using the ADO command

The ADO command is used to add options to an existing ISDN line. AFC is a feature that is specific to ISDN LTs. Single-call capability on a DN supported by a functional terminal is known as single functional call (SFC). A call appearance is automatically assigned option SFC when it is first added to a logical terminal. Option AFC is added to existing lines on non-NI-2 ISDN sets using the ADO command as shown in Figure 17-24.

Multiple call capacity is added to the SFC DN by assigning AFC members. The AFC capacity must be assigned to the keys whose numbers immediately follow the SFC key. It is possible to assign up to five calls for each SFC DN. AFC members are identical to the corresponding SFC DN. Any MDC feature assigned against the SFC is also automatically associated with the AFC members.

Note: AFC is not allowed for NI-2 terminals. For NI-2 terminals, AFC is automatically added through option CRBL. Refer to Figure 17-39.

Figure 17-24 Example of MAP display when using the ADO command to add option AFC to an ISDN line

```
CI:
>SERVORD
SO:
>ADO
SONUMBER:     NOW  98  1 24 PM
>
DN_OR_LEN:
>ISDN 240
OPTKEY:
>1
OPTION:
>AFC
NUMCALLS:
>2
OPTKEY:
>$
COMMAND AS ENTERED:
ADO NOW 98 1 24 PM ISDN 240 ( 1 AFC 2 ) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
additional functional calls now exist on keys   2 TO   3
```

Figure 17-25 shows the MAP display when the QLT command is used to verify the adding of option AFC to the DN associated with the LTID ISDN 240.

Figure 17-25 Example of MAP display showing response to the QLT command used on LTID showing option AFC added

```
CI:
>QLT ISDN 240
-------------------------------------------------------
LTID:         240
SNPA: 613
DIRECTORY NUMBER:     5482012
LT GROUP NO: 0
LTCLASS:  BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: Y   CACH: N
SLBRI: N
BEARER SERVICES RESTRICTIONS:NOPMD
CS: Y PS: N
VERSION: FUNCTIONAL  ISSUE: 2
TSPID:     6137232525
LEN: HOST  02 1 08 06    TEI: DYNAMIC
CUSTGRP:            ISDN  SUBGRP: 0  NCOS: 0  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC

   KEY       DN
   ---       --
     1       DN             5482012

   KEY     FEATURE
   ---     -------
     2        AFC
     3        AFC
-------------------------------------------------------
```

Add an option to an existing NI-2 ISDN line using the ADO command

Call forwarding per DN per CT (CFXDNCT) is an example of an option that can be added to an NI-2 ISDN line using the ADO command. This option provisions call forwarding for BRI lines on a per DN CT basis. The supported CFW features are the following: CFU, CFI, CFF, CFB, CFD, CBU,

- CBE — Call Forward Busy External
- CBI— Call Forward Busy Intragroup
- CBU— Call Forward Busy Unrestricted
- CDE— Call Forward Do Not Answer External
- CDI— Call Forward Do Not Answer Internal
- CDU— Call Forward Do Not Answer Unrestricted
- CFB— Call Forward Busy
- CFF— Call Forward Fixed

- CFI— Call Forward Intragroup
- CFU— Call Forward Universal

The CT of a CFXDNCT feature activator can not be changed through the SERVORD CHF or ADO commands. The only way to change the CT of an existing CFXDNCT feature activator is to remove option CFXDNCT using the DEO command and then add it again with the ADO command.

CFXDNCT provisioning for voice information (VI) and circuit mode data (CMD) can not share the same feature activator key or DN appearance. Each must reside on a separate key. For example, Call Forward for VI and Call Forward for CMD can not both be provisioned on the primary DN (PDN). Only one feature can be provisioned on the PDN. The other feature can be provisioned on a feature activator with a keylist containing the PDN. Both features can be provisioned on separate feature activators with a keylist that contains the PDN.

SERVORD ensures that supported CFW features are added by option CFXDNCT if at least one appearance of CFXDNCT has been provisioned. For example, if CFU has been provisioned on an NI-2 device by option CFXDNCT, then an ADO of CFB is disallowed. CFB must also be added using CFXDNCT.

The DNs entered as the forwarding DNs are converted to a keylist by SERVORD. The check procedures for the SERVORD transaction look for all appearances of a DN CT pair on an NI-2 device and create a keylist for the CT requested.

Refer to Figure 17-26 for an example of the MAP display resulting from the use of the ADO command to add option CFXDNCT to an existing NI-2 ISDN line. Figure 17-27 shows the SERVORD DEO command used to remove CFB.

Figure 17-26 Example of MAP display when using the ADO command to add option CFXDNCT and CFU to an NI-2 ISDN line

```
 CI:
 >SERVORD
 SO:
>ADO
SONUMBER:     NOW  98  1 24 AM
>
DN_OR_LEN:
>ISDN 24
OPTKEY:
>1
OPTION:
>CFXDNCT
CALLTYPE:
>VI
CFXTYPE:
>CFU
OVRDACR:
>N
NOTIFY:
>Y
DN_OR_KEYLIST:
>KEYLIST
CFXDNCT_KEYS:
>1
CFXDNCT_KEYS:
>$
OPTKEY:
>$
COMMAND AS ENTERED:
ADO NOW 98 1 24 AM ISDN 24 ( 1 CFXDNCT VI CFU N Y
KEYLIST (1) $) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-27 Example of MAP display when using the DEO command to remove option CFB from an NI-2 ISDN line

```
CI:
>SERVORD
SO:
>DEO
SONUMBER: NOW 98 1 2 3PM
>$
DN_OR_LEN:
>ISDN 2
OPTKEY:
>14
OPTION:
>CFXDNCT
CFXTYPE:
>CFB
OPTKEY:
>$
COMMAND AS ENTERED:
DEO NOW 98 1 2 3 PM  ISDN 2 14 CFXDNCT CFB $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Refer to Figure 17-28 for an example of the MAP display resulting from the use of the QLT command to query an NI-2 ISDN line to which option CFXDNCT was added.

Figure 17-28 Example of the MAP display showing response to the QLT command used to verify the addition of option CFXDNCT to a DN associated with NI-2 LTID ISDN 24

```
CI:
>QLT ISDN 24
-----------------------------------------------------------
LTID:  ISDN        1
SNPA: 613
DIRECTORY NUMBER:     7235300
LT GROUP NO: 0
LTCLASS:  BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: N   CACH: N
SLBRI: N
CS: NI2 PS: N
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID:             6137235011
LEN: HOST  02 1 08 06    TEI: DYNAMIC
CUSTGRP:            ISDN  SUBGRP: 0  NCOS: 0  RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC CMD BOTH $ $ N VI $ $ N
CFXDNCT VI CFU N Y $ I KEYLIST 1 CRBL 1 1 NDNAP 2 AFC 5

   KEY       DN                    CALLTYPE
   ---       --                    --------
    1        DN          6137235300 VI & CMD

   KEY     FEATURE
   ---     -------
    1     CFXDNCT     VI     CFU N Y        $ I KEYLIST 1
    1        CRBL   1 1
    1          DBC    DBC_SP
    2          AFC    DBC_SP
-----------------------------------------------------------
```

NA011 Enhancement to Call Forwarding

In NA011, Call Forwarding Remote Access (CFRA) is available to ISDN BRI terminals. Support exists for CFRA on terminals with a pre-NI-2 Call Forwarding feature (CFX) or NI-2 Call Forwarding feature (CFXDNCT). CFRA provides its existing functionality to terminals with either pre-NI-2 or NI-2 Call Forwarding. This enhancement adds support for CFRA only with CFU, CFI, or CFF for both pre-NI-2 Call Forwarding (CFX) and NI-2 Call Forwarding (CFXDNCT).

The following is a list of restrictions and limitations placed on the use of CFRA with ISDN terminals:

- CRFA is available on
  - — NI-1 FITs
  - — 2B NITs and FITs
  - — NI-2 NITs and FITs
- CFRA is not supported for CFB and CFDA.
- CFRA provides remote activation and deactivation of Call Forwarding only for the voice CTs.
- The assignment of CFRA to a DN requires it to have a valid form of CFX or CFXDNCT assigned.
- CFRA can only be assigned to the VI call appearances of a DN with CFXDNCT assigned.

Add and remove option CFXVAL to an existing NI-2 line

Option CFWVAL enables the Optional Courtesy Call feature for a subscriber group. Option CFXVAL makes the Optional Courtesy Call feature available on a device basis. Option CFXVAL is exclusive to NI-2 terminals. The option is available even if a pre-NI-2 call forwarding offering is provisioned on an NI-2 terminal.

Option CFXVAL is allowed to be added to a device even if there are no CFX features or sub-features assigned to it. Option CFXVAL takes precedence over option CFWVAL. The Courtesy Call feature applies to DN appearances of the VI CT, but CFXVAL's validation functionally is available for both the VI and CMD CTs.

Figure 17-29 shows the MAP display when the ADO command is used to add option CFXVAL to an ISDN line with Courtesy Call set to Y.

Figure 17-29 Example of MAP display when using the ADO command to add option CFXVAL with Courtesy Call set to Y to an ISDN line

```
CI:
>SERVORD
SO:
>ADO
SONUMBER: NOW 98 1 22PM
>$
DN_OR_LEN:
>ISDN 6
OPTKEY:
>1
OPTION:
>CFXVAL
TERMOPT:
>Y
OPTKEY:
>$
COMMAND AS ENTERED:
ADO NOW 98 1 22 PM ISDN 6 1 CFXVAL Y $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-30 shows the MAP display when the ADO command is used to add option CFXVAL to an ISDN line with Courtesy Call set to N.

Figure 17-30 Example of MAP display when using the ADO command to add option CFXVAL with Courtesy Call set to N to an ISDN line

```
CI:
>SERVORD
SO:
>ADO
SONUMBER: NOW 98 1 22PM
>$
DN_OR_LEN:
>ISDN 7
OPTKEY:
>1
OPTION:
>CFXVAL
TERMOPT:
>N
OPTKEY:
>$
COMMAND AS ENTERED:
ADO NOW 98 1 22 PM ISDN 7 1 CFXVAL N $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-31 shows the MAP display when the DEO command is used to remove option CFXVAL from an ISDN line.

Figure 17-31 Example of MAP display when using the DEO command to remove option CFXVAL from an ISDN line

```
CI:
>SERVORD
SO:
>DEO
SONUMBER: NOW 98 1 24 PM
>$
DN_OR_LEN:
>ISDN 2
OPTKEY:
>1
OPTION:
>CFXVAL
OPTKEY:
>$
DEO $ ISDN 2 1 CFXVAL $
COMMAND AS ENTERED:
DEO NOW 98 1 24 PM ISDN 2 1 CFXVAL $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

NA012 enhancements to option CFXVAL

As of NA012, the DMS software allows the assignment of CFXVAL termination option values on a call type basis on an ISDN terminal. The assignment of termination option values applies to VI and CMD CTs. The termination option values include the following:

- ANSRQC—answer to courtesy call required with confirmation indicator
- ANSRQNC—answer to courtesy call required without confirmation indicator
- NANSR—no answer required
- NECC—do not establish a courtesy call

> ***Note:*** DMS software does not support TERMOPT values ANSRQC and ANSRQNC for the CMD CT.

Figure 17-32 shows the MAP display when the ADO command is used to add option CFXVAL to an ISDN line with Courtesy Call with the termination option for the VI CT set to ANSRQC. For additional information refer to *ISDN Service Orders for ISDN Terminals Reference Manual*, 297-2401-310.

Figure 17-32 Example of MAP display when using the ADO command to add option CFXVAL with Courtesy Call termination option for VI CTs set to NECC

```
CI:
>SERVORD
SO:
>ADO
SONUMBER: NOW 99 4 22PM
>$
DN_OR_LEN:
>ISDN 6
OPTKEY:
>1
OPTION:
>CFXVAL
CALLTYPE
>VI
TERMOPT:
>NECC
OPTKEY:
>$
COMMAND AS ENTERED:
ADO NOW 99 4 22 PM ISDN 6 1 CFXVAL NECC $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

NA012 Redirecting Number Privacy for ISDN Call Forwarding

NA012 option Redirecting Number Privacy (SUPPRND) allows an ISDN subscriber to control the privacy status of a redirected call when using features such as Call Forward Universal (CFU), Call Forward Busy (CFB), Call and Forward Don’t Answer (CFD). Additionally, when a call is redirected over a trunk as a Key Short Hunt (KSH) or Line Overflow to DN/Route (LOD/LOR), the redirecting DN will be suppressed.

To control the delivery or suppression of the redirecting number from an ISDN BRI line, the SUPPRND option must be provisioned for that DN using SERVORD commands ADO or NEW. The CHF command is used to change the SUPPRND values. When the SUPPRND option is not provisioned on the forwarding subscriber’s DN, the privacy status for the redirecting number defaults to the Calling Number Delivery (CND) option assigned to that line.

A separate SUPPRND option value for unconditional, busy, and no answer redirection call types is provisioned when using SERVORD to add option SUPPRND to a DN. CFU and the intragroup call forward variants Call Forward Fixed (CFF) and Call Forward Intragroup (CFI) use the value provisioned for unconditional redirections. For calls that the use lines, CFB uses the value established for busy redirections. For calls that use trunks, CFB, LOD, LOR, and KSH overflow cause busy reorder to be given to the subscriber. CFD uses the value provisioned for no answer redirections.

When a terminating ISDN call is redirected as a result of CFU, CFF,CFI, CFB,CFD, KSH, LOD, or LOR, the SUPPRND option datafill for that DN is used to determine whether or not to deliver or suppress the DN. The following describes the SUPPRND sub-option parameters that control the deliver of the redirecting DNs.

- SUPPRND_UNCOND—Assigns the suppression value for unconditional redirections, which CFU, CFF, and CFI cause. A value of Y means suppress the redirecting DN for unconditional redirections. A value of N means do not suppress.
- SUPPRND_BUSY—Assigns the suppression value for busy redirections which CFB causes for lines; or which CFB, LOD LOR, and KSH cause for trunks. A value of Y means suppress the redirecting DN for busy redirections. A value of N means do not suppress.
- SUPPRND_NO_ANS—Assigns the suppression value for no-answer redirections which CFD causes for lines and trunks. A value of Y means suppress the redirecting DN for the no-answer redirections. A value of N means do not suppress.

Provisioning rules for option SUPPRND

The following provisioning rules apply to the SUPPRND option:

- The SUPPRND option must be assigned to a DN key
- Multi-line (MLH) and distributed line (DLH) hunt groups
  - — The SUPPRND option is only assignable to the ISDN pilot.
  - — The SUPPRND option controls the display of the hunt group’s DN whenever the pilot or member of the group redirects a call.
  - — The SUPPRND option can not be assigned to a hunt group using SERVORD commands ADD or EST. The SERVORD command ADO must be used when assigning the SUPPRND option to a hunt group.
- Distributed line (DNH) hunt groups
  - — The SUPPRND option is assignable to any ISDN member or pilot of the hunt group.
  - — The SUPPRND assignment controls whether or not the hunt group DN is displayed on a redirected call.
- MADN groups
  - — For both MADN SCA and CACH groups, the SUPPRND option is assignable only to ISDN primary members.
  - — The SUPPRND assignment controls whether or not the MADN group DN is displayed whenever the MADN group redirects a call.

- Shared DNs—The delivery or suppression of the DN on a redirected call is handled the same way for all appearances of the DN, since the SUPPRND option is assigned on a DN basis.
- Single DN—When two DN appearances are configured on the same ISDN terminal with one DN appearance for calltype VI and the other one for calltype CMD, the SUPPRND option applies to both.

SERVORD example for option SUPPRND

Figure 17-33 is an example of the MAP display when using the SERVORD ADO command to add the SUPPRND option to an ISDN line. Refer to *ISDN Service Orders for ISDN Terminals Reference Manual*, 297-2401-310, for additional information on the SUPPRND option.

Figure 17-33 Example of MAP display when using the ADO command to add option SUPPRND to the primary DN on an ISDN terminal

```
CI:
>SERVORD
SO:
>ADO
SONUMBER: NOW 99 4 22PM
>$
DN_OR_LEN:
>ISDN 6
OPTKEY:
>1
OPTION:
>SUPPRND
NETNAME
>PRIVATE
SUPPRND_UNCOND:
>Y
SUPPRND_BUSY:
>Y
SUPPRND_NO_ANS:
>Y
NETNAME:
>$
OPTKEY:
>$
COMMAND AS ENTERED:
ADO NOW 99 4 22 PM ISDN 6 1 SUPPRND PRIVATE Y Y Y $ $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Supplementary services

This section describes the SERVORD procedures necessary to implement the supplementary service: Flexible Calling (FC).

For information on additional NI-1 Supplementary Services, refer to the *Translations Guide*, 297-8001-350.

Flexible Calling (FC)

Option FC, which assigns flexible calling to a terminal key, is assigned to the logical terminal by using the ADO command in SERVORD. An entry is automatically made in table KSETFEAT when option FC is added in SERVORD. There is one parameter, CONFSIZE, that is associated with ADO FC. Conference size (CONFSIZE), determines the number of members allowed for conference calls initiated at the terminal.

Two separate options are associated with option FC, and must be assigned with option FC to ensure proper operation of the FC feature:

- Transfer (TRANSFER), which specifies that the conference can be transferred, and defines the conditions under which it can be transferred. TRANSFER applies to NI-2 logical terminals while option XFER applies to NI-1 logical terminals.
- DROP, which enables the conference controller (that is, the initiator of the conference) to drop the last user from the conference

Conference size

When a conference request occurs, one of two types of facilities is seized for the call, either a 3-port circuit or a 6-port circuit. The 3-port facility is selected when a conference size of 3 is datafilled for the terminal. The 6-port facility is designated when a conference size larger than 3 is specified.

Unless the terminal will be used frequently for conferences, users typically find that a conference size of 3 is sufficient. Conference size is datafilled in table KSETFEAT through SERVORD.

Three-port conferences can be chained together, thus providing larger conference sizes. Any non-controlling member in a 3-port conference can place a conference on hold and establish a conference with another terminal (which can be an ISDN, POTS, MBS, or CLASS set), then retrieve the first conference and connect all parties. This action can be repeated to build a more extensive FC chain, each link in the conference chain using another 3-port circuit, until the maximum number of circuits (defined with office parameter MAX_NO_OF_3_PORTS_IN_CHAIN) is reached. (A second office parameter, NO_OF_LARGE_FTR_DATA_BLKS, is used to ensure that sufficient software resources are available for conference calls.) Both of these parameters are located in table OFCENG.

For 6-port conference facilities, the operating company is able to specify the maximum number of 6-port circuits that can be in use simultaneously by a specific customer group. This parameter (CONF6C) is specified in table CUSTENG.

Flexible calling deactivate conference facility

Option DCC (flexible calling deactivate conference facility), which enhances option FC, was added in NA009. Option DCC applies to NI-1 and NI-2 BRI terminals with the protocol version control (PVC) of functional 2. Option DCC is a set functionality.

Option DCC removes the conference facility under the following conditions:

- A member of the conference releases the connection and the conference changes from three members to two members (the controller and one member).
- The drop request changes the conference from three members to the controller and one member.
- The controller connects the conference call over a B-channel and there is only one member on the conference.
- The controller retrieves the conference call from hold and two members of the conference remain (the controller and one other member).

The assignment of DCC is made through SERVORD to the PDN of the ISDN set. The FC feature is a prerequisite. Option DCC option is assigned with the NEW or ADO commands.

Figure 17-34 shows the MAP display when the NEW command is used to add option DCC to an NI-2 ISDN line.

Figure 17-34 Example of the MAP display when using the NEW command to add DCC to an NI-2 ISDN line

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  1 24 AM
>
DN:
>5480021
LCC_ACC:
>ISDNKSET
GROUP:
>ISDN
SUBGRP:
>0
NCOS:
>0
SNPA:
>919
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:   0
>
LEN_OR_LTID:
>ISDN 23
OPTKEY:
>7
OPTION:
>FC
CONFSIZE:
>6
OPTKEY:
>1
OPTION:
>DCC
OPTKEY:
$
 COMMAND AS ENTERED:
 NEW NOW 98 1 24 AM 5480021 ISDNKSET ISDN 0 0 919 1 Y
 NILLATA 0 ISDN 23 7 FC 6 1 DCC $
 ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
 >Y
 CRBL values will default to VI=1 and CMD = 1.
 The CHF command can be used to modify the CRBL values.
 NDNAP will default to 2
 The CHF command can be used to modify the NDNAP value.
```

Detach an LTID from a LEN using the SLT DET command

Refer to Figure 17-35 for an example of the MAP display when using the SLT DET command.

Figure 17-35 Example MAP display when using the SLT DET command to detach an LTID from a LEN

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  1 24 PM
>$
LTID:
>ISDN 1
FUNCTION:
>DET
COMMAND AS ENTERED:
SLT NOW 98 1 24 AM ISDN 1 DET
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
Logical terminal ISDN 1 has been
detached from LEN HOST 02 1 06 06
```

Remove an LTID using the SLT REM command

Before using the SLT REM command, any DN associated with an LTID must be removed using the OUT command. An error message is generated if an attempt is made to use the SLT REM command on an LTID that has a DN associated with it. Refer to Figure 17-36.

Figure 17-36 Example of MAP display error when using the SLT REM command before removing the DN associated with an LTID.

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  97  10 24 PM
>$
LTID:
>ISDN 1
FUNCTION:
>REM
COMMAND AS ENTERED:
SLT NOW 97 10 24 AM ISDN 1 REM
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
This LTID has a DN assigned to it. The DN must first be
removed via the OUT command
*** ERROR *** - INCONSISTENT DATA ***
COMMAND AS ENTERED:
SLT NOW 97 10 24 AM ISDN 1 REM
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>N
```

Refer to Figure 17-37 for an example of the MAP display while using the OUT command to delete the DN associated with the LTID.

Figure 17-37 Example of MAP display when using the OUT command to remove a DN associated with an LTID

```
CI:
>SERVORD
SO:
>OUT
SONUMBER:     NOW  98  1 24 PM
>$
DN:
>7235300
LEN_OR_LTID:
>ISDN 1
INTERCEPT_NAME:
>BLDN
COMMAND AS ENTERED:
OUT NOW 98 1 24 AM ISDN 1 BLDN
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
7235300 WAS AN SFC DN WITH 1 AFC MEMBER(S)
ALL MEMBERS HAVE BEEN REMOVED
```

Figure 17-38 shows a display following the use of the SLT REM command to remove an SLT that has no associated DN.

Figure 17-38 Example of MAP display when using the SLT REM command to remove an LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  1 24 PM
>$
LTID:
>ISDN 1
FUNCTION:
>REM
COMMAND AS ENTERED:
SLT NOW 98 1 24 AM ISDN 1 REM
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Enhancement of CHG command for ISDN lines

CHG is a SERVORD command used to change certain translation attributes. These attributes include AUTH, CLLI, CONTLEN, HUNTGRP, LINE, TDR, and VFG. Not all of these apply to lines. The enhancements to the CHG command apply only to LINE attributes.

The enhancements to the CHG command made in NA009 for ISDN lines apply only to those lines that are

- in a shared DN configuration where the DN is shared between two LTIDs. The DN appearances on each LTID have a different CT. The valid CTs at present are VI for voice and PMD for packet.
- in a single LTID, shared DN configuration. This is a single DN that appears on two different keys of the same LTID with an access privilege of 2BD. The CT for the two appearances must be different with one being VI and the other PMD.

The CHG command enhancements apply to changes to line attributes including NCOS, SUBGROUP, RING, and CUSTGRP. Since each call associated with an ISDN shared or single LTID, shared DN can have a different NCOS, SUBGRP, or RING value, the DN can not be used to uniquely identify which attribute is the intended target. If a DN is entered at the DN_or_LEN prompt during use of the CHG command on an ISDN Shared or single LTID, Shared DN, the user receives the message “ISDN shared DN, enter LEN” followed by a prompt for a LEN. This allows the system to correctly target the change. This enhancement to the CHG command is consistent with the prompting that occurs when the user inputs a hunt group or MADN DN.

The only attribute that must be the same for both CTs associated with an ISDN shared or single LTID, shared DN arrangement is CUSTGRP. If the user attempts to use the CHG command to change the CUSTGRP on a shared or single LTID, shared DN arrangement, the system attempts to change it on both VI and PMD CTs. Other line attributes like NCOS or SUBGRP can be changed individually on the VI and PMD CTs of the DN. This is done by specifying the LTID and key when the DN is in a shared or single LTID, shared DN arrangement.

These enhancements to the CHG command do not apply to when the CHG command is used with

- non-ISDN lines
- ISDN lines that are not in a shared DN or single LTID, shared DN arrangement

NI-1, 2B and NI-2 provisioning tree for NA014

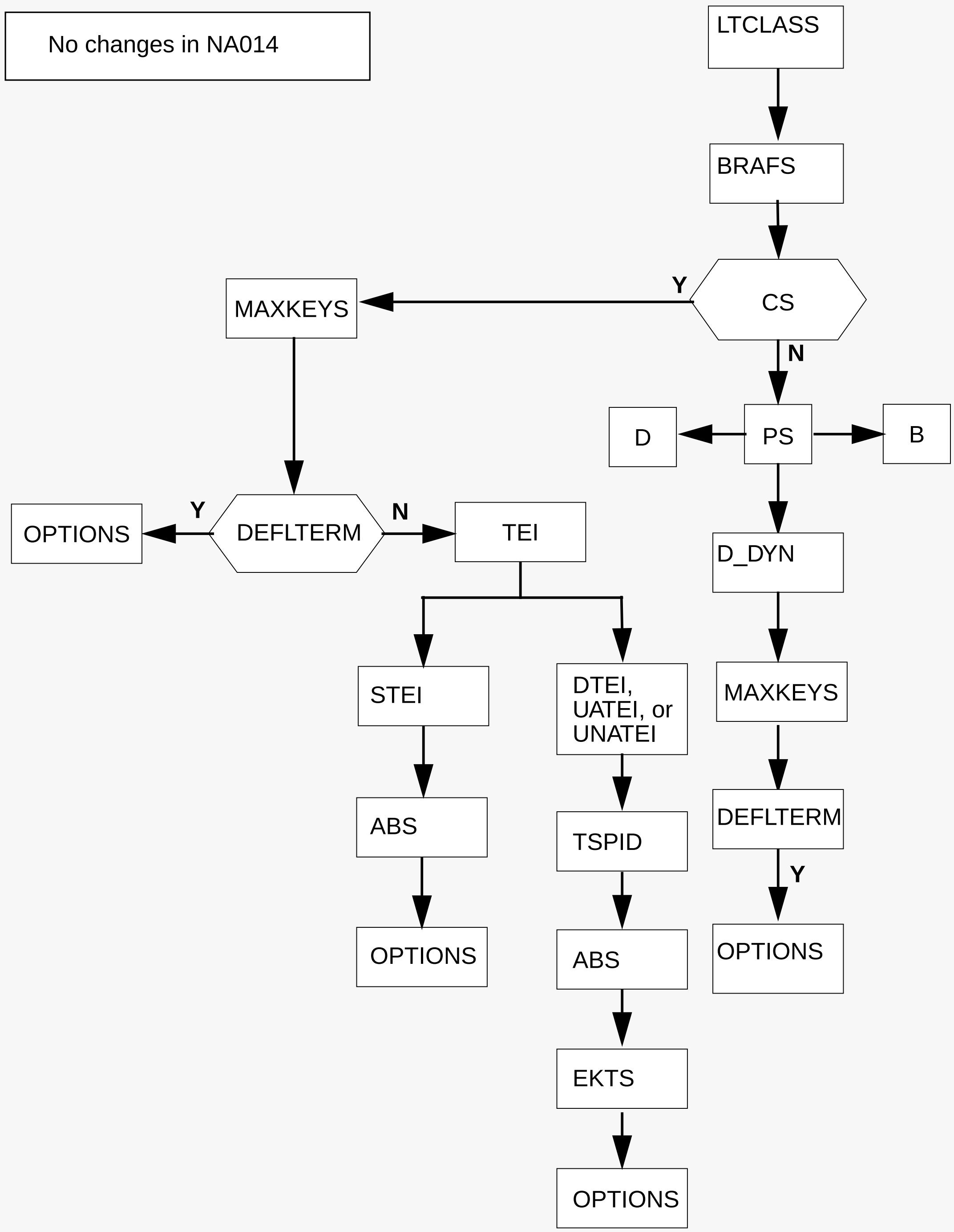
The flowcharts in Figure 17-39 through Figure 17-48 show the provisioning differences between NI-1, 2B, and NI-2 BRAFS LTIDS.

The link access privilege describes the channel access capability of an ISDN LTID; it is assigned using the SLT ADD command.

In SERVORD, when prompted for CS, the user can enter Y, 2B or NI2 to distinguish circuit switch access privileges associated with NI-1, 2B and NI-2 terminals. An entry of N indicates circuit switched services are not being assigned.

Furthermore, non-initializing terminals are distinguished by option DEFLTERM when adding a LTID using the SLT ADD command. Option DEFLTERM can be provisioned on both 1B NIT and 2B NIT LTIDs.

Figure 17-39 NI-1 SLT ADD command



Note 1: Option SPIDSFX is only applicable to Meridian feature transparency (MFT).
Note 2: Prompt TSPID is added by Free Format SPID feature.
Note 3: Option D_DYN is for packet-only NIT.

Figure 17-40 NI-1 NEW command

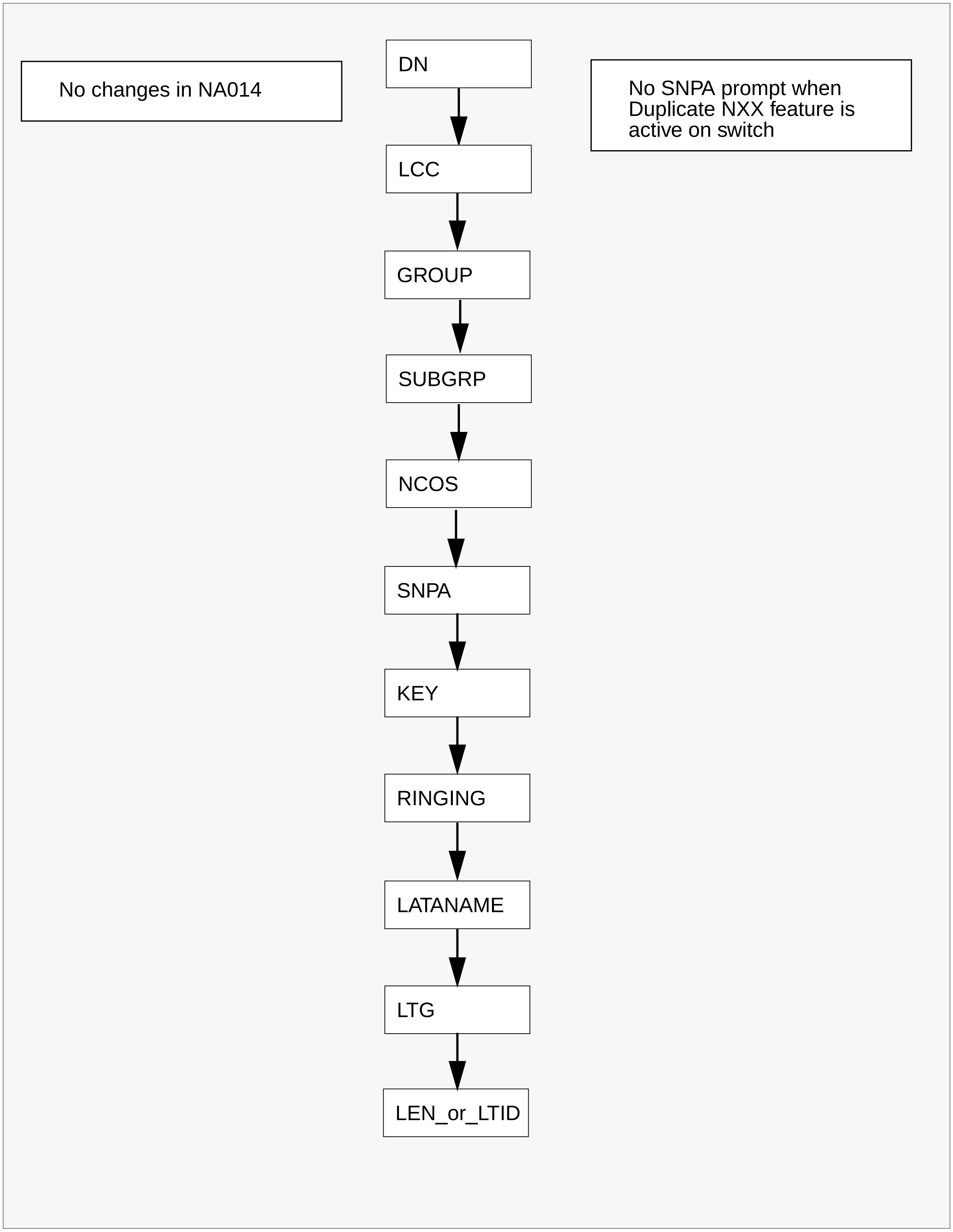
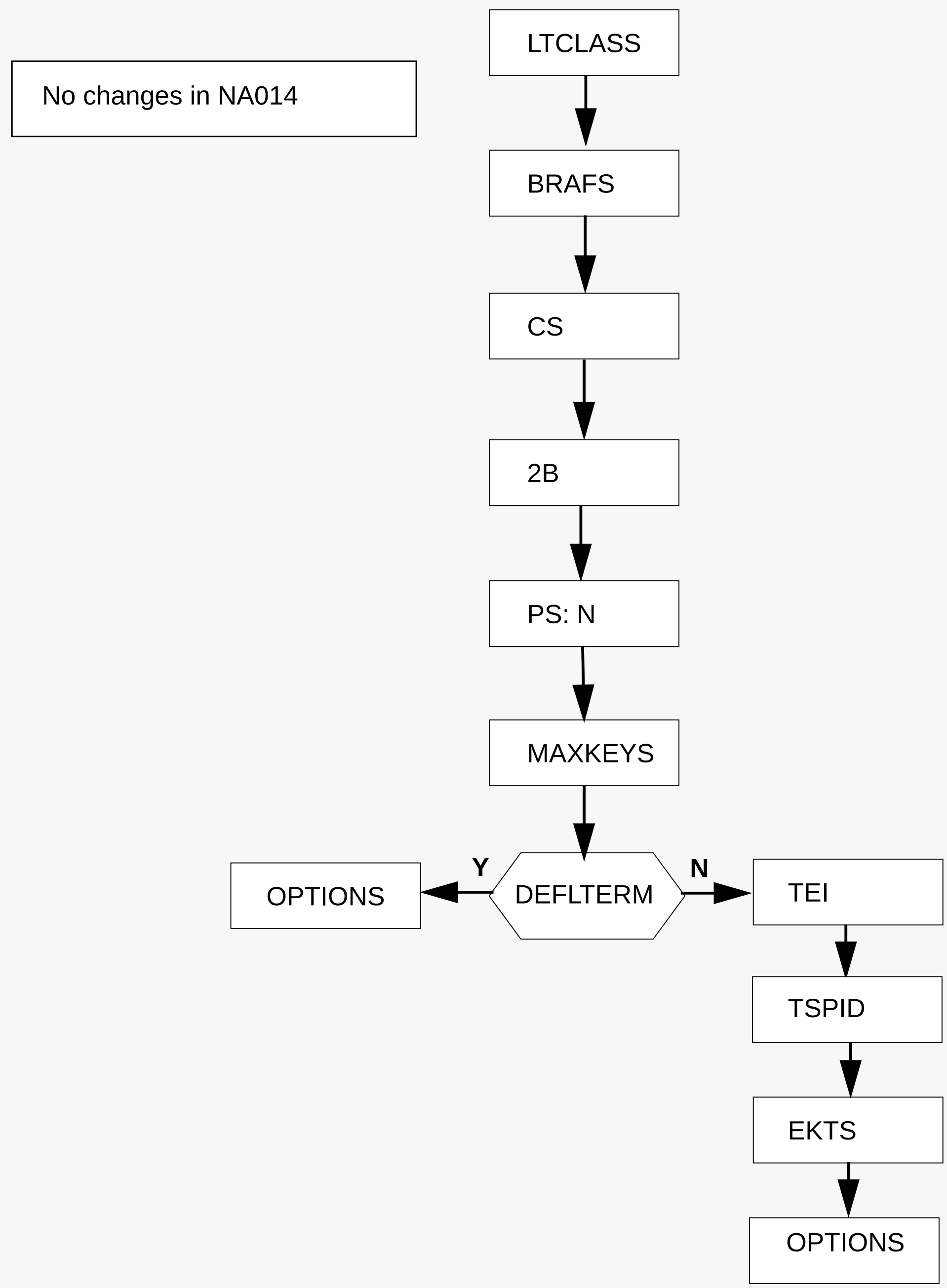


Figure 17-41 2B SLT ADD command



Note 1: Option SIDSFX is only applicable to Meridian feature transparency (MFT).
Note 2: Prompt TSPID is added by Free Format SPID feature.

Figure 17-42 2B NEW command

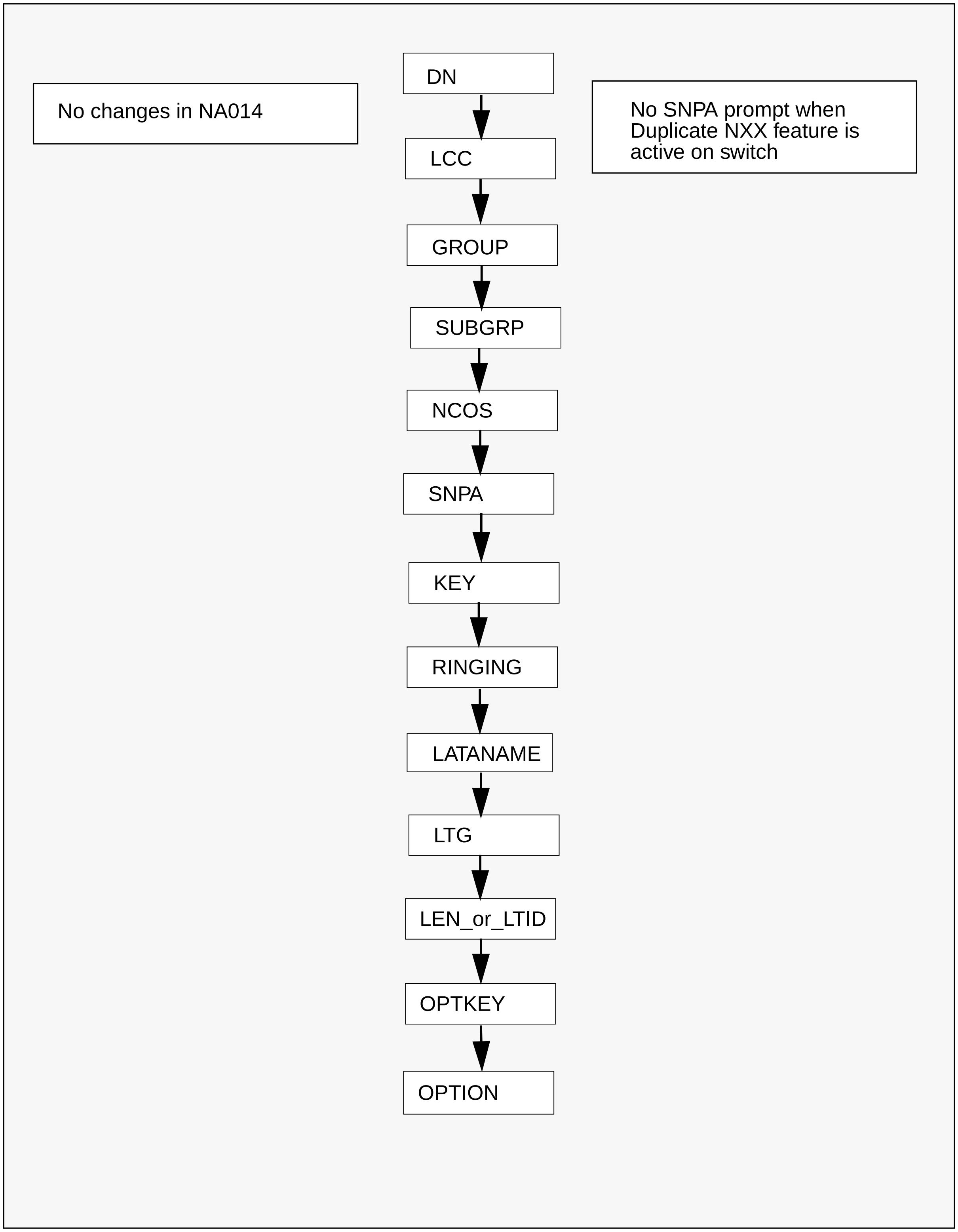


Figure 17-43 NI-2 SLT ADD command

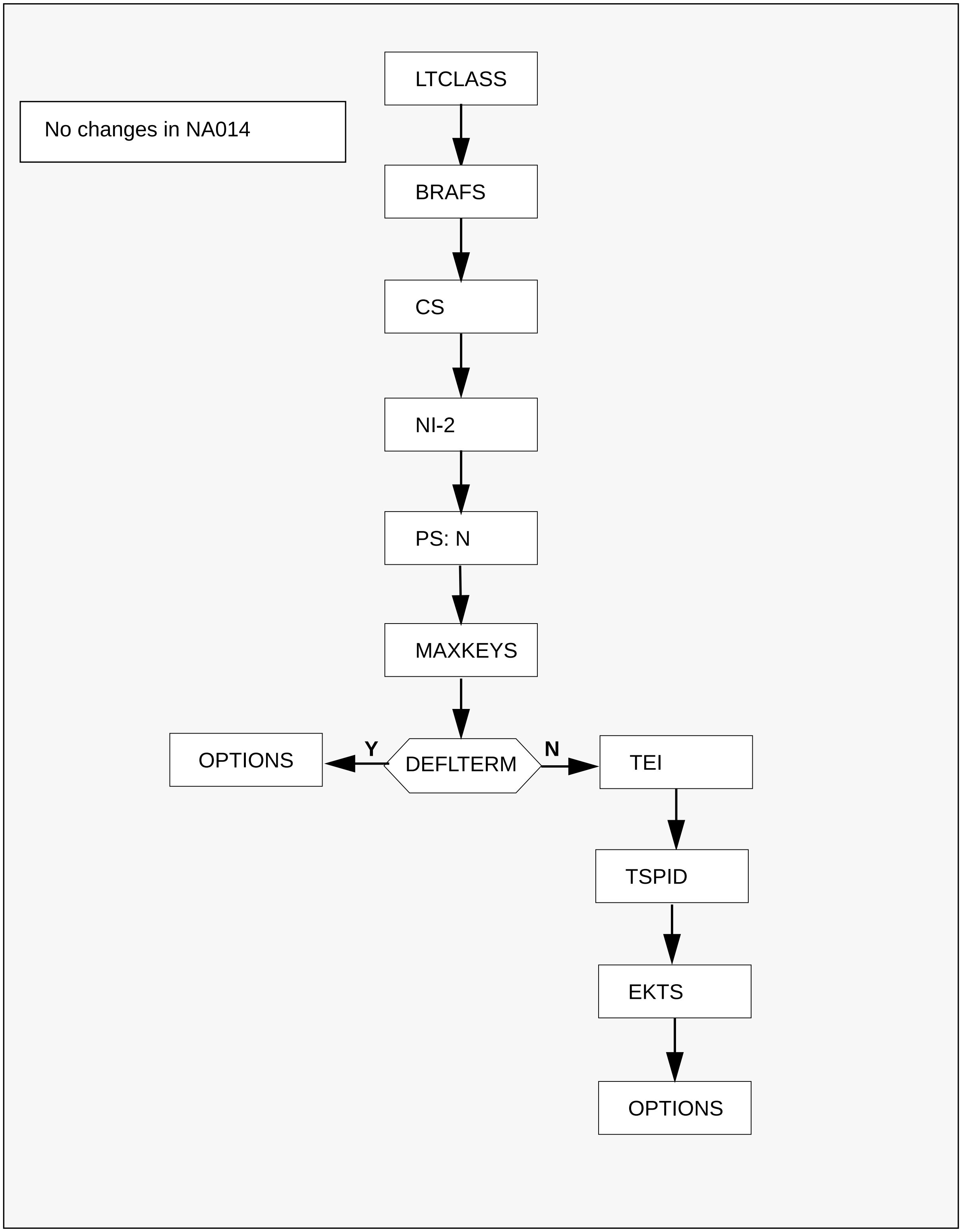


Figure 17-44 NI-2 NEW command

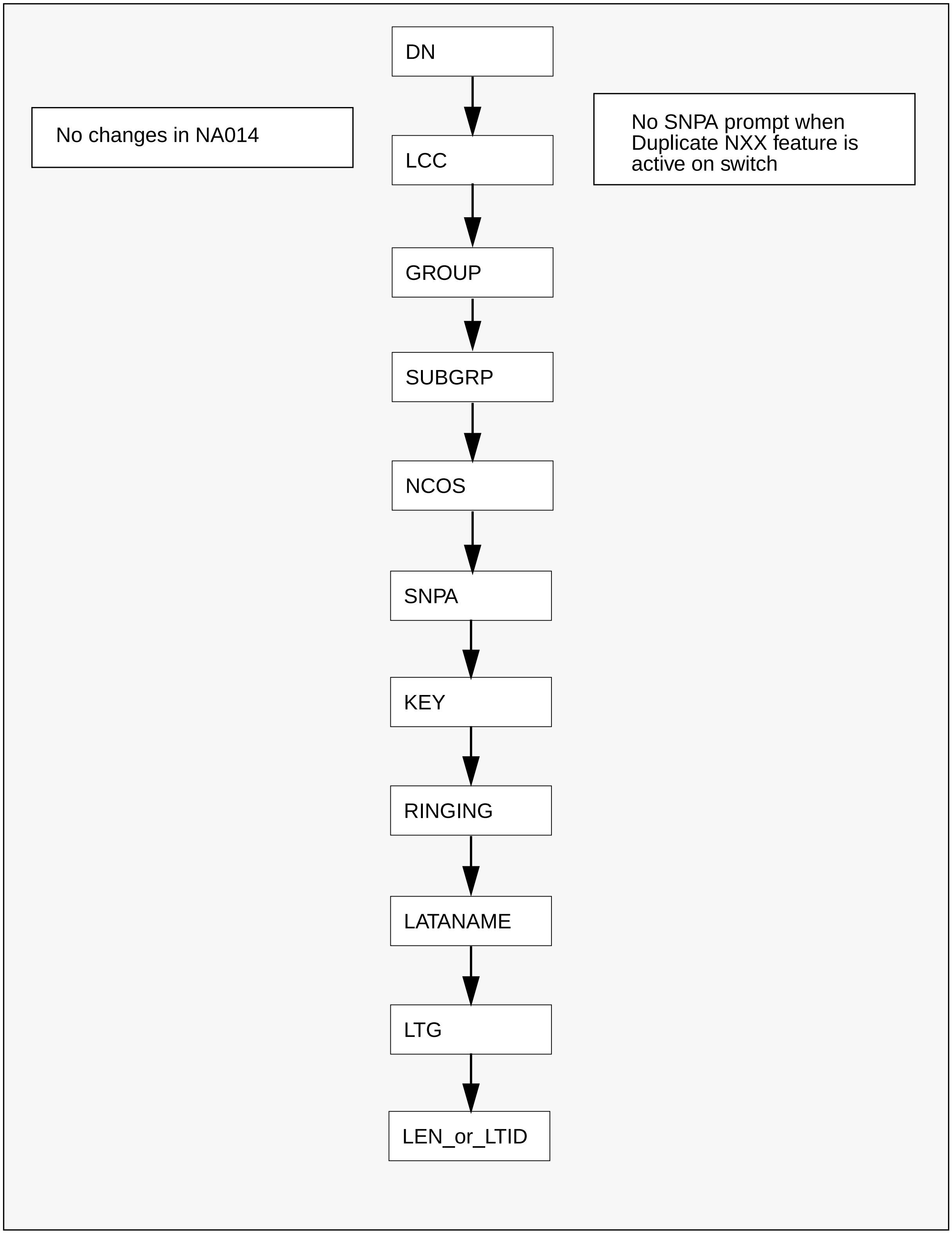
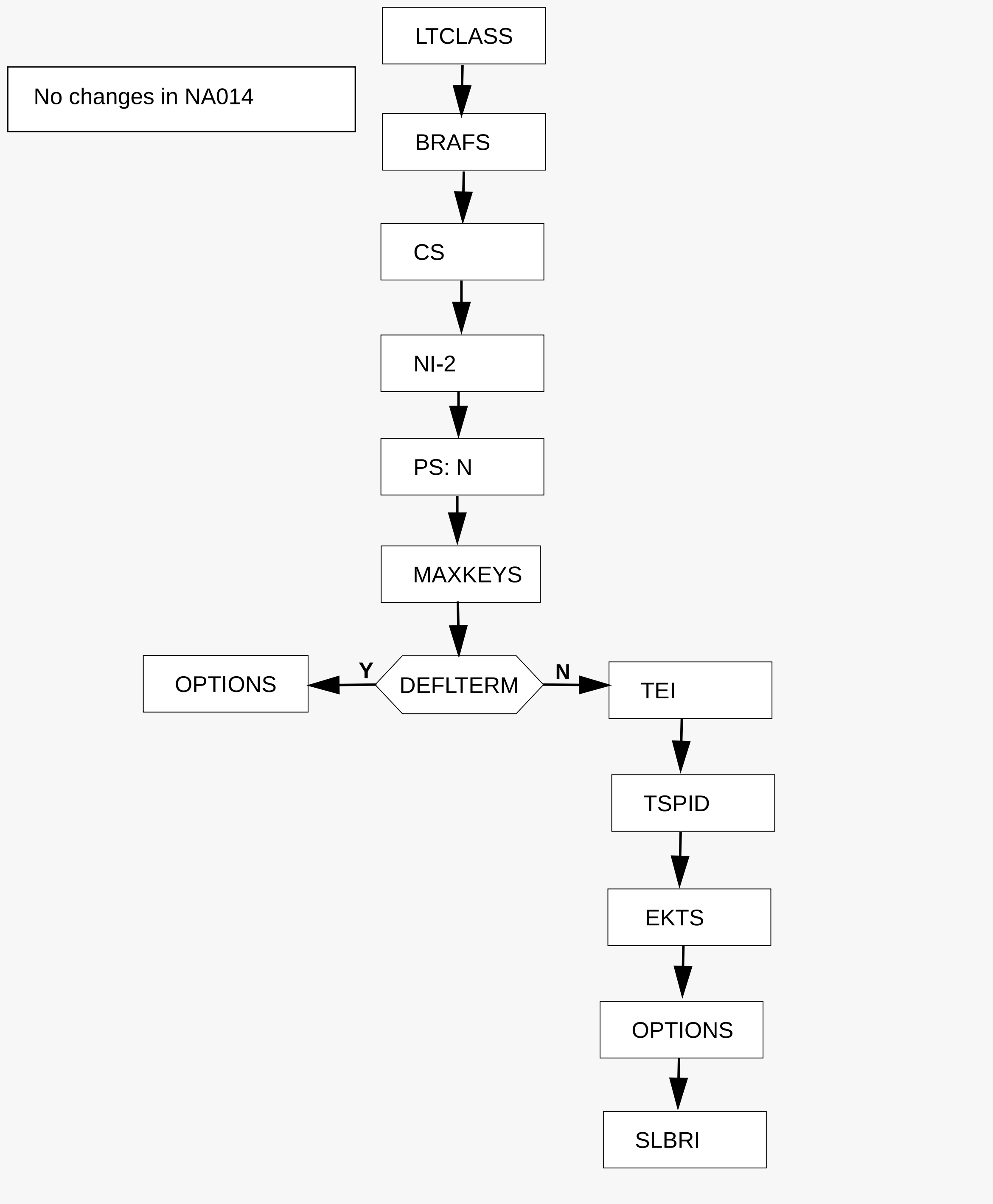
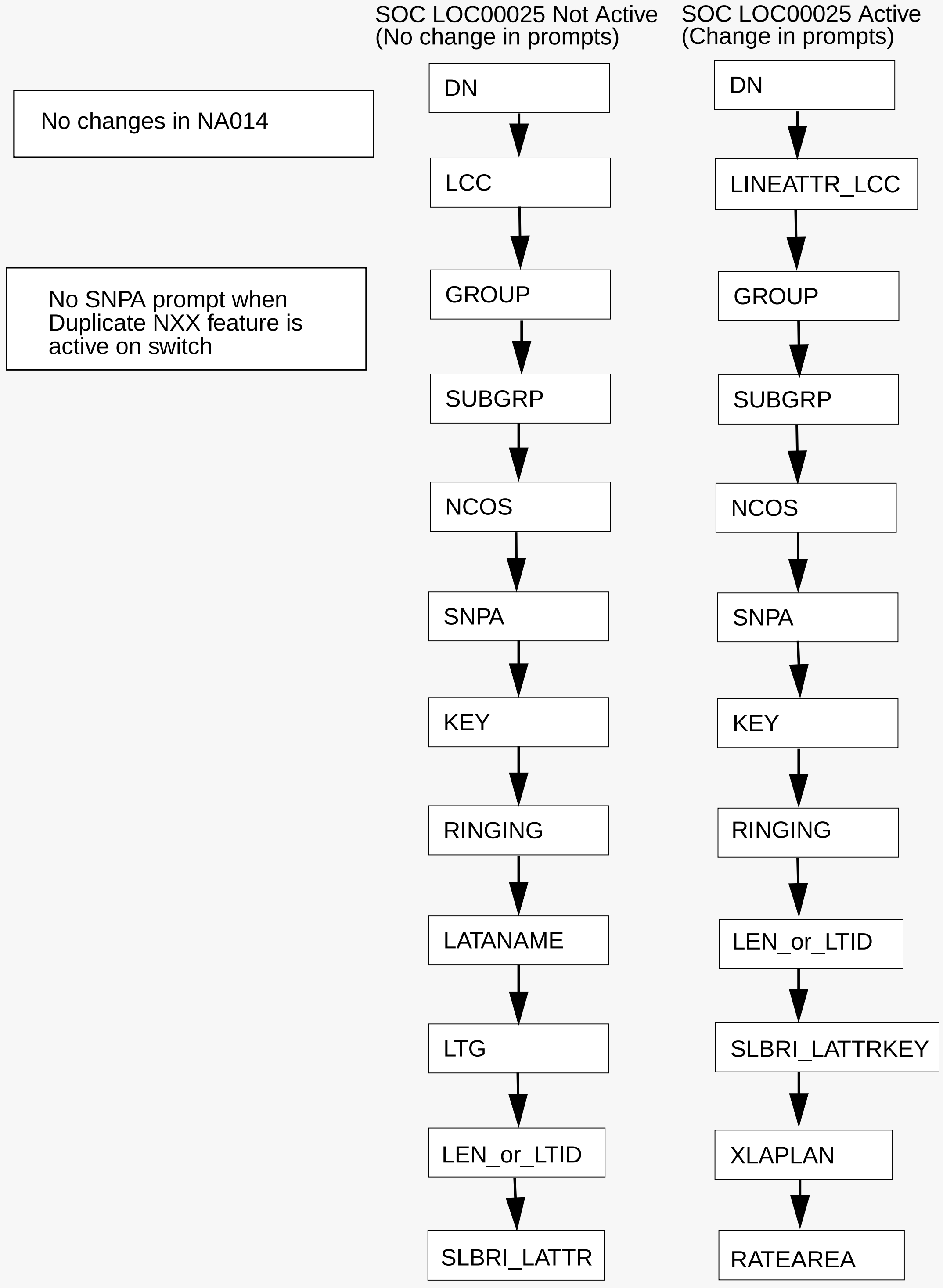


Figure 17-45 NI-2 BRI RES SLT ADD command



Note: Option SLBRI is for BRI RES lines.

Figure 17-46 NI-2 BRI RES NEW command



Note: SLIBRI_LATTR prompt is for BRI RES lines**.** Prompt only received if LTID is associated with option SLBRI.

Figure 17-47 NI-1/2B/NI-2 ATT command

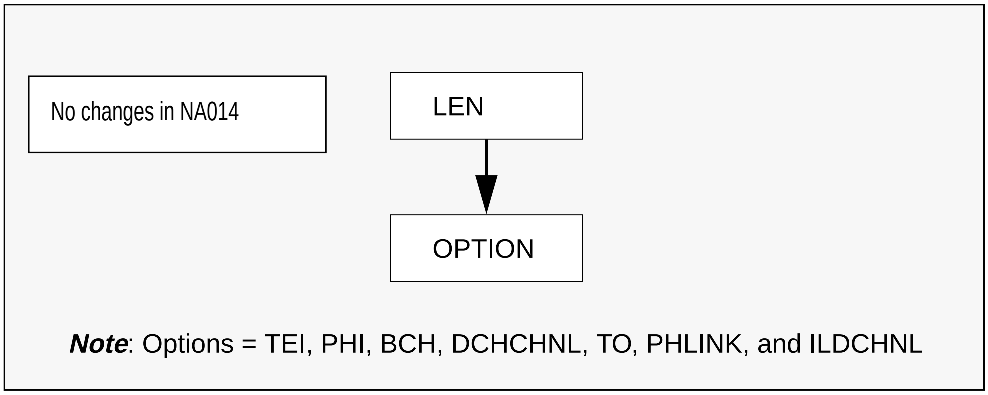
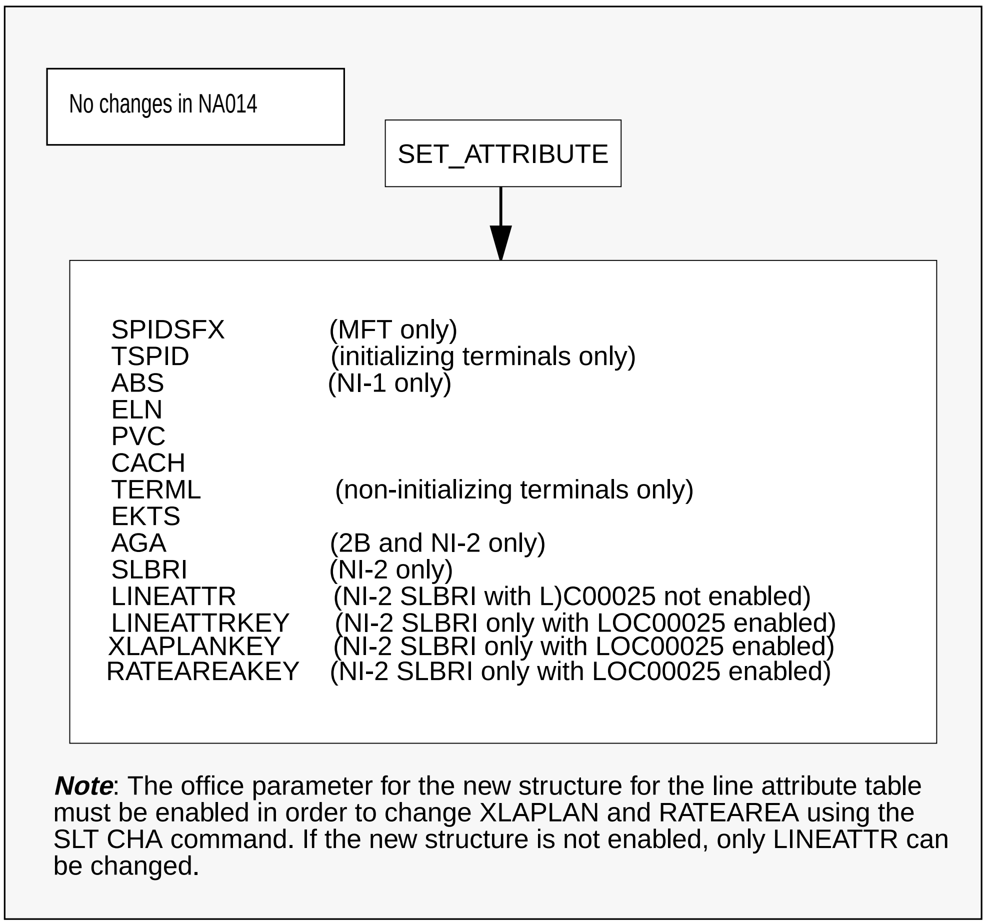


Figure 17-48 NI-1/2B/NI-2 SLT CHA command



SERVORD examples for NI-1 1B FIT Configuration

The following SERVORD examples for configuring NI-1 1B FIT sets are shown in Figure 17-49 through Figure 17-53:

- SLT ADD command used to add NI-1 1B FIT LTID
- NEW command used to add DN associated with the NI-1 1B FIT LTID
- QLT command used to query the NI-1 1B FIT LTID
- SLT ATT command used to attach the NI-1 1B FIT LTID to LEN
- QLEN command used to query the LEN associated with the NI-1 1B FIT LTID

Figure 17-49 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-1 1B FIT configuration.

Figure 17-49 Example of MAP display when using the SLT ADD command to add an NI-1 1B FIT LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  2  6 AM
>$
LTID:
>ISDN 201
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>Y
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI
TSPID:
>6137235020
ABS:
>VOICE
ABS:
>$
EKTS:
>N
OPTION:
>PVC
VERSION:
>FUNCTIONAL
ISSUE:
>2
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 201 ADD BRAFS Y N 64 N DTEI
6137235020(VOICE) $ N (PVC FUNCTIONAL 2) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
```

Figure 17-50 shows an example of the MAP display when the NEW command is used to add the DN associated with NI-1 1B FIT configuration LTID ISDN 201.

Figure 17-50 Example of MAP display when using the NEW command to add a DN associated with an NI-1 1B FIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  2  6 AM
>
DN:
>7235900
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 201
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 97 2 6 AM 7235900 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 201
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-51 shows an example of the MAP display when the QLT command is used to query NI-1 1B FIT LTID ISDN 201.

Figure 17-51 Example of MAP display showing response to the QLT command used on an NI-1 1B FIT LTID

```
CI:
>QLT ISDN 201
---------------------------------------------------
LTID: ISDN 201
SNPA: 613
DIRECTORY NUMBER:7235900
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: N CACH: N
SLBRI: N
BEARER SERVICE ALLOWED: VOICE
CS: Y  PS: N   TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID:    6137235020
CUSTGRP:  NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC

KEY       DN
---       --
1         DN    7235900

KEY       FEATURE
---       -------
    NONE
--------------------------------------------------
```

Figure 17-52 shows an example of the MAP display when the NI-1 1B FIT LTID is attached to a LEN using the SLT ATT command.

Figure 17-52 Example of MAP display when using the SLT ATT command to attach an NI-1 1B FIT LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 2 6 AM
>
LTID:
>ISDN 201
FUNCTION:
>ATT
LEN:
>1 1 8 23
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 201 ATT HOST 01 1 08 23 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-53 shows an example of the MAP display when the QLEN command is used to query LEN to which an NI-1 1B FIT LTID is attached.

Figure 17-53 Example of MAP display showing response to the QLEN command used on a LEN with an NI-1 1B FIT LTID attached

```
CI:
>QLEN 1 1 8 23
----------------------------------------------------------
LEN:      HOST 01 1 08 23
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 35
PM TERMINAL NUMBER: 280

TEI      LTID         CS    PS    BCH/ISG Bd AG_information
---     ---------     --   ---   ----------   -------------
DYNAMIC ISDN 201      Y     N
---------------------------------------------------------
```

SERVORD examples for NI-1 1B NIT configuration

The following SERVORD examples for configuring NI-1 1B NIT sets are shown in Figure 17-54 through Figure 17-58:

- SLT ADD command used to add an NI-1 1B NIT LTID
- NEW command to used to add a DN associated with the NI-1 1B NIT LTID
- QLT command used to query an NI-1 1B NIT LTID

- SLT ATT command used to attach the NI-1 1B NIT LTID to LEN
- QLEN command used to query the LEN associated with the NI-1 1B NIT LTID

Figure 17-54 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-1 1B NIT configuration.

Figure 17-54 Example of MAP display when using the SLT ADD command to add an NI-1 1B NIT LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  2  6 AM
>$
LTID:
>ISDN 211
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>Y
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>Y
ABS:
>VOICE
ABS:
>$
OPTION:
>PVC
VERSION:
>FUNCTIONAL
ISSUE:
>2
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 211 ADD BRAFS Y N 64 Y (VOICE) $
(PVC FUNCTIONAL 2) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-55 shows an example of the MAP display when the NEW command is used to add a DN associated with NI-1 1B NIT configuration LTID ISDN 211.

Figure 17-55 Example of MAP display when using the NEW command to add a DN associated with an NI-1 1B NIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  2  6 AM
>$
DN:
>7235800
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 211
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 2 6 AM 7235800 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 211
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-56 shows an example of the MAP display when the QLT command is used to query the NI-1 1B NIT LTID ISDN 201.

Figure 17-56 Example of MAP display showing response to the QLT command used on an NI-1 1B NIT LTID

```
CI:
>QLT ISDN 211
--------------------------------------------------
LTID: ISDN 211
SNPA: 613
DIRECTORY NUMBER:  7235800
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:Y
EKTS: N CACH: N
BEARER SERVICE ALLOWED: VOICE
CS: Y PS: N TEI: UNATEI
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
CUSTGRP:         NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC

KEY       DN
---       --
1         DN    7235800

KEY       FEATURE
---       -------
    NONE
--------------------------------------------------
```

Figure 17-57 shows an example of the MAP display when the NI-1 1B NIT LTID is attached to a LEN using the SLT ATT command.

Figure 17-57 Example of MAP display when using the SLT ATT command to attach an NI-1 1B NIT LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 2 6 AM
>
LTID:
>ISDN 211
FUNCTION:
>ATT
LEN:
>1 1 8 25
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 211 ATT HOST 01 1 08 25 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-58 shows an example of the MAP display when the QLEN command is used to query a LEN to which an NI-1 1B NIT LTID is attached.

Figure 17-58 Example of MAP display showing response to the QLEN command used on a LEN with an NI-1 1B NIT LTID attached

```
CI:
>QLEN 1 1 8 25
-----------------------------------------------------------
LEN:  HOST 01 1 08 25
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 35
PM TERMINAL NUMBER: 280

TEI     LTID        CS   PS   BCH/ISG Bd  AG__information
---     ----------  --   --   -----------   --------------
UNATEI  ISDN  201    Y   N

-----------------------------------------------------------
```

SERVORD examples for dynamic TEI packet-only NIT

The following SERVORD examples for configuring a dynamic TEI packet-only NIT are shown in Figure 17-59 through Figure 17-72:

- SLT ADD command used to add a dynamic TEI packet-only NIT LTID
- NEW command used to add a DN associated with a dynamic TEI packet-only NIT LTID
- SLT ATT command used to associate a dynamic TEI packet-only NIT LTID with a LEN
- QLEN command used to query a LEN associated with a dynamic TEI packet-only NIT LTID
- QLT command used to query a dynamic TEI packet-only NIT LTID

Figure 17-59 shows an example of the MAP display when the SLT ADD command is used to add dynamic TEI packet-only NIT LTID.

Figure 17-59 Example of MAP display when using the SLT command to add a dynamic TEI packet-only NIT LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98 2  6 AM
>$
LTID:
>ISDN 202
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>N
PS:
>D_DYN
MAXKEYS:
>64
DEFLTERM:
>Y
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 202 ADD BRAFS N D_DYN 64 Y $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-60 shows an example of the MAP display when the NEW command is used to add a DN associated with dynamic TEI packet-only LTID ISDN 202.

Figure 17-60 Example of MAP display when using the NEW command to add a DN associated with a dynamic TEI packet-only NIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98 2  6 AM
>$
DN:
>7236000
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>N
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 202
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 2 6 AM 7236000 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 202
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-61 shows an example of the MAP display when the SLT ATT command is used to used to associate dynamic TEI packet-only LTID ISDN 202 with a LEN.

Figure 17-61 Example of MAP display when using the SLT command to associate a dynamic TEI packet-only NIT LTID with a LEN

```
CI:
>SERVORD
SO:
>SLT
SONUMBER: NOW 98 12 18 AM
>
LTID:
>LTID 202
FUNCTION:
>ATT
LEN:
>1 0 0 8
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 12 18 AM ISDN 202 ATT HOST 01 0 00 08 $

ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
```

Figure 17-62 shows an example of the MAP display when the QLEN command is used to query the LEN to which dynamic TEI packet-only LTID 202 is attached.

Figure 17-62 Example of MAP display showing response to the QLEN command used on a LEN with a dynamic TEI packet-only NIT LTID attached

```
CI:
>QLEN 1 0 0 8
------------------------------------------------------
LEN: HOST 01 0 00 08
ISG:0 DCH: 0 ISG BRA CHANNEL:1
CARDCODE: BX27AA PADGRP:NPDGP
PM NODE NUMBER : 34
PM TERMINAL NUMBER : 9

 TEI     LTID          CS PS BCH/ISG Bd  AG_information
----     -----         -- -- ---------- ----------------
UNATEI   ISDN 202      N D_DYN ISG Bd:29
-------------------------------------------------------
```

Figure 17-63 shows an example of the MAP display when the QLT command is used to query dynamic TEI packet-only NIT LTID ISDN 202.

Figure 17-63 Example of MAP display showing response to the QLT command used on a dynamic TEI packet-only NIT LTID ISDN 202

```
CI:
>QLT ISDN 202
---------------------------------------------------
LTID: ISDN 202
SNPA:613
DIRECTORY NUMBER:  7236000
LT GROUP NO:  8
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:Y
EKTS: N CACH: N
SLBRI: N
CS: N PS:D_DYN TEI: UNATEI
ELN: N
TERML: 1
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: N
MAXKEYS:2
OPTIONS:
NONE
  KEY       DN
  ---       --
   1         DN      9197236000

   KEY     FEATURE
   ---     --------
      NONE
---------------------------------------------------
```

SERVORD examples for NI-1 2B FIT configuration

The following SERVORD examples for configuring NI-1 2B FIT sets are shown in Figure 17-64 through Figure 17-68:

- SLT ADD command used to add a NI-1 2B FIT LTID
- NEW command used to add a DN associated with an NI-1 2B FIT LTID
- QLT command used to query a NI-1 2B FIT LTID
- SLT ATT command used to attach an NI-1 2B FIT LTID to a LEN
- QLEN command used to query a LEN associated with an NI-1 2B FIT LTID

Figure 17-64 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-1 2B FIT configuration.

Figure 17-64 Example of MAP display when using the SLT ADD command to add an NI-1 2B FIT LTID

```
CI:
>SERVORD
 SO:
>SLT
SONUMBER:     NOW  98  2  6 AM
>$
LTID:
>ISDN 221
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>2B
PS: N
>
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE:
>DTEI
TSPID:
>6137235025
EKTS:
>N
OPTION:
>PVC
VERSION:
>FUNCTIONAL
ISSUE:
>2
OPTION:
$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 221 ADD BRAFS 2B N 64 N DTEI
6137235025 PVC FUNCTIONAL 2 $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-65 shows an example of the MAP display when the NEW command is used to add a DN associated with NI-1 2B FIT configuration LTID ISDN 221.

Note: For 2B sets, options VI and CMD are automatically assigned.

Figure 17-65 Example of MAP display when using the NEW command to add a DN associated with an NI-1 2B FIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  2  6 AM
>$
DN:
>7235600
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 221
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 2 6 AM 7235600 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 221
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-66 shows an example of the MAP display when the QLT command is used to query NI-1 2B FIT LTID ISDN 221.

Figure 17-66 Example of MAP display showing response to the QLT command used on an NI-1 2B FIT LTID ISDN 221

```
CI:
>QLT ISDN 221
---------------------------------------------------
LTID: ISDN 221
SNPA: 613
DIRECTORY NUMBER:     7235600
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: N CACH: N
SLBRI: N
CS: 2B PS: N TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID:6137235025
CUSTGRP:  NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD $ $ N

KEY       DN                CALLTYPE
---       --                --------
1         DN     6137235600 VI-CMD

KEY       FEATURE
---       -------
    NONE
--------------------------------------------------
```

Figure 17-67 shows an example of the MAP display when the NI-1 2B FIT LTID is attached to a LEN using the SLT ATT command.

Figure 17-67 Example of MAP display when using the SLT ATT command to attach a NI-1 2B FIT LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 2 6 AM
>
LTID:
>ISDN 221
FUNCTION:
>ATT
LEN:
>1 1 8 23
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 221 ATT HOST 01 1 08 23 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-68 shows an example of the MAP display when the QLEN command is used to query the LEN to which an NI-1 2B FIT LTID is attached.

Figure 17-68 Example of MAP display showing response to the QLEN command used on a LEN with an NI-1 2B FIT LTID attached

```
CI:
>QLEN 1 1 8 23
----------------------------------------------------------
LEN:      HOST 01 1 08 23
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 35
PM TERMINAL NUMBER: 280

TEI       LTID       CS    PS    BCH/ISG Bd AG_information
---      ------      --    --    ----------  --------------
DYNAMIC  ISDN  221   2B    N     -           AG_UNASSIGNED

---------------------------------------------------------
```

SERVORD examples for NI-1 2B NIT configuration

The following SERVORD examples for configuring NI-1 2B NIT sets are shown in Figure 17-69 through Figure 17-73:

- SLT ADD command used to add an NI-1 2B NIT LTID
- NEW command used to add DN associated with an NI-1 2B NIT LTID
- QLT command used to query an NI-1 2B NIT LTID

- SLT ATT command used to attach an NI-1 2B NIT LTID to a LEN
- QLEN command used to query a LEN associated with an NI-1 2B NIT LTID

Figure 17-69 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-1 2B NIT configuration.

Figure 17-69 Example of MAP display when using the SLT ADD command to add an NI-1 2B NIT LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  2  6 AM
>$
LTID:
>ISDN 231
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>2B
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>Y        <- Entering Y here will define this line as
a NIT and automatically define the TEI as a UNATEI.
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 231 ADD BRAFS 2B N 64 Y $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

In the example shown in Figure 17-69, the option PVC was omitted. A default PVC version of FUNCTIONAL and PVC issue of 2 will be used.

Figure 17-70 shows an example of the MAP display when the NEW command is used to add a DN associated with NI-1 2B NIT configuration LTID ISDN 231.

> ***Note:*** For 2B sets, options VI and CMD are automatically assigned.

Figure 17-70 Example of MAP display when using the NEW command to add a DN associated with an NI-1 2B NIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:      NOW  98  2  6 AM
>$
DN:
>7235500
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 231
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 2 6 AM 7235500 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 231
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-71 shows an example of the MAP display when the QLT command is used to query NI-1 2B NIT LTID ISDN 231.

Figure 17-71 Example of MAP display showing response to the QLT command used on an NI-1 2B NIT LTID ISDN 231

```
CI:
>QLT ISDN 231
---------------------------------------------------
LTID: ISDN 231
SNPA: 613
DIRECTORY NUMBER:     7235500
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:Y
EKTS: N CACH: N
SLBRI: N
CS: 2B PS: N
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N


KEY       DN                CALLTYPE
---       --                --------
1         DN    6137235500  VI-CMD

KEY       FEATURE
---       -------
    NONE
----------------------------------------------------
```

Figure 17-72 shows an example of the MAP display when the NI-1 2B NIT LTID is attached to a LEN using the SLT ATT command.

Figure 17-72 Example of MAP display when using the SLT ATT command to attach an NI-1 2B NIT LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 2 6 AM
>
LTID:
>ISDN 231
FUNCTION:
>ATT
LEN:
>1 1 8 23
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 231 ATT HOST 01 1 08 23 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-73 shows an example of the MAP display when the QLEN command is used to query the LEN to which an NI-1 2B NIT LTID is attached.

Figure 17-73 Example of MAP display showing response to the QLEN command used on a LEN with an NI-1 2B NIT LTID attached

```
CI:
>QLEN 1 1 8 23
------------------------------------------------------
LEN:      HOST 01 1 08 23
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 35
PM TERMINAL NUMBER: 280

TEI     LTID     CS    PS    BCH/ISG Bd  AG_information
---     ------   --    --    ---------- ---------------
UNATEI ISDN 231  2B    N    -           AG_UNASSIGNED
-------------------------------------------------------
```

NI-2 set SERVORD defaults

The following NI-2 set options are assigned default values by the switching system:

- PVC is automatically entered with version set to FUNCTIONAL and issue set to 2 unless otherwise entered in SERVORD by specifying option PVC. If option PVC is not entered in SERVORD, the following message displays, “The PVC option was omitted. A default PVC version of FUNCTIONAL and PVC issue of 2 will be used.”

- VI (voice information) and CMD (circuit mode data) are automatically assigned by the system as parameters of option CRBL. Both VI and CMD are assigned a default value of 1. The CHF command can be used to change the values assigned to VI and CMD. The values for VI and CMD are 0-16.
- CRBL (call reference busy limit) and DBC (default bearer capability) are automatically assigned as options with default values. If the CRBL VI value is a number other than 0, all DBC values default to DBC_SP. This applies to NI-2 FIT sets only.
- If the CRBL VI value is 0 and the DBC value in table DNATTRS is BC_64KDATA, all DBC values default to DBC_64K.

  Note: The default DBC that is assigned to each DN appearance or AFC key on an NI-2 FIT can be changed using the CHF command.

- As of NA011, the NEW command automatically assigns option NDNAP (number of DN call appearances) to the line with a value equal to the sum of the CRBL values. This applies only to NI-2 ISDN sets.

Allowable NI-2 terminal configurations

As of NA008, an NI-2 interface is capable of supporting up to eight non-initializing terminals and two fully initializing terminals in the following configurations:

- two NI-2 fully initializing terminals (NI-2 FIT)
- eight NI-2 non-initializing terminals (NI-2 NITs)
- one NI-2 FIT and up to seven NI-2 NITs

As of NA009, an NI-2 interface is capable of supporting the following NI-2 interface configurations:

- up to eight NI-2 FITs
- any combination of NI-2 FITs and NITs whose sum total does not exceed 8

If an attempt is made to exceed this limitations when using the ATT command, the user receives the following message:

ERROR - Can not attach anymore Logical Terminals to the specified LEN - Engineering limits have been reached.

If an attempt is made to use the NEW command to associate a DN with an existing LTID that is attached to an XPM that has exceeded the engineering limitations for allowable DNs per peripheral, the user receives the following message:

ERROR - Can not add anymore DNs to the specified Logical Terminal - Engineering limits have been reached.

Figure 17-74 through Figure 17-79 illustrate the various ISDN configurations supported in NA008.

Figure 17-74 One 2 B-channel FIT

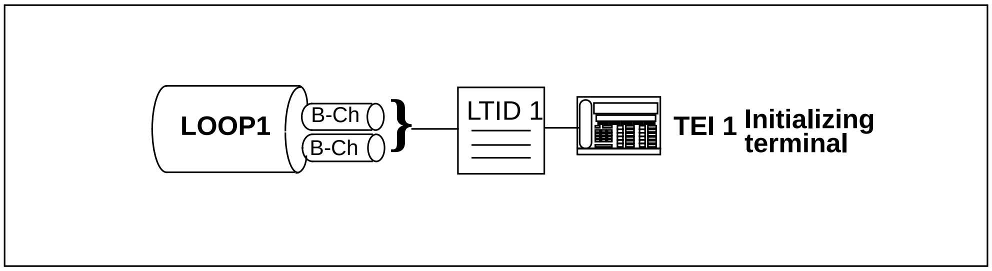


Figure 17-75 One 2 B-channel NIT

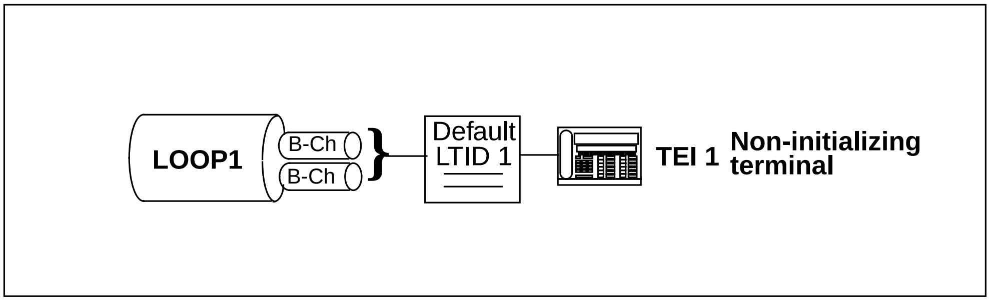


Figure 17-76 Two 1B-channel FITs

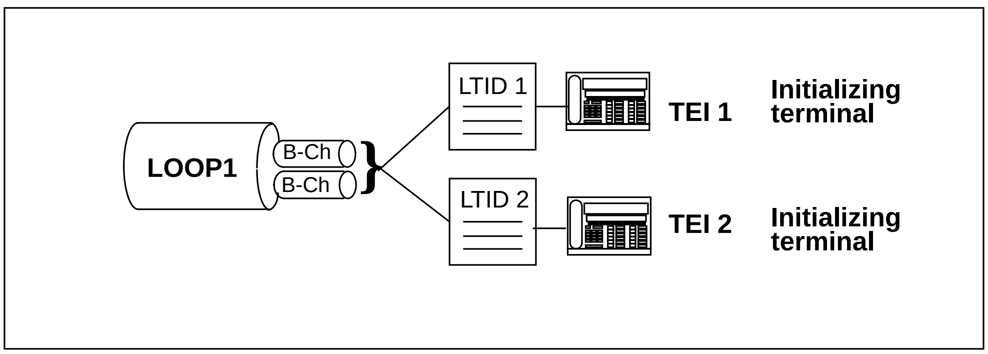


Figure 17-77 Up to eight NITs

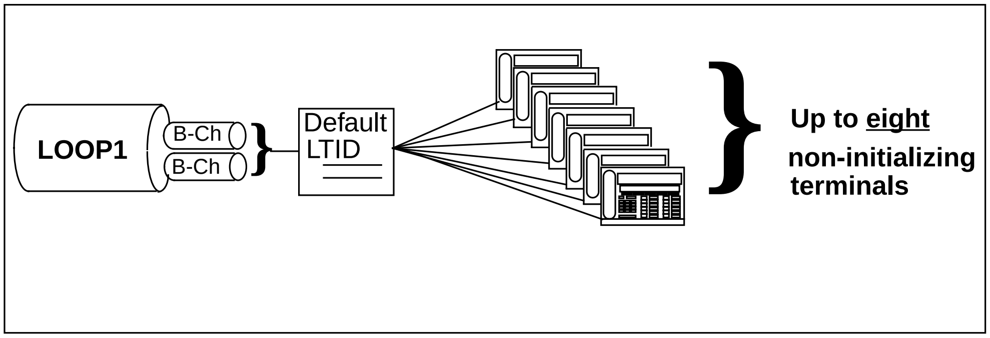


Figure 17-78 Two 2B NI-2 FITs with access to both B-channels

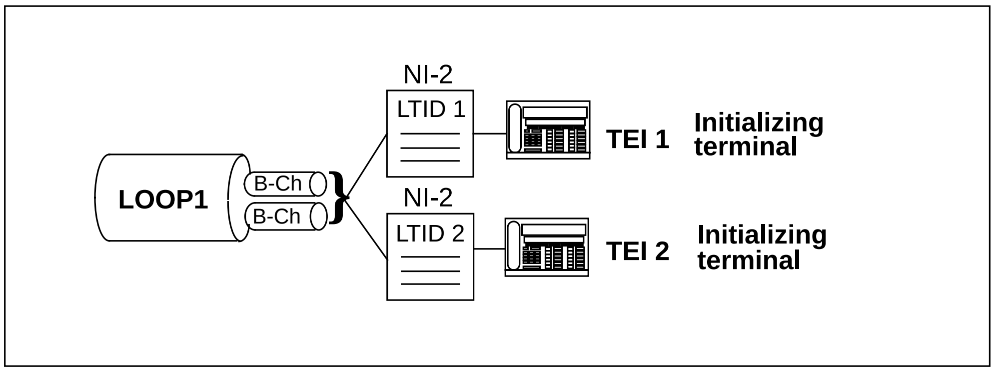


Figure 17-79 One 2B NI-2 FIT with up to seven 2B NITs

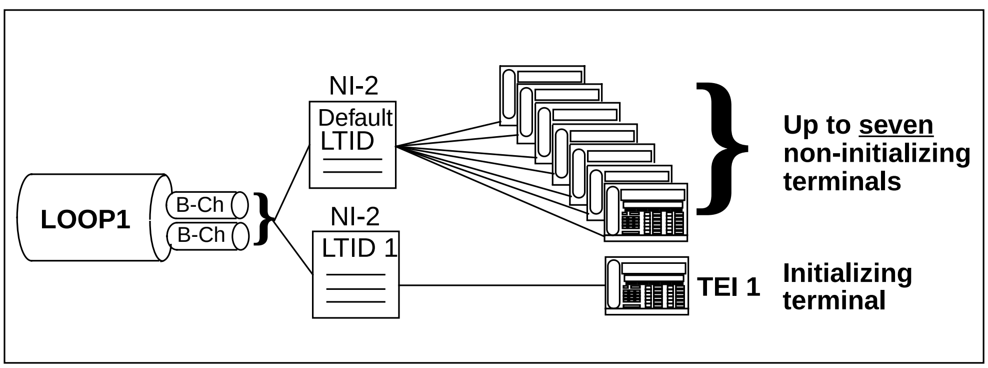


Figure 17-80 through Figure 17-81 illustrate two configurations that were added in NA009.

Figure 17-80 Up to eight 2B NI-2 FITs each with their own logical terminal

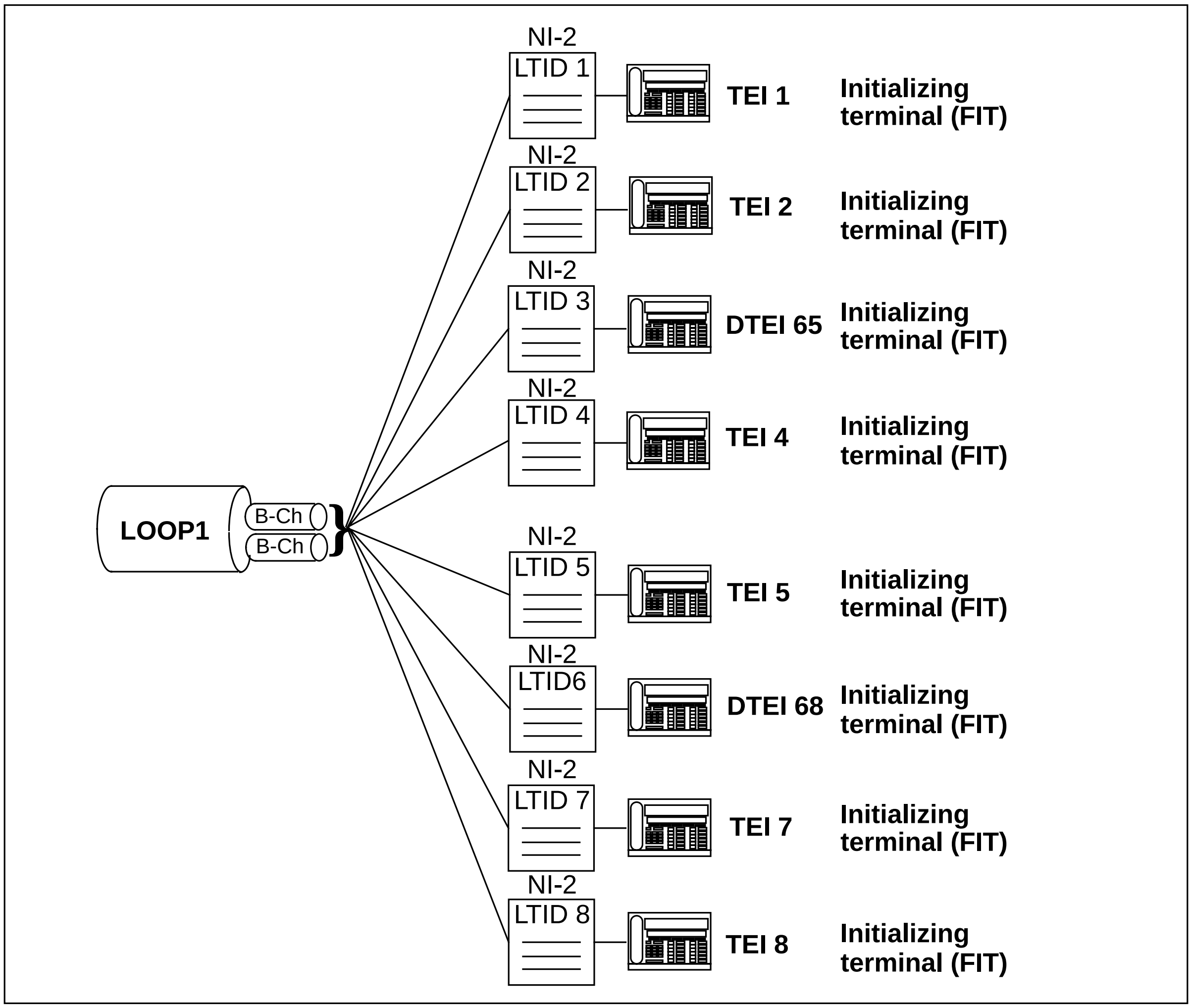
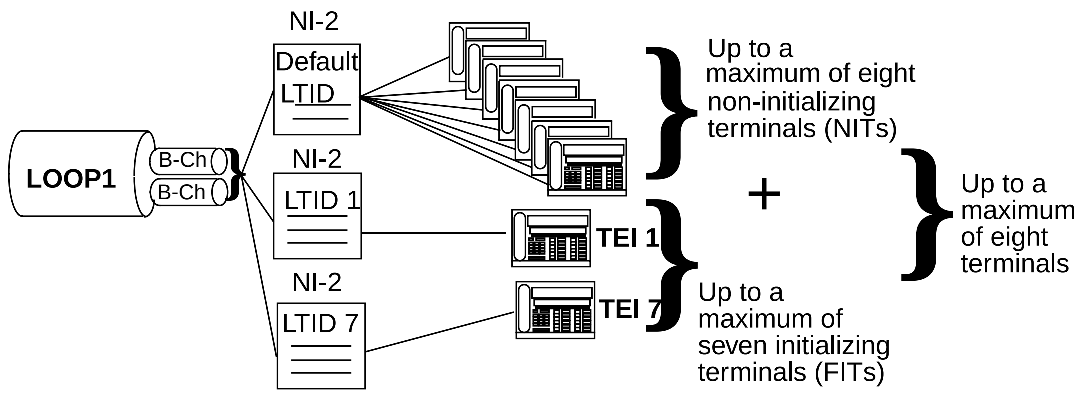


Figure 17-81 Any combination of 2B NI-2 FITs/NITs up to maximum of eight



Note: If a default LTID is provisioned on the LOOP, then a maximum of seven logical terminals can also be provisioned on the loop, for a total of eight LTIDs per loop. The total number of physical terminals supported is eight (8), in any combination of FITs and NITs.

SERVORD examples for NI-2 FIT configuration

The following SERVORD examples for configuring NI-2 FIT sets are shown in Figure 17-82 through Figure 17-86:

- SLT ADD command used to add an NI-2 FIT LTID
- NEW command used to add a DN associated with an NI-2 FIT LTID
- QLT command used to query an NI-2 FIT LTID
- SLT ATT command used to attach an NI-2 FIT LTID to a LEN
- QLEN command used to query a LEN associated with an NI-2 FIT LTID

Figure 17-82 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 FIT configuration.

Figure 17-82 Example of MAP display when using the SLT ADD command to add an NI-2 FIT LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  2  6 AM
>
LTID:
>ISDN 241
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI
TSPID:
>6137235030
EKTS:
>N
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 241 ADD BRAFS NI2 N 64 DTEI
6137235030 N $ ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-83 shows an example of the MAP display when the NEW command is used to add a DN associated with NI-2 FIT configuration LTID ISDN 241.

> ***Note:*** Option AFC is not allowed on NI-2 terminals. For NI-2 terminals, AFC is automatically added with option CRBL.

Figure 17-83 Example of MAP display when using the NEW command to add a DN associated with an NI-2 FIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  2  6 AM
>$
DN:
>7235200
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 241
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 2 6 AM 7235200 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 241
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
CRBL values will default to VI=1 and CMD = 1.
The CHF command can be used to modify the CRBL values.
NDNAP will default to 2
The CHF command can be used to modify the NDNAP value.
```

Figure 17-84 shows an example of the MAP display when the QLT command is used to query NI-2 FIT LTID ISDN 241.

Figure 17-84 Example of MAP display showing response to the QLT command used on an NI-2 FIT LTID

```
CI:
>QLT ISDN 241
---------------------------------------------------
LTID: ISDN 241
SNPA: 613
DIRECTORY NUMBER:     7235200
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: N CACH: N
SLBRI: N
CS:NI2 PS: N TEI DYNAMIC
TSPID: 6137235030
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

KEY       DN            CALLTYPE
---       --             -------
1         DN    7235200 VI & CMD

KEY       FEATURE
---       -------
1         CRBL 1 1
1          DBC DBC_SP
1         NDNAP 2
2         AFC DBC_SP
----------------------------------------------------
```

Figure 17-85 shows an example of the MAP display when an NI-2 FIT LTID is attached to a LEN using the SLT ATT command.

Figure 17-85 Example of MAP display when using the SLT ATT command to attach an NI-2 FIT LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 2 6 AM
>
LTID:
>ISDN 241
FUNCTION:
>ATT
LEN:
>1 1 8 23
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 241 ATT HOST 01 1 08 23 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-86 shows an example of the MAP display when the QLEN command is used to query a LEN to which an NI-2 FIT LTID is attached.

Figure 17-86 Example of MAP display showing response to the QLEN command used on a LEN with an NI-2 FIT LTID attached

```
CI:
>QLEN 1 1 8 23
----------------------------------------------------------
LEN:      HOST 01 1 08 23
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 35
PM TERMINAL NUMBER: 280

TEI      LTID       CS   PS    BCH/ISG Bd AG_INFORMATION
---      -------    --   --    ----------  ---------------
DYNAMIC ISDN 241   NI2   N     -           AG_UNASSIGNED
----------------------------------------------------------
```

SERVORD examples for 2B and NI-2 FITs with an associated group

The Associated Groups (AG) feature can be provisioned based on the LTID as follows:

- all CTs on the LTID
- voiceband information (VI) or circuit-mode data (CMD) CT on the LTID
- up to nine AGs can be on a single interface

- AG can cross LTIDs if the LTIDs are on the same interface
- Option AG is assigned using SLT ADD or SLT CHA commands

The following restrictions and limitations apply to associated groups:

- AG capability does not apply to 1B LTIDs, since these LTIDs, by definition, are already restricted to a single B-channel.
- AG capability is provided on 2B LTIDs. However, the number of NI-1 2B LTIDs that can be assigned to an interface is limited to one. The assignment of two NI-1 2B LTIDs on an interface with B-channel throttling using AGA is not supported, since an equivalent configuration can be obtained using two 1B LTIDs.
- A DNCT appearance can not be assigned to more than one AG.
- A maximum of two AGs can be defined for a 2B LTID.

The following SERVORD examples for configuring 2B and NI-2 terminals with associated group (AG) are shown in Figure 17-87 through Figure 17-94:

- SLT ADD command used to add a 2B FIT with all DNs associated with VI CT in one AG
- SLT ADD command used to add an NI-2 FIT with DNs associated with VI CT in one AG and DNs associated with CMD CT in a second AG
- SLT CHA command used to change the AG assignment of an existing NI-2 FIT that already has both CTs assigned to an AG group
- QLT command used to display an NI-2 LTID with AG provisioned
- QDN command used to display associated group indicator (AGI) information for all CTs associated with the queried DN

Figure 17-87 shows an example of the MAP display when the SLT ADD command is used to add 2B FIT LTID ISDN 11 with all associated VI DNs assigned to one AG.

Figure 17-87 Example of MAP display when using the SLT ADD command to add a 2B FIT with all DNs associated with VI in one AG

```
CI:
>SERVORD
SO:
>SLT
SONUMBER: NOW 98 12 3 PM
>$
LTID:
ISDN 11
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>2B
PS
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE:
>DTEI
TSPID:
>6137235035
EKTS:
>N
OPTION:
>AGA 7 AG_VI
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 12 3 PM ISDN 11 ADD BRAFS 2B N 64 N DTEI
6137235035( AGA 7 AG_VI)$ ENTER Y TO CONFIRM, N TO REJECT
OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version
of FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-88 shows an example of the MAP display when the SLT ADD command is used to add NI-2 FIT LTID ISDN 12 with all VI DNs assigned to AG 7 and CMD DNs assigned to AG 5.

Figure 17-88 Example of MAP display when using the SLT ADD command to add an NI-2 FIT LTID with VI DNs in one AG and CMD DNs in another AG

```
CI:
>SERVORD
SO:
>SLT
SONUMBER: NOW 98 12 3 PM
>$
LTID:
>ISDN 12
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS: N
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE:
>DTEI
TSPID:
>6137235040
EKTS:
>N
OPTION:
>AGA 7 AG_VI
OPTION:
>AGA 5 AG_CMD
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 12 3 PM ISDN 12 ADD BRAFS NI2 N 64 N DTEI
6137235040 NAG 7 VI AG 5 CMD $ ENTER Y TO CONFIRM, N TO
REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version
of FUNCTIONAL and PVC issue of 2 will be used.
```

The SLT CHA command can be used to change the AGA group assignment for a CT associated with an existing LTID from one group to another. This use of the SLT CHA command only applies to an existing LTID that has both CTs assigned to an AG group. In order to do this, the original group assignment for that CT must first be removed. This is done as part of the SERVORD SLT CHA command sequence. In response to the first prompt for set attribute, enter the option AGA, the existing AGA group number for that CT being assigned a new AGA group followed by AG_UNASSIGNED, for example, AGA 5

AG_UNASSIGNED. At the second SERVORD prompt for set attribute, enter the AGA option, the new AGA group number, and the CT, for example AGA 3 AG_CMD.

Figure 17-89 shows an example of the MAP display when the SLT CHA command is used to change NI-2 FIT LTID ISDN 12 CMD CT to a different AGA group.

Figure 17-89 Example of MAP display when using the SLT CHA command to change AG for an NI-2 FIT-CMD CT to a different AG GROUP

```
CI:
>SERVORD
SO:
>SLT
SONUMBER: NOW 98 12 3 PM
>$
LTID:
>ISDN 12
FUNCTION:
>CHA
SET_ATTRIBUTE:
>AGA 5 AG_UNASSIGNED
SET_ATTRIBUTE:
>AGA 3 AG_CMD
COMMAND AS ENTERED:
SLT NOW 98 12 3 PM ISDN 12 CHA (AGA 5 AG_UNASSIGNED)
(AGA 3 AG_CMD)$
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-90 shows and example of the MAP display when using the QLT command to query an NI-2 FIT LTID with AG.

Figure 17-90 Example of MAP display when using the QLT command to query an NI-2 LTID which is a member of an AG

```
CI:
>QLT ISDN 12
---------------------------------------------------
LTID: ISDN 12
SNPA: 613
DIRECTORY NUMBER: 7235010
LT GROUP NO: 0
LTCLASS: BRAFS DEFAULT LOGICAL TERMINAL: N
EKTS: N CACH: N
SLBRI: N
CS: NI2 PS: N TEI: DYNAMIC
ELN: N
AGA:3 AG_CMD
AGA:7 AG_VI
VERSION: FUNCTIONAL ISSUE 2
TSPID:6137235040
LEN: HOST 02 0 07 02 TEI: DYNAMIC
CUSTGRP: NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC CMD BOTH $ $ N VI $ $ N
CFXDNCT VI CFU N Y $ KEYLIST 1 CRBL 1 1 NDNAP 2 AFC 6

KEY     DN                    CALLTYPE
---     --                    --------
1       DN         6137235010 VI-CMD

KEY       FEATURE
---       -------
1         CFXDNCT   VI CFU N Y         $ I KEYLIST 1
1           CRBL 1 1
1           DBC  DBC_SP
1          NDNAP 2
2           AFC  DBC_SP
---------------------------------------------------
```

Figure 17-91 shows an example of the MAP display when the QDN command is used to query a DN where the VI portion of an NI-2 FIT LTID with which it is associated is a member of an AG.

Figure 17-91 Example of MAP display showing response to the QDN command where VI portion of an NI-2 FIT LTID is a member of an AG

```
CI:
>QDN 7228000
------------------------------------------------
DN: 7228000
TYPE: SINGLE PARTY LINE
SNPA: 613 SIG: N/A LNATTIDX: N/A
LTID: ISDN 10
LTCLASS: BRAFS
LINE CLASS CODE: ISDNKSET
KEY: 1
CUSTGRP:          NORTEL SUBGRP: 0 NCOS: 0 RING: Y
AGA: 7 AG_VI
OPTIONS:
SFC CMD BOTH $ $ N VI $ $ N
AFC
CFXDNCT VI CFU N Y $ I KEYLIST 1 CRBL 1 1 NDNAP 2
--------------------------------------------------
```

Figure 17-92 shows an example of the MAP display when the QDN command is used to query a DN where the CMD portion of an NI-2 FIT LTID with which it is associated is a member of an AG.

Figure 17-92 Example of MAP display showing response to the QDN command where CMD portion of an NI-2 FIT LTID is a member of an AG

```
CI:
>QDN 7228010
----------------------------------------------
DN: 7228010
TYPE: SINGLE PARTY LINE
SNPA: 613 SIG: N/A LNATTIDX: N/A
LTID: ISDN 13
LTCLASS: BRAFS
LINE CLASS CODE: ISDNKSET
KEY: 1
CUSTGRP:          NORTEL SUBGRP: 0 NCOS: 0 RING: N
AGA: 3  AG_CMD
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
AFC
CRBL 1 1 NDNAP 2
-----------------------------------------------
```

Figure 17-93 shows an example of the MAP display when the QDN command is used to query a DN where an NI-2 FIT LTID is a member of an AG.

Figure 17-93 Example of MAP display showing response to the QDN command where an NI-2 FIT LTID is a member of an AG

```
CI:
>QDN 7228020
------------------------------------------------
DN: 7228020
TYPE: SINGLE PARTY LINE
SNPA: 613 SIG: N/A LNATTIDX: N/A
LTID: ISDN 16
LTCLASS: BRAFS
LINE CLASS CODE: ISDNKSET
KEY: 1
CUSTGRP: NORTEL SUBGRP: 0 NCOS: 0 RING: Y
AGA: 8 AG_ALL
OPTIONS:
SFC CMD BOTH $ $ N VI $ $ N
CFXDNCT VI CFU N Y $ I KEYLIST 1 CRBL 1 1 AFC 1
------------------------------------------------
```

Figure 17-94 shows an example of the MAP display when the QLEN command is used to display every associated group assignment (AGA) and associated group indicator (AGI) defined on the interface.

Figure 17-94 Example of MAP display showing response to the QLEN command used to determine AGA/AGI assignments of attached LTIDs

```
CI:
>QLEN 1 0 0 20
---------------------------------------------------------
LEN: HOST 01 0 00 20
ISSG: 0 DCH: 0 ISG BRA CHANNEL: 1
CAARDCODE: BX27AA PADGRP: NPDGP
PM NODE NUMBER: 33
PM TERMINAL NUMBER: 21


TEI         LTID       CS    PS  BCH/ISG Bd  AG Information
---         --------   --    --  ----------  --------------
DYNAMIC     ISDN 444   NI2   N   -           AG_CMD
DYNAMIC     ISDN 445   NI2   N   -           AG_VI
DYNAMIC     ISDN 446   NI2   N   -           AG_ALL
DYNAMIC     ISDN 447   NI2   N   -           AG_DN/CT
DYNAMIC     ISDN 448   NI2   N   -           AG_UNASSIGNED
----------------------------------------------------------
```

NA011 changes for SLBRI

As of NA011, SLBRI LATTR data for VI,CMD, and PMD DN keys on an LTID is stored in the BRI agent specific data of a tuple in table KSETLINE instead of table DNCTINFO. Figure 17-95 shows an example of data stored in table DNCTINFO for the VI and CMD keys on an LTID for releases earlier than NA011. Figure 17-96 shows an example of similar data stored in table KSETLINE starting in NA011.

Figure 17-95 MAP display example for table DNCTINFO (NA010 and earlier)

```
KEY OPTIONS
--------------------------------------------------------
6136213000 VI VI (SLBRI_LATTR (1) $)$
```

Figure 17-96 MAP display example for table KSETLINE (NA011 and up)

```
KSETKEY
       FORMAT                                      DNRESULT

       KSFMTID                                    KSFMTARE
---------------------------------------------------------
ISDN   300  1
               DN   Y           7237878
               ISDN  0          0 613
                                            (     SFC)$
               BRI  VI_CMD Y ( 2 613_P62_1 L613_LATA1_0)$
```

NA012 changes for SLBRI

The following is a list of changes in the SERVORD prompts when using the NEW command to add a DN associated with an NI-2 BRI RES LTID when the SOC LOC00025 is active. If SOC LOC00025 is not active, the SERVORD prompts when using the NEW command to add a DN associated with an NI-2 BRI RES LTID remain unchanged from NA011.

- The SERVORD prompt for LCC changes to LINEATTR_LCC. ISDNKSET is the only valid response to this prompt for NI-2 BRI RES SLBRI lines is ISDNKSET.
- SERVORD does not prompt for LATANAME, since the LATA is included in RATEAREA entry.
- SERVORD prompts for SLBRI_LATTRKEY which is the alphanumeric located in table LINEATTR. It can be up to 16 characters in length.
- SERVORD prompts for XLAPLAN which is the key into table XLAPLAN.
- SERVORD prompts for RATEAREA which is the key into table RATEAREA where tuple includes LATA information.

SERVORD examples for NI-2 BRI RES FIT configuration

The following SERVORD examples for configuring NI-2 BRI RES single-line (SLBRI) service are shown in Figure 17-97 through Figure 17-110:

- SLT ADD command used to add an NI-2 BRI RES LTID
- NEW command used to add a DN associated with an NI-2 BRI RES LTID when SOC LOC00025 is not active.

  Note: SOC stands for Software Optionality Control.

- NEW command used to add a DN associated with an NI-2 BRI RES LTID when SOC LOC00025 is active
- QLT command used to query an NI-2 BRI RES LTID
- SLT ATT command used to attach an NI-2 BRI RES LTID to a LEN
- QLEN command used to query a LEN associated with an NI-2 BRI RES LTID
- QDN command used to query DN associated with NI-2 BRI RES LTID when SOC LOC00025 is not active
- QDN command used to query DN associated with NI-2 BRI RES LTID when SOC LOC00025 is active

Note: LOC00025 is the Enhanced Local Translations feature that is part of the NA012 software load.

The following restrictions apply to BRI RES:

- Option SLBRI is only assignable to NI-2 LTIDs.
- Option SLBRI can not be added or removed using the SLT CHA command.
- The Line Attribute Index specified by the SLBRI_LATTR can not be changed using any SERVORD commands.
- SUSP billing is not provided for ACRJ.
- ACRJ is currently incompatible with the following options:
  - — Automatic Call Distribution (ACD)
  - — Group Intercom (GIC)
  - — E911 PSAP Table Control
  - — Uniform Call Distribution (UCD)

Figure 17-97 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 BRI RES LTID configuration.

Figure 17-97 Example of MAP display when using the SLT ADD command to add an NI-2 BRI RES LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  5  6 AM
>$
LTID:
>ISDN 28
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI
TSPID:
>6137235050
EKTS:
>N
OPTION:
>SLBRI
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 5 6 AM ISDN 28 ADD BRAFS NI2 N 64 N DTEI
6137235050 N SLBRI $ ENTER Y TO CONFIRM,N TO REJECT OR
E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.

Addition of SLBRI option enables usage of NET GEN (RES)
selector in Tables IBNXLA/XLANAME with appropriately
datafilled set DN line attrs.
```

Figure 17-98 shows an example of the MAP display when the NEW command is used to add the DN associated with NI-2 BRI RES configuration LTID ISDN 28 when SOC LOC00025 is not active.

Figure 17-98 Example of MAP display when using the NEW command to add a DN and SLBRI_LATTR associated with an NI-2 BRI RES LTID with SOC LOC00025 not active.

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  5  6 AM
>$
DN:
>7237700
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 28
SLBRI_LATTR:
>2
OPTKEY:
>$
NEW NOW 98 11 6 AM 7237700 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 28 ( 2) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
CRBL values will default to VI=1 and CMD=1
The CHF command can be used to modify the CRBL values.
NDNAP will default to 2
The CHF command can be used to modify the NDNAP value.
accordingly.
```

Figure 17-99 shows an example of the MAP display when the NEW command is used to add the DN associated with NI-2 BRI RES configuration LTID ISDN 28 when SOC LOC00025 is active.

Figure 17-99 Example of MAP display when using the NEW command to add a DN and SLBRI_LATTR associated with an NI-2 BRI RES LTID with SOC LOC00025 is active.

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  5  6 AM
>$
DN:
>7237700
LINEATTR_OR_LCC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LEN_OR_LTID:
>ISDN 28
SLBRI_LATTRKEY:
>EXAMPLENAME12345 (Note: LINEATTR KEY (LK) in table LINEATTR
XLAPLAN:           is alphanumeric with up to 16 characters.)
>613_PUB_401
RATEAREA:
>L613_LATA1_0
OPTKEY:
>$
NEW NOW 98 11 6 AM 7237700 ISDNKSET NORTEL 0 0 613 1 Y
ISDN 28 EXAMPLENAME12345 613_PUB_401 L613_LATA1_0 $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
CRBL values will default to VI=1 and CMD=1
The CHF command can be used to modify the CRBL values.
NDNAP will default to 2
The CHF command can be used to modify the NDNAP value.
accordingly.
```

Figure 17-100 shows an example of the MAP display when the QLT command is used to query NI-2 BRI RES LTID ISDN 28.

Figure 17-100 Example of MAP display when using the QLT command on an NI-2 BRI RES LTID

```
CI:
>QLT ISDN 28
---------------------------------------------------
LTID: ISDN 28
SNPA: 613
DIRECTORY NUMBER:     7237700
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: N CACH: N
SLBRI: Y
CS:NI2 PS: N TEI DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID: 6137235050
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

KEY       DN             CALLTYPE
---       --             --------
1         DN    7237700  VI & CMD

KEY       FEATURE
---       -------
1         CRBL 1 1
1         DBC DBC_SP
1         NDNAP  2
2         AFC DBC_SP
---------------------------------------------------
```

Figure 17-101 shows an example of the MAP display when an NI-2 BRI RES LTID is attached to a LEN using the SLT ATT command.

Figure 17-101 Example of the MAP display when using the SLT ATT command to attach an NI-2 BRI RES LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 5 6 AM
>
LTID:
>ISDN 28
FUNCTION:
>ATT
LEN:
>1 1 9 1
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 5 6 AM ISDN 28 ATT HOST 01 1 09 01 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-102 shows an example of the MAP display when the QLEN command is used to query a LEN to which an NI-2 BRI RES LTID is attached.

Figure 17-102 Example of the MAP display showing response to the QLEN command used on a LEN with an NI-2 BRI RES LTID attached

```
CI:
>QLEN 1 1 8 23
-------------------------------------------------------
LEN:      HOST 01 1 09 01
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 35
PM TERMINAL NUMBER: 280

TEI       LTID       CS   PS    BCH/ISG Bd AG_information
---       ------     --   --    --------- ---------------
DYNAMIC  ISDN 28    NI2   N     -          AG_UNASSIGNED
--------------------------------------------------------
```

Figure 17-103 shows an example of the MAP display when DN associated with NI-2 BRI RES LTID is queried when SOC LOC00025 is not active using QDN command.

Figure 17-103 Example of the MAP display when using the QDN command to query DN associated with NI-2 BRI RES LTID when SOC LOC00025 is not active

```
CI:
>QDN 7237700
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
DN:        7237700
TYPE: SINGLE PARTY LINE
SNPA: 613    SIG:  N/A      LNATTIDX:  N/A
LTID:   ISDN     28
LTCLASS:   BRAFS
LINE CLASS CODE:     ISDNKSET
SLBRI LINEATTR:  0
XLAPLAN:     613_P621_0     RATEAREA:   L613_LATA1_0
KEY: 1
CUSTGRP:                   NORTEL    SUBGRP: 0    NCOS:  0 RING:  Y
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
AFC
CRBL 1 1 NDNAP 2
```

Figure 17-104 shows an example of the MAP display when DN associated with NI-2 BRI RES LTID is queried when SOC LOC00025 is active using QDN command.

Figure 17-104 Example of the MAP display when using the QDN command to query DN associated with NI-2 BRI RES LTID when SOC LOC00025 is active

```
CI:
>QDN 7237700
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
DN:        7237700
TYPE: SINGLE PARTY LINE
SNPA: 613    SIG:  N/A      LNATTIDX:  N/A
XLAPLANKEY: N/A                    RATEAREA KEY: N/A
LTID:   ISDN     28
LTCLASS:   BRAFS
LINE CLASS CODE:     ISDNKSET
SLBRI LINEATTR:  EXAMPLENAME12345
XLAPLAN:   613_P621_0          RATEAREA KEY:   L613_LATA1_0
KEY: 1
CUSTGRP:                   NORTEL    SUBGRP: 0    NCOS:  0 RING:  Y
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
AFC
CRBL 1 1 NDNAP 2
```

SERVORD examples for NI-2 2BD FIT configuration

The following SERVORD examples for configuring NI-2 2BD FIT sets are shown in Figure 17-105 through Figure 17-110:

- SLT ADD command used to add an NI-2 2BD LTID
- NEW command used to add a DN associated with NI-2 2BD LTID voice features
- NEW command used to add a DN associated with NI-2 2BD LTID data feature
- QLT command used to query an NI-2 2BD LTID
- SLT ATT command used to attach an NI-2 2BD LTID to a LEN
- QLEN command used to query the LEN associated with an NI-2 2BD LTID

Figure 17-105 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 2BD FIT configuration.

Figure 17-105 Example of the MAP display when using the SLT ADD command to add an NI-2 2BD FIT LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  10  6 AM
>$
LTID:
>ISDN 261
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>D
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE:
>DTEI
TSPID:
>6137235060
EKTS:
>N
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 261 ADD BRAFS NI2 D 64 N DTEI
6137235060 N $ ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Two separate service orders using the NEW command are required when establishing NI-2 2BD service. One service order is required to identify a DN associated with the voice services for the NI-2 2BD set. A second service order is required to identify a DN associated with the packet services for the NI-2 2BD set.

Figure 17-106 shows an example of the MAP display when the NEW command is used to add the DN associated with the voice features for NI-2 2BD FIT LTID ISDN 261.

Figure 17-106 Example of MAP display when using the NEW command to add a DN for voice features on an NI-2 2BD FIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>$
DN:
>7236000
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 261
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 7236000 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 261
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
CRBL values will default to VI=1 and CMD=1.
The CHF command can be used to modify the CRBL values.
NDNAP will default to 2
The CHF command can be used to modify the NDNAP value.
```

Figure 17-107 shows an example of the MAP display when the NEW command is used to add a DN associated with the data features for NI-2 2BD FIT LTID ISDN 261.

> ***Note:*** It is important to set the ringing option for the DN associated with the data functions of the NI-2 2BD set to N.

Figure 17-107 Example of MAP display when using the NEW command to add a DN for data features on an NI-2 2BD FIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>$
DN:
>7236000
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>3
RINGING:
>N        <-It is important to set ringing to N for
the DN appearance for the DN associated with the data
functions of the NI2 2BD set.
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 261
OPTKEY:
>3
OPTION:
>PMD
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 7236000 ISDNKSET NORTEL 0 0 613 3 N
NILLATA 0 ISDN 261 (3 PMD)$
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-108 shows an example of the MAP display when the QLT command is used to query NI-2 2BD LTID ISDN 261.

Figure 17-108 Example of MAP display showing response to the QLT command used on an NI-2 2BD FIT LTID

```
CI:
>QLT ISDN 261
---------------------------------------------------
LTID: ISDN 261
SNPA: 613
DIRECTORY NUMBER:     7236000
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: N CACH: N
SLBRI: N
CS:NI2 PS: D TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID: 6137235060
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

KEY       DN    CALLTYPE
---       --    ------
1         DN    7236000 VI & CMD
3         DN    7236000 PMD

KEY       FEATURE
---       -------
1         CRBL 1 1
1         DBC DBC_SP
1        NDNAP 2
2         AFC DBC_SP
----------------------------------------------------
```

Figure 17-109 shows an example of the MAP display when the NI-2 2BD FIT LTID is attached to a LEN using the SLT ATT command.

Figure 17-109 Example of MAP display when using the SLT ATT command to attach an NI-2 2BD FIT LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 10 6 AM
>$
LTID:
>ISDN 261
FUNCTION:
>ATT
LEN:
>1 1 8 23
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 261 ATT HOST 01 1 08 23 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-110 shows an example of the MAP display when the QLEN command is used to query the LEN to which an NI-2 2BD FIT LTID is attached.

Figure 17-110 Example of MAP display showing response to the QLEN command used on a LEN with an NI-2 2BD FIT LTID attached

```
CI:
>QLEN 1 1 8 23
--------------------------------------------------------
LEN:      HOST 01 1 08 23
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 35
PM TERMINAL NUMBER: 280

TEI      LTID     CS    PS   BCH/ISG Bd AG_information
---     --------  ---   --    --------- ---------------
DYNAMIC ISDN 261  NI2   D   ISG Bd: 31  AG_UNASSIGNED
--------------------------------------------------------
```

SERVORD examples for DN shared across LTIDs

The following SERVORD examples for configuring a DN shared across LTIDs are shown in Figure 17-111 through Figure 17-117:

- SLT ADD command used to add an NI-2 FIT LTID for calltype VI
- SLT ADD command used to add NI-2 FIT LTID for calltype CMD
- SLT ADD command used to add packet-only LTID

- NEW command used to associate shared DN with NI-2 FIT LTID with calltype VI
- NEW command used to associate shared DN with NI_2 FIT LTID with calltype CMD
- NEW command used to associate shared DN with packet-only LTID
- QDN command to query DN shared across LTIDs

Note: When using the RND option with a shared DN, it must be assigned to each DN appearance on separate LTIDs. When the RND option is assigned to one appearance of a shared DN, it does not automatically appear on that shared DN on other LTIDs.

Figure 17-111 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 FIT configuration.

Figure 17-111 Example of MAP display when using the SLT ADD command to add an NI-2 FIT LTID for calltype VI

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  2  6 AM
>
LTID:
>ISDN 270
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI:
TSPID:
>6137237575
EKTS:
>N
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 270 ADD BRAFS NI2 N 64 DTEI
6137237575 N $ ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-112 shows an example of the MAP display when the SLT ADD command is used to add an NI-2 LTID for calltype CMD.

Figure 17-112 Example of MAP display when using the SLT ADD command to add an NI-2 FIT LTID for calltype CMD

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  2  6 AM
>
LTID:
>ISDN 271
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI:
TSPID:
>6137237576
EKTS:
>N
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 271 ADD BRAFS NI2 N 64 DTEI
6137237576$ ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-113 shows an example of the MAP display when the SLT ADD command is used to add a packet-only LTID.

Figure 17-113 Example of MAP display when using the SLT ADD command to add a packet-only LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  2  6 AM
>
LTID:
>ISDN 272
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>N
PS:
>D
COMMAND AS ENTERED:
SLT NOW 98 2 6 AM ISDN 272 ADD BRAFS N D
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-114 shows an example of the MAP display when the NEW command is used to associate a shared DN with an NI-2 FIT LTID for calltype VI.

Figure 17-114 Example of MAP display when using the NEW command to associate a shared DN with an NI-2 FIT LTID for calltype VI

```
 CI:
 >SERVORD
 SO:
 >NEW
 SONUMBER:     NOW  98  2  6 AM
 >$
 DN:
 >7236565
 LCC_ACC:
 >ISDNKSET
 GROUP:
 >NORTEL
 SUBGROUP:
 >0
 NCOS:
 >0
 SNPA:
 >613
 KEY:
 >1
 RINGING:
 >Y
 LATANAME:
 >NILLATA
 LTG:0
 >
 LEN_OR_LTID:
 >ISDN 270
 OPTKEY:
 >1
 OPTION:
 >CRBL
 VI:
 >2
 CMD:
 >0
 OPTKEY:
 >$
COMMAND AS ENTERED:
NEW NOW 98 2 6 AM 7236565 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 270 (1 CRBL 2 0)
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
NDNAP will default to 2
The CHF command can be used to modify the NDNAP value.
```

Figure 17-115 shows an example of the MAP display when the NEW command is used to associate a shared DN with an NI-2 FIT LTID for calltype CMD.

Figure 17-115 Example of MAP display when using the NEW command to associate shared DN with NI-2 FIT LTID for calltype CMD

```
 CI:
 >SERVORD
 SO:
 >NEW
 SONUMBER:     NOW  98  2  6 AM
 >$
 DN:
 >7236565
 LCC_ACC:
 >ISDNKSET
 GROUP:
 >NORTEL
 SUBGROUP:
 >0
 NCOS:
 >0
 SNPA:
 >613
 KEY:
 >1
 RINGING:
 >N
 LATANAME:
 >NILLATA
 LTG:0
 >
 LEN_OR_LTID:
 >ISDN 271
 OPTKEY:
 >1
 OPTION:
 >CRBL
 VI:
 >0
 CMD:
 >1
 OPTKEY:
 >$
COMMAND AS ENTERED:
NEW NOW 98 2 6 AM 7236565 ISDNKSET NORTEL 0 0 613 1 N
NILLATA 0 ISDN 271 (1 CRBL 0 1)
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
NDNAP will default to 1
The CHF command can be used to modify the NDNAP value.
```

Figure 17-116 shows an example of the MAP display when the NEW command is used to associate the shared DN with a packet-only LTID.

Figure 17-116 Example of MAP display when using the NEW command to associate a shared DN with a packet-only LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  2  6 AM
>$
DN:
>7236565
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>N
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 272
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 2 6 AM 7236565 ISDNKSET NORTEL 0 0 613 1 N
NILLATA 0 ISDN 272
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-117 shows the MAP display when the QDN query command is used to query a DN shared across two LTIDs.

Figure 17-117 Example of MAP display when using the QDN command is used to query a DN shared across two LTIDs

```
CI:
>QDN 7236565
-----------------------------------------------------------
DN:    7236565
CALLTYPE:   VI
TYPE:  SINGLE PARTY LINE
SNPA:  613   SIG:  N/A    LNATTIDX:  N/A
XLAPLAN KEY :                               RATEAREA KEY :
LTID:  ISDN      270
LTCLASS:   BRAFS
LINE CLASS CODE:   ISDNKSET
KEY:  1
CUSTGRP:             NORTEL   SUBGRP: 0 NCOS: 0 RING: Y
OPTIONS:
SFC VI $ $ N $ $ N
AFC
CRBL 2 0 NDNAP 2
OFFICE OPTIONS:
AIN LNPOFFICE

CALLTYPE:   CMD
TYPE:  SINGLE PARTY LINE
SNPA:  613   SIG:  N/A   LNATTIDX:  N/A
XLAPLAN KEY  :                              RATEAREA KEY :
LTID:  ISDN      271
LTCLASS:  BRAFS
LINE CLASS CODE:  ISDNKSET
KEY: 1
CUSTGRP:             NORTEL   SUBGRP: 0  NCOS: 0 RING: N
OPTIONS:
SFC CMD BOTH $ $ N
CRBL 0 1  NDNAP 1
OFFICE OPTIONS:
AIN LNPOFFICE

CALLTYPE:  PMD
TYPE: SINGLE PARTY LINE
SNPA: 613  SIG:  N/A    LNATTIDX: N/A
XLAPLAN KEY  :                              RATEAREA KEY :
LTID: 272
LTCLASS: BRAFS
LINE CLASS CODE:   ISDNKSET
KEY: 1
CUSTGRP:             NORTEL  SUBGRP: 0  NCOS: 0 RING: N
OPTIONS:
 NONE
-----------------------------------------------------------
```

Using shared DNs with hunt groups

Before NA010, the DMS-100 switching system allowed the provisioning of separate hunt groups for circuit and packet-mode CTs. The CTs supported were PMD and the combined VI and CMD CT VI-CMD. In the case of the multi-line hunt (MLH) and distributed line hunt (DLH), the DMS-100 switching system allowed the sharing of the pilot DN between the circuit and packet CTs. In the case of directory number hunt (DNH), the DMS-100 switching system allowed the sharing of the pilot as well as the member DNs between the circuit and packet CTs. This functionality is not enhanced in NA010. The circuit-mode CT appearances must belong to the same hunt group. It is not possible to split the VI and CMD appearances of a shared DN across different huntgroups. It is possible to obtain hunt group information on a CT basis using either the SERVORD QGRP or the MAPCI POST HUNT commands.

In NA010, a DN associated with either a circuit-mode VI or a CMD hunt group on one LTID can be shared with a PMD CT on another LTID. At any given time, only one of the circuit-mode hunt group types, either VI or CMD, on the same LTID can share a DN with a PMD CT on a different LTID. For example, if a CMD hunt group on an LTID is set up to share a DN with a PMD CT on another LTID, the user is not allowed to establish a similar arrangement for the first LTID's VI call appearance. The following SERVORD commands have been modified to allow the sharing of a hunt group DN located on one LTID with a PMD CT on another LTID:

- NEW command
  - — allows the assignment of a DN with VI or CMD CT to an LTID that is already assigned to a different LTID with a different CT.
  - — rejects an attempt to assign a second circuit-mode appearance of a DN if the first circuit-mode appearance belongs to a hunt group.
- EST command
  - — allows creation of a hunt group and pilot DN using a DN previously assigned to another LTID using either the NEW or EST commands. The CT of the existing DN must be PMD.
  - — rejects attempts to create two separate hunt groups with the same pilot DN using both circuit-mode CTs VI and CMD.
  - — allows the use of only one circuit-mode CT when DNs are shared

> ***Note:*** When used with hunt groups, the RND option must be assigned to each DN in the hunt group in order for each of them to receive the redirecting number delivery.

- — requires LTIDs to meet criteria described under the NEW command
- — rejects attempts to create a hunt group and pilot DN for a DN on a second LTID with switching characteristics that do not meet the criteria described under the NEW command

- ADD command
  - — allows the adding of a DN that is already assigned to one LTID as a hunt group member DN on another LTID
  - — requires both circuit-mode appearances of a shared DDN to belong to the same hunt group
  - — requires LTIDS to meet the criteria described under the NEW command
  - — rejects attempts to create a hunt group and pilot DN for a DN on a second LTID with switching characteristics that do not meet the criteria described under the NEW command

SERVORD examples for establishing a DNH group with pilot DN shared with PMD CT on second LTID

The following SERVORD examples for configuring a DNH group with pilot DN shared with PMD CT on a second LTID are shown in

- SLT ADD command used to add an NI-2 LTID ISDN 301 with CTs VI and PMD
- SLT ADD command used to add an NI-2 LTID ISDN 302 to be associated with CMD DNH hunt group
- NEW command used to add a DN associated with VI CT appearance on LTID ISDN 301
- NEW command used to add DN associated with the PMD CT appearance on LTID ISDN 301
- EST command used to add DNH to LTID ISDN 302 where hunt DN is shared with PMD DN appearance on LTID ISDN 301
- QDN command used to verify that DN 7235200 is shared by DNH hunt group with CMD CT on LTID ISDN 302 and PMD CT appearance on LTID ISDN 301

Refer to Figure 17-118 for an example of the MAP display when the SLT ADD command is used to add an LTID with VI and PMD CTs.

Figure 17-118 Example of MAP display when using the SLT ADD command to add NI-2 LTID with CTs VI and PMD

```
CI:
>Servord
SO:
>SLT
SONUMBER:   NOW 98 7 21 PM
>
LTID:
>ISDN 301
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>D
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE:
>DTEI
TSPID:
>6137235555
EKTS:
>N
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 7 PM ISDN 301 ADD BRAFS NI2 D 64 N DTEI
6137235555 N $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Refer to Figure 17-119 for an example of the MAP display when the SLT ADD command is used to add an NI-2 LTID to be used with a CMD DNH group.

Figure 17-119 Example of MAP display when using the SLT ADD command to add NI-2 LTID to be used with a CMD DNH hunt

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:   NOW 98 7 21 PM
>
LTID:
>ISDN 302
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE:
>DTEI
TSPID:
>6137235551
EKTS:
>N
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 7 PM ISDN 302 ADD BRAFS NI2 N 64 N DTEI
6137235551 N $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Refer to Figure 17-120 for an example of the MAP display when the NEW command is used to add the DN associated with the VI CT on LTID ISDN 301.

Figure 17-120 Example of MAP display when using the NEW command to add DN associated with VI CT on LTID ISDN 301

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:   NOW 98 7 21 PM
>
DN:
>7235100
LCC_ACC
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME
>NILLATA
LTGO: 0
>
LEN_OR_LTID:
>ISDN 301
OPTKEY:
>1
OPTION:
>CRBL
VI:
>1
CMD:
>0
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 7 21 PM 7235100 ISDNKSET NORTEL 0 0 613 1 N
NILLATA 0 ISDN 301 (1 CRBL 1 0 ) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
NDNAP will default to 1
```

Refer to Figure 17-121 for an example of the MAP display when the NEW command is used to add the DN associated with the PMD CT on LTID ISDN 301.

Figure 17-121 Example of MAP display when using the NEW command to add DN associated with PMD CT on LTID ISDN 301

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:   NOW 98 7 21 PM
>
DN:
>7235200
LCC_ACC
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>2
RINGING:
>N
LATANAME
>NILLATA
LTG: 0
>
LEN_OR_LTID:
>ISDN 301
OPTKEY:
>2
OPTION:
>PMD
OPTKEY:
>$
OPTION:
>$
COMMAND AS ENTERED:
NEW NOW 98 7 21 PM 7235200 ISDNKSET NORTEL 0 0 613 2 N
NILLATA 0 ISDN 301 (2 PMD) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Refer to Figure 17-122 from an example of the MAP display when the EST command is used to establish a DNH group associated with the CMD CT on NI-2 LTID ISDN 302.

Figure 17-122 Example of MAP display when using the EST command to establish a DNH group associated with CMD CT on NI-2 LTID ISDN 302

```
CI:
>SERVORD
SO:
>EST
SONUMBER:   NOW 98 7 21 PM
>
HUNTTYPE:
>DNH
PILOT_DN
>7235200
LCC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>N
LATANAME:
>NILLATA
LTG: 0
>
PILOT_LEN:
>ISDN 302
DN_LEN:
>$
OPTION:
>CRBL
VI:
>0
CMD:
>1
OPTION:
>$
GROUPSIZE:
>5
COMMAND AS ENTERED:
EST NOW 98 7 21 PM DNH 7235200 ISDNKSET NORTEL 0 0 613 1 N
NILLATA 0 ISDN 302 $ (CRBL 0 1 ) $ 5
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
NDNAP will default to 1
```

Refer to Figure 17-123 for an example of the MAP display when the QDN command is used to verify a DN that is shared by a CMD hunt group on LTID ISDN 302 and PMD CT on LTID ISDN 301.

Figure 17-123 Example of MAP display when using the QDN command to verify DN shared by CMD group and PMD

```
CI:
>QDN 7235200
----------------------------------------------------------
DN:    7235200
CALLTYPE:  CMD
TYPE: PILOT OF DNH HUNT GROUP
SNPA: 613 SIG: N/A  LNATIDX: N/A
HUNT GROUP: 50    HUNT MEMBER: 0
LTID: ISDN 302
LTCLASS:  BRAFS
LINE CLASS CODE:  ISDNKSET
KEY: 1
CUSTGRP:            NORTEL  SUBGRP: 0 NCOS: 0 RING: N
OPTIONS:
SFC  CMD BOTH $ $ N
CRBL 0 1 NDNAP 1
OFFICE OPTIONS:
AIN LNPOFFICE
GROUP OPTIONS:
RCVD CMD 64 N
MEMBER INFO

CALLTYPE:  PMD
TYPE: SINGLE PARTY LINE
SNPA: 613  SIG: N/A  LNATTIDX: N/A
LTID: ISDN     301
LTCLASS:  BRAFS
LINE CLASS CODE:  ISDNKSET
KEY: 2
CUSTGRP:           NORTEL  SUBGRP: 0 NCOS: 0 RING: N
OPTIONS:
PMD DFDN

----------------------------------------------------------
```

SERVORD examples for NI-2 NIT configuration

SERVORD examples for configuring NI-2 NIT sets are shown in Figure 17-124 through Figure 17-128:

- SLT ADD command used to add an NI-2 NIT LTID
- NEW command used to add a DN associated with an NI-2 NIT LTID
- QLT command used to query an NI-2 NIT LTID
- SLT ATT command used to attach an NI-2 NIT LTID to a LEN
- Use the QLEN command to query the LEN associated with an NI-2 NIT LTID

Figure 17-124 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 NIT configuration.

Figure 17-124 Example of MAP display when using the SLT ADD command to add an NI-2 NIT LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  10  6 AM
>$
LTID:
>ISDN 112
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>Y
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 112 ADD BRAFS NI2 N 64 Y $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-125 shows an example of the MAP display when the NEW command is used to add a DN associated with NI-2 NIT LTID ISDN 112.

Figure 17-125 Example of MAP display when using the NEW command to add a DN associated with an NI-2 NIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>$
DN:
>7236000
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 112
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 7236000 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 112
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
CRBL values will default to VI=1 and CMD=1
The CHF command can ne used to modify the CRBL values.
NDNAP will default to 2
The CHF command can be used to modify the NDNAP value.
```

Figure 17-126 shows an example of the MAP display when the QLT command is used to query NI-2 NIT LTID ISDN 112.

Figure 17-126 Example of MAP display showing response to the QLT command used on an NI-2 NIT LTID

```
CI:
>QLT ISDN 112
---------------------------------------------------
LTID: ISDN 112
SNPA: 613
DIRECTORY NUMBER:     7236000
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:Y
EKTS: N CACH: N
CS:NI2 PS: N TEI: UNATEI
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

KEY       DN      CALLTYPE
---       --      --------
1         DN      6137236000 VI & CMD

KEY       FEATURE
---       -------
1         CRBL 1 1
1         DBC DBC_SP
1         NDNAP 2
2         AFC DBC_SP
--------------------------------------------------
```

Figure 17-127 shows an example of the MAP display when NI-2 NIT LTID ISDN 112 is attached to a LEN using the SLT ATT command.

Figure 17-127 Example of MAP display when using the SLT ATT command to attach an NI-2 NIT LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 10 6 AM
>
LTID:
>ISDN 112
FUNCTION:
>ATT
LEN:
>1 1 8 23
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 112 ATT HOST 01 1 08 23 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-128 shows an example of the MAP display when the QLEN command is used to query the LEN to which NI-2 NIT LTID ISDN 112 is attached.

Figure 17-128 Example of MAP display showing response to the QLEN command used on a LEN with an NI-2 NIT LTID attached

```
CI:
>QLEN 1 1 8 23
--------------------------------------------
LEN:      HOST 01 1 08 23
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 33
PM TERMINAL NUMBER: 22

TEI      LTID      CS   PS    BCH/ISG Bd   AG_information
---      ------    --   --    ----------- ---------------
UNATEI   NI2 112   NI2   N     ISG Bd: 31  AG_UNASSIGNED
---------------------------------------------------------
```

SERVORD examples for NI-2 2BD integrated NIT

The following SERVORD examples for configuring NI-2 2BD integrated NIT sets are shown in Figure 17-129 through Figure 17-134.

- SLT ADD command used to add an NI-2 2BD integrated NIT LTID
- NEW command used to add a DN associated with NI-2 2BD integrated NIT LTID voice features
- NEW command used to add a DN associated with NI-2 2BD integrated NIT LTID data feature

- QLT command used to query an NI-2 2BD integrated NIT LTID
- SLT ATT command used to attach NI-2 2BD integrated NIT to a LEN
- QLEN command used to query the LEN associated with an NI-2 2BD integrated NIT LTID

Figure 17-129 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 2BD integrated NIT configuration.

Figure 17-129 Example MAP display when using the SLT ADD command to add an NI-2 2BD integrated NIT LTID

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  10  6 AM
>$
LTID:
>ISDN 283
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>D
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI
TSPID:
>6137235064
EKTS:
>N
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 283 ADD BRAFS NI2 D 64 N DTEI
6137235064 N $ ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Two separate service orders using the NEW command are required when establishing NI-2 2BD integrated NIT service. One service order is required to identify a DN associated with the voice services for the NI-2 2BD integrated NIT set. A second service order is required to identify a DN associated with the packet services for the NI-2 2BD integrated NIT set.

Figure 17-130 shows an example of the MAP display when the NEW command is used to add the DN associated with the voice features for NI-2 2BD integrated NIT LTID ISDN 283.

Figure 17-130 Example of MAP display when using the NEW command to add a DN for voice features on an NI-2 2BD integrated NIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>$
DN:
>7236555
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 283
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 7236555 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 283
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
CRBL values will default to VI=1 and CMD=1.
The CHF command can be used to modify the CRBL values.
NDNAP will default to 2
The CHF command can be used to modify the NDNAP value.
```

Figure 17-131 shows an example of the MAP display when the NEW command is used to add a DN associated with the data features for NI-2 2BD integrated NIT LTID ISDN 283.

> ***Note:*** It is important to set the ringing option for the DN associated with the data functions of the NI-2 2BD integrated NIT set to N.

Figure 17-131 Example of MAP display when using the NEW command to add a DN for data features on an NI-2 2BD integrated NIT LTID

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>$
DN:
>7236555
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGROUP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>3
RINGING:
>N        <-It is important to set ringing to N for
the DN appearance for the DN associated with the data
functions of the NI2 2BD set.
LATANAME:
>NILLATA
LTG:0
>
LEN_OR_LTID:
>ISDN 283
OPTKEY:
>3
OPTION:
>PMD
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 7236555 ISDNKSET NORTEL 0 0 613 3 N
NILLATA 0 ISDN 283 (3 PMD)$
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-132 shows an example of the MAP display when the QLT command is used to query NI-2 2BD LTID ISDN 261.

Figure 17-132 Example of MAP display showing response to the QLT command used on an NI-2 2BD integrated NIT LTID

```
CI:
>QLT ISDN 283
----------------------------------------------------
LTID: ISDN 283
SNPA: 613
DIRECTORY NUMBER:     7236555
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: N CACH: N
SLBRI: N
CS:NI2 PS: D TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID: 6137235064
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

KEY       DN                  CALLTYPE
---       --                  --------
1         DN       6137236555 VI & CMD
3         DN       6137236555 PMD

KEY       FEATURE
---       -------
1         CRBL 1 1
1         DBC DBC_SP
1        NDNAP 2
2         AFC DBC_SP
----------------------------------------------------
```

Figure 17-133 shows an example of the MAP display when the NI-2 2BD integrated NIT LTID is attached to a LEN using the SLT ATT command.

Figure 17-133 Example of MAP display when using the SLT ATT command to attach an NI-2 2BD integrated NIT LTID to a LEN

```
CI:
>SERVORD
SO:
SONUMBER: NOW 98 10 6 AM
>$
LTID:
>ISDN 283
FUNCTION:
>ATT
LEN:
>1 1 8 29
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 283 ATT HOST 01 1 08 29 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-134 shows an example of the MAP display when the QLEN command is used to query the LEN to which an NI-2 2BD integrated NIT LTID is attached.

Figure 17-134 Example of MAP display showing response to the QLEN command used on LEN with NI-2 2BD integrated NIT LTID attached

```
CI:
>QLEN 1 1 8 29
-------------------------------------------------------
LEN:      HOST 01 1 08 29
ISG: 1 DCH: 2 ISG BRA CHANNEL: 16
CARDCODE: BX27AA PADGRP: NPDGRP
PM NODE NUMBER : 35
PM TERMINAL NUMBER: 280

TEI      LTID      CS   PS    BCH/ISG Bd AG_information
---     --------   --   --    ---------   --------------
DYNAMIC ISDN 283   NI2  D     ISG Bd: 31  AG_UNASSIGNED
--------------------------------------------------------
```

NA014 SERVORD examples for On-demand B-channel X.25 PMD

In the NA014 release, the On-demand X.25 B-channel Packet Mode Data (PMD)—Provisioning, Data Distribution Manager, and XLIU feature introduced the provisioning of on-demand B-channel (ODB) X.25 packet mode data (PMD) service. This service allows the user to originate packet-mode calls over a user initiated B-channel. When not being used for packet-mode data, the B-channel can be used for voice and circuit-switched data calls. This new feature allows the sharing of B-channels by VI, CMD and PMD call types.

A new SERVORD option, ODB (On-demand B-channel), was added for NI-2 2BD DNs.The guidelines for provisioning NI-2 2BD DNs with the ODB option are as follows:

- Only the NEW command can be used to provision NI-2 2BD DNs with option ODB.
- Provisioning of DNs with the ODB option requires an unmapped LTID.
- Provioning only allows two DNs with the ODB option to be assigned to an LTID
- Provisioning does not allow the assignment of DNs with the ODB option on an LTID that is already mapped to a LEN.
- Provisioning does not allow the assignment of a D-packet DN on an LTID provisioned with ODB DNs that is attached to a LEN. Adding a D-packet DN requires detaching the LTID from the LEN to which it is attached. Provisioning requires the detaching of the LTID from the LEN each time a new D-packet DN is provisioned on the LTID.
- Provisioning allows the sharing of an ODB DNs with DN appearances having call types other than PMD in both single and shared DN configurations as follows:
  - Single DN configuration—an ODB DN can be shared with a DN appearance having call type VI, CMD, or VI-CMD. An ODB DN cannot be shared with a DN appearance having call type PMD. A call type of PMD includes DNs with D packet service on the D-channel or an ODB DN.
  - Shared DN configuration—an ODN DN can be shared with a DN appearance having call type VI, CMD, or VI-CMD on different LTIDs. An ODB DN cannot be shared with a DN having call type PMD. A call type of PMD includes DNs with D packet service on the D-channel or a ODB DN.

The following SERVORD commands can not be used with the ODB option. Attempts to use these commands with the ODB option result in the generation of an error message.

- ADD–An attempt to use the ADD command with the ODB option causes the following error message to generate:

  ```
  ODB does not support HUNT GROUPS
  ```
- ADO–An attempt to use the ADO command to assign the ODB option to a non-ODB DN causes the following error message to generate:

  ```
  PMD/DFDN/ODB cannot be manipulated using ADO/DEO/CHF
  PMD/DFDN/ODB can be added only using NEW
  ```

- ADO–An attempt to use the ADO command to assign any other options on a key along with the ODB option causes the following error message to generate:

```
Cannot assign any options on the key along with ODB
```

- ADDPH–An attempt to use the ADDPH command to add an ODB DN to a permanent virtual circuit (PVC) causes the following error message to generate:

```
ODB DN cannot be a part of PVC
```

- ADDPH–An attempt to use the ADDPH command to add an ODB DN to a closed user group (CUG) causes the following error message to generate:

```
ODB DN cannot be a part of CUG
```

- CHF–An attempt to use the CHFcommand with the ODB option causes the following error message to generate:

```
PMD/DFDN/ODB cannot be manipulated using ADO/DEO/CHF
PMD/DFDN/ODB cannot be changed using any SO command
```

- DEO–An attempt to use the DEO command to remove the ODB option from a DN causes the following error message to generate:

```
PMD/DFDN/ODB cannot be manipulated using ADO/DEO/CHF
PMD/DFDN/ODB can be deleted only using OUT
```

- EST–An attempt to use the EST command to assign an ODB DN as either the pilot or as a member of a hunt group causes the following error message to generate:

```
ODB does not support HUNT GROUPS
```

- SETPH–An attempt to use the SETPH command to change the X.25 parameters associated with an ODB DN causes the following error message to generate:

```
SETPH command cannot be used for ODB DNs
Use CHAPH command for ODB DNs
```

SERVORD examples for On-demand B-channel X.25 PMD service

The following examples for configuring NI2 2BD DNs with option ODB are shown in Figure 17-135 through Figure 17-144.

- SLT ADD command used to add and NI-2 2BD ODB LTID
- SLT NEW command used to a NI-2 2BD DN with option ODB
- SLT ATT command to attach an NI-2 2BD ODB LTID to a LEN

- QDN command used to query a ODB DN
- QLT command used to query an ODB LTID

Figure 17-135 shows an example of the MAP display when the SLT ADD command is use to add an NI-2 2BD LTID capable of supporting ODB and D-packet DNs.

Figure 17-135 Example of the SLT ADD command in prompt mode—adding and NI2 2BD LTID capable of supporting ODB DNs along with a D-packet DN

```
>SLT
SONUMBER: MAY 0 05 10 PM
>(CR)
LTID:
>NI2 400
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>D
MAKEYS:
>64
DEFLTERM:
>N
TEI-TYPE:
>DTEI
TSPID:
>6135554000
EKTS:
>N
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 0 05 10 PM NI2 400 ADD BRAFS NI2 D 64 N DTEI
6135554000 N $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-136 through Figure 17-138 show examples of using the NEW command to add ODB and D-packet DNs. When key 1 is provisioned as a ODB DN, a second ODB DN can be assigned to any other key, such as key 5, as shown in Figure 17-137. An optional PMD DN can also be provisioned on a vacant key, such as key 10, as shown in Figure 17-138.

Figure 17-136 Example of the NEW command used to assign an ODB DN to key 1 of an NI2 2BD terminal

```
>NEW
SONUMBER:   NOW 0 5 10 PM
>(CR)
DN:
>6135551000
LCC_ACC:
>ISDNKSET
GROUP:
>LONS634
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>N
LTG: 0
>(CR)
LEN_OR_LTID:
>NI2 400
OPTKEY:
>1
OPTION:
>ODB
OPTION:
>$
COMMAND AS ENTERED:
NEW NOW 0 5 10 PM 6135551000 ISDNKSET LONS634 0 0 613 1 N
0 NI2 400 1 ODB $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-137 Example of the NEW command used to assign an ODB DN to key 5 of an NI2 2BD terminal

```
>NEW
SONUMBER:   NOW 0 5 10 PM
>(CR)
DN:
>6135551000
LCC_ACC:
>ISDNKSET
GROUP:
>LONS634
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>5
RINGING:
>N
LTG: 0
>(CR)
LEN_OR_LTID:
>NI2 400
OPTKEY:
>5
OPTION:
>ODB
OPTION:
>$
COMMAND AS ENTERED:
NEW NOW 0 5 10 PM 6135551000 ISDNKSET LONS634 O O 613 5
N 0 NI2 400 5 ODB $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-138 Example of the NEW command in used to assign a PMD DN to key 10 of an NI2 2BD terminal

```
>NEW
SONUMBER:   NOW 0 5 10 PM
>(CR)
DN:
>6135551000
LCC_ACC:
>ISDNKSET
GROUP:
>LONS634
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>10
RINGING:
>N
LTG: 0
>(CR)
LEN_OR_LTID:
>NI2 400
OPTKEY:
>10
OPTION:
>PMD
OPTION:
>$
COMMAND AS ENTERED:
NEW NOW 0 5 10 PM 6135551000 ISDNKSET LONS634 0 0 613 10 N
0 NI2 400 10 PMD $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

SERVORD examples for using the SLT ATT command to attach an LTID provisioned with ODB DNs to a LEN

When attaching an ODB LTID to a LEN, the user must specify the XSG to which it should be connected. Figure 17-139 through Figure 17-142 show the four different ways in which the user can use the SLT ATT command to attach an LTID provisioned with ODB and D-packet DNs on it to a LEN:

- specify no options
- specify the PHLINK option only
- specify the DCHCHNL option only
- specify both the PHLINK and DCHCHNL options

SERVORD example for using the SLT ATT command with no options specified to attach an ODB LTID to a LEN

If the user does not specify any option, the XSG for the ODB DNs is chosen by automatic resource assignment (ARA). The channel to which the LEN is connected is chosen from the entries in table SPECCONN. Figure 17-139 shows an example of the MAP display when using the SLT ATT command with no option specified to attach an ODB LTID to a LEN.

Figure 17-139 Example of the SLT ATT command used without options to attach an ODB LTID to a LEN

```
>SLT
SONUMBER:  NOW 0 5 10 PM
>(CR)
LTID:
>NI2 400
FUNCTION:
>ATT
LEN:
>ISDN 00 0 10 00
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 0 5 10 PM NI2 400 ATT ISDN 00 0 10 00 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

SERVORD example for using the SLT ATT command with the PHLINK option to attach an ODB LTID to a LEN

If the user specifies the PHLINK option, the XSG chosen for the ODB DNs is the one specified by the user. The XSG selected for D-packet DNs depends on the entries datafilled in table SPECCONN. Figure 17-140 shows an example of the MAP display when using the SLT ATT command with the PHLINK option to attach an ODB LTID to a LEN.

Figure 17-140 Example of the SLT ATT command used with the PHLINK option in prompt mode to attach an ODB LTID to a LEN

```
>SLT
SONUMBER:  NOW 0 5 10 PM
>(CR)
LTID:
>NI2 400
FUNCTION:
>ATT
LEN:
>ISDN 00 0 10 00
OPTION:
>PHLINK
XSG:
>100
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 0 5 10 PM NI2 400 ATT ISDN 00 0 10 00 PHLINK 100 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

SERVORD example for using the SLT ATT command with the DCHCHNL option to attach an ODB LTID to a LEN

If the user specifies the DCHCHNL option, the XSG chosen for the ODB DNs is the one. The XSG selected for D-packet DNs is done automatically using ARA. Figure 17-141 shows an example of the MAP display when using the SLT ATT command with the DCHCHNL option to attach an ODB LTID to a LEN.

Figure 17-141 Example of the SLT ATT command used with the DCHCHNL option in prompt mode to attach an ODB LTID to a LEN

```
>SLT
SONUMBER:  NOW 0 5 10 PM
>(CR)
LTID:
>NI2 400
FUNCTION:
>ATT
LEN:
>ISDN 00 0 10 00
OPTION:
>DCHCHNL
DCHCHNL:
>30
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 0 5 10 PM NI2 400 ATT ISDN 00 0 10 00 DCHCHNL 30 $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

SERVORD example for using the SLT ATT command with both the PHLINK and the DCHCHNL options to attach an ODB LTID to a LEN

If the user specifies the PHLINK and DCHCHNL options, the XSG chosen for the ODB DNs is the one specified by the user. The XSG selected for the D-packet DNs depends on the entry in table SPECCONN for the specified Bd channel. Figure 17-142 shows an example of the MAP display when using the SLT ATT command with the PHLINK and DCHCHNL options to attach an ODB LTID to a LEN.

Figure 17-142 Example of the SLT ATT command used with the PHLINK and DCHCHNL options in prompt mode to attach an ODB LTID to a LEN

```
>SLT
SONUMBER:  NOW 0 5 10 PM
>(CR)
LTID:
>NI2 400
FUNCTION:
>ATT
LEN:
>ISDN 00 0 10 00
OPTION:
>PHLINK
XSG:
>100
OPTION:
>DCHCHNL
DCHCHNL:
>30
COMMAND AS ENTERED:
SLT NOW 0 5 10 PM NI2 400 ATT ISDN 00 0 10 00 (PHLINK 100)
(DCHCNHL 30) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Querying a DN with the ODB option

Figure 17-143 shows an example of the MAP display when the QDN command is used to query an ISDN BRI DN in single DN configuration with the ODB option.

Figure 17-143 Example of the QDN command used to query ISDN BRI DN in single DN configuration with ODB option

```
>QDN
DIRECTORY_NUMBER
>6135551000
DN: 5551000
CALLTYPE: VI-CMD
TYPE: SINGLE PARTY LINE
SNPA: 613     SIG: NA   LNATTIDX: N/A
LTID: NI2 400
LTCLASS: BRAFS
LINE CLASS CODE: ISDNKSET
KEY: 1
CUSTGRP: LONS634   SUBGRP: 0 NCOS: 0  RING: Y
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
AFC
CRBL 1 1 NDNAP 2

CALLTYPE: PMD-ODB
TYPE: SINGLE PARTY LINE
SNPA: 613     SIG: N/A  LNATTIDX: N/A
LTID: NI2 100
LTCLASS: BRAFS
LINE CLASS CODE: ISDNKSET
KEY: 10
CUSTGRP: LONS634   SUBGRP: 0 NCOS: 0 RING: N
OPTIONS:
ODB
```

Query an LTID with ODB DNs

Figure 17-144 shows an example of the MAP display when the QLT command is used to query an LTID with ODB DNs. The call type for the ODB DNs displays as PMD-ODB. This example applies to software release NA014 and up.

Figure 17-144 Example of MAP display for QLT command used to query an LTID with ODB DNs

```
>QLT
ENTER: LTGRP
>NI2
ENTER: LTNUM
>100
LTID:NI2 100
SNPA: 613
DIRECTORY NUMBER: 5556789
LT GROUP NO: 3
LTCLASS: BRAFS      DEFAULT LOGICAL TERMINAL: N
EKTS: N     CACH: N
SLBRI: N
CS: NI2   PS: D    TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL    ISSUE: 2
TSPID: 6135556745
CUSTGRP: LONS634
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
CRBL 1 1 NDNAP 2 AFC 5 SFX VI $ $ N CMD BOTH $ $ N

KEY             DN                      CALLTYPE
---             --                      --------

 1              DN           6135556785   VI-CMD
 4              DN           6135556785   PMD-ODB
 8              DN           6135556546   PMD-ODB

KEY             FEATURE
---             -------

 1              CRBL 1 1
 1              DBC     DBC_SP
 1              NDNAP   2
 2              AFC     DBC_SP
```

SERVORD examples for Electronic key telephone service

Electronic key telephone service (EKTS) is a set of services for ISDN BRI voice terminals. These services are available if option EKTS is assigned to the LTID associated with it. EKTS services allow

- multiple DNs on a terminal
- sharing of DNs by multiple users
- bridging of multiple users in to the same call
- flexible calling DN bridging with flexible calling
- intercom calling

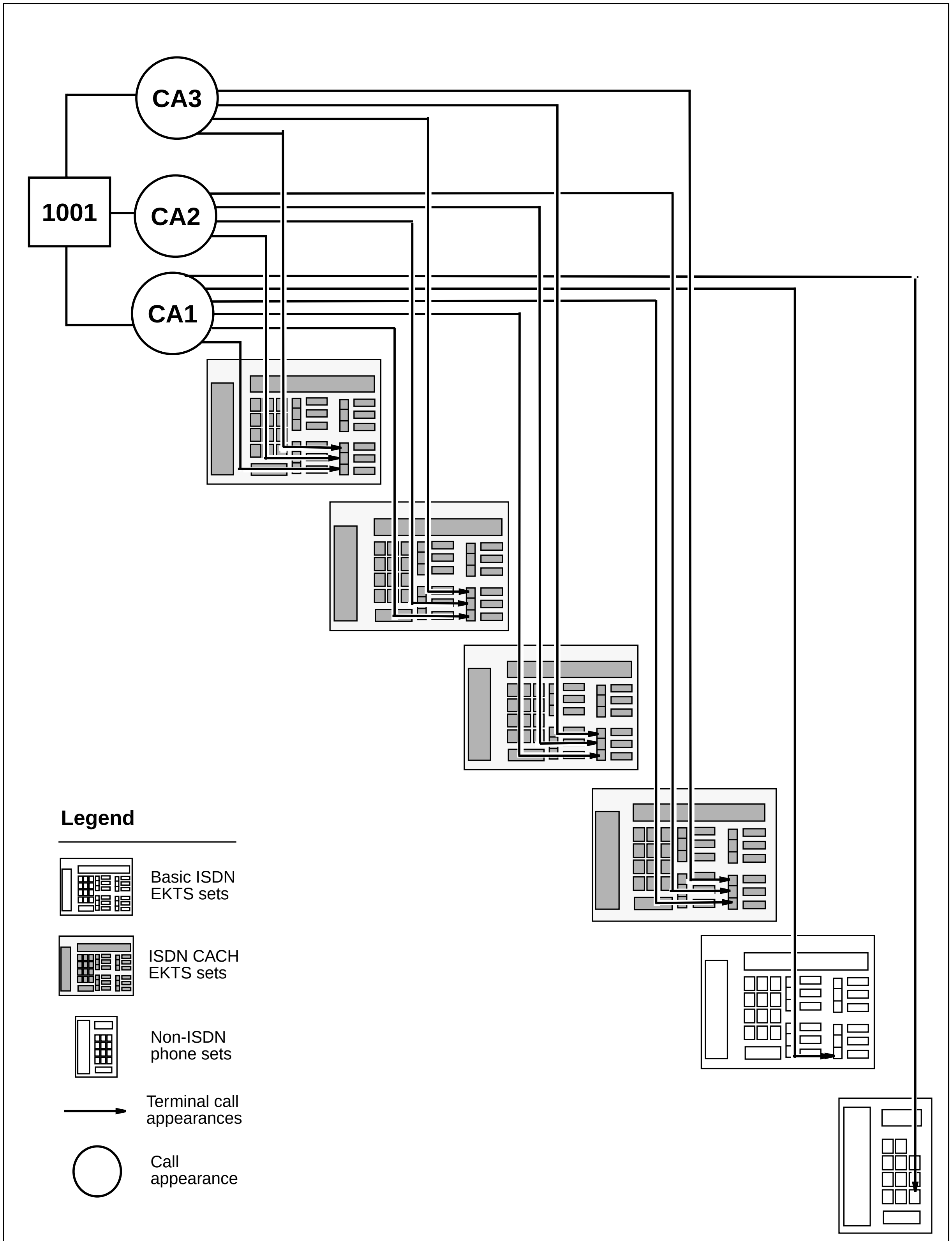
The following sections show examples of using SERVORD to configure EKTS services including Single Call Arrangement (SCA) Multiple Appearance Directory Number (MADN) and MADN CACH (Call Appearance Call Handling). The examples shown include:

- SLT ADD command used to add an NI-2 FIT LTID with EKTS activated
- QLT command used to query NI-2 FIT LTID with EKTS activated
- SLT ADD command used to add an NI-2 FIT LTID with EKTS activated and option CACH
- QLT command used to query an NI-2 FIT LTID with both EKTS and CACH activated
- NEW command used to create an SCA MDN primary member
- NEW command used to add an SCA MDN member
- QLT command used to query NI-2 FIT LTID associated with a SCA MDN primary member
- NEW command used to create an SCA MDN primary member for MDN group that includes a RES line
- NEW command used to add a RES line as a secondary member of a MDN SCA group
- QLT command used to query the LTID of the PRIMARY DN of the MDN SCA group that includes a RES line
- QDN command used to query the DN used in the MDN SCA group that includes the RES line
- NEW command used to add a new CA to an LTID
- NEW command used to add a CA2 to an LTID
- NEW command used to add a MADN CACH member
- QLT command used to query an NI-2 FIT LTID with option MADN CACH
- New command used to create MADN CACH member that share a common DN with a CMD appearance on the same NI-2 LTID
- NEW command used to create a CMD appearance sharing a common DN with a MADN CACH member on the same NI-2 LTID
- QLT command used to query NI-2 FIT LTID with MADN CACH and CMD call appearances that have same assigned DN
- NEW command used to add MADN CACH secondary member with option CFMDN

- QLT command used on LTID associated with a secondary MADN CACH member to verify assignment of option CFMDN
- QGRP command used to query a MADN CACH group

Figure 17-145 illustrates the relationship between shared DN to CA to terminal assignment.

Figure 17-145 Relationship of DN to CA to terminal



Making EKTS available on BRI terminals

EKTS is made available on BRI terminals at the time the LTID is created by entering Y in response to the prompt EKTS as shown in Figure 17-146. This figure shows option EKTS set Y when a QLT is performed on LTID 250.

Only functional signaling terminals with a dynamic TEI can be defined as an EKTS set. Option EKTS can not be assigned to a default logical terminal (NIT). An attempt to add the option EKTS to NIT results in an error message stating that option EKTS can not be assigned to a default logical terminal.

Option CACH is assignable to EKTS LTIDs. This capability changes O.931 signaling to use CAP I.E.s (Call Appearance Information Elements) instead of called DN (CDN) and calling DN (CGN) for voice call establishment as specified in Bellcore Generic Requirement 205 (GR-205).

> ***Note:*** In software loads earlier than NA008, option CACH is only available for change if the value for EKTS is set to Y. The value for EKTS can not be changed using the SLT CHA command. Beginning with NA008, the SLT CHA command is used to change the EKTS value from N to Y and to add option CACH.

Figure 17-146 shows an example of the MAP display when option EKTS is set to Y. In this example, the SLT ADD command is used to add an NI-2 FIT LTID.

Figure 17-146 Example of MAP display when using the SLT ADD command to add an NI-2 FIT LTID with EKTS activated

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW  98  10  6 AM
>
LTID:
>ISDN 250
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI
TSPID:
>6137235070
EKTS:
>Y
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 250 ADD BRAFS NI2 N 64 DTEI
6137235070 Y $ ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-147 shows an example of the MAP display when the QLT command is used to query LTID ISDN 250 to verify that option EKTS is set to Y.

Figure 17-147 Example of MAP display showing response to the QLT command used on an NI-2 FIT LTID with EKTS activated

```
CI:
>QLT ISDN 250
---------------------------------------------------
LTID: ISDN 250
SNPA: 613
DIRECTORY NUMBER:     7235220
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: Y CACH: N
SLBRI: N
CS:NI2 PS: N TEI DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID: 6137235070
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

KEY       DN                CALLTYPE
---       --                --------
1         DN    6137235220  VI & CMD

KEY       FEATURE
---       -------
1         CRBL 1 1
1         DBC DBC_SP
1         NDNAP 2
2         AFC DBC_SP
--------------------------------------------------
```

Figure 17-148 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 FIT that is to have a CACH MADN associated with it. The figure shows EKTS set to Y and option CACH being added.

Figure 17-148 Example of MAP display of when using the SLT ADD command to add an NI-2 FIT LTID with EKTS activated and option CACH

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW 98 10 6 AM
>
LTID:
>ISDN 41
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI
TSPID:
>6137235080
EKTS:
>Y
OPTION:
>CACH
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 41 ADD BRAFS NI2 N 64 DTEI
6137235080 Y(CACH)$ ENTER Y TO CONFIRM, N TO REJECT OR E TO
EDIT
 >Y
WARNING: Firmware must be compatible with CACH option.
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-149 shows an example of the MAP display when the QLT command is used to query LTID ISDN 41 to verify that options EKTS and CACH are both set to Y.

Figure 17-149 Example of MAP display of response to the QLT command used on an NI-2 FIT LTID with both EKTS and CACH activated

```
CI:
>QLT ISDN 41
---------------------------------------------------
LTID: ISDN 41
SNPA: 613
DIRECTORY NUMBER:     7235220
LT GROUP NO: 0
LTCLASS: BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: Y CACH: Y
SLBRI: N
CS:NI2 PS: N TEI DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID: 6137235080
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
SFC VI $ $ N CMD BOTH $ $ N
CRBL 1 1 NDNAP 2 AFC 6

KEY       DN               CALLTYPE
---       --               --------
1         DN    6137235220 VI & CMD

KEY       FEATURE
---       -------
1         CRBL 1 1
1         DBC DBC_SP
1         NDNAP 2
2         AFC DBC_SP
--------------------------------------------------
```

The following options associated with EKTS are available through SERVORD:

- FC—flexible calling is a set of capabilities that allows the user to establish two or more concurrent calls and then join them into a conference of up to 30 members. Flexible calling allows the user to
  - — designate an established call as a conference call
  - — hold and retrieve a conference call
  - — bridge either an incoming or outgoing basic call into a conference
  - — release, or drop, the last member to join the conference call
  - — transfer a conference call
- GIC—group intercom allows a user to terminate a call on a member of a pre-designated intercom group using abbreviated dialing. Group members

are accessed by using abbreviated dialing that is determined by group size as follows:

- — one digit (0-9) for groups of up to 10 members
- — two digits (00-99) for groups of up to 100 members
- — three digits (000-999) for groups of up to 1000 members
- — four digits (0000-9999) for groups of up to 10 000 members

- ICM—intercom calling allows user to directly terminate on a pre-designated set by pressing the ICM feature key
- CRBL—call reference busy limit can be used to assign multiple appearances of non-MADN DNs
- MDN—multiple appearance directory number allows a DN to be shared across a number of LTIDs. The following are options that apply to MDN DNs:
  - — EHLD—EKTS hold
  - — MRF—MDN (MADN) Ring forward
  - — MREL—MDN (MADN) release

Setting up MADN groups on an EKTS set

Option MDN assigns a DN to more than one set. EKTS serves as a base for MDN features. To assign MDN features, assign EKTS to the LTID that is associated with the set. Next create call appearances for each MDN DN and assign them to the appropriate LTIDS. SLBRI LTIDs are compatible with MADN SCA and CACH.

> ***Note:*** In NA008, to assign MDN to an EKTS (or EKTS CACH) LTID, option SPIDSFX is required. With the introduction of the TSPID in NA009, this is no longer true. However, the required TSPID must uniquely identify the LTID with the MDN group.

There are two arrangements for MDN groups applicable to ISDN EKTS sets:

- single call arrangement (SCA)
- call appearance call handling (CACH)

> ***Note:*** MADN CACH was added in NA008.

Figure 17-150 shows an example of the MAP display when using the NEW command to create the primary member of an MDN SCA group. MADN SCA is assignable to LTIDs with EKTS set to Y and with or without option CACH.

Figure 17-150 Example of MAP display when using the NEW command to create an MDN SCA primary member

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:      NOW  98  10  6 AM
>$
DN:
>7235900
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>1
LATANAME:
>NILLATA
LTG:      0
>
LEN_OR_LTID:
>ISDN 38
OPTKEY:
>1
OPTION:
>MDN
MDNTYPE:
>SCA
PRIMARY:
>Y
DENIAL_TRMT:
>SILENCE
BRIDGING:
>Y
CONF_SIZE:
>10
BRIDGE_TONE
>Y
INIT_STAT:
>PRIVATE
PRL_MODE:
>MANUAL
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 7235900 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 38 (1 MDN SCA Y SILENCE Y 10 Y PRIVATE
MANUAL)$
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-151 show the MAP display of the command NEW being used to add a member of an MDN SCA group.

Figure 17-151 Example of MAP display when using the NEW command to add an MDN SCA member

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>$
DN:
>7235900
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>3
RINGING:
>Y
LATANAME:
>NILLATA
LTG:  0
>
LEN_OR_LTID:
>ISDN 40
OPTKEY:
>3
OPTION:
>MDN
MDNTYPE:
>SCA
PRIMARY:
>N
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 10 6 PM 7235900 ISDNKSET NORTEL 0 0 613 3 Y
NILLATA 0 ISDN 40 (3 MDN SCA N) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-152 shows the MAP display of the QLT command used on LTID ISDN 38 on which the primary member of the MDN SCA group appears.

Figure 17-152 Example of MAP display showing response to the QLT command used on NI-2 FIT LTID associated with MDN SCA primary member

```
CI:
>QLT ISDN 38
---------------------------------------------------
LTID: ISDN 38
SNPA: 613
DIRECTORY NUMBER:     7235900
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: Y CACH: Y
SLBRI: N
CS:NI2 PS: N
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID: 6137235090
LEN:  HOST 01 0 0 21  TEI:  DYNAMIC
CUSTGRP:       NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
MADN MEMBER INFO:
    ISDN     38
    ISDN     40
SFC VI $ $ N


KEY       DN                       CALLTYPE
---       --                       --------
1         MDN      6137235900     VI SCA         PRIMARY

KEY       FEATURE
---       -------
    NONE
--------------------------------------------------
```

Adding a RES line as member of a MDN SCA group

As of NA012, enhancements to the DMS switch software allows a Residential Enhanced Services (RES) line to be added as a secondary member of a MDN SCA group. This allows the appearance of the same DN on both a RES line and an ISDN line. All MDN SCA features that are compatible with RES lines are supported by these enhancements. The following two restrictions apply to adding a RES line as a secondary member of a MDN SCA group:

- The RES line and the ISDN EKTS MDN SCA lines must belong to the same customer group.
- The RES line can not be the primary member of the MDN SCA group.

Figure 17-153 shows an example of the MAP display when using the NEW command to create the primary member of a MDN SCA group that includes a RES line as a member.

Figure 17-153 Example of MAP display when using the NEW command to create a MDN SCA primary member

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:      NOW  98  10  6 AM
>$
DN:
>6217777
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>1
LATANAME:
>NILLATA
LTG:      0
>
LEN_OR_LTID:
>ISDN 111
OPTKEY:
>1
OPTION:
>MDN
MDNTYPE:
>SCA
PRIMARY:
>Y
DENIAL_TRMT:
>SILENCE
BRIDGING:
>Y
CONF_SIZE:
>10
BRIDGE_TONE
>Y
INIT_STAT:
>PRIVATE
PRL_MODE:
>MANUAL
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 6217777 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 111 (1 MDN SCA Y SILENCE Y 10 Y PRIVATE
MANUAL)$
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-154 shows an example of the MAP display when using the NEW command to add a RES line as a secondary member of a MDN SCA group.

Figure 17-154 Example of MAP display when using the NEW command to add RES line as secondary MDN SCA member.

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  99 8 12 AM
>$
DN:
>6217777
LCC_ACC:
>1FR
LATANAME:
>NILLATA
LTG: 0
>
LEN_OR_LTID:
>0 0 0 21
OPTION:
>MDN
MDNTYPE:
>SCA
PRIMARY:
>N
RINGING:
>Y
OPTION:
>DGT
OPTION:
>$
COMMAND AS ENTERED:
NEW NOW 99 8 12 AM 6217777 1FR NILLATA 0 HOST 00 0 00 21
(MDN SCA N Y) (DGT)$
ENTER Y TO CONFIRM, NE TO REJECT OR E TO EDIT
>Y
There is a RES specific option in the option set.
Line will be created as a RES line.
```

Figure 17-155 shows an example of the MAP display when using the QLT on the LTID associated with MDN SCA primary member. The display includes the RES line member shown as HOST 00 0 00 21.

Figure 17-155 Example of MAP display showing response to the QLT command used on NI-2 FIT LTID associated with MDN SCA primary member

```
CI:
>QLT ISDN 111
---------------------------------------------------
LTID: ISDN 111
SNPA: 613
DIRECTORY NUMBER:     6217777       (NON-UNIQUE)
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: Y CACH: N
SLBRI: N
CS:NI2 PS: N
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID: 6136217777
LEN:  HOST 01 0 0 21  TEI:  DYNAMIC
CUSTGRP:        NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
MADN MEMBER INFO:
    ISDN    111
    HOST 00 0 00 21
SFC VI $ $ N


KEY       DN                    CALLTYPE
---       --                    --------
1         MDN      6136217777    VI SCA        PRIMARY

KEY       FEATURE
---       -------
    NONE
--------------------------------------------------
```

Figure 17-156 shows an example of the MAP display when using the QDN command on a MDN SCA DN. The display, in this case, includes information on the RES line which is a secondary of the MDN SCA group.

Figure 17-156 Example of MAP display when using the QDN command on a MDN SCA DN

```
CI:
>QDN 6217777
----------------------------------------------------------
DN:      6217777     (NON-UNIQUE)
TYPE: MULTIPLE APPEARANCE DIRECTORY NUMBER
SNPA: 613   SIG: N/A        LNATTIDX: N/A
LTID: ISDN     111
LTCLASS:  BRAFS
PRIMARY LEN: ISDN      111
LINE CLASS CODE:     ISDNKSET
KEY: 1
MADN INFRO - TYPE: SCA PRIMARY: Y
MADN GROUP INFO - DENIAL_TRMT: SILENCE  BRIDGING: Y
           CONF_SIZE: 10 BRIDGE_TONE: Y INIT_STAT:PRIVATE
           PRL_MODE: MANUAL
OPTIONS:
SFC VI $ $ N
MADN MEMBER LENS INFO:
ISDN 111        KEY: 1 SCA PRIMARY: Y RING: ALWAYS NCOS: 0
HOST 00 0 00 21        SCA PRIMARY: N RING:ALWAYS
----------------------------------------------------------
```

Setting up MADN CACH groups on an EKTS set

MADN CACH is assignable to all LTIDs with EKTS set to Y. LTIDs without option CACH can only be assigned one call appearance (CA) of the MADN CACH DN. LTIDs with option CACH can be assigned up to 16 CAs of the MADN CACH DN.

> ***Note:*** The primary member of CA 1 (first CA created using the NEW command) must be an ISDN EKTS LTID. The primary member of CA 1 is the CACH Controller.

Option CACH adds the following capabilities to EKTS MADN groups:

- a new call arrangement of MADN called MADN CACH
- allows MADN CACH DN to have 1 to 16 call appearances (CA)
- allows MADN CACH CA to have 1 to 32 members
- allows an EKTS CACH terminal to support more than one CA of a given MADN CACH DN

- allows calls to originate on and terminate to other idle CAs of the same MADN CACH DN when one CA of a MADN CACH DN is busy
- offers calls terminating to a MADN CACH DN to the first available CA depending on the call appearance search order
  - the terminating CA search order of a MADN CACH DN will default to a sequential search from 1 to 16
  - the terminating CA search order is changed through SERVORD

Figure 17-157 shows an example of the MAP display when a MADN CACH first CA is added to LTID ISDN 41.

Figure 17-157 Example of MAP display when using the NEW command to add first MADN CACH CA to LTID ISDN 41

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:      NOW  98  10  6 AM
>
DN:
>7235950
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:  0
>
LEN_OR_LTID
>ISDN 41
OPTKEY:
>1
OPTION:
>MDN
MDNTYPE:
>CACH
PRIMARY:
>Y
NEWCA:
>Y
CARES_TYPE:  NULL
>
DENIAL_TRMT:
>SILENCE
BRIDGING:
>Y
CONF_SIZE:
>10
```

-continued-

Figure 17-157 Example of MAP display when using the NEW command to add a new CA to LTID ISDN 41

```
BRIDGE_TONE:
Y
INIT_STAT:
>PRIVATE
PRL_MODE:
>MANUAL
OPTKEY:
>$
COMMAND AS ENTERED
NEW NOW 98 10 6 AM 7235950 ISDNKSET NORTEL 0 0 613 1 Y
MILLATA 0 ISDN 41 (1 MDN CACH Y Y NULL SILENCE Y 10 PRIVATE
MANUAL) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

-end-

Figure 17-158 shows an example of the MAP display when a MADN CACH CA2 is added to LTID ISDN 41.

Figure 17-158 Example of MAP display of when using the NEW command to add a MADN CACH CA2 to LTID ISDN 41

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>
DN:
>7235950
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:  0
>
LEN_OR_LTID
>ISDN 41
OPTKEY:
>1
OPTION:
>MDN
MDNTYPE:
>CACH
PRIMRARY:
>N
NEWCA:
>Y
CARES_TYPE:  NULL
>
OPTKEY:
>$
COMMAND AS ENTERED
NEW NOW 98 10 6 AM 7235950 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 41 (1 MDN CACH N Y NULL)$
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-159 shows an example of the MAP display when a member of the same MADN CACH group as shown in Figure 17-160 is added to LTID ISDN 42.

Figure 17-159 Example of MAP display using the NEW command to add a MADN CACH member

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>
DN:
>7235950
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY
>3
RINGING:
>Y
LATANAME:
>NILLATA
LTG:  0
>
LEN_OR_LTID
>ISDN 42
OPTKEY:
>3
OPTION:
>MDN
MDNTYPE:
>CACH
PRIMARY:
>N
NEWCA:
>N
CA_NUM
>1
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 7235950 ISDNKSET NORTEL 0 0 613 3 Y
NILLATA OS ISDN 42 (3 MDN CACH N N 1) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 17-160 shows the MAP display of the QLT command used on LTID ISDN 41 on which the controller of the MADN CACH group appears after it is attached to a LEN.

Figure 17-160 Example of MAP display showing response to the QLT command used on an NI-2 FIT LTID with option MADN CACH

```
CI:
>QLT ISDN 41
---------------------------------------------------------
LTID: ISDN 41
SNPA: 613
DIRECTORY NUMBER:     7235950
LT GROUP NO: 0
LTCLASS:  BRAFS DEFAULT LOGICAL TERMINAL:N
EKTS: Y CACH: Y
SLBRI: N
CS:NI2 PS: N TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL ISSUE: 2
TSPID:           6137235095
LEN:  HOST 01 0 0 21  TEI:  DYNAMIC
CUSTGRP:         NORTEL SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE: ISDNKSET
MAXKEYS: 64
OPTIONS:
MADN MEMBER INFO:
    ISDN     41
SFC VI $ $ N


KEY     DN                CALLTYPE
---     --                ---------
1       MDN   6137235950   VI    CACH CA 1 NULL CONTROLLER
2       MDN   6137235950   VI    CACH CA 2 NULL
3       MDN   6137235950   VI    CACH CA 3 NULL
KEY     FEATURE
---     -------
20      PRL
----------------------------------------------------------
```

Figure 17-161 shows an example of the MAP display resulting from using the QGRP command to query the MADN CACH group.

Figure 17-161 Example of MAP display showing response to the QGRP command used on a MADN CACH group

```
CI:
>QGRP
GRP_TYPE:
>MDN
DN_LEN_OR_LTID:
>7235950
BRIEF_FULL_OR_CA: BRIEF
>FULL
----------------------------------------------------------
MDN Call Appearance:  1 CARES: NULL
- - - - - - - - - - - - - - - - - -
ISDN        1   KEY 1       CONTROLLER
ISDN        2   KEY 2
ISDN        3   KEY 3
HOST  00 1 10 06
HOST  00 1 12 06 KEY 1

The number of members in the Call Appearance is 5.

MDN Call Appearance:  2 CARES: DOR
- - - - - - - - - - - - - - - - - -
ISDN        2   KEY 1       PRIMARY
ISDN        1   KEY 2
ISDN        3   KEY 3
HOST  00 1 15 06

The number of members in the Call Appearance is 4.
MDN Call Appearance:  3 CARES: DTM
- - - - - - - - - - - - - - - - - -
ISDN        2   KEY 1       PRIMARY
ISDN        1   KEY 2
ISDN        3   KEY 3

The number of members in the Call Appearance is 3.

The CACH Controller has the following options:
LNR SFC NAME PUBLIC MADN1 5317
PRL PRV
----------------------------------------------------------
```

Assigning same DN for MADN EKTS and CMD on same LTID

In NA010, the same DN is assignable to both MADN VI and CMD call appearances on the same LTID. The following is a list of the rules that apply to this configuration:

- Up to 16 CMD call appearances can be supported by one terminal
- CMD appearance is allowed on only one NI-2 member of MADN EKTS group
- If the MADN group is CACH, the CMD appearance is assignable to only one NI-2 member of the group using the CRBL option.

- During emergency standalone (ESA) mode, terminations to the CMD appearances will only be allowed if the data entries assign them to the same LEN as the primary member.
- Terminal option ACOU which is incompatible with EKTS will not facilitate CMD termination.
- CMD terminations on an EKTS are subject to the same B-channel availability as MADN VI appearances.
- The LTID's alignment within associated groups determines the availability of B-channels to CMD terminations.
- If all B-channels designated for an associated group are busy, a CMD termination will not be offered a B-channel.

SERVORD examples for assigning MADN CACH CA and CMD to same LTID sharing same DN

The following SERVORD examples for configuring an NI-2 FIT LTID with MADN CACH and CMD call appearances sharing the same DN are shown in Figure 17-162 through Figure 17-166.

- SLT ADD command used to add an NI-2 FIT LTID with EKTS and option CACH
- NEW command used to create MADN CACH group primary member call appearance with calltype VI
- NEW command used to create CMD calltype appearance
- QLT command used on LTID associated with MADN CACH VI and CMD call appearances that use the same DN
- QDN of common DN shared by MADN CACH VI and CMD call appearances on same ISDN terminal

Figure 17-162 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 FIT that is to have a MADN CACH member associated with it. The figure shows EKTS set to Y and option CACH being added.

Figure 17-162 Example of MAP display of when using the SLT ADD command to add an NI-2 FIT LTID with EKTS activated and option CACH

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW 98 10 6 AM
>
LTID:
>ISDN 222
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI
TSPID:
>6136215083
EKTS:
>Y
OPTION:
>CACH
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 222 ADD BRAFS NI2 N 64 DTEI
6136215083 Y (CACH)$ ENTER Y TO CONFIRM, N TO REJECT OR E
TO EDIT
 >Y
WARNING: Firmware must be compatible with CACH option.
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-163 shows the MAP display when the NEW command is used to add a MADN CACH group's primary CA to an LTID.

Figure 17-163 Example of MAP display when using the NEW command to add a MADN CACH group's primary CA to an LTID ISDN 222

```
CI:
>SERVORD
SO:
>NEW
SONUMBER:     NOW  98  10  6 AM
>
DN:
>6215953
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:  0
>
LEN_OR_LTID
>ISDN 222
OPTKEY:
>1
OPTION:
>MDN
MDNTYPE:
>CACH
PRIMARY:
>Y
NEWCA:
>Y
CARES_TYPE:  NULL
>
DENIAL_TRMT:
>SILENCE
BRIDGING:
>Y
CONF_SIZE:
>10
BRIDGE_TONE
>Y
INIT_STAT
>PRIVATE
```

-continued-

Figure 17-163 Example of MAP display when using the NEW command to add a MADN CACH group's primary CA to LTID ISDN 222

```
PRL_MODE
>MANUAL
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 10 6 AM 6215953 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 222 (1 MDN CACH Y Y NULL SILENCE Y 10
PRIVATE MANUAL) $
```

-end-

Figure 17-164 shows an example of the MAP display when using the NEW command to add a CMD call appearance using the same DN as a MADN CACH member already assigned to the same NI-2 LTID.

Figure 17-164 Example of MAP display when using the NEW command to add a CMD call appearance to LTID ISDN 222

```
CI:
>SERVORD:
SO:
>NEW
SONUMBER:   NOW 98 6 25 AM
>
DN:
>6215953
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>2
RINGING:
>N
LATANAME:
>NILLATA
LTG: 0
>
LEN_LTID:
>ISDN 222
OPTKEY:
>2
OPTION:
>CRBL
VI:
>0
CMD:
>1
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 6 25 AM 6215953 ISDNKSET NORTEL 0 0 613 2 N
NILLATA 0 ISDN 222 (2 CRBL 0 1 ) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
NDNAP will default to 1
The CHF command can be used to modify the NDNAP value.
```

Figure 17-165 shows an example of the MAP display when the QLT command is used on the LTID associated with a MADN CACH and CMD call appearances that have the same DN.

Figure 17-165 Example of MAP display when the QLT command is used to display LTID with MADN CACH CA and CMD appearance using same DN

```
CI:
QLT ISDN  222
-----------------------------------------------------------
LTID:  ISDN    222
SNPA: 613
DIRECTORY NUMBER:   6215953
LT GROUP NO: 0
LTCLASS:  BRAFS    DEFAULT LOGICAL TERMINAL: N
EKTS: Y   CACH: Y
SLBRI: N
VERSION: FUNCTIONAL  ISSUE: 2
TSPID:         6136215083
CUSTGRP;           NORTEL   SUBGRP: 0  NCOS:   0 RING: Y
LINE CLASS CODE:  ISDNKSET
MAXKEYS: 64
MADN MEMBER INFO:
 ISDN      222
OPTIONS:
SFC NAME PUBLIC CACH3 5317 VI $ $ N
CRBL 0 1 NDNAP 1
  KEY     DN             CALLTYPE
  ---     --             --------
    1     MDN   6136215953 VI     CACH CA 1 NULL CONTROLLER
    2     DN    6136215953 CMD
  KEY      FEATURE
  ---      -------
    2        CRBL 0 1
    2         DBC DBC_64K
    2        NDNAP 1
```

Figure 17-166 shows an example of the MAP display when the QDN command is used on the DN that is shared in common by a MADN CA and CMD appearance on the same LTID.

Figure 17-166 Example of MAP display when the QDN command is used on DN that is assigned to both a MADN CA and a CMD appearance on same LTID

```
CI:
QDN 6215953
---------------------------------------------------------
DN:    6215953
CALLTYPE:   VI
TYPE: MULTIPLE APPEARANCE DIRECOTRY NUMBER
SNPA: 613  SIG: N/A      LNATTIDX: N/A
LTID: ISDN      222
LTCLASS:   BRAFS
LINE CLASS CODE:  ISDNKSET
KEY: 1
CUSTGRP:          NORTEL  SUBGRP: 0  NCOS: 0 RING: Y
MADIN INFO - TYPE: CACH
MADN GROUP INFO - DENIAL_TRMT: SILENCE   BRIDGING: Y
            CONF_SIZE: 10 BRIDGE_TONE: Y INIT_STAT PRIVATE
            PRL_MODE: MANUAL
OPTIONS:
SFC PUBLIC CACH3 5317 VI $ $ N
CRBL 0 1 NDNAP 1
MADN CACH INFO:
 CA        CARES     Members   Primary Member
---------------------------------------------------------
 CA 1      NULL     1          ISDN     222    KEY 1 CTLR


CALLTYPE:  CMD
TYPE: SINGLE PARTY LINE
SNPA: 613  SIG: N/A   LNATTIDX: N/A
XLAPLAN KEY : N/A                   RATEAREA KEY : N/A
LTID: ISDN   222
LTCLASS:  BRAFS
LINE CLASS CODE:    ISDNKSET
KEY: 2
CUSTGRP:             NORTEL  SUBGRP: 0  NCOS: 0  RING: N
OPTIONS:
SFC NAME PUBLIC CACH3 5317 CMD BOTH $ $ N
CRBL 0 1 NDNAP 1
```

SERVORD examples for assigning Call Forward to a secondary MADN CACH member

In NA010, option CFMDN may be assigned to any secondary MADN CACH member on an ISDN set supported by MADN CACH whether or not the CACH controller has Call Forward Universal (CFU) or Call Forward Intra-group assigned to it. Secondary MADN CACH members can use dial access procedures to activate and deactivate call forwarding. Assignment of CFMDN is made to secondary MADN CACH members using SERVORD command NEW or ADO. However, CFMDN only becomes active on the secondary MADN CACH member when one of the following call forward features is assigned to the CACH controller of a MADN CACH DN:

- CFU
- CFI
- CFXDNCT CFU
- CFXDNCT CFI

The following limitations and restrictions apply to Call Forward on secondary MADN member

- Call Forward on MADN feature controls Call Forwarding for only the voice calltypes of a DN.
- This feature supports only the call forwarding variants of CFU, CFI, CFXDNCT CFU and CFXDNCT CFI.
- The CFMDN feature allows the secondary MADN CACH members to program call forwarding for the list of DNs in the CACH controller’s call forwarding keylist.
- Call forwarding dial access is not permitted for CAs with call appearance reservation (CARES) type of terminating only.
- Support for CFMDN on the following types of sets requires the assignment of at least one CA of a MADN CACH DN to the set
  - — IBN 2500
  - — MBS
  - — ISDN BRAFS EKTS (non-CACH)
  - — BRAFS ISDN EKTS CACH

The following SERVORD examples for assigning Call Forward to a secondary MADN CACH member are shown in Figure 17-167 through Figure 17-169

- SLT ADD command used to add an NI-2 FIT LTID with EKTS and option CACH to be used with secondary MADN CACH member
- NEW command used to create MADN CACH group secondary member call appearance with calltype VI and option CFMDN
- QLT command used on LTID associated with a secondary MADN CACH member to verify assignment of option CFMDN

Figure 17-167 shows an example of the MAP display when the SLT ADD command is used to add an LTID for an NI-2 FIT that is to have a secondary MADN CACH member associated with it. The figure show EKTS set to Y and option CACH added.

Figure 17-167 Example of MAP display of when using the SLT ADD command to add an NI-2 FIT LTID with EKTS activated and option CACH

```
CI:
>SERVORD
SO:
>SLT
SONUMBER:     NOW 98 10 6 AM
>
LTID:
>ISDN 227
FUNCTION:
>ADD
LTCLASS:
>BRAFS
CS:
>NI2
PS:
>N
MAXKEYS:
>64
DEFLTERM:
>N
TEI_TYPE
>DTEI
TSPID:
>6136215087
EKTS:
>Y
OPTION:
>CACH
OPTION:
>$
COMMAND AS ENTERED:
SLT NOW 98 10 6 AM ISDN 227 ADD BRAFS NI2 N 64 DTEI
6136215087(CACH)$ ENTER Y TO CONFIRM, N TO REJECT OR E TO
EDIT
 >Y
WARNING: Firmware must be compatible with CACH option.
The PVC option was omitted. A default PVC version of
FUNCTIONAL and PVC issue of 2 will be used.
```

Figure 17-168 shows an example of the MAP display when the NEW command is used to add the DN associated with the secondary MADN CACH member with option CFMDN.

Figure 17-168 Example of the MAP display when using the NEW command to ADD the DN associated with secondary MADN CACH member with option CFMDN

```
CI:
>SERVORD:
SO:
>NEW
SONUMBER:    NOW 98 6 25 AM
>
DN:
>6213535
LCC_ACC:
>ISDNKSET
GROUP:
>NORTEL
SUBGRP:
>0
NCOS:
>0
SNPA:
>613
KEY:
>1
RINGING:
>Y
LATANAME:
>NILLATA
LTG:  0
>
LEN_OR_LTID:
>ISDN 227
OPTKEY:
>1
OPTION:
>MDN
MDNTYPE:
>CACH
PRIMARY:
>N
NEWCA:
>N
CA_NUM:
>1
OPTKEY:
>1
OPTION:
>CFMDN
OPTKEY:
>$
COMMAND AS ENTERED:
NEW NOW 98 6 25 AM 6213535 ISDNKSET NORTEL 0 0 613 1 Y
NILLATA 0 ISDN 227 (1 MDN CACH N N 1) (1 CFMDN) $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
```

Figure 17-169 shows an example of the MAP display when using the QLT command on the LTID associated with the secondary MADN CACH member with option CFMDN assigned to it.

Figure 17-169 Example of the MAP display when using the QLT command on an LTID associated with a secondary MADN CACH member

```
CI:
QLT ISDN 227
-----------------------------------------------------------
LTID:  ISDN   227
SNPA: 613
DIRECTORY NUMBER:  6213535         (NON-UNIQUE)
LT GROUP NO: 0
LTCLASS:  BRAFS   DEFAULT LOGICAL  TERMINAL: N
EKTS: Y  CACH: Y
SLBRI: N
CS: NI2 PS: N   TEI: DYNAMIC
ELN: N
VERSION: FUNCTIONAL  ISSUE: 2
TSPID:          6136215087
CUSTGRP:             NORTEL:  SUBGRP: 0 NCOS: 0 RING: Y
LINE CLASS CODE:  ISDNKSET
MAXKEYS: 64
MADN MEMBER INFO:
  ISDN 226
  ISDN 227
OPTIONS:
SFC VI $ $ N CFMDN

  KEY       DN                CALLTYPE
  ---       --                --------
   1        MDN    6136213535 VI   CACH CA 1 NULL

  KEY       FEATURE
  ---       -------
     NONE
```

Note: Option CFDMDN only appears in the MAP display from the QLT command used on an LTID with CFDMDN assigned to key 1. CFDMDN appears in the display that results from the use of the QMADN DISPLAY command. This occurs whether or not CFDMDN is assigned to key 1.

NA011 feature additions for MADN EKTS and MADN CACH

As of NA011, the following feature enhancements are available for MADN EKTS and MADN CACH:

- *MADN/FLEX Interworking for ISDN* allows a MADN EKTS member to either MADN bridge into an existing Flex Call conference or invoke

FlexCall conferencing while MADN bridged. The following is a list of limitations and capabilities related to this feature:

- — Support for the MADN EKTS and FlexCall interaction does not depend on the MADN group conference size.
- — Just one active MADN EKTS member can invoke FlexCall. However. for MADN CACH the enhancement allows one MADN EKTS member for each CA to invoke FlexCall.
- — MADN EKTS member(s) can MADN bridge into an existing FlexCall call.
- — Does not allow a bridged MADN EKTS member to take or inherit FlexCall control from the original FlexCall controller.
- — The controller of the MADN EKTS FlexCall remains the FlexCall controller even while on hold. For example, a retrieving MADN EKTS member is not made FlexCall controller while the original FlexCall controller is on hold.
- — Different types of party agents including those agents connected with ISDN NI-1, NI-2, 2B, and Meridian business and 2500 sets can MADN bridge into a MADN call while another MADN member has FlexCall active. MADN member can place call on hold, retrieve or disconnect from the call.

  Note: The size of the conference allowed, for example, three-way or six-way conferencing, is based on the subscriber’s FlexCall (ISDN) or conference calling (other agents) subscription.

- *MADN CACH for ACB/AR Interworking* allows the assignment of the Automatic Call Back (ACB) and Automatic Recall (AR) features to MADN CACH members using SERVORD. The ACB/AR feature does not change any of the existing CACH or SCA functionality. For example, ACB/AR users can still bridge calls, place them on hold, and retrieve them after starting a call using ACB/AR:
  - — When a user activates ACB on a MADN CACH call appearance, ACB calls back the last number called from the MADN CACH DN CA.
  - — When a user activates AR on a MADN CACH call appearance, AR calls back the last number that called that CA.

The following list describes the SERVORD command changes that apply to ACB/AR:

- The ADO command allows user to add
  - ACB/AR to a MADN CACH DN
  - MADN CACH to a DN already assigned the ACB/AR feature
  - AR to a secondary MADN SCA or CACH member

    Note: There must be a primary SCA or CACH member already provisioned with AR before secondary members are allowed to activate AR.

- The DEO command allows the deletion of the primary AR member which, in turn, removes AR activation from secondary members. This applies to both MADN SCA and MADN CACH.
- The CHF command allows the user to change a MADN SCA or CACH DN to have ACB/AR options.
- The NEW command allows the user to create a primary or secondary MADN SCA or CACH DN with ACB/AR assigned to it.

• *Redirecting Number and Reason Delivery for ISDN CFW* is assigned to EKTS DNs with the following restrictions:

- RND on the primary member of a MADN group controls RND for the entire group.
- If the primary member of a MADN group is non-ISDN, all secondary and non-ISDN members always get redirection information.
- Non-ISDN lines always receive RND regardless of whether or not the primary member is an ISDN line.

- — If the primary member is an ISDN line, the control of RND for both the primary and the secondary members including non-ISDN members is held by the primary DN.
- — If the EKTS controller is ISDN, the status of option RND on the controller determines the status of RND for the secondary ISDN members as well.

- *Redirecting Number and Reason Delivery for ISDN CFW* is assigned to MADN CACH DNs with the following restrictions:
  - — The status of option RND on the EKTS controller determines RND availability for the entire group.
  - — If the EKTS controller is non-ISDN, all secondary ISDN and non-ISDN members always receive the redirection information.
  - — Non-ISDN secondary members always receive redirection information regardless of the status of the EKTS controller.

NA012 MADN CACH Bridged Call feature enhancements

The following two enhancements to the DMS MADN CACH Bridged Call feature make it fully NI-2 compliant with Telcordia Technologies general requirement GR-205.

- The *Allow Bridging after Call Proceeding State* enhancement removes the restrictions that block bridging by MADN members when a call has not progressed to the talking state. After one MADN member initiates a call, secondary MADN members are able to bridge into the call before the called party answers. The bridging of the secondary MADN members to the call does not change the call integrity. The secondary parties to the call, like the call originator, are given ringback and can release from the call without tearing it down. During the bridging process, the DMS switching system
  - — stores the initial call state
  - — creates connections to called party to perform supervision
  - — bridges the MADN member into the call
  - — informs the XPM of the bridged member

  When the called party answers, all of the MADN members bridged into the call are connected. If a party drops out of the call, the DMS switch performs similar call handling to remove the party from the call.

  The DMS switching system utilizes conference circuits to allow bridging to occur after call proceeding. The Allow Bridging after Call Proceeding State enhancement allows bridging to occur earlier, not more often.

Therefore this use of conference circuits does not require additional conference circuits to be provisioned.

- The *Block return-from-hold after enabling Bridged Call Exclusion* enhancement restricts members of a bridged MADN call placed on local hold from returning to the call when Bridged Call Exclusion (BCE) is enabled. The call controller by activating BCE is able to block an EKTS MADN member from returning from local hold to the call. While activated, BCE prevents other MADN members that are not part of the call from bridging on to it. A MADN member who goes on local hold after BCE is activated is able to return to the call even though BCE is active. Once the call controller deactivates BCE, all MADN members of the call on local hold are able to return to the call.

  The Block return-from-hold after enabling Bridged Call Exclusion enhancement requires no provisioning changes. The Block return-from-hold after enabling Bridged Call Exclusion enhancement builds on the existing bridging functionality. Every MADN member with call bridging capabilities is provided with the Block return-from-hold after enabling Bridged Call Exclusion enhancement.

MADN restrictions

The following features have restrictions with variants of MADN:

- Additional Call Offering Unrestricted (ACOU)
- Additional Functional Call (AFC)
- Answer Agent Key (AAK)
- Automatic Answer Back (AAB)
- Automatic Call Distribution (ACD)
- Bridged Night Number (BNN)
- Call Login (CALLOG)
- Call Reference Busy Limit (CRBL)
- Circuit Mode Data (CMD)
- Default Bearer Capability (DBC)
- Denied Malicious Call Termination (DMCT)
- Directory Number Hunt (DNH)
- Distributed Line Hunt (DLH)
- Do Not Disturb (DND)
- DTMF Calling Number Delivery (DCND)
- Extended Call Management (ECM)
- Group Intercom (GIC)

- Intercom (ICM)
- Line Appearance on Digital Trunk PSAP (LDTPSAP)
- Multiple Line Hunt (MLH)
- Multiple Position Hunt (MPH)
- Number of DN Appearances (NDNAP)
- Private Business Line (PBL)
- Random Make Busy (RMB)
- Redirecting Number and Reason Delivery (RND)
- Secondary Directory Number (SDN)
- Simplified Message Desk Interface (SMDI)
- Single Line Queuing (SLQ)
- Single-line Variety Package (SLVP)
- Station Origination Restriction Controller (SORC)
- Stop Hunt (SHU)
- Uniform Call Distribution (UCD)
- Uniform Call Distribution Signal Distributor (UCDSD)

The following additional features are specifically incompatible with MADN CACH:

- Calling Name Delivery (CNAMD)
- Call Pickup (CPU)
- Call Waiting (CWT)
- Customer Originated Trace (COT)
- Distinctive Ringing/Call Waiting (DRCW)
- Key Short Hunt (KSH)
- Message Center on EBS Set Msg Indication Key (MWIDC)
- Message Waiting Indication (MWI)
- Power Feature Control (PFCNTL)
- Power Feature Display (PFDSP)
- Secondary Member CF Programming (CFMDN)
- Selective Call Acceptance (SCA)
- Selective Call Forwarding (SCF)
- Selective Call Rejection (SCRJ)

- Series Completion (SCMP)
- Spontaneous Call Waiting ID (SCWID)
- Terminal Management (TME) which is part of Power Features

The following features can be provisioned to the MADN CACH controller only:

- Anonymous Caller Rejection (ACRJ)
- Bulk Calling Line Identification (BCLID)
- Call Forward Busy (CFB)
- Call Forward Don’t Answer (CFD)
- Call Forward Don’t Answer Variable Timer (CFDVT)
- Call Forward Universal (CFU)
- Call Screening, Monitoring and Intercept (CSMI)
- Executive Message Waiting (EMW)
- Leave Message (LVM) (Note)
- Message Waiting (MWT) (Note)

> ***Note:*** LVM and MWT are provisionable to the CACH controller only if the primary call appearance CARES type is NULL.

Provisioning changes due to number plan expansion

The following is a description of the SERVORD changes that are a result of the introduction of the Number Plan Expansion features Order Codes/SOC: NPE00001 and NPE00002 in NA009. These two DMS switching system features are optional. The Number Plan Expansion features

- introduce the capability to handle an increased number of office code/numbering plan area combinations
- permit provisioning of directory numbers (DN) using ten digits

Duplication

Duplication is the allowing NXXs that have the same last seven digits but a different serving numbering plan area (SNPA) to be mapped to more than one SNPA.

Table TOFCNAME

Table TOFCNAME (Terminating Office Name) is the key to managing DN duplication. NPA NXX (numbering plan area/three-digit office code) combinations must be entered in table TOFCNAME before the DMS switch recognizes them.

In order to make entries for duplicate NXXs in table TOFCNAME and support the provisioning of ten-digit DNs, SOC (software optionality control) code NPE00001 must be enabled. Ordering code NPE0002 allows the expansion of table TOFCNAME to 10 000 entries. Table 17-4 shows an example of duplicate NXX entries in table TOFCNAME.

Table 17-4 Duplicate NXX entry example

NPA	NXX
919	467
910	467
919	460

If an attempt is made to enter a duplicate NXX entry in table TOFCNAME when SOC code NPE00001 is not turned off, the DMS switching system rejects the attempt with an error code as shown in Figure 17-170.

Figure 17-170 Example of MAP display showing error code when attempt is made to add duplicate NXX to table TOFCNAME

```
CI:
Table TOFCNAME
>ADD
AREACODE:
>910
OFCCODE:
>460
OPTION:
>$
This tuple will create a duplicate with  919    467
ERROR: Duplicate office codes are not allowed while NPE0001
is idle.

TUPLE TO BE ADDED:
   910     467                     $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>N
```

If SOC code NPE0001 is enabled, the DMS switching system allows an entry for a duplicate NXX in table TOFCNAME. The DMS switching system issues a warning to the user that the entry will result in two TOFCNAME entries with the same office code as shown in Figure 17-171.

Figure 17-171 Example of MAP display for successful entry in table TOFCNAME

```
CI:
Table TOFCNAME
>ADD
AREACODE:
>910
OFCCODE:
>460
OPTION:
>$

***WARNING: This change will result in two TOFCNAME entries
with the same office code. Service Order prompting will
change to compensate for the resulting DN ambiguity,
possibly preventing automated systems from performing
Service Orders. Please contact your next level of support
before confirming this change.

TUPLE TO BE ADDED:
  910      467                    $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y

***WARNING: This change will result in two TOFCNAME entries
with the same office code. Service Order prompting will
change to compensate for the resulting DN ambiguity,
possibly preventing automated systems from performing
Service Orders. Please contact your next level of support
before confirming this change.

TUPLE ADDED
```

Impact of duplication of NXXs on SERVORD

The duplication of NXXs in table TOFCNAME impacts two groups of SERVORD commands. These two groups of commands treat duplicated NXXs differently. The following description of how these two command groups treat duplicated NXXs makes reference to the NXXs 460 and 467. NXXs 460 and 467 are found inTable 17-4.

The first group includes commands ADD, ADO, CDN, CHDN, CHF, CHG, CHL, CICP, COPYSET, DEL, DEO, DSP, EST, NEW, OUT, RES, and SUS. This group treats duplicated NXXs differently from non-duplicated NXX entries when they appear in a service order. If one of these commands detects a duplicated NXX in a SERVORD command entry, the following error message is generated: “This Local DDDDDN is not Unique. Please Use the Full National DN.” Figure 17-172 shows an example of this error message.

Figure 17-172 Example of MAP display showing error code displayed when a duplicated NXX is detected when using the ADD command

```
CI:
>SO
SO:
>ADD
SONUMBER NOW 98 12 7 AM
>
GROUPTYPE:
>DNH
LINK_DN:
>4675008

This Local DN is not Unique.
Please Use the Full National DN.

LINK_DN:
>6134675008
DN_LEN:
>4674545
LEN:
>12 0 19 2
KEY:
>1
DN_LEN:
>$
OPTION:
>$
GROUPSIZE:
>3
COMMAND AS ENTERED:
ADD NOW 98 12 7 AM DNH 613675008 4674545 12 0 19 2 1 $ $ 3
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
```

The duplicate appearance of the NXX specified in a SERVORD command in table TOFCNAME impacts other SERVORD commands differently. These commands are NEWDN and OUTDN. Once the first duplicate entry is made in table TOFCNAME, these two commands treat all NXXs as duplicated. This is the result of the way these commands worked before the introduction of the features supporting duplicate NXX. In the past these commands prompted the user for SNPA before prompting them for the DN. Since in the absence of a ten-digit DN, it is not possible to determine if a DN has a duplicated NXX, these two commands assume that if there is a duplicate entry in table TOFCNAME, the DN has a duplicated NXX. Therefore, ten digits must be entered in response to the prompt for DN. SERVORD does not require or accept a separate SNPA.

The second group includes the commands NEWDN and OUTDN. Once the first duplicate NXX entry is made in table TOFCNAME, these two commands treat all NXXs as duplicated. This is the result of the way these two commands worked before the introduction of the features that support duplicated NXXs. In the past when these two commands SERVORD commands prompted for

SNPA before prompting for the DN. If a ten-digit number is not present, it is not possible to determine whether or not a DN has a duplicated NXX. As a result if there is a duplicate entry in table TOFCNAME, these two commands treat the DN as if it has a duplicated NXX. Therefore, when using these two SERVORD commands a 10-digit number must be entered for the DN. There is no separate prompt for SNPA. Failure to enter a full 10-digit DN results in an the following error message being generated:

This Local DN is not Unique.
Please Use the Full National DN.

Figure 17-173 shows an example of the MAP display when the NEWDN command is used in the presence of ambiguity or duplication of NXXs and an incomplete DN is entered resulting in an error code.

Figure 17-173 Example of MAP display showing the NEWDN command being used in presence of ambiguity or duplication of NXX

```
CI:
>SO
SO:
>NEWDN
SONUMBER:  NOW 98  12  7 PM
>
BLOCK_OF_DNS:
>NO
DN:
>4671020

This Local DN is not Unique.
Please Use the Full National DN.
DN:
>6134671020
DNTYPE:
>RCF
FWD_DN:
>4671021
MAXCALLS:
>2
BLK_TOLL_COM:
>Y
BLOCK_TOLL_TREATMENT:
>TDND
OM_INDEX:
>1
SCRNL:
>NSCR
LATANM:
>LATA1
PRTNM:
>POT1
 COMMAND AS ENTERED:
 NEWDN NOW 98 12 7 PM NO 6134671020 RCF 4671021 2 Y TDND
 1 NSCR LATA1 POT1
 ENTER Y TO CONFIRM,  N TO REJECT OR E TO EDIT
 >Y
```

18 Simplification of ordering, provisioning, and installation

Introduction

In an effort to accomplish simplification, the Simplification of ISDN Ordering, Provisioning and Installation Work Group within the North American ISDN Users' Forum (NIUF) has published the following documents:

- *NIUF 418-93 Phase 1: ISDN Parameter Groups (NIPGs)*, February 1993
- *NIUF 427-93 Phase 2: ISDN Interface Groups (NIIGs)*, October 1993
- *NIUF 428R4-94 Phase 3: Capability Packages and Solution Sets*, September 1995

More than 300 organizations participate in the NIUF, which meets three times a year in various locations throughout North America. The NIUF focuses on the requirements of ISDN users in North America. Participation is open to all interested users, product providers, and service providers.

For further information about the NIUF, call 301-975-2937 or email niuf@nist.gov. In addition, the NIUF World Wide Web home page can be accessed at the following address: http://www.niuf.nist.gov/misc/niuf.html.

ISDN ordering codes descriptions

An ISDN ordering code (IOC) allows customers to order ISDN using a single code. An IOC is an easy-to-communicate term that refers to the services and features that are needed for ISDN equipment and applications to work. IOC provides the detailed technical specifications that are needed by service providers to establish the appropriate ISDN interface to customer's ISDN equipment. Reference SR3622, *National ISDN Ordering Code Overview and Code Listing* for specific ordering code information.

Note: SR3493 has been replaced by SR3622.

By having detailed technical information about ISDN equipment/applications available in advance in the form of IOCs, service providers can be better prepared to handle customer orders for ISDN. Using IOCs can simplify the ordering process and expedite operating company provisioning. Additionally, IOCs can reduce errors in understanding what the customer needs and result in the service provider correctly providing the needed set of capabilities into the desired switching system.

Industry efforts to simplify the ordering, provisioning and installation of ISDN have been developed by the NIUF. The NIUF has developed a set of 20 capability packages. Generic IOCs are based exactly on the NIUF capability packages. Each describes the technical specifications needed to support a specific set of ISDN features and capabilities.

BellCore now oversees the administration and support of IOCs. In this effort BellCore has established a National IOC process to help simplify the ordering, provisioning, and installation of ISDN. This process helps equipment and application developers.

To find information about capability packages, see World Wide Web location:

http://www.niuf.nist.gov/niuf/docs/428-94.html

From this location, there are links to additional information. To find the feature DMS key assignments for the following capability packages, see World Wide Web location:

http://www.niuf.nist.gov/niuf/docs/428-tbl3.html

Generic IOCs/capability packages

Generic capability packages as defined by the NIUF are listed as follows. Today Bellcore manages the ISDN ordering codes. In addition to the generic packages, additional vendor-specific IOCs have been developed.

Capability Package A (OB + D) includes basic D-channel packet. No voice capabilities are provided.

Capability Package B (1B) includes circuit-switched data on one B-channel. Data capabilities include Calling Number Identification. No voice capabilities are provided.

Capability Package C (1B) includes alternate voice-/circuit-switched data on one B-channel. Data and voice capabilities include Calling Number Identification.

Capability Package D (1B + D) includes voice on one B-channel and basic D-channel packet. Only basic voice capabilities are provided, with no features.

Capability Package E (1B + D) includes voice on one B-channel and basic D-channel packet. This package provides non-EKTS voice features, including Flexible Calling, Additional Call Offering, and Calling Number Identification.

Capability Package F (1B + D) is equivalent to Capability Package E, with the change that Call Appearance Call Handling (CACH) EKTS service is used for the voice service. (Note that Additional Call Offering functionality is incorporated in the EKTS service).

Capability Package G (2B) includes voice on one B-channel and circuit-switched data on the other B-channel. This package provides non-EKTS voice features, including Flexible Calling, Additional Call Offering, and Calling Number Identification. Data capabilities include Calling Number Identification.

Capability Package H (2B) is equivalent to Capability Package G, with the change that CACH EKTS service is used for the voice service. (Note that Additional Call Offering functionality is incorporated in the EKTS service).

Capability Package I (2B) includes circuit-switched data on two B-channels. Data capabilities include Calling Number Identification. No voice capabilities are provided.

Capability Package J (2B) includes alternate voice-/circuit-switched data on one B-channel, and circuit-switched data on the other B-channel. Only basic voice capabilities are provided, with no features except Calling Number Identification. Data capabilities include Calling Number Identification.

Capability Package K (2B) includes alternate voice-/circuit-switched data on one B-channel, and circuit-switched data on the other B-channel. This package provides non-EKTS voice features, including Flexible Calling, Additional Call Offering, and Calling Number Identification. Data capabilities include Calling Number Identification.

Capability Package L (2B) is equivalent to Capability Package K, with the change that CACH EKTS service is used for the voice service. (Note that Additional Call Offering functionality is incorporated in the EKTS service).

Capability Package M (2B) includes alternate voice-/circuit-switched data on two B-channels. Data and voice capabilities include Calling Number Identification.

Capability Package N (2B + D) includes alternate voice-/circuit-switched data on one B-channel, circuit-switched data on the other B-channel, and basic D-channel packet. This package provides non-EKTS voice features, including Flexible Calling, Additional Call Offering, and Calling Number Identification. Data capabilities include Calling Number Identification.

Capability Package O (2B + D) is equivalent to Capability Package N, with the change that CACH EKTS service is used for the voice service. (Note that Additional Call Offering functionality is incorporated in the EKTS service.)

Capability Package P (2B + D) includes alternate voice-/circuit-switched data on two B-channels, and basic D channel packet. This package provides non-EKTS voice features, including Flexible Calling, Additional Call Offering, and Calling Number Identification. Data capabilities include Calling Number Identification.

Capability Package Q (2B + D) is equivalent to Capability Package P with the change that CACH EKTS service is used for the voice service. (Note that Additional Call Offering functionality is incorporated in the EKTS service.)

Capability Packages R and S are closely related to Capability Packages I and M; the main difference is that Capability Packages R and S consistently assign two DNs to the interface, whereas the Capability Packages I and M assign one or two DNs, based on the central office switch type.

These new capability packages grew out of ISDN Solutions '94, sponsored by the Corporation for Open Systems, International (COS). As part of ISDN Solutions '94, industry participants began the implementation of the Capability Packages developed by the NIUF. This implementation, in the form of IOCs, is seen as essential for delivering ISDN products and services to the mass market. Capability Package R and Capability Package S are identical to two Non-Generic IOCs, Generic Data I and Generic Data M, developed by three CPE suppliers during ISDN Solutions '94.

These new packages were seen by equipment/application developers to be more useful for many applications than capability packages I and M. In addition, they are consistent with National ISDN; they are already in use by several CPE suppliers; and they further promote the goals of simplification.

Capability Package R (2B) includes circuit-switched data on two B-channels. Data capabilities include Calling Number Identification. No voice capabilities are provided.

Capability Package S (2B) includes alternate voice-/circuit-switched data on two B-channels. Data and voice capabilities include Calling Number Identification.

Capability Package T was developed primarily to meet the needs of Transaction Services applications. Several CPE suppliers expressed the need for such a package during ISDN Solutions '94, sponsored by the Corporation for Open Systems, International (COS); several ISDN Ordering Codes (IOCs) have been created which are related to this capability package. Capability package T includes two voice channels and D-channel packet.

A typical application scenario might involve a multipoint application, with the voice channels used either for two voice telephones or for voice and fax, and with the D-channel packet used for transactions. Although this application can be provided with two DNs on the AT&T and Siemens switches, this capability package contains three DNs on all switch types to meet the requirements of some CPE and for consistency across switches.

Capability Package T (2B + D) includes voice on two B-channels and basic D-channel packet. Only basic voice capabilities are provided, with no features.

Based on further analysis of customer needs, two additional NIUF capability packages were developed (and approved March 15, 1996). These capability packages are “superset” packages that can simultaneously meet the needs of the current top volume mass market applications.

Capability Package U (2B) includes alternate voice-/circuit-switched data on two B-channels. This package provides non-EKTS voice features, including Flexible Calling, Call Forwarding Variable, Additional Call Offering, and Calling Number Identification (which includes Redirecting Number Delivery). Data capabilities include Calling Number Identification (which includes Redirecting Number Delivery).

Capability Package V (2B) includes alternate voice-/circuit-switched data on two B-channels. This package provides non-EKTS voice features, including Flexible Calling, Advanced Call Forwarding (that is, Call Forwarding Variable, Call Forwarding Interface Busy, Call Forwarding Don't Answer, and Message Waiting Indicator), Additional Call Offering, and Calling Number Identification (which includes Redirecting Number Delivery). Data capabilities include Calling Number Identification (which includes Redirecting Number Delivery).

EZ-ISDN

As can be seen from the previously listed packages, simplification can still be complicated. In 1996, several regional Bell operating companies (RBOCS) introduced basic packages that cover most applications. Tariffs within certain companies have been introduced to support these packages. Following is the non-EKTS description.

EZ-ISDN 1 provides alternate Circuit-Switched Voice/Data calling on both B-channels. There is a CSV/D terminal associated with each of the B-channels.

The non-EKTS terminal associated with the first B-Channel has a unique PDN capable of making/receiving one circuit-switched voice/data call.

The following Circuit-Switched Voice features are also included:

- Additional Call Offering (provides two additional appearances of the PDN for making/receiving voice calls)
- Flexible Calling (3-Way Conference, Drop, Hold, and Transfer)
- Call Forwarding Variable
- Calling Party Number Identification and Redirecting Number Delivery

The following circuit-switched data features are also included:

- Calling Party Number Identification and Redirecting Number Delivery
- The non-EKTS terminal associated with the second B-Channel has a unique PDN and is able to make/receive one circuit-switched voice or circuit-switched data call.
- The following features are also included for circuit-switched voice and circuit-switched data calls:
  - Calling Party Number Identification
  - Redirecting Number Delivery

EZ-ISDN 1A This package includes all the features and capabilities of EZ-ISDN 1. In addition, the following circuit-switched voice features are also provided to the terminal associated with the first B-channel:

- Visual Message Waiting Indicator
- Call Forwarding Busy
- Call Forwarding Don't Answer

Overlap with Capability Packages

In order to simplify the ordering of ISDN, the Working Group on the Simplification of ISDN Ordering, Provisioning, and Installation has created two types of packages: capability packages and EZ- ISDN packages. These two types of packages have been developed to meet different needs and to serve different purposes.

Capability packages are generally intended to meet the needs of specific applications; they are often developed based on a particular user application. In order to register with a capability package in the National ISDN Ordering Code (IOC) Process, CPE must be fully compliant with the features specified in the IOC.

On the other hand, the EZ-ISDN packages are designed as superset packages that can simultaneously meet the needs of the top volume mass market applications.

Part V
Operations, administration and maintenance

“Part V: OAM” contains the following chapters:

19. Operations, administration, and maintenance overview

20. ISDN Maintenance

21. BRI multiple terminal maintenance

22. BRI verification-office equipment

23. Echo station X.25 loopback testing

24. Problem case 1: no dialtone received or limited dialing capability

25. ISDN Problem case 2: verification of connectivity between 2B1Q line card and CPE

26. Problem case 3: mp-eoc trouble fault isolation

27. Problem case 4: office equipment identification retrieval

28. ISDN log reports

29. ISDN operational measurements

19 Operation, administration, and maintenance overview

This part describes procedures for ISDN operation, administration, and maintenance. All maintenance activities described assume that ISDN is working off of a DMS-100 switch using National ISDN and Nortel customer premises equipment (CPE). There are four problem case descriptions. Descriptions of ISDN associated logs and operational measurements (OM) are also included.

ISDN loop maintenance

The ISDN maintenance chapter includes the following:

- MAP levels necessary for ISDN maintenance
- Basic ISDN loop components
- ISDN line states
- Loop back testing
- BERT testing
- DCHON testing
- Digital test access
- Diagnostics testing
- Asynchronous line diagnostic testing

ISDN maintenance commands

The following ISDN-related maintenance commands are described:

- DET
- DIAG NOWAIT
- DIAG QUERY
- DIAG QUERYALL
- POST DK

- ISPGAUD
- L1BLMALM
- L2LOGCTL
- L3LOGCTL
- QCOUNTS
- QLAYER
- RLAYER
- TEI CHECK
- TERMCHK
- THR

ISDN log routing recommendations

The ISDN log routing recommendations include the following:

- Recommended log report class groupings
- Identity and brief description of ISDN related log reports

Operational measurements setup

The operational measurement (OM) setup description includes:

- Procedures to set up ISDN related OM reports
- Procedure for enabling and routing ISDN OM reports
- ISDN BRI performance factors and related OMs

Maintenance tools

The following maintenance tools are described:

- DISPCALL tool
- PMDEBUG

BRI multiple terminal maintenance

The “BRI multiple terminal maintenance” chapter includes the following:

- Description of the BRI multiple maintenance feature
- Limitations and restrictions for the BRI multiple terminal maintenance feature
- Interactions between BRI multiple terminal maintenance feature and other functionalities

- Datafill changes necessary to support use of the L2LOGCTL, the L3LOGCTL, and the TERMCHK commands with this feature
- Description of the user interface commands used with the BRI multiple terminal maintenance feature

BRI verification-office equipment

The “BRI verification-office equipment” (BRIV-OE) chapter includes the following:

- Description of the BRIV-OE feature
- Hardware requirements for the BRIV-OE feature
- Limitations and restrictions for the BRIV-OE feature
- Interaction between BRIV-OE and default service
- Translations datafill for the BRIV-OE feature
- User interface commands for the BRIV-OE feature

Echo station X.25 loopback testing

The “Echo station X.25 loopback testing” chapter includes the following:

- Description of the Echo Station X.25 loopback testing feature
- List of limitations and restrictions for Echo Station X.25 loopback testing feature
- Operational measurements for Echo Station X.25 loopback testing feature
- Office parameter information for Echo Station X.25 loopback testing feature
- Description of the ECHOCI MAP level commands used for provisioning echo station DNs
- Identifies tables that require datafill when provisioning an echo station DN. Datafill information includes examples of datafill for each table.
- Description of QPHF command when used with echo station feature
- LTP MAP level maintenance information for echo station DN
- Packet resource reassignment tool (PHRRCI) information for using this tool with echo station feature

Problem case 1

no dialtone received or limited dialing capabilities

Problem case 2

verification of connectivity between 2B1Q line card and CPE

Problem case 3

mp-eoc trouble fault isolation

Problem case 4

office equipment identification retrieval

ISDN log reports

The “ISDN log reports” chapter includes the following:

- Description of information included in an ISDN log report
- Example log reports for all ISDN logs introduced in the current software release only

ISDN operational measurements

The “ISDN operational measurements” (OM) chapter includes the following:

- Details on the information included in an ISDN OM group description
- Descriptions of OM reports for all ISDN OMs introduced in the current software release only

20 ISDN maintenance

ISDN loop maintenance

Several methods of performing ISDN loop maintenance exist within the DMS switch. These methods include loopback, D-channel continuity, and diagnostics. By using these methods, information can be obtained from various tests by issuing commands from the LTPLTA, LTPISDN, or LTPDATA level of the MAP display. Figure 20-1 shows the hierarchy of relevant command levels used for ISDN line maintenance.

Figure 20-1 Hierarchy of MAP levels

```
CI (Command Interpreter)
        MAPCI (Maintenance and Administration Position)
        MTC (Maintenance)
        LNS (Lines Maintenance Subsystem)
               ALT (Automatic Line Test)
               LNSTRBL
               LTP (Line Position Test)
                    LTPMAN      (LTP, Manual Level)
                    LTPLTA      (LTPLTA, Line Test Access Level)
                    LTPDATA     (LTP, Data Level)
                    LTPISDN       (LTP, ISDN Level)
```

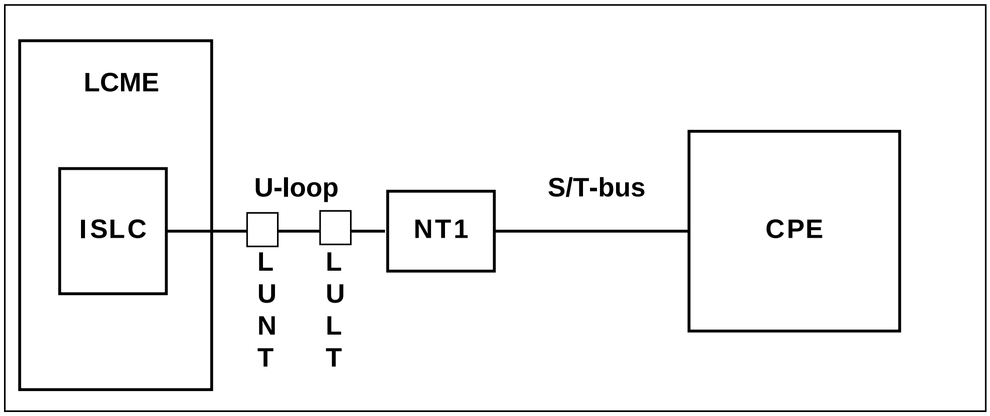
Loopback provides a method of setting reference points on an ISDN line for running bit error rate tests (BERT). BERT is used to verify transmission performance and the continuity of connections.

D-channel continuity allows for the verification of D-channel continuity from the switch D-channel handler (DCH) to the ISDN line card or the NT1.

Diagnostics provide a means of testing ISDN loop components through maintenance channel messaging and parameter measurement.

The LTPLTA, LTPISDN, and LTPDATA levels allow fault isolation at the line card level. Isolating the fault is the most important objective when attempting to resolve possible line problems. Figure 20-2 displays the basic components of an ISDN loop.

Figure 20-2 Basic ISDN loop components



The fault can be isolated to one of the following components:

- LCME
- ISDN line card (ISLC)
- U-loop
- LULT— Line Unit Termination (optional)
- LUNT— Line Unit Network Termination (optional)
- NT1
- S/T-bus
- customer premise equipment (CPE)

The line unit termination (LULT) and the line unit network termination (LUNT) are intermediate line units. The LULT and the LUNT are used to extend the ISDN BRI U-loop range beyond the existing maximum 17 000 feet distance from the DMS central office. One to six of these intermediate line units are used in a multipoint embedded operations channel (mp-eoc) configured peripheral module (PM). These intermediate units extend the performance monitoring capabilities of the PM to customer loops that exist beyond the maximum 17 000 foot distance from the DMS central office

The CPE can consist of ISDN telephones, terminal adapters, and NT1s.

ISDN line states

ISDN lines can display various states at the MAP display due to normal maintenance, call processing, and problem reporting. Table 20-1 contains a list of line states that can exist on a ISDN loop.

Table 20-1 ISDN line states

State	Description
CPB	Call processing busy. ISDN call processing in progress.
CPD	Call processing Deload. The ISDN line is in use, and a maintenance request is pending. State changes to MB with DEL.
CUT	Cutoff. The CO relay in the ISDN line card is in the operated state, disconnecting the subscriber loop from the ISDN line card.
DEL	Deloaded. ISDN line removed by maintenance order. This is a temporary state between CPD and MB.
DMB	D-channel maintenance busy. There is no DCH connected to the ISDN line.
HAZ	Hazard
IDL	Idle. The ISDN line is in-service and ready for subscriber use.
INB	Installation busy. The ISDN line is not available for call processing.
LMB	Line module busy. The LGC/LTC, LCME, or line drawer where the line is located is out of service.
LO	Lock-out. There is no u-sync between the ISDN line card and the NT1.
MB	Manual busy. The ISDN line has been removed from service by maintenance personnel or the system put the line in this state because it determined the line to be babbling messages. With the advent of NA003, babbling lines were changed to SYB state and the system brought the line back in service.
NEQ	Not equipped. The LEN has not been datafilled.
PLO	PSPD (permanent signal partial dial)
SB	System busy

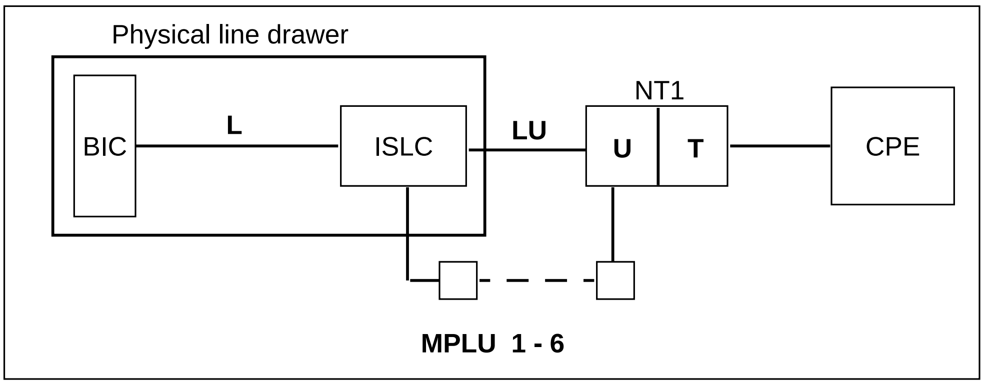
Loopback testing

Loopback testing is performed to verify that a line has continuity endpoint-to-endpoint, and to measure transmission performance through the peripherals on the loop. It can be used to test the integrity of a line, or troubleshoot possible line problems. While a loopback is set, call processing is inhibited on that loop and the status will display MB (manual busy). Two types of loopback testing include BERT and DCH continuity (DCHCON).

Figure 20-3 displays the reference points where loopbacks can be set along an ISDN line. The following describes the loopback points:

- T interface: loopback at T interface of the NT1 towards the DMS-100 switch
- LU interface: loopback the network side of the line card
- MPLU interface: the loop extenders between the ISLC and NT1
- L interface: loopback the C-side of the line card

Figure 20-3 Loopback reference points



Loopbacks should be set at the T interface first, because this is the farthest point on the loop. If the loopback test shows a problem at this point, the loopback point can be moved in to the LU interface, and finally to the L interface to isolate the problem.

If the LU point is selected, it is possible to select IN or OUT with regards to the direction of the loopback point. IN means towards the switch: OUT means toward the CPE. The default is IN, and this is what usually should be done. OUT should only be selected if you have loopback equipment on site that can be used to test from an ISDN terminal towards the line card.

The simplified syntax for the LoopBk command is:

```
LoopBk {L, LU, MPLU, T} {B1, B2, BBD}
```

B1 is used to specify channel B1 to loopback. B2 is used to specify channel B2 to loopback. And BBD indicates all channels, B1, B2, and D, are looped back.

> ***Note:*** A LoopBk RLS must be done when finished to release the loopback point unless the 'bert stop' command was used.

The following is an example of a loopback point set at the T interface on channel B1. The LEN 2 0 1 8 is example of a ISDN loop.

From the CI level of a MAP display type:

```
>MAPCI;MTC;LNS;LTP;LTPDATA;POST L 2 0 1 8
>LOOPBK T B1
```

The result displayed on the MAP screen is shown in Figure 20-4.

Figure 20-4 Loopback example

```
 CM     MS     IOD      Net     PM     CCS     Lns     Trks     Ext APPL
 .     .      .        .      .       .       .      .        .    .


 LTPData
  0 Quit      POST        DELQ          BUSYQ          PREFIX
  2 Post_
  3           LCC PTY RNG .....LEN..........     DN     STA F S LTA
TE  RESULT
  4 Equip_    ISDN LOOP   HOST 02 0 01 08     548 4200 MB    .
  5 Connect_                  (note: line status goes manual busy)
  6 Sustate
  7 LoopBk_
  8 BERT_
  9
 10 BPVO_     Y
 11 Hold      B1    Loopback activated at T TO U
 12 Next
 13
 14
 15
 16
 17
 18
    LD313
 Time  14:48  >
```

BERT testing

BERT testing involves sending a known stream of data to a preset loopback point, and sending the data back to the sender for comparison of sent and received data bits. Using this method, the line transmission quality can be measured. BERT testing requires that an IBERT card (6X99AA) be present in the office.

BERT testing can also be performed using external test equipment, such as a Fireberd 6000. The external equipment can be configured as a DTE capable of sending and receiving asynchronous or synchronous data at speeds up to 64 kbit/s.

Troubleshooting with BERT is especially useful for ISDN lines that are having intermittent problems with circuit switched data transmissions. If a bit error rate is greater than zero, a problem exists. To narrow the search for the problem component, move the LoopBk point in closer towards the switch (from T to LU to L).

The simplified syntax for BERT is:

`BERT START {B1, B2}`

From the previous example, the loopback point is set at the T interface.

To run BERT on B1, type:

```
>BERT START B1
```

The result displayed on the MAP screen is shown in Figure 20-5.

Figure 20-5 BERT example

```
CM      MS      IOD     Net     PM      CCS     Lns     Trks    Ext   APPL
.       .       .       .       .       .       .       .       .     .

  LTPData
   0 Quit      POST        DELQ            BUSYQ     PREFIX
   2 Post_
   3           LCC PTY RNG .....LEN.......... DN    STA F S LTA  TE
 RESULT
   4 Equip_    ISDN LOOP   HOST 02 0 01 08     548 4200 MB      IBERT  0
   5 Connect_
   6 Sustate   BLOCKS RCVD:248
   7 LoopBk_   BIT ERRORS :0
   8 BERT_     BER        :0
   9           SYNC STATUS:INSYNC
  10 BPVO_     bert start b1
  11 Hold      Obtained IBERT   0
  12 Next      Bert test started.
  13
  14
  15
  16
  17
  18
    LD313
  Time  14:54  >
```

The functionality of the IBERT tester can be verified by injecting errors into the data stream of a BERT test. The command to do this is:

>BERT INJECT {1 to 16}

where 1 to 16 equals the number of error bits to inject.

The MAP output will reflect the injection of bit errors.

The BERT test can be stopped at any time by typing at the following command at the MAP terminal:

```
>BERT STOP
```

> ***Note:*** This command will remove the loopbk (loopback).

DCHCON testing

The D-channel (DCH) continuity test is invoked from the LTPDATA level of the MAP terminal. The purpose of the D-channel continuity test is to test for the D-channel continuity from a DCH or EDCH card to the T interface in an NT1.

The DCHCON command sends a test pattern to the specified loopback point (L, LU, or T) and checks whether it is returned properly. If it is returned, D-channel continuity is present and the test for DCH continuity passes. If the returned test pattern does not match the pattern sent, the test fails indicating that continuity does not exist.

If the LU interface is selected, sync will be lost on the loop when the test is performed. The continuity test is performed with the echo canceler ON and repeated with the echo canceler OFF to test its functionality.

No preset loopback point must be set prior to performing the DCHCON. A loopback point is automatically set every time the command is executed with one of the optional parameters (L, LU, or T) and released when it finishes. When no optional parameter is specified with the DCHCON command, the test default T interface is selected.

> ***Note:*** This test can not be performed on ISDN lines equipped only with provisioned B-channel packet service because these lines do not use a DCH or EDCH.

The syntax for the DCHCON command is:

`DCHCON  {L, LU, T}`

The following is an example of a DCHCON T test. From the CI level of a MAP terminal, type:

```
>MAPCI;MTC;LNS;LTP;LTPDATA
>POST L 2 0 1 8; T
```

The result displayed on the MAP screen is shown in Figure 20-6.

Figure 20-6 DCHCON example

```
 CM     MS     IOD     Net     PM     CCS    Lns     Trks    Ext  APPL
 .      .      .       .       .      .      .       .       .     .



 LTPISDN
   0 Quit      POST        DELQ            BUSYQ        pREFIX
   2 Post_
   3           LCC PTY RNG .....LEN..........     DN    STA F S LTA TE
 RESULT
   4 Termchk   ISDN LOOP   HOST 02 0 01 08     548 4200 IDL
   5
   6 Sustate
   7 BCHCON
   8 Ltloopbk
   9 DCHCon
  10 TEST_       DCHCON T
  11 Hold        WARNING - Action may affect Packet Data Service
  12 Next            Do you wish to continue?
  13           Please confirm (“YES”, “Y”, “NO”, “N”):
  14 TstSgnl
  15 TEI_  Note:(answer ‘Y’ to confirm and proceed with the test)
  16 Qloop
  17 Qlayer
  18 Rlayer
    LD313
  Time  10:27  >
```

Digital test access

Digital test access (DTA) is a feature that allows a protocol analyzer to be used to monitor an ISDN line from a remote location. The DTA package NTXJ51AA is included in NI000007 NI0 ISDN Base. It requires one HASU LEN with an NT and a protocol analyzer (Progressive Computing or Tekelec). With the analyzer connected to the HASU LEN, any other LEN within the DMS switching system.

```
>QLEN 10 1 14 2
----------------------------------------------------------
TYPE: HARDWARE ASSIGNED SOFTWARE UNASSIGNED
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    63
PM TERMINAL NUMBER :    451
----------------------------------------------------------
```

Assume that the HASU LEN will be connected to the **DTA** equipped analyzer. Post this LEN at the **MAPCI;MTC;LNS;LTP;LTPDATA** level. Then use the following command:

```
>EQUIP DTA LEN 10 1 14 2
```

Refer to Figure 20-7 for an example.

Figure 20-7 DTA LEN MAP display

```
CM     MS    IOD     Net     PM    CCS     Lns     Trks    Ext   APPL
.      .     .       .       .     .       .        .      .      .
LTPData
 0 Quit     POST    DELQ          BUSYQ         PREFIX
 2 Post_
 3          LCC   PTY RNG .....LEN.....   DN      STA F S LTA TE RESULT
 4 Equip_   ISDN HASU  HOST  10  1  14  02        NO DIRN      INB
 5 Connect_
 6 Sustate      DTA MONITOR LOOP
 7 LoopBk_
 8 BERT_
 9
10 BPVO_        EQUIP DTA LEN 10 1 14 2
11 Hold         DTA monitor equipment 1 reserved.
12 Next
13
14
15
16
17
18
  LAP1046
Time  01:16  >EQUIP DTA LEN 10 1 14 2
```

Post the line to be monitored and issue the command **>CONNECT <n>** to begin monitoring. The output on the protocol analyzer will be exactly as if the line were connected directly to the analyzer.

Be sure to note the TDM channel (in this case, **2**). This information is needed by the protocol analyzer. Refer to Figure 20-8.

Figure 20-8 Connect 1 command display

```
 CM    MS    IOD     Net     PM    CCS    Lns     Trks    Ext     APPL
  .     .     .       .       .     .      .       .       .        .

LTPData
 0 Quit   POST      DELQ         BUSYQ      PREFIX
 2 Post_
 3      LCC PTY RNG  .....LEN..........   DN   STA F S LTA  TE  RESULT
 4 Equip_       ISDN LOOP   HOST 10 1 14 01     675 9905    IDL
 5 Connect_     DTA-CHNL         EQP STAT
 6 Sustate          D TDM (2)          1       .
 7 LoopBk_
 8 BERT_
 9
10 BPVO_        CONNECT 1
11 Hold
12 Next
13
14
15
16
17
18
  LAP1046
Time  01:20  >CONNECT 1
```

The protocol analyzer that is attached to the **DTA** LEN (in this case, **10 1 14 2**) has to be set up to monitor the DTA connection. Use the TDM channel that was noted from the **CONNECT <n>** command. Refer to the operating instructions for the specific analyzer in use to set up the DTA monitoring operation.

With the protocol analyzer correctly programmed, an ISDN terminal (in this case,**10 1 14 1**) can be monitored from a remote location. This allows data collection without interfering with business. When finished, both lines must be disconnected from the DTA. DTA connections should not remain active when not in use.

CAUTION
Release all DTA connects before beginning the one night process (ONP)
Failure to release DTA connects can lead to failure of ONP

To disconnect **DTA** from the line being monitored, issue the command

>CONNECT <n> RLS

with the LEN posted at the LTPDATA level.

To disconnect **DTA** from the HASU LEN, issue the command

>**EQUIP DTA RESET 1**

with the LEN posted at the LTPDATA level.

Diagnostics testing

The DIAG (diagnostics test) command can be issued at the LTP level of the MAP display. There are several optional parameters that can be used with the DIAG command. The most commonly used options are the following:

- dial lc
- diag
- diag full
- diag fast
- diag nowait
- diag query
- diag query all

Option diag lc only performs tests pertaining to the line card. Options diag and diag full run the same tests, but if a failure is encountered using option diag, the test will stop at the failed test and a line log will be printed. Option diag full should be performed in the nodisp mode as it will run all of the tests and print the results to your MAP screen.

Option diag fast runs a subset of tests that the option diag full performs. Table 20-2 displays all the tests and measurement operations performed.

Table 20-2 Diagnostic operations (Sheet 1 of 3)

Diagnostic operation	Full	Fast	Test description
PUPS Power Failure	Y	Y	PUPS power failure test sends a message to the LCME to determine if the PUPS for the line drawer containing the line under test has failed.
Line Card Occupancy	Y	Y	Line card occupancy test sends a message to the LCME to determine if a line card is properly seated.
Data Ready (DR) Stuck	Y	Y	Data Ready stuck test determines if the DR bit of the L-interface chip is stuck high or low.

Table 20-2 Diagnostic operations (Sheet 2 of 3)

Diagnostic operation	Full	Fast	Test description
CO Relay	Y	Y	Relay test checks that the CO, TEST-IN, and TEST-OUT relays on the ISDN line card are functional. The CO relay is operated and the MTU is used to measure the tip and ring voltage.
BF Stuck	Y	Y	BF stuck test determines if the buffer full (BF) bit of the L-bus is stuck high or low.
Line Card Restore	Y	Y	Line card restore test reads and validates the line card relay status and U-interface frame sync following a soft reset of the card. The reset should have cleared data registers and released relays.
Self Test Line Card	Y	N	Self test (LC) is a built-in test of the line card executed by the on-board firmware. The test includes and internal read-only memory (ROM) test, and internal RAM test, and L-bus subsystem test, and a U-interface subsystem test.
Continuity Test (L)	Y	Y	Continuity test (L) performs a D-channel continuity test between the D-channel handler (DCH) and the L-interface on the line card to determine if a path has been established.
Continuity Test (LU)	Y	Y	Continuity test (LU) performs a D-channel continuity test between the D-channel handler (DCH) and the LU-interface on the line card to determine if a path has been established. A full frame analog loopback is used in this test.
U Loop	Y	N	U-loop tests use the MTU to measure the loop parameters (dc voltage, ac voltage, resistance, and capacitance). This test is performed only if a failure has been detected by a previous test.
Termination	Y	Y	Termination test is performed even if there is no frame sync, uses the resistance value read by the U-loop tests to determine if the loop is terminated by a NT1.
Sealing Current	Y	N	Sealing current test first sends a message to provide continuous current and then, using the MTU, measures the tip-to-ring voltage while the ISDN line card TEST-OUT relay is operated. This test is performed only if a failure has been detected by a previous test.
NEBE	Y	Y	NEBE test verifies the operation of the near-end block error (NEBE) checking mechanism in the line card firmware. The test causes the NT1 to inject a CRC and the firmware checks that is has been detected.

Table 20-2 Diagnostic operations (Sheet 3 of 3)

Diagnostic operation	Full	Fast	Test description
FEBE	Y	Y	FEBE test verifies the operation of the far-end block error (FEBE) checking mechanism in the line card firmware. The test causes the NT1 to inject a CRC and the firmware checks that is has been detected.
Error Register	Y	Y	Error register query determines if errored seconds (ES) and severely errored seconds (SES) performance thresholds have been exceeded. One message queries the performance thresholds and another message reads the current and previous hour ES and SES values for comparison.
Hard Reset	Y	N	Hard reset forces re-initialization of the ISDN line card circuit only if a service-affecting fault is detected after the diagnostic has been run. This action is also performed automatically when an ISDN line card is inserted into a slot.
Restore (LC and NT1)	Y	N	Restore (LC and NT1) restores the line card and the NT1 after the diagnostic tests are completed to ensure loopbacks are released and both components are returned to normal.

NA011 enhancements to ISDN BRI line diagnostics

In the past, an ISDN line diagnostic performed by operating company personnel required several minutes to complete. The user performing the diagnostic test could not enter additional commands until the test completed. Beginning with NA011, the ISDN Asynchronous DIAG command allows the user to perform an ISDN line diagnostic asynchronously. Asynchronous diagnostics are made possible by use of the NOWAIT optional parameter with the DIAG command.

The DIAG NOWAIT command allows line diagnostics that run in the background to be started on the posted line. Background diagnostics give the user the capability to perform additional actions from the same MAP while the line diagnostic is running. The user no longer has to wait for the diagnostic to complete before the command prompt is returned to them.

The LOGUTIL system reports the results of the line diagnostics. The LOGUTIL system generates a LINE100 log if the line passes the diagnostic test or a LINE101 log if the line fails the diagnostic test. The new QUERY optional parameter used with the DIAG command gives the user the last line diagnostic result or status on a posted LEN. Information for the 100 most recent ISDN LENs on which asynchronous DIAG was performed is stored in the history. This information is displayed in response to the DIAG QUERY command used on a posted LEN. The new QUERYALL optional parameter used with the DIAG command gives the user a summary of all currently running line diagnostics.

Office parameter MAX_ASYNC_ISDN_LINES located in table ISDNVAR allows operating company personnel to activate or deactivate the Asynchronous Diag feature. This parameter sets the maximum number of asynchronous diags that can be run at the same time from all CI ports. The range of values for this parameter is 0 to 10. A value of 0 deactivates asynchronous line diagnostics for the whole DMS office. The default value for this parameter is 5.

Asynchronous line diagnostics use the following commands at the LTP MAP level:

- DIAG NOWAIT
  - The DMS switching system first performs an initial check for resources in response to the entry of the DIAG NOWAIT command. Once the resource check is complete, the DMS switching system returns the command prompt to the user.
  - The DMS switching system generates a LINE log report that indicates the successful completion or failure of the diagnostic. A LINE100 log reports a successful line diagnostic and a LINE101 log reports a line diagnostic failure.
  - The DIAG NOWAIT command supports all other DIAG optional parameters such as LC, INS, FAST, or EXTENDED except for DISP and FULL.
  - The DMS switching system notifies the user of the completion of the diagnostic test providing the user is still logged on to the same port.
- DIAG QUERY
  - The DIAG QUERY command provides the user with the results of the last asynchronous diagnostic performed on the posted LEN. The DIAG QUERY command requires the user to post the LEN in the control position. The DIAG QUERY command does not have to be entered from the same port used to enter the DIAG NOWAIT.
  - If an asynchronous diagnostic is currently running on the posted LEN, a message “A DIAG NOWAIT <option> is in progress on the posted LEN” is displayed to the user.
- DIAG QUERYALL
  - This command, when executed, displays the LEN, CARD TYPE, and the type of diagnostics being performed, for example: LC, INS, FAST,

or EXTENDED, for all the concurrently running Asynchronous ISDN diagnostics in the entire DMS office.

— If no ISDN diagnostic is running, the message “No Asynchronous ISDN DIAG running presently in the entire DMS office” displays.

— DIAG QUERYALL command requires an ISDN line to be in the control position.

> ***Note:*** The DIAG NOWAIT, QUERY, and QUERYALL options are valid only for BX26AA and BX27AA ISDN lines.

ISDN user interface commands

The CI query commands provide “status quo” information about a DN, a SPID, or physical ISDN line connection information from CI (command interpreter) MAP level, or from any MAPCI (MAP command interpreter) MAP level.

Table 20-3 provides a brief description of the CI query commands and a list of the parameters displayed by the CI command. For more information about the CI query commands, refer to the following documents:

- *DMS Packet Handler Provisioning Guide*, 297-2431-320 (BCS34 and BCS35)
- *Integrated Services Digital Network Service Orders for ISDN Terminals Reference Manual*, 297-2401-310 (BCS36 and up)
- *ISDN Basic Rate Interface Maintenance Guide*, 297-2401-501 (BCS36 and up)

> ***Note:*** The query commands in the above references currently use SERVORD.

Starting in NA012, the query D-channel (QDCH) command includes the parameter status, which allows the user to query ISDN DCHs by state. The status parameter is shown as follows:

```
STATUS <STATE> {SysB,
                ManB,
                OffL,
                CBsy,
                ISTb,
                InSv,
                ALL}
```

Figure 20-9 shows an example of the MAP display when using the QDCH command with the status parameter.

Figure 20-9 Example of MAP display when using the QDCH command with the STATUS parameter

```
CI:
>QDCH STATUS INSV

LTC 0 DCH 1 InSv SPARE
LTC 1 DCH 3 InSv SPARE
LTC 3 DCH 6 InSv ISG 4
LTC 4 DCH 7 InSv ISG 5
LTC 4 DCH 8 InSv ISG 6
LTC 4 DCH 9 InSv ISG 9
LTC 1 DCH 11InSv SPARE
LTC 3 DCH 14 InSv ISG 10
LTC 4 DCH 20 InSv ISG 11

There are 9 InSv DCHs of which 3 are spare
```

> ***Note:*** A complete list of all the parameters that can be used with the QDCH command can be obtained by entering, HELP QDCH, at any level of the MAP.

The query commands shown below are accessible from the various MAP levels to maintain transparency of service.

Table 20-3 CI query commands (Sheet 1 of 3)

Command	Description
QBB	Displays BV-channel, X.25 service group (XSG), circuit, channel, and LEN information.
QBCLID	Displays information about bulk calling ID (BCLID) lines in a group or in all groups.
QBERT	Displays parameters associated with the BERT cards: • A list of BERT numbers associated to line equipment numbers (LEN). • The bit error rate test (BERT) cards can be used for LINE or TRUNK testing. • Status of BERT hardware.
QCM	This command is used for tracking the last incoming and outgoing call for CLASS/CXMS services. It can be executed on a DN, LEN, or LTID/SPID (for ISDN).
QCOUNTS	Displays and resets the line-level protocol, packet-level protocol, and protocol abnormality counts for a particular X.25 LTID or X.75 interface.

Table 20-3 CI query commands (Sheet 2 of 3)

Command	Description
QCPUGNO	Displays the LENs or LTIDs/SPIDs associated with call pickup user (CPU) Groups.
QCUST	Displays the customer group datafilled for a LTID/SPID.
QDCH	Displays D-channel handler ISG, Bd channel, and endpoint information.
QDN	Displays information about a DN.
QDNA	Not applicable for ISDN lines.
QDNSU	Displays a summary or a detailed listing of all DNs that are not assigned in software.
QDNWRK	Displays a summary or a detailed listing of all DNs assigned in software.
QGRP	Displays DNs belonging to any of the following group: • CPU • FTRGRP • FTRKEY • GIAC • GIC • HUNT • KSH • ISDNAMA • MADN • QBS • RESSCU • SCU
QHA	Displays a summary or a detailed listing of all hardware assigned in software.
QHASU	Displays a summary or a detailing listing of all hardware assigned and all software unassigned LENs.
QHU	Displays a summary or a detailed listing of all hardware unassigned LENs.

Table 20-3 CI query commands (Sheet 3 of 3)

Command	Description
QIT	Displays the service information associated with an ISDN terminal, including the DS-1 connection to the packet handler for a special connection.
QL	Displays the line-data on an ISDN loop, that is, maintenance parameters, such as line state, sync status and also hunt group busy.
QLEN	Obtains all relevant information about a logical terminal associated with the LEN specified when the QLEN command is used.
QLENWRK	Displays a summary or a detailed listing of all hardware assigned and software assigned LENs.
QLOAD	Displays the loading of PM (that is, LCME) with LCC.
QLT	Displays a listing of information about a logical terminal.
QMADN	Displays the following information for a MADN group: • Multiple appearance DN (MADN) group type • MADN group size • LTID/SPIDs associated with a MADN group and LTID/SPID mapping to Lens • LTCLASS associated with a MADN group • Features associated with MADN, that is, call forward (CF)
QNCOS	Displays the NCOS (network class service) information for a range of DNs.
QPHF	Displays DMS packet handler configuration information.
QSCMP	Displays the area code for a specific 7-digit DN (series completion).
QSCONN	Displays detailed special connection endpoint information.
QSCUGNO	Displays all the DNs associated with a speed call user (SCU) group.
QX75	Displays DMS packet handler X.75 trunk XSG, endpoint, carrier, common language identifier (CLLI) and member information.

Many of the CI Query commands indicated in Table 20-3 display similar information. These commands can be consolidated into a single command. The following are examples of commands that provide identical or similar types of information.

- QIT and QLT
- QDN, QDNA, and QPHF <option DN>
- QBB and QSCONN

Loop testing from MAP

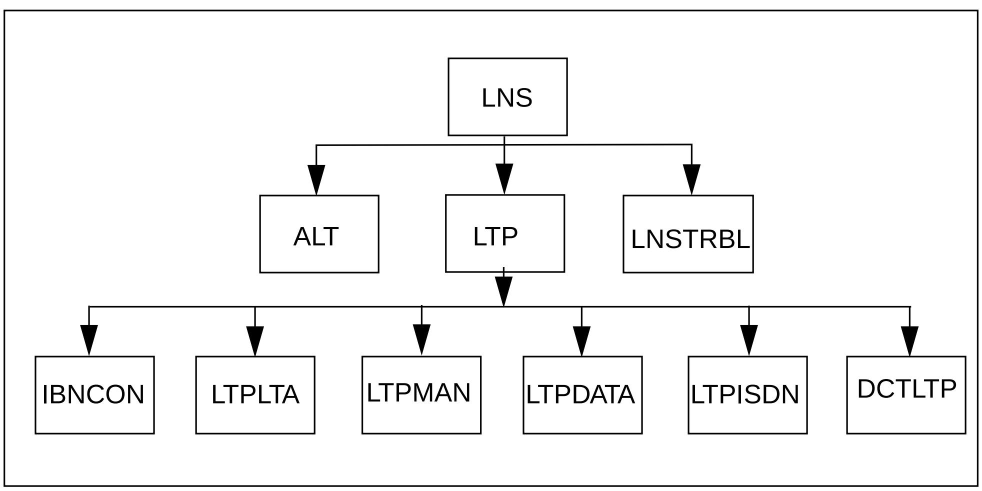
The line maintenance is provided from the MAP position LTP level. The LTP is the human-machine interface between the operating company personnel and the line maintenance subsystem (LNS). Requests for tests and other actions are entered at the MAP keyboard, and responses are displayed on the MAP screen.

More information can be obtained from the following documents:

- *DMS-100 Family ISDN BRI Maintenance Guide*, 297-2401-501
- *DMS-100 Line Maintenance Guide*, 297-1001-594
- *DMS-100 Family ISDN Product Guide*, 297-2401-010

The current ISDN line maintenance architecture as shown in Figure 20-10 supports the following levels:

Figure 20-10 Levels supported by ISDN line maintenance architecture



The LNS level is accessed from the MAP CI by entering MAPCI; MTC;LNS. The LNS level provides sublevels ALT, LTP, and LNSTRBL. For ALT level, refer to section “Automatic Line Testing” in this chapter. The LTP level contains sublevels LTPLTA, LTPMAN, LTPDTA, LTPISDN, IBNCON, and DCTLTP. The following functions are supported by each of the levels:

Line test position level

Table 20-4 lists the LTP (line test position) MAP level menu commands that provide the basic line control and test functions.

Table 20-4 LTP level menu commands (Sheet 1 of 3)

<table>
<tr><th>Command</th><th>Description</th></tr>
<tr><td>Quit</td><td>Quit from LTP level
The option ALL allows return to the CI from LTP level.l</td></tr>
<tr><td>Post</td><td>Lines can be posted individually or in sets of more than one line.
Individual lines are posted by specifying circuit identifiers, such as the DN (directory number) or the LEN (line equipment number).
A set of lines can be posted by using location identifiers, such as DN, LEN, or CLLI (common language location identifier), or condition identifiers, such as the state of the line.

Note: In NA010, the fail type used with the Post DF (diagnostic failure) command has been expanded to include rapid messaging DF types OMAJ and OMIN.
An individual LTID can be posted using POST LT command with parameters GROUP NAME and GROUP NUMBER.

Note: In NA010, the LTP MAP display, in response to the POST LT command, is modified to include the rapid messaging state of the LTID. When a circuit is posted, it is made known only to the LTP and it is still available to anyone else in the system. When the circuits are posted, the first circuit of the posted set is displayed in the control position of the MAP. Individual lines may be posted by key using the following command format: POST DK <dn> <key #>|'all'].</td></tr>
</table>

Table 20-4 LTP level menu commands (Sheet 2 of 3)

Command	Description
BSY	• Sets the line in control position, or using the ALL option, all the posted lines to the state indicated, if allowed. • The default state is MB. • Other allowable states that can be used as options with this command are IDL and INB.
RTS	• Returns to service the line in the control position • Returns to service all posted lines if lines are MB when ALL parameter is selected • Returns to service LTID in the control position • Returns to service all LTIDs in the posted set when the ALL parameter is entered
Diag	• Performs diagnostic on an ISDN line, and displays the test results on the screen. • The type of diagnostic can be extended, line card, or in-service ***Note:*** In NA011 the DIAG NOWAIT, DIAG QUERY, and DIAG QUERYALL command options used for asynchronous line diagnostics were added.
AlmStat	• Displays the status of line alarms. • The lines and alarms to be displayed can be specified. • Change the alarm threshold setting for the lines. ***Note:*** In NA010, the options OMAJ and OMIN are added to the ALMSTAT QUERY and SET commands. These options give the alarm status for rapid messaging.
CktLoc	Displays the physical location of the line in the office.
Hold	Moves the line from control to HOLD position and the next line from the posted set, if any, to control position.

Table 20-4 LTP level menu commands (Sheet 3 of 3)

Command	Description
Next	• Gets the next line from the posted set or the HOLD position and places it in the control position. • The line in the control position can be deleted, returned to the posted set, or exchanged with the line in the hold position.
Prefix	• Sets the prefix of the DN for the line. • Requires the DN as a parameter.
LCO	Operates or releases the ISDN line card cutoff (CO) relay.
Level	Allows access to the sublevels of the LTP level (LTPLTA, LTPMAN, LTPDATA, LTPISDN).

Table 20-5 lists the LTP MAP level non-menu commands that provide the basic line control and test functions

Table 20-5 LTP level non-menu commands (Sheet 1 of 2)

Command	Description
FRLS	Force releases the line or circuit in the control position and sets it MB.
Data_Screen	Automatically used by the system during the command code screening process and is not available for manual use.
Dav_Screen	Used by the system during the command code screening process and is not available for manual use.
POTSDiag	Not applicable for ISDN lines.
RECORD_DTSR	Not applicable for ISDN lines.
VOICE_SCREEN	Automatically used by the system during the command code screening process and is not available for manual use.
LTPLTA	Go to the LTPLTA level.
LTPMAN	Go to the LTPMAN level.
LTPDATA	Go to the LTPDATAT level.
LTPISDN	Go to the LTPISDN level.

Table 20-5 LTP level non-menu commands (Sheet 2 of 2)

Command	Description
IBNCON	Go the IBNCON level.
DCTLTP	Go to the DCTLTP level.
LTPRSCR	LTP resource release mechanism.
FULLDN	Display full national number.
EBSMSG	Enable/disable the EBS warning message and prompt.
LTP_AUX_GATE_COM	Automatically used by the system and is not available for manual use.
LTP_AUX_COM	Automatically used by the system and is not available for manual use.

LTP line test access level

Table 20-6 lists the LTPLTA (LTP line test access) MAP level commands that provide various tests using the metallic test access.

Table 20-6 LTPLTA level commands (Sheet 1 of 3)

Command	Description
Quit	Quits from LTPLTA level.
Post	Refer to LTP Level Commands Table.
MonLTA	Not applicable for ISDN lines.
TalkLTA	Not applicable for ISDN lines.
Orig	Not applicable for ISDN lines.
LnTst	Performs VDC, VAC, Res, and Cap tests on a subscriber loop.

Table 20-6 LTPLTA level commands (Sheet 2 of 3)

Command	Description
VDC	• Performs a DC voltage measurement on a subscriber loop. • Very quick in taking the measurement without disconnecting the NT1 from the line at the U-interface. • Measurements can be single or continuous and they are tip-to-ground or ring-to-ground. • Continuous measurement disallowed with remote relay (RR) operated in NT1. If it is specified. it is operated before the measurement is made.
VAC	• Performs an AC voltage measurement on a subscriber loop. • Very quick in taking the measurement without disconnecting the NT1 from the line at the U-interface. • Measurements can be single or continuous and they are tip-to-ground or ring-to-ground. • Continuous measurement disallowed with remote relay (RR) operated in NT1. If it is required, it is operated before the measurement is made.
Res	• Performs resistance measurements on a subscriber line and they are tip-to-ground, ring-to-ground, and tip-to-ring. • Allows continuous testing. • If no options are chosen then tip-to-ground, ring-to-ground, and tip-to-ring DC measurements are made. • Measurement of the AC resistance is an option (for 2B1Q only). • If the remote relay (or AC) option is selected, the continuous testing parameter is not allowed.

Table 20-6 LTPLTA level commands (Sheet 3 of 3)

Command	Description
Cap	• Performs a quick capacitance measurement on a subscriber line without disconnecting the NT1 from the line at the U-interface. • Measurements taken are tip-to-ground, ring-to-ground, and tip-to-ring. • Only non-continuous Cap test with both ISLC CO and NT1 CO relays operated is allowed on the ISDN line.
Hold	Refer to the LTP level commands table.
Next	Refer to the LTP level commands table.
LTA	• Connects or releases the line test access (LTA) from the line card. • The connection can be specified towards the line card (IN connection) or towards the subscriber loop (OUT connection). • If no parameters are specified, the testing is toggled between IN and OUT. • Displays any problems encountered.
BalNet	Not applicable for ISDN lines.
Coin	Not applicable for ISDN lines.
Ring	Not applicable for ISDN lines.
Dgttst	Not applicable for ISDN lines.

LTP manual level

Table 20-7 lists the LTPMAN (LTP manual) MAP level commands that provide the common manual test functions.

Table 20-7 LTPMAN level commands (Sheet 1 of 2)

Command	Description
Quit	Quits the LTPMAN level.
Post	Refer to the LTP level commands table.
Loss	• Not applicable for ISDN lines. • Must use ILOSS command (LTPISDN level).

Table 20-7 LTPMAN level commands (Sheet 2 of 2)

Command	Description
Noise	• Not applicable for ISDN lines. • Must use NSE command (LTPISDN level).
ToneGen	• Only metallic option valid for ISDN lines. • Transmits a tone on a line. The frequency and tone level can be specified. • Connection can also be set up using the metallic test access (MTA) bypassing the line card.
Jack	Not applicable for ISDN lines.
TstRing	Not applicable for ISDN lines.
Bal	Not applicable for ISDN lines.
RlsConn	Releases line, test equipment and their connections.
Hold	Refer to the LTP level commands table.
Next	Refer to the LTP level commands table.
Ckttst	• Sends multiple messages to the line card. The number of messages to send during the test can be specified (from 1 to 50). If the number is not specified, the default value is in office parameter CIRCUIT_TEST_NUMBER_MESSAGES in table OFCVAR. • The location where the test messages are looped back has to be specified, that is, it has to be stated whether the tests are to be run on the line or the line card. • The line card option is available for ISDN lines only
Sustate	Determines the internal hardware, NT1 and TEI status of the line.
SetLpBk	Not applicable for ISDN lines.
DCHCON	Performs a D-channel continuity test on the ISDN loop.

LTPDATA level

Table 20-8 lists the commands used at the LTPDATA (LTP data transmissions testing level) MAP level.

Table 20-8 LTPDATA level commands (Sheet 1 of 2)

Command	Description
Quit	Quits the LTPDATA level.
Post	Refer to the LTP level commands table.
Equip	• Select equipment for digital test access. • Defines monitor equipment termination point for DU or ISDN lines. • The monitor equipment can be seized or released for the transmit or receive direction of the data transmission path. • The QUERY option displays the status of all monitor and test equipment that is defined at a MAP. • In response to being invoked, this command displays that status of execution, that is, all relevant messages. • Only 2 channels, DS1 or ISLC, can be equipped using this command.
Connect	• Established the digital test access connection. • Connects any or all of test equipment, monitor equipment, or a digital trunk, depending on the option chosen, to a data line. The DN or the CLLI number can be used for specifying the connection to posted B1, B2, or D channels. • This command is also dependent on the command Equip_ having been previously invoked to define and seize the equipment required.
Sustate	Determines the internal hardware, NT1 and TEI status of the line.
LoopBk	• Activates or releases loopback at specified location. • Displays loopback if set up.

Table 20-8 LTPDATA level commands (Sheet 2 of 2)

Command	Description
BERT	• Measures the transmission quality of an ISDN B-channel and other lines like DUs. The speed of the BERT test can be specified. • If QUERY is invoked during the test, it displays the number of blocks received, bit errors received, and the sync losses incurred. • If QUERY is invoked after the test, then it displays the error-free seconds during the test, total time in synchronization, and the total test time.
BPVO	Not applicable for ISDN lines.
Hold	Refer to the LTP level commands table.
Next	Refer to the LTP level commands table.
BERTTIME	• Non-menu command for BERT testing only. • Sets a maximum test time or displays what the value is. The time can be set in minutes and hours. • An audit is conducted every 30 minutes to stop BERTs that exceed the set duration.

LTPISDN level

Table 20-9 lists the LTPISDN MAP level menu commands that provide specific test functions for ISDN lines.

Table 20-9 LTPISDN level menu commands (Sheet 1 of 3)

Command	Description
Quit	Quits from LTPISDN level.
Post	Refer to the LTP level commands table.
Sustate	Determines the internal hardware, NT1 and TEI status of the line.
BCHCON	• Performs Bb channel continuity test on nailed-up B channel on an ISDN loop. • Continuity is test from the XSG to the T interface of the NT1 connected to the line card.
Ltloopbk	Applicable to SAP116; sets up a loopback point in the DCH or EDCH for the selected LTID for continuity testing from the DPN.

Table 20-9 LTPISDN level menu commands (Sheet 2 of 3)

Command	Description
DCHCon	• Tests the continuity of the path from the D-channel handler (DCH) to the line card or the NT1 (determined by the loopback specified). • Parameters L, LU, or T determine the location of the interface Loopback (the LU parameter does not apply to the S/T-ISLC). • When the LU interface parameter is selected for DCHCON, synchronization is lost on the line. There is a delay to regain synchronization. The continuity est is performed with the Echo Canceller (EC) on, and then repeated with the EC off. • A continuity test can not be performed while a call is in progress on the line. The line state must not be CPB or CPD. The peripherals must be in service, not LMB.
TEST	• Performs selected layer 1 tests on posted 2B1Q ISDN line. • The types of tests that can be performed are — DCSIG: DC signature test — COLDST: cold start test — SCUR: sealing current test. — DET: BLM detection — THR: BLM thresholds test — ALM: alarm test — IMP: impulse noise test — NSE: noise test — ILOSS: loop loss test • The above tests can be invoked using the hidden commands. For details, refer to Table 19 on page 84. Note that IMP, NSE, and ILOSS tests require the ESTU.
Hold	Refer to the LTP level commands table.
Next	Refer to the LTP level commands table.
Termchk	Provides information regarding the terminal states and reasons for initilization failures on BRAFSI ISDN terminals.

Table 20-9 LTPISDN level menu commands (Sheet 3 of 3)

Command	Description
TstSgnl	Activates a test signal from the line card onto the loop (BX26AA-ST line card only)
TEI	Checks the status of TEIs or restores the removed TEI.
Qloop	• Queries all LTIDs, DNs, TEIs, and rapid messaging states on a posted ISDN loop. • Requires instigation
Qlayer	Queries the performance and/or protocol monitoring data for the specified layers of an ISDN LEN posted in the control position of the MAP.
Rlayer	Resets the performance and/or protocol monitoring data for the specified layer of an ISDN LEN posted in the control position of the MAP

The LTPISDN MAP level also provides non-menu maintenance commands listed in Table 20-10. Some of these commands provide the same maintenance functions as can be requested from the menu command TEST with appropriate parameters. Most of the commands are specific to 2BIQ line card testing.

Table 20-10 LTPISDN level non-menu commands (Sheet 1 of 2)

Command	Description
DCSIG	• Performs DC signature test. • The optional parameter, DISPLAY, returns the resistance measurements for the test.
COLDST	• Performs cold start test. • Determines if U-synchronization can be established within the required time interval (15 seconds), after the physical link has been established. • Requires the test NT1 or ESTU (enhanced services test unit) testhead.
SCUR	• Performs sealing current test • Helps identify U-loop failures attributed to insufficient sealing current. • The optional parameter, DISPLAY, returns the sealing current measurements for the test.

Table 20-10 LTPISDN level non-menu commands (Sheet 2 of 2)

Command	Description
DET	Tests the BLM functionality by checking the ability of the line card to detect and record BE, ES, and SES.
THR	• Tests for correct BLM by checking the thresholding capability. • Checks to see that alerts are generated when the number of ES and SES accumulated have exceeded the preset thresholds.
ALM	Alarm test to verify that the DMS detects and reports LOS.
IMP	Measures impulse noise. Requires the ESTU testhead.
NSE	Measures wideband noise. Requires ESTU test head.
ILOSS	Loop loss test. Requires the ESTU test head. Tests the loop performance of a U-loop to identify the presence of load coils on the loop and to verify that the amount of loss on the loop is acceptable.
L1THRSH	Sets or queries the layer 1 performance threshold values for the 2B1Q loop.
L1BLMALM	Sets or queries the automatic alarm reporting capability of the posted ISDN loop.
L2LOGCTL	Used to set the layer 2 abnormality log report status on an individual ISDN line basis.
L3LOGCTL	Used to set the layer 3 abnormality log report status on an individual ISDN line basis.
QPHINFO	Displays the terminating DNs for all DMSPH X.25 calls on the posted DN.

Lines trouble (LNSTRBL) level

Table 20-11 lists the LNSTRBL (lines trouble) MAP level commands that provide the means of displaying the call processing troubles encountered. It is a sublevel of LNS level.

Table 20-11 LNSTRBL level commands (Sheet 1 of 2)

Command	Description
Quit	Quit from LNSTRBL level.
ClrAlm	Clear call processing (CP) alarms in specified LCD.

Table 20-11 LNSTRBL level commands (Sheet 2 of 2)

Command	Description
ClrBuf	Clear CP troubles in specified LCD.
CreatSet	Post CP troubles in specified LCD.
Disp	Display CP troubles in specified LCD.
ListAlm	List the modules having the specified alarms (MN, NH, CR).
QSup	Display suppressed trouble types.
Resume	Activate suppressed trouble types.
StopDisp	Stop updating displays.
Suppress	Suppress specified trouble types.

Automatic line testing

Automatic line testing (ALT) also provides coverage for ISDN BRI Maintenance. The existing ALT commands as shown in Figure 20-11 reside in MAP level “MAPCI;MTC;LNS;ALT” which contains the sublevel hierarchy:

Figure 20-11 Table ALTSCHED commands

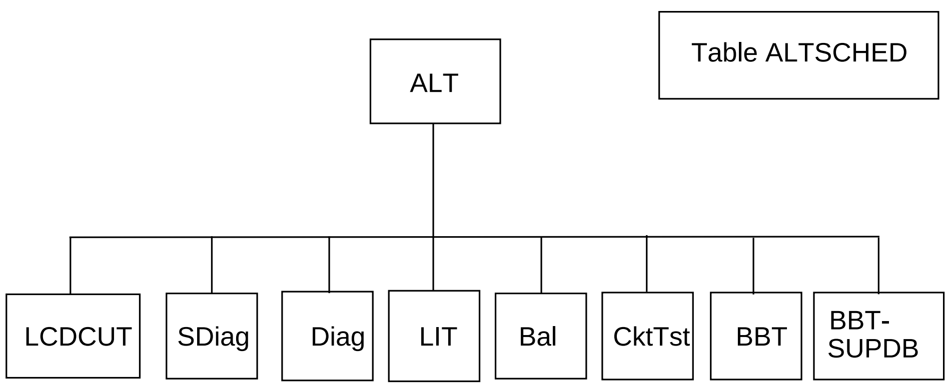


Table ALTSCHED contains scheduled ALT test data tuples. the sublevels display information on a defined test, provide control to manually activate/deactivate tests and facilitate immediate “on-demand” ALT testing. In addition, new tests can be defined and added into table ALTSCHED from the sublevels.

The reference for automatic line testing can be found in the *DMS-100 Lines Maintenance Guide*, 297-1001-594.

Each sublevel relates to specific line test type as follows:

- SDIAG—Short Diagnostic Test
- Diag—Diagnostic test
- LIT—Line Insulation test
- Bal—On-hook balance network. Not supported for ISDN lines.
- CktTst—MDC (Message Driven Card) circuit test, for example, Data or EBS
- BBT—board to board testing
- BBTSUPDB
- LCDCUT

Table 20-12 lists the supported ALT MAP level commands.

Table 20-12 ALT MAP level commands

Command	Description
Quit	Quit from the ALT MAP level
Post	Post a test identifier form table ALTSCHED
ALTInfo	Output information about ALT scheduled data
SDiag	Go to ALTSDIAG sublevel of ALT
Diag	Go to ALTDIAG sublevel of ALT
LIT	Go to ALTLIT sublevel of ALT
Bal	Go to ALTBAL sublevel of ALT
CktTst	Go to ALTCKTTST sublevel of ALT
BBT	Go to ALTBBT sublevel of ALT
BBTSUPDB	Go to BBTSUPDB sublevel of ALT
LCDCUT	Go to LCDCUT sublevel of ALT

Table 20-13 lists the ALTSDIAG MAP level commands.

Table 20-13 ALTSDIAG MAP commands

Command	Description
Quit	Quit from ALTSDIAG
Post	Post a test identifier from table ALTSCHED
start	Activate test identifier to run
Stop	Deactivate test identifier
Remove	Delete data from test identifier
Define	Define parameters for a test identifier
Submit	Attempts to add a test identifier to ALTSCHED table
DefMAN	Defines a new test identifier for manual ALT testing
DefSCHD	Allow definition of new test identifier for the same test type SDIAG
Status	Output status information on posted test identifier
OVRride	Override scheduled tests.

Table 20-14 lists the ALTDIAG MAP level commands.

Table 20-14 ALTDIAG MAP level commands (Sheet 1 of 2)

Command	Description
Quit	Quit from the ALTSDIAG
Post	Post a test identifier from table ALTSCHED
Start	Activate test identifier to run
Stop	Deactivate test identifier
Remove	Delete data from test identifier
Define	Define parameters for a test identifier
Submit	Attempts to add a test identifier to ALTSCHED table
DefMAN	Defines a new test identifier for manual ALT testing
DefSCHD	Allow definition of new test identifier for the same test types SDIAG

Table 20-14 ALTDIAG MAP level commands (Sheet 2 of 2)

Command	Description
Status	Output status information on posted test identifier
OVRride	Override scheduled tests

Table 20-15 lists the ALTLIT MAP level commands

Table 20-15 ALTLIT MAP level commands

Command	Description
Quit	Quit from ALTLIT
Post	Post a test identifier from table ALTSCHED
LITInfo	Displays the system default value for the LIT parameters
Start	Activate test identifier to run
Stop	Deactivate test identifier
Remove	Delete data from test identifier
Define	Define parameters for a test identifier
Submit	Attempts to add a test identifier to ALTSCHED table
DefMAN	Defines a new test identifier for manual ALT testing
DefSCHD	Allow definition of new test identifier for the same test types LIT
Status	Output status information on posted test identifier
OVRride	Override scheduled tests

Table 20-16 lists the ALTCKTTST MAP level commands.

Table 20-16 ALTCKTTST MAP level commands (Sheet 1 of 2)

Command	Description
Quit	Quit from ALTCKTTST
Post	Post a test identifier from table ALTSCHED
Start	Activate test identifier to run
Stop	Deactivate test identifier

Table 20-16 ALTCKTTST MAP level commands (Sheet 2 of 2)

Command	Description
Remove	Delete data from test identifier
Define	Define parameters for a test identifier
Submit	Attempts to add a test identifier to the ALTSCHED table
DefMAN	Defines a new test identifier for manual ALT testing
DefSCHD	Allow definition of new test identifier for the same test types CKTTST
Status	Output status information on posted test identifier
OVRride	Override scheduled tests

Table 20-17 lists the ALTBBT MAP level commands.

Table 20-17 ALTBBT MAP level commands

Command	Description
Quit	Quit from ALTBBT
Post	Not applicable for ISDN lines.
start	Not applicable for ISDN lines.
Stop	Not applicable for ISDN lines.
Remove	Not applicable for ISDN lines.
Define	Not applicable for ISDN lines.
Submit	Not applicable for ISDN lines.
DefMAN	Not applicable for ISDN lines.
DefSCHD	Not applicable for ISDN lines.
Status	Not applicable for ISDN lines.
OVRride	Not applicable for ISDN lines.

Table 20-18 lists the ALTBBTSUPDB level commands

Table 20-18 ALTBBTSUPDB sublevel commands

Command	Description
Quit	Quit from ALTBBTSUPDB
Post	Not applicable for ISDN lines
Postin	Not applicable for ISDN lines.
Next	Not applicable for ISDN lines.
GenRep	Not applicable for ISDN lines.
MapDN	Not applicable for ISDN lines.
RunRst	Not applicable for ISDN lines.
Continue	Not applicable for ISDN lines.

Table 20-19 lists the ALTLCDCUT level commands.

Table 20-19 ALTLCDCUT level commands

Command	Description
Quit	Quit from ALTLCDCUT
Post	Post a BBT TESTID
Postin	Post a single line from a posted TESTID
Next	Display the next line in the posted set
COrelay	Operate the CO relays of the lines in the posted TESTID
HOLDrel	Operate/release/query HOLD relays on an LCD
CutOff	Perform CUTOFF with HOLD on an LCD
AuxPwr	Not add/remove/query LCM auxiliary power supply
CutOver	Release CO and HOLD relays on a LCD
MacCut	Define a dummy manual TESTID

Table LNTHRSH

Table LNTHRSH stores the alarm status setting for each of the BLM entities and the performance monitoring mode. The information stored is for 2B1Q loops that do not have default BLM thresholds or alarm reporting data.

Fields performance monitoring mode (PMODE) and mp-eoc line unit failure (MPLUFAIL) were added in NA008. These two fields are applicable only to 2B1Q lines.

Field PMODE contains the data for the PM mode. The PM mode determines the type of data being stored in the line units. The two types are segmented (SEG) and path (PATH). PATH is the default data mode.

SEG — Segmented PM occurs when each network facility segment of the Basic Rate Access is independently monitored and thresholded in both directions of transmission.

PATH — Path PM occurs when the crc is initially calculated at the source terminal (ET/LT or NT1) of the DSL. When this crc is received by intermediate network elements, the crc is forwarded to the next network element in the direction of the data flow. The febe bits are set at the LT and NT1 and are carried unaltered between them. Performance parameters for the entire path are thresholded in the LT and as a customer option in the NT1. Intermediate crc monitors in the facility nodes can provide sectionalization information.

Field MPLUFAIL controls whether or not a LINE 145 mp-eoc failure log report is generated when a line unit reports an internal failure (node failure) on an individual loop basis. An mp-eoc node failure log report is generated only if both the MPLUFAIL field and the OFFICE PARAMETER ISDN_MPLU_NODE_FAILURE_ALARM located in table OFCVAR are set to ON. The default setting for MPLUFAIL is ON.

Posting ISDN lines using the POST DK command

The POST DK command displays a DN appearance on the specified key on an ISDN terminal as shown in Figure 20-12. If the DN appearance is active, the POST DK command displays the key number of the DN appearance and the bearer capability of the call as well as the far-end information. This command only applies to ISDN lines.

> ***Note:*** The POST DK command requires the presence of 2B FIT/NIT option NI000050.

The POST DK command accessed at the LTP MAP level has the following parameters:

```
POST  DK dn_number [<key#>|'ALL']
```

From the CI level of a MAP type:

```
>MAPCI;MTC;LNS;LTP
>POST DK 5484200 33
```

Figure 20-12 shows the MAP display when the POST DK command is entered.

Figure 20-12 POST DK MAP display

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext   APPL
  .      .      .       .       .      .       .       .        .     .



 LTP
   0 Quit      POST         DELQ            BUSYQ         pREFIX
   2 Post_
   3           LCC PTY RNG .....LEN..........      DN     STA F S LTA TE
 RESULT
   4           ISDN LOOP    HOST 02 0 01 08      5484200 IDL
   5 Bsy                                            33  SP
   6
   7
   8
   9 AlmStat                                              Bearer capability
  10 CktLoc                                         Key number
  11 Hold
  12 Next
  13
  14
  15
  16 Prefix
  17 LCO_
  18 Level_
     userid
  Time hh : nn >
```

After the ISDN line is posted using the POST DK command, the line display below the control position displays the key number and bearer capability. In the example in Table 20-20, the CPE has DN 5484200 assigned to key 33 and has a speech call active. The system checks the DN once each second and updates the display. Table 20-21 lists the possible bearer capabilities that can be displayed.

Table 20-20 Bearer capability display codes

Bearer capability	Display
Speech	SP
3.1 kHz audio	3AU
Circuit mode data, rate adapted to 56 kHz	56C
Circuit mode data 64 kHz	64C
Packet data	PMD

Table 20-21 lists the possible responses to the POST DK command entry.

Table 20-21 Responses to POST DK command entry at LTP MAP level

Response	What it means	What to do
Option NI000050 is not enabled	The user has attempted to use the POST DK command but has not enabled software optionality control (SOC) option NI000050.	Use a different POST command to post the DN
The DN is not an ISDN DN	The POST DK command was issued on a non-ISDN line. This command is only valid on ISDN lines.	Either re-enter the command on an ISDN line, or use a different POST command.
The system responds by displaying No Equipment in LEN field and NEQ in the Status field.	The posted DN is assigned to an LTID which is not mapped to a LEN in table LTMAP.	Map the LTID to a LEN using the SLT ATT command before posting the DN.
Incorrect DN Appearance	The specified DN does not appear on the specified key.	Enter the POST DK command again with the correct key or use the ALL option to list all keys for the DN.
CO/AFC DN: The key number shown can be different than the actual key in use	When posting a DN appearance that has AFC or ACO provisioned, the DN appearance is a member of a group of appearances for the DN. The key numbers used for the DNs are not necessarily the same as the physical keys on the ISDN set. This is due to the Q.931 message protocol that initially refers to the DN without any reference key number being used. Either the user or the ISDN set determines which physical key is used for a call, and that is never communicated to the CM or XPM.	Information only

Layer 1 basic line monitoring alarm

The L1BLMALM (layer 1 basic line monitoring alarm) command sets or queries the automatic alarm reporting capability of a posted loop. The

L1BLMALM command is only valid for ISDN lines. The L1BLMALM command is used to perform the following:

- loss of signal
- set and query mp-eoc unit alarm report state for the following BLM entities:
  - LOSW—loss of Sync Word detected by line card or mp-eoc line unit
  - LOSDG—loss of signal with dying gasp
  - TSYNC—loss of t-synch
  - NTM—NT1 is undergoing maintenance
  - PERF—performance monitoring alerts (threshold crossings) for 2B1Q line card and mp-eoc line units
  - MPLUFAIL—nodal failure of multipoint mp-eoc line unit
- query or set mp-eoc performance monitoring mode for all units on an ISDN line to either path or segmented
- inhibit the mp-eoc line unit nodal failure alarm reports using the blm_entity parameter, MPLUFAIL

> ***Note:*** Office parameter ISDN_MPLU_NODE_FAILURE in table OFCVAR controls the reporting of Layer 1 mp-eoc line unit node failures on a per office basis. When the parameter is set to OFF, LINE 145 logs are not generated when an mp-eoc line unit has an internal failure (node failure). The L1BLMALM command using the BLM_entity, MPLUFAIL, is used to control the state of this office parameter.

Figure 20-13 shows the syntax for the L1BLMALM command that is displayed at the MAP display or screen. This display is generated after a BRI line is posted at the LTPISDN MAP level and the command 'HELP L1BLMALM' is entered.

Note: The L1BLMALM command is a non-menu command.

Figure 20-13 HELP L1BLMALM MAP display

```
>HELP L1BLMALM
L1BLMALM - Modify Layer 1 Anomaly Reporting for
Loop posted in the Control Position of MAP.
Parms: <action> {QRYALRM,
                 SETALRM <BLM_ENTITY> {LOSW,
                                       LOSDG,
                                       LOS
                                       TSYNC,
                                       NTM,
                                       PERF,
                                       MPLUFAIL,
                                       ALL}
                         <REPORT_STATE> {ON,
                                         OFF},
                 QRYMODE,
                 SETMODE <mplu_mode> {SEG<
                                    PATH}}
```

THR

The THR (threshold) command tests the ability of 2B1Q line cards and mp-eoc line units to detect when their performance monitoring threshold levels are crossed. The test crosses both the ES/HR and SES/HR thresholds. The line card test sends corrupt cyclic redundancy check (CRC) to increase the PM counts beyond the threshold levels. Line unit test values that exceed the threshold values are written to the PM registers of the line unit.

Figure 20-14 shows the syntax for the THR command that is displayed at the MAP display or screen. This display is generated after a BRI line is posted at the LTPISDN MAP level and the HELP THR command is entered.

> ***Note:*** The THR command is a non-menu command.

Figure 20-14 HELP THR MAP display

```
THR - Performs BLM test of BE, ES and SES

PARMS : [direction> {NE,
                     FE}]

        [<target> {LC,
                   MPLU <lu_no|ALL> {1 TO 6,

                                    ALL}}]

        [<test NT1> {TST}]
```

Note: The threshold values for a line are found in tables BLMTHRSH and LNTHRSH.

The following is an example of a THR test. From CI level of a MAP terminal, type:

```
>MAPCI;MTC;LNS;LTP;LTPISDN
>POST L 1 2 0 1
>THR
```

The result of using the LTPISDN level non-menu THR command displayed on the MAP screen is shown in Figure 20-15.

Figure 20-15 THR MAP display

```
>THR

BLM threshold test may take 2 mins and 14 secs

Do you wish to continue ?

Please confirm (“YES”, “Y”, “NO”, or “NO”):

>Y

WARNING -Action may affect Packet Data Service
         Do you wish to continue?
>Y
BLM Thresholding Test Completed
Test Time = 88 seconds


Linecard Clock    1 23:30:02

Line Card Test Results:
NE, ES cnt/th 41/40 PASSED SES cnt/th 41/10 PASSED
FE, ES cnt/th 41/40 PASSED SES cnt/th 41/10 PASSED

mp-eoc line unit 1 test results:
NE, ES cnt/th 41/40 FAILED SES cnt/th 11/10 PASSED
FE, ES cnt/th 41/40 FAILED SES cnt/th 11/10 PASSED
NE, ES cnt/th 101/100 FAILED SES cnt/th 26/25 PASSED
FE, ES cnt/th 101/100 FAILED SES cnt/th 26/25 PASSED

mp-eoc line unit 2 test results:
NE, ES cnt/th 41/40 FAILED SES cnt/th 11/10 FAILED
FE, ES cnt/th 41/40 FAILED SES cnt/th 11/10 FAILED
NE, ES cnt/th 101/100 FAILED SES cnt/th 26/25 FAILED
FE, ES cnt/th 101/100 FAILED SES cnt/th 26/25 FAILED
```

DET

The basic line monitoring (BLM) DET (error detection) command tests Layer 1 error detection of multipoint embedded operations channel (mp-eoc) line units. It detects both near-end and far-end bit errors. It displays the initial and final values of the following types of errors:

- block errors
- ES/Hr
- ES/Day
- SES/Hr
- SES/Day

Figure 20-16 shows the syntax for the DET command that is displayed at the MAP display or screen. This display is generated after a BRI line is posted at the LTPISDN MAP level and the HELP DET command is entered.

> ***Note:*** The DET command is a non-menu command.

Figure 20-16 HELP DET MAP display

```
>HELP DET
DET - Performs BLM detection of BE, ES and SES
PARMS : [<crctime> {1 TO 3500}]
        [<direction> {NE,
                      FE}]

        [<target> {LC,
                   MPLU <lu_no|ALL> {1 TO 6,
                                     ALL}}]


        [<test NT1> {TST}]
```

> ***Note:*** When the DET test command is used with the test NT1 parameter, the Metallic Test Unit (MTU) is used to perform the test. Both the MTU and the line card are located in the DMS switch. Neither the mp-eoc line units nor the actual NT1 are part of the test when the test NT1 parameter is used.

The following is an example of a DET test. From the CI level of a MAP terminal, type:

```
>MAPCI NODISP;MTC;LNS;LTP;LTPISDN
>POST L 1 2 0 1
>DET
```

The result of using the LTPISDN level non-menu DET command displayed on the MAP screen is shown in Figure 20-17.

Figure 20-17 DET MAP display

```
>DET

WARNING - Action may affect Packet Data Service

          Do you wish to continue ?

Please confirm (“YES”, “Y”, “NO”, or “NO”):

>Y

BLM Detection Test Completed
Test Time = 30 seconds
Line Card Detection Results:
               --BE--   --ES--   --ES--   --SES--   --SES--
                C.Hr     C.Hr     C.Dy     C.Hr      C.Dy
Initial (NE)       0        0        0        0         0
Final   (NE)     444        7        7        7         7
Initial (FE)       0        0        0        0         0
Final   (FE)     431        6        6        6         6

MPLU 1 Detection Results:
               --BE--   --ES--   --ES--   --SES--   --SES--
                C.Hr     C.Hr     C.Dy     C.Hr      C.Dy
Initial (NE)       0        0        0        0         0
Final   (NE)     430        6        6        6         6
Initial (FE)       0        0        0        0         0
Final   (FE)     431        6        6        6         6

MPLU 2 Detection Results:
               --BE--   --ES--   --ES--   --SES--   --SES--
                C.Hr     C.Hr     C.Dy     C.Hr      C.Dy
Initial (NE)       0        0        0        0         0
Final   (NE)     430        6        6        6         6
Initial (FE)       0        0        0        0         0
Final   (FE)     431        6        6        6         6

Linecard Clock    1  23:18:56
```

Information queries

Information queries are used to examine the status of lines, cards, or retrieve other information. This section deals with information queries of particular interest to ISDN BRI users.

QLAYER

The QLAYER command is issued to obtain Layer 1, Layer 2, or Layer 3 performance monitoring information for the posted line. The performance monitoring information that is displayed in response to the QLAYER command is updated by a system audit. These audits take place once every minute. However, the current QLAYER screen display is not updated dynamically. But instead requires the entry of a new QLAYER command to see the changes detected by the audit. Mp-eoc line units derive the following PM performance information:

- error counts
- thresholds
- mode
- PM alert status

> ***Note 1:*** If the QLAYER command is entered within the same one minute audit process interval, the counters will still show the same values even though the counters have incremented. These new values will only be shown when the one-minute audit process is completed and the QLAYER command is re-issued.
>
> ***Note 2:*** The QLAYER command is not supported for ISDN line drawer (ILD) lines.

Table 20-22 defines the error types associated with the error counts for both the QLAYER and RLAYER commands.

Figure 20-18 shows the MAP display generated when the HELP QLAYER command is entered when a valid ISDN line is not posted.

Figure 20-18 MAP display of response to the HELP QLAYER command without an ISDN line posted

```
>HELP QLAYER

The QLAYER command queries the Performance Monitoring
&/or Protocol Abnormality data for the specified layer
of an ISDN LEN posted in the Control Position of the
LTPISDN level of the MAP. Layer 1 queries are valid for
2B1Q LENs and their sub-tending mp-eoc line units only.
As a default, Layer 1 parameters for the line card and
all sub-tending line units is queried. Layer 2 and Layer
3 queries are valid for all ISDN LENs. There is only one
syntax for the QLAYER command. The QLAYER command is only
valid for the following terminals: ISDN lines.
To view a QLAYER command syntax, POST a terminal the
QLAYER is valid for.
```

Figure 20-19 shows the syntax for the QLAYER command that is displayed at the MAP. This display is generated after a BRI line is posted at the LTPISDN MAP level and the HELP QLAYER command is entered.

Figure 20-19 HELP QLAYER MAP display

```
QLAYER - Query the Performance &/or Protocol
Monitoring data for the specified layer(s) of an ISDN
LEN posted in the Control Position of the MAP.
Parms:  [<layer> {L1 {<mode> {BE,
                              HIST,
                              BOTH}}

                  [<target> {LC,
                                MPLU <lu_no|ALL> {1 to 6,
                                                  ALL}}],

                  L2,
                  L3,
                  FULL}]
```

From the CI level of a MAP terminal (using 'nodisp' mode) type:

```
>MAPCI NODISP;MTC;LNS;LTP;LTPISDN
>POST L 2 0 1 8;QLAYER
```

The result displayed on the MAP screen is shown in Figure 20-20. Figure 20-21 shows the result displayed on the MAP screen when the QLAYER command is issued with the L3 parameter.

> ***Note:*** The item Layer 3 Service Disruption Count was added to the QLAYER command response display in NA012.

Figure 20-20 QLAYER MAP display

```
>QLAYER
LEN HOST 02 0 01 08
---ES NE---  ---SES NE---    ---ES FE---  ---SES FE---
 C.Hr  C.Dy   C.Hr  C.Dy      C.Hr  C.Dy   C.Hr  C.Dy
    0     0      0     0         0     0      0     0

Active Thresholds (NE)   and   (FE)
   40   100     10    25        40   100     10    25

Linecard Clock    1   22:03:02

Mp-eoc Line Unit 1:

PM MODE:  PATH

PM COUNTS:
---ES NE---  ---SES NE---  ---WS FE---  ---SES FE---
 C.Hr  C.Dy  C.Hr  C.Dy    C.Hr  C.Dy   C.Hr  C.Dy
    0     0     0     0       0     1      0     1

Linecard Clock    2   22:03:18

Mp-eoc Line Unit 2:

PM MODE:  PATH

PM COUNTS:
---ES NE---  ---SES NE---  ---WS FE---  ---SES FE---
 C.Hr  C.Dy  C.Hr  C.Dy    C.Hr  C.Dy   C.Hr  C.Dy
    0     0     0     0       0     2      0     2
Linecard Clock    2   22:03:34

Frames received in total      :      90814
Frames received in error      :          0
Frames transmitted in total   :      57278
Frames retransmitted          :          0
Percentage error received     :        0.0%
Percentage retransmitted      :        0.0%

Number of Layer 2 Service Disruptions :     0
Length of Time Disrupted      :     0 minutes.
Currently Disrupted           : NO

Layer 2 Abnormality Counts:
 ABN1 ABN2   ABN3 ABN4  ABN5  ABN6   ABN7  ABN8 ABN9  ABN10
===== ===== ===== ===== ===== ===== ===== ===== ===== =====
    0     0     0     0     0     0     0     0 27947     0

TEI Abnormality Count  :  4
Layer 2 High Abnormality Count  : 27951
Layer 3 high Abnormality Count  : 0
Layer 3 Service Disruption Count: 0
```

Figure 20-21 Example of MAP display in response to QLAYER L3 command

```
>QLAYER L3
LEN HOST 01 0 00 06
Layer 3 High Abnormailty Count: 0
Layer 3 Service Disruption Count: 0
```

RLAYER

The RLAYER (Reset layer) command is used for resetting Layer 1, Layer 2, and Layer 3 performance monitoring information for an ISDN line. Multipoint embedded operations channel (mp-eoc) line units derive the following PM performance information:

- error counts
- thresholds
- mode

> ***Note:*** The RLAYER command is not supported for ILD ISDN lines.

The RLAYER command can be issued from the LTPISDN level after posting the desired LEN. The RLAYER command resets the Layer 1, Layer 2, or Layer 3 data registers for the posted LEN and sub-tending line units. Note that the mode of mp-eoc line units is reset to either the default mode (PATH) or the mode entered in table LNTHRSH.

Figure 20-22 shows the MAP display generated when the HELP RLAYER command is entered when a valid ISDN line is not posted

Figure 20-22 MAP display of response to the HELP RLAYER command without an ISDN line posted

```
>HELP RLAYER

The RLAYER command resets the Performance Monitoring
&/or Protocol Abnormality data for the specified layer
of an ISDN LEN (or set of LENs) posted at the LTPISDN
level of the MAP. Layer 1 resets are valid for 2B1Q LENs
and their sub-tending mp-eoc line units only. As a default,
Layer 1 parameters for the line card and all sub-tending
line units are reset. Layer 2 and layer 3 resets are valid
for all ISDN LENs. There is only one syntax for the
RLAYER command.
The RLAYER command is only valid for the following
terminals: ISDN lines.
To view a RLAYER command syntax, POST a terminal the
RLAYER command is valid for.
```

Figure 20-23 shows the syntax for the RLAYER command that is displayed at the MAP display or screen. This display is generated after a BRI line is posted at the LTPISDN MAP level and the HELP RLAYER command is entered.

Figure 20-23 HELP RLAYER MAP display

```
RLAYER - Reset the Performance &/or Protocol
Monitoring data for the specified layer(s) of an ISDN
LEN posted in the Control Position of the MAP.
Parms:  [<layer> {L1 {<mode> {CUR,
                              HIST,
                              BOTH}}

                     {<target> {LC,
                                MPLUS]


                  L2,
                  L3,
                  FULL}]
             [<all_posted> {ALL}]
```

In the example that follows, the 'nodisp' mode was used to display all the output on one screen.

From the CI level of a MAP terminal (using 'nodisp' mode) type:

```
>MAPCI NODISP;MTC;LNS;LTP;LTPISDN
>POST L 2 0 1 8;RLAYER
```

The result displayed on the MAP screen is shown in Figure 20-24. Figure 20-25 shows the result displayed on the MAP screen when the RLAYER command is issued with the L3 parameter.

> ***Note:*** The item Layer 3 Service Disruptions Count was added to the RLAYER command response display in NA012.

Figure 20-24 RLAYER MAP display

```
LEN HOST 02 0 01 08
Linecard:
---BE NE---  ---BE FE---
 C.Hr  P.Hr   C.Hr  P.Hr
    0     0      0     0
---ES NE---  ---SES NE---    ---ES FE---  ---SES FE---
 C.Hr  C.Dy   C.Hr  C.Dy      C.Hr  C.Dy   C.Hr  C.Dy
    0     0      0     0         0     0      0     0
Active Thresholds (NE)   and   (FE)
   40   100     10    25        40   100     10    25
---ES NE---  ---SES NE---    ---ES FE---  ---SES FE---
 P.Hr  P.Dy   P.Hr  P.Dy  TI  P.Hr  P.Dy   P.Hr  P.Dy
    1     0      0     0  -1     0     0      0     0
    0                     -2     0
    0                     -3     0
    0                     -3     0
    0                     -4     0
    0                     -5     0
    0                     -6     0
    0                     -7     0
    0                     -8     0

 Linecard Clock    1   13:20:48
Mp-eoc Line Unit 1:
---BE NE---  ---BE  FE---
 C.Hr  P.Hr   C.Hr   P.Hr---
    0     0      0      0

PM MODE:  SEGMENTED

ALERTS:
---ES  NE---  ---SES  NE---  ---ES FE---  ---SES  FE---
 C.Hr   C.Dy   C.Hr   C.Dy    C.Hr C.Dy    C.Hr   C.Dy
  OFF    OFF    OFF    OFF     OFF  OFF     OFF    OFF

---ES  NE---  ---SES  NE---  ---ES FE---  ---SES  FE---
 C.Hr   C.Dy   C.Hr   C.Dy    C.Hr C.Dy    C.Hr   C.Dy
    0      0      0      0       0    0       0      0

Threshold Condition:
---ES  NE---  ---SES  NE---  ---ES FE---  ---SES  FE---
 C.Hr   C.Dy   C.Hr   C.Dy    C.Hr C.Dy    C.Hr   C.Dy
   ON     ON     ON     ON      ON   ON      ON     ON

Active Thresholds  (NE)   and  (FE)
   40   100     10     25      40   100     10     25
---ES  NE---  ---SES  NE---   ---ES FE---  ---SES  FE---
 P.Hr   P.Dy   P.Hr   P.Dy  TI  P.Hr P.Dy    P.Hr   P.Dy
    0      0      0      0  -1  0    0       0      0
    0                       -2
---ES  NE---  ---SES  NE---   ---ES FE---  ---SES  FE---
 P.Hr   P.Dy   P.Hr   P.Dy  TI  P.Hr P.Dy    P.Hr   P.Dy
    0                       -3
    0                       -4
```

-continued-

Figure 20-24 RLAYER MAP display

```
Linecard Clock     1   13:21:34
 ---ES  NE---  ---SES  NE---   ---ES FE---  ---SES  FE---
  P.Hr   P.Dy   P.Hr   P.Dy  TI  P.Hr P.Dy    P.Hr   P.Dy
     0                       -3
     0                       -4
 Linecard Clock     1   13:21:34
 Mp-eoc Line Unit 2:
---BE NE---  ---BE  FE---
 C.Hr  P.Hr   C.Hr   P.Hr---
    0     0      0      0
PM MODE:  SEGMENTED
ALERTS:
---ES  NE---  ---SES  NE---  ---ES FE---  ---SES  FE---
 C.Hr   C.Dy   C.Hr   C.Dy    C.Hr C.Dy    C.Hr   C.Dy
  OFF    OFF    OFF    OFF     OFF  OFF     OFF    OFF

---ES  NE---  ---SES  NE---  ---ES FE---  ---SES  FE---
 C.Hr   C.Dy   C.Hr   C.Dy    C.Hr C.Dy    C.Hr   C.Dy
    0      0      0      0       0    0       0      0

Threshold Condition:
---ES  NE---  ---SES  NE---  ---ES FE---  ---SES  FE---
 C.Hr   C.Dy   C.Hr   C.Dy    C.Hr C.Dy    C.Hr   C.Dy
   ON     ON     ON     ON      ON   ON      ON     ON

Active Thresholds  (NE)   and  (FE)
   40   100     10     25       40   100     10     25

---ES  NE---  ---SES  NE---   ---ES FE---  ---SES  FE---
 P.Hr   P.Dy   P.Hr   P.Dy  TI  P.Hr P.Dy    P.Hr   P.Dy
    0      0      0      0  -1  0    0       0      0
    0                       -2
    0                       -3
    0                       -4
 Linecard Clock       1    13:22:20

 Mp-eoc  Line Unit  1:
 Current,  History PM counters:  reset
 Alert settings and PM mode:  reset
 PM threshold condition register:  not reset
 Mp-eoc  Line Unit  1:
 Current,  History PM counters:  reset
 Alert settings and PM mode:  reset
 PM threshold condition register:  not reset

 L1 LINE CARD COUNTERS : RESET
 Frames received in total      :      90814
 Frames received in error      :          0
 Frames transmitted in total   :      57278
 Frames retransmitted          :          0
 Percentage error received     :        0.0%
 Percentage retransmitted      :        0.0%
```

-continued-

Figure 20-24 RLAYER MAP display

```
Number of Layer 2 Service Disruptions :     0
Length of Time Disrupted      :     0 minutes.
Currently Disrupted           : NO

Layer 2 Individual Abnormality Counts:
ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10
==== ==== ==== ==== ==== ==== ==== ==== ==== =====
   0    0    0    0    0    0    0    0 27947    0

TEI Assignment Abnormality Count  : 27947
Layer 2 High Abnormality Count  : 55894

L2 COUNTERS : RESET

Layer 3 High Abnormality Count  : 0
Layer 3 Service Disruptions Count: 0

L3 COUNTERS : RESET
                          -end-
```

Figure 20-25 Example of MAP display in response to RLAYER L3 command

```
>RLAYER L3

LEN HOST 01 0 00 06

Layer 3 High Abnormality Count :  0
Layer 3 Service Disruptions Count:   0


   L3 COUNTERS : RESET
```

Table 20-22 defines the error types associated with the error counts.

Table 20-22 QLAYER and RLAYER error count information (Sheet 1 of 2)

Error number	Error description
1	Disconnect Mode (DM) frames received in response to SABME frames
2	DM frames sent in response to SABME frames
3	Frames received with unidentified or unimplemented control field
4	Frames received with an information field that is not permitted or a supervisory or unnumbered frame with an incorrect length
5	Frames received with an invalid sequence number

Table 20-22 QLAYER and RLAYER error count information (Sheet 2 of 2)

Error number	Error description
6	Frames received with an information field that exceeds the established maximum length
7	Unexpected frames received
8	Frame Reject (FRMR) frames received
9	Proper response not RCVD After SABME Frame sent
10	Other Invalid Frames Received - Non FCS error

QLOOP

The QLOOP command can be used to obtain information pertaining to a specific ISDN line such as the LTIDs attached to the LEN, directory numbers associated with the LTIDs, and TEI assignments. The '***' under the TEI column indicates that the TEI is assigned as dynamic.

From the CI level of a MAP terminal type:

```
>MAPCI;MTC;LNS;LTP;LTPISDN;POST L 2 0 1 8;QLOOP
```

The result displayed on the MAP screen is shown in Figure 20-26.

Figure 20-26 QLOOP MAP display

```
CM      MS     IOD     Net      PM     CCS     Lns Trks    Ext     APPL

 .       .       .       .        .      .      .       .       .       .

 LTPISDN
  0 Quit      POST        DELQ            BUSYQ         PREFIX
  2 Post_     LEN HOST 02 0 01 08
  3           LCC PTY RNG                       STA F S LTA  TE  RESULT
  4 Termchk   ISDN LOOP        DN 919 548 4400 IDL
  5
  6 Sustate
  7 BCHCON
  8 Ltloopbk
  9 DCHCon
 10 TEST_     Qloop
 11 Hold       LTID        TEI   RMSG ASSOCIATED DNs
 12 Next      ======================================
 13            ISDN  427   ***   INSV  548 4400
 14 TstSgnl                            548 4400
 15 TEI_                               548 4400
 16 Qloop                              548 4400
 17 Qlayer     ISDN  428    3     N/A  548 4405
 18 Rlayer     ISDN  201   *B2*   N/A  548 4201
   LD313
 Time  10:05  >
```

Note: The *B2* indicates that ISDN 201 is a nailed-up B-channel packet LTID on channel B2.

SUSTATE

The SUSTATE command is used to take a snapshot of the status of a particular line. Status information for the line card, NT1 (U and T sync), and the existence of TEIs can be obtained from the results of issuing this command. This example uses LEN 2-0-1-8, which has two LTIDs defined.

The SUSTATE command can be issued from the LTPISDN level of the MAP terminal. Type the following from a CI prompt:

```
>MAPCI;MTC;LNS;LTP;LTPISDN;POST L 2 0 1 8;SUSTATE
```

The result displayed on the MAP screen is shown in Figure 20-27.

Figure 20-27 SUSTATE MAP display

```
Line Equipment Status
CO  TA   LC_Lpbk  V_id
 -   -     -      0D07

 ES_NE/h  ES_FE/h  ES_NE/d  ES_FE/d
     0        0        0        0

U_sync U_act T_Lpbk P_pwr S_pwr NTM
       .     .      -     .    -    -   Notes : ('.' indicates active)
                                               ('-' indicates not active)
T_Sync T_act
   .     .

ISDN mp-eoc Status
Line Unit     1   2  NT1                Notes:  (could be 1-6 LUs, ISLC to NT1)
Status        .    .      .                      ('.' indicates sync established)

Note:  (mp-eoc Status only appears if ISDN lines have loop
extenders associated with them, for example ADTRAN and U-BRITE.)

ISDN TEI Status
TEI        64   65
Status      D    D                    Notes: (2 TEI existing on line)
                                      (The 'D' indicates dynamic TEI)

>
```

L2LOGCTL command

The L2LOGCTL command is a non-menu command used at the LTPISDN MAP level. This command, which was added in NA008, allows the user to control which ISDN layer 2 abnormality logs are generated and which are inhibited. The logs can be controlled on an individual line basis as well as on an office-wide basis. This command is only used to set individual line log generation parameters. The office-wide parameters are controlled through table control. Both the office parameter and the line parameter must be ON for a log to be generated for a particular line. This provision can be overridden using the particular line’s override parameter. The inclusion of this parameter allows the generation of log reports for an individual line instead of for the whole office. There are three options for this command: QUERY, SET, and SETOVR.

> ***Note:*** The L2LOGCTL command is not supported for ILD ISDN lines.

L2LOGCTL command syntax

The syntax for the L2LOGCTL command is:

L2LOGCTL QUERY <query_type> {DEF, STATUS}

L2LOGCTL SET <l2logc_entity><12_entity_status>

L2LOGCTL SETOVR <12_ovr_state> {ON, OFF}

In order to use the L2LOGCTL command, a valid ISDN line must be posted at the LTPISDN MAP level.

Figure 20-28 shows the MAP display generated when the HELP L2LOGCTL command is entered when a valid ISDN line is not posted.

Figure 20-28 MAP display of response to the HELP L2LOGCTL command without an ISDN line posted

```
>HELP L2LOGCTL
This command is used to turn on or off layer 2 log
control entities for ISDN lines. These entities determine
whether or not a log is generated when an abnormality is
reported. This command is issued on a posted ISDN LEN
at the LTPISDN level of the MAP.
The L2LOGCTL command is only valid for the following
terminals: ISDN lines.
To view a L2LOGCTL command syntax, POST a terminal for
which the L2LOGCTL command is valid.
```

Figure 20-29 shows the MAP display generated when the HELP L2LOGCTL command is entered when a valid ISDN line is posted.

Figure 20-29 Map display of response to the HELP L2LOGCTL command with ISDN line posted

```
>HELP L2LOGCTL
L2LOGCTL - Usd to set the layer 2 log control entities
for the ISDN line posted in the control position of the
MAP.
Parms: [<com_type> {QUERY [<query_type> {DEF,
                                         STATUS}]},

                   {SET [<12logc_entity> {ALL,
                                          LAPD,
                                          TAA1
                                          TAA2
                                          TAA3
                                          TAA4
                                          TAA5
                                          TAA6
                                          TAA7
                                          ABN1
                                          ABN2
                                          ABN3
                                          ABN4
                                          ABN5
                                          ABN6
                                          ABN7
                                          ABN8
                                          ABN9
                                          ABN10
                                          LAPD16
                                          LAPB
                                          SDT
                    <12_entity_status     {ON,
                                           OFF}
                    SETOVR <12_ovr_state> {ON,
                                           OFF}}
```

Figure 20-30 shows the MAP display generated when the L2LOGCTL QUERY DEF command is entered.

Figure 20-30 MAP display of response to the L2LOGCTL QUERY DEF command with ISDN line posted

```
>L2LOGCTL QUERY DEF

Layer 2 Abnormality Log Entity Definition
Override: the override bit
lapd:  LAPD protocol
taa1:  subscription limits exceeded
taa2:  no terminal response
taa3:  routine test
taa4:  multiple TEI response
taa5:  identify verify message
taa6:  unsolicited response
taa7:  TEI not assigned
abn1:  DM frame rcvd in response to a SABME frame
abn2:  DM frame sent in response to a SABME frame rcvd
abn3:  frames rcvd with undefined control fields
abn4:  frames rcvd with invalid info field or incorrectlength
abn5:  frame rcvd with invalid receive seq num
abn6:  frames rcvd with info field over max length
abn7:  unexpected frames received
abn8:  FRMR frame received
abn9:  proper response not rcvd after N200/N2 SABME frames
       sent
abn10: other invalid frames received - non FCS error
lapd16: lapd protocol abnormality on SAPI16 frames
lapb: lapb protocol abnormality on B-channel packet data
sdt : service disruption threshold - limit exceeded
```

Figure 20-31 shows the MAP display generated when the L2LOGCTL QUERY STATUS command is entered.

Figure 20-31 MAP display of response to the L2LOGCTL QUERY STATUS command

```
>L2LOGCTL QUERY STATUS

Loop Layer 2 Abnormality Log Reporting Status:
Override: OFF
LAPD TAA1 TAA2 TAA3 TAA4 TAA5 TAA6 TAA7
ON   ON   OFF  ON   OFF  ON   ON   OFF
ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10
ON   OFF  ON   ON   ON   OFF  ON   ON   OFF  OFF
LAPD16 LAPB
OFF    OFF
Office Layer 2 Abnormality Log Reporting status:
LAPD LAPD TAA1 TAA2 TAA3 TAA4 TAA5 TAA6 TAA7
OFF  ON   ON   ON   OFF  OFF  ON   ON   OFF
ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10
ON   OFF  ON   OFF  ON   ON   OFF  ON   OFF  OFF
LAPD16 LAPB
OFF    OFF
```

Figure 20-32 shows the MAP display generated when the L2LOGCTL SET ABN1 OFF command is entered.

Figure 20-32 MAP display of response to the L2LOGCTL SET ABN1 OFF command

```
>L2LOGCTL SET ABN1 OFF
Loop Layer 2 Abnormality Log Reporting Status:
Override: OFF
LAPD TAA1 TAA2 TAA3 TAA4 TAA5 TAA6 TAA7
ON   ON   OFF  ON   OFF  ON   ON   OFF
ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10
ON   OFF  ON   ON   ON   OFF  ON   ON   OFF  OFF
LAPD16 LAPB SDT
OFF    OFF  ON
Office Layer 2 Abnormality Log Reporting status:
LAPD LAPD TAA1 TAA2 TAA3 TAA4 TAA5 TAA6 TAA7
OFF  ON   ON   ON   OFF  OFF  ON   ON   OFF
ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10
ON   OFF  ON   OFF  ON   ON   OFF  ON   OFF  OFF
LAPD16 LAPB SDT
OFF    OFF  ON
```

Figure 20-33 shows the MAP display generated when the L2LOGCTL SETOVR ON command is entered.

Figure 20-33 MAP display of response to the L2LOGCTL SETOVR ON command

```
>L2LOGCTL SETOVR ON

Loop Layer 2 Abnormality Log Reporting Status:
Override: ON
LAPD TAA1 TAA2 TAA3 TAA4 TAA5 TAA6 TAA7
ON   ON   OFF  ON   OFF  ON   ON   OFF
ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10
OFF  OFF  ON   ON   ON   OFF  ON   ON   OFF  OFF
LAPD16 LAPB
OFF    OFF

Office Layer 2 Abnormality Log Reporting status:
LAPD LAPD TAA1 TAA2 TAA3 TAA4 TAA5 TAA6 TAA7
OFF  ON   ON   ON   OFF  OFF  ON   ON   OFF
ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10
ON   OFF  ON   OFF  ON   ON   OFF  ON   OFF  OFF
LAPD16 LAPB SDT
OFF    OFF  OFF
```

L2LOGCTL command usage

Following are examples of how the command L2LOGCTL can be used to block or unblock logs from being generated. In all of the examples, ABN1 is used as a sample entity.

Turn ON/OFF a single log on an individual line

Procedure 20-1 and Procedure 20-2 describe the steps to turn on or off a single log on an individual line.

Procedure 20-1 To turn a log OFF

At the LTPISDN level of the MAP

1 Post the line with the desired log.

2 Verify that the log control entities controlling the required protocols, LAPD16 and LAPB, are set to ON.

3 Use L2LOGCTL SET ABN1 OFF to turn it OFF. This will inhibit the log.

Procedure 20-2 There are two methods to turn a log ON:

At the LTPISDN level of the MAP

1 The first method is for use when the entity is ON for the office in general.

- Post the line with the desired log.
- Since the entity is ON for the office, use L2LOGCTL SET ABN1 ON to turn the log on for the line.

Note: This method also assumes that the office and line entities controlling LAPD protocols are on. Turning these entities off is currently the equivalent of turning all the individual entities off (either on an office-wide basis or an individual line basis). This is due to the fact that all layer 2 abnormality logs are related to LAPD. However, this will not always be the case. In the future, new layer 2 logs that are not related to the LAPD log control errors will not be turned off simply because either the LAPD log control entity for the line or the LAPD log control entity for the office is set to off.

2 The second method is for use when the entity is OFF for the office in general.

- Post the line with the desired log.
- Use L2LOGCTL SETOVR ON to turn the line’s override bit to ON.
- Use L2LOGCTL SET ABN1 ON to turn on the log.

Turn ON/OFF all logs for an individual line

Procedure 20-3 and Procedure 20-4 describe the steps to turn on or off all the individual entities for a line.

Procedure 20-3 To turn OFF all the individual entities for a line

At the LTPISDN level of the MAP

1 Post the line with the desired log.

2 Verify that the log control entities controlling the required protocols, LAPD16 and LAPB, are set to ON.

3 Use L2LOGCTL SET ALL OFF to turn off all the logs.

Procedure 20-4 Two ways to turn all the individual entities ON

At the LTPISDN level of the MAP

1 When all office log control entities are ON

- Post the line with the desired logs.
- Verify that the log control entities controlling the required protocols, LAPD16 and LAPB, are set to ON.
- Use L2LOGCTL SET ALL ON to turn on all the logs.

2 When any office entity is OFF

- Post the line with the desired logs.
- Verify that the log control entities controlling the required protocols, LAPD16 and LAPB, are set to ON.
- Use L2LOGCTL SETOVR ON to turn on the override bit.
- Use L2LOGCTL SET ALL ON to turn on all the logs.

Turn ON/OFF a single log for the entire office

Procedure 20-5 describes the steps to turn off an entity for an office using table control.

Procedure 20-5 To turn an entity for an office OFF

At the CI level of the MAP

1 Go to table ISDNVAR.

2 Set ABN1 to OFF.

This turns off all logs of that type except for those from lines with both their override bit and their ABN1 entity set to ON. To turn OFF the ABN1 logs for these lines, refer to "Turn ON/OFF a single log on an individual line."

Turn ON a single log

Procedure 20-6 describes the steps to turn ON the logs for lines with their ABN1 entity set to ON using table ISDNVAR.

Procedure 20-6 To turn the logs ON

At the CI level of the MAP

1 Go to table ISDNVAR.

2 Set ABN1 to ON.

To turn ON the ABN1 entity set to OFF, refer to "Turn ON/OFF a single log on an individual line."

Turn ON/OFF all logs for the entire office

To turn OFF the log entities for the office, set the value for the log entities in table ISDNVAR to OFF. This will only turn off the logs for lines that have their override bit set to OFF. Lines with their override bit set to ON will continue to have logs generated for all abnormalities for which the line's corresponding log entity is set to ON.

> ***Note 1:*** To turn OFF all logs, either all override bits must be set to OFF or all the log entities for all lines must be set to OFF.
>
> To turn ON all log entities, set all layer 2 log control entities in table ISDNVAR to ON. However, individual lines with individual entities set to OFF will not generate logs for those entities.
>
> ***Note 2:*** A L2LOGCTL SET ALL ON command must be issued before all layer 2 logs are truly turned on for all office lines.

Table Layer 2 abnormality log control

Table Layer 2 abnormality log control (L2ABNLOG) stores the reporting status for layer 2 controllable log reports for individual ISDN lines. Entries appear in this table only if they override the office-wide default status set for these log reports. The office-wide status for layer 2 abnormality log reports is set in office parameters in table ISDNVAR (Integrated Services Digital Network Variable).

Entries in this table are made either by using table editor or the LTPISDN MAP level command L2LOGCTL. L2LOGCTL is a non-menu command that is used to set the layer 2 abnormality log report status in table L2ABNLOG for an individual ISDN line posted at the LTPISDN MAP level.

Table L2ABNLOG is dynamically updated to reflect changes made in the status of log reports for individual ISDN lines resulting from the use of the L2LOGCTL command.

> ***Note:*** For further information on table L2ABNLOG refer to the Translations Guide.

Figure 20-34 shows an example of a tuple entered in to table L2ABNLOG as a result of using the L2LOGCTL command on an ISDN line.

Figure 20-34 MAP display example for table L2ABNLOG

```
                 LEN OVR LAPD TAA1 TAA3 TAA4 TAA5 TAA6 TAA7 ABN1 ABN2 ABN3
ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10 LAPD16 LAPB SDT
--------------------------------------------------------------------------
HOST   01  0   00  21 OFF ON    ON    ON     ON    ON     ON   ON OFF     ON ON
  ON      ON      ON  ON  ON     ON     ON         ON     ON     ON
```

Layer 3 service disruption reporting for ISDN BRI switched services

In NA012, the Layer 3 Service Disruption feature provides layer 3 abnormality reports on a real-time basis. These reports identify signalling conditions that cause layer 3 service disruptions. The Nortel Networks DMS-100 ISDN Layer 3 Service Disruption feature meets with both NI-2 and GR-268-CORE requirements. The Layer 3 Service Disruption feature supports each of the following:

- counting ISDN BRI Layer 3 service disruptions
- logging when layer 3 service disruptions exceed threshold value
- logging when layer 3 service disruption counter capacity is reached
- layer 3 service disruption threshold log generation control
- layer 3 service disruption count access and reset

> ***Note:*** The Layer 3 Service Disruption feature is not supported for ILD ISDN lines.

An XPM detects ISDN layer 3 signaling conditions that cause D-channel service disruptions on BRI lines and reports these conditions to the CM. These reports from the XPM cause the layer 3 service disruption counter in the CM to peg. The CM compares the peg count with the value provisioned for layer 3 service disruption threshold. The CM generates a log report to alert operating company personnel when the peg count exceeds the provisioned threshold value. The DMS switching system maintains a layer 3 service disruption counter for each ISDN BRI line.

Just one threshold log report generates for an ISDN BRI line in a 60 minute interval. Log report ISDN311 generates when the layer 3 service disruption counter exceeds the provisioned layer 3 service disruption threshold value. Log report ISDN 311 displays the message “LEN has exceeded the Layer 3 Service Disruption Threshold for Ckt.” The layer 3 service disruption counter continues to peg even after the count exceeds the threshold value. However, no additional ISDN 311 log reports generate during that 60 minute interval.

When the counter reaches its maximum capacity it stops incrementing and the DMS switching system generates an ISDN 312 log report. ISDN log report 312 displays the message “Layer 3 Service Disruption counter has reached its capacity for Ckt.”

The DMS switching system automatically resets the layer 3 service disruption counters every 60 minutes. Operating company personnel can query and reset the layer 3 service disruption counters from a MAP terminal. The Layer 3 Service Disruption feature modifies MAP commands QLAYER and RLAYER. The QLAYER MAP display now includes layer 3 service disruption counts. The layer 3 service disruption counters can be manually reset using the RLAYER command.

Layer 3 service disruption log control

Layer 3 log control can be operated on a line basis or office-wide basis. The DMS switching system supports this functionality for the following line types:

- 2B1Q-U ISLC
- S/T-ISLC
- S/T-RCU
- RDT ISDN

The Layer 3 Service Disruption feature adds two new office parameters

- L3_SVC_DSRPT_CTRL controls the office-wide generation of ISDN 311 layer 3 service disruption log reports. If the override bit for layer 3 service disruption threshold logs is off, the status value set for office parameter L3_SVC_DSRPT_CTRL controls the generation of the ISDN311 log reports. If the override bit is set to OFF and the status value of office parameter L3_SVC_DSRPT_CTRL is set to OFF log report ISDN311 does not generate for any line in the office.
- L3_SVC_DSRPT_THLD sets the threshold value for the layer 3 service disruptions for circuit switched services. If the count for layer 3 service disruptions exceeds the threshold set in parameter L3_SVC_DSRPT_THLD, an ISDN 311 log report generates if one of the following two conditions is met:
  - log control is set to ON for both office-wide and individual line generation of log report ISDN 311
  - the override bit and the individual line generation of log reports are set to ON and office parameter L3_SVC_DSRPT_CTRL is set to OFF

> ***Note:*** For additional information on office parameters L3_SVC_DSRPT_CTRL and L3_SVC_DSRPT_THLD refer to chapter “ISDN office parameters” in this document or to the *Office Parameters Reference Manual*, 297-8001-855.

Operating company personnel can control the generation of layer 3 service disruption threshold log reports through use of the L3LOGCTL command. The L3LOGCTL command allows operating company personnel to generate logs on an individual line basis. The L3LOGCTL command can be used to turn the override bit for an individual line on in table L3ABNLOG. This causes the generation of layer 3 service disruption log reports for the line which has its override bit turned on even if office parameter L3_SVC_DSRPT_THLD is set to OFF. Layer 3 log control entity L3SD was added to table L3ABNLOG by feature Layer 3 Service Disruption. If both this entity and the override bit for an individual line are set to on layer 3 service disruption log reports generate for that individual line.

A new audit runs at every 60 minute interval. The audit resets the service disruption counts and disables the disruption threshold log throttle bool if it is set to on. The layer 3 service disruption audit reschedules after every restart.

L3LOGCTL command description

The L3LOGCTL command is a non-menu command used at the LTPISDN MAP level. This command allows the user to control which ISDN layer 3 abnormality logs are generated and which are inhibited. The logs can be controlled on an individual line basis as well as on an office-wide basis. This command is only used to set individual line log generation parameters. The office-wide parameters are controlled through table control. Both the office parameter and the line parameter must be set to ON for a log to be generated for a particular line. This provision can be overridden using the particular line's override parameter. The inclusion of this parameter allows the generation of log reports for an individual line instead of for the whole office. There are three options for this command: QUERY, SET, and SETOVR.

> ***Note:*** The L3LOGCTL command is not supported for ILD ISDN lines.

L3LOGCTL command syntax

The syntax for the L3LOGCTL command is:

L3LOGCTL QUERY <query_type> {DEF, STATUS}

L3LOGCTL SET <13logc_entity><13_entity_status>

L3LOGCTL SETOVR <13_ovr_state> {ON, OFF}

In order to use the L3LOGCTL command, a valid ISDN line must be posted at the LTPISDN MAP level.

Figure 20-35 shows the MAP display generated when the HELP L3LOGCTL command is entered when a valid ISDN line is not posted.

Figure 20-35 MAP display of response to the HELP L3LOGCTL command without an ISDN line posted

```
>HELP L3LOGCTL

This command is used to turn on or off layer 3 log control
entities for ISDN lines. These entities determine whether
or not a log is generated when an abnormality is reported.
This command is issued on a posted ISDN LEN at the LTPISDN
level of the MAP.
The L3LOGCTL command is only valid for the following
terminals: ISDN lines.
To view a L3LOGCTL command syntax, POST a terminal for
which the L3LOGCTL command is valid.
```

Figure 20-36 shows the MAP display generated when the HELP L3LOGCTL command is entered when a valid ISDN line is posted.

> ***Note:*** The layer 3 logical entity layer 3 service disruption (L3SD) entity was added in NA012.

Figure 20-36 MAP display of response to the HELP l3LOGCTL command with ISDN line posted

```
>HELP L3LOGCTL
L3LOGCTL - Used to set the layer 3 log control entities
for the ISDN line posted in the control position of the
MAP.
Parms: [<com_type> {QUERY {<query_type> {DEF,
                                          STATUS}]},
                    SET <l3 logc_entity {ALL,
                                         Q931
                                         ABN1
                                         ABN2
                                         ABN3
                                         ABN4
                                         ABN5
                                         ABN6
                                         ABN7
                                         ABN8
                                         ABN9
                                         ABN10
                                         ABN11
                                         ABN12
                                         ABN13
                                         PKT
                                         ABN14
                                         ABN15
                                         ABN16
                                         ABN17
                                         ABN18
                                         ABN19
                                         ABN20
                                         ABN21
                                         L3SD}
                             <13_entity_status> {ON,
                                                 OFF}]},
                        {SETOVR [<13_ovr_state> {ON,
                                                 OFF}]},
```

Figure 20-37 shows the MAP display generated when the L3LOGCTL QUERY DEF command is entered when a valid ISDN line is posted.

Figure 20-37 MAP display of response to the L3LOGCTL QUERY DEF command when an ISDN line is posted

```
>L3LOGCTL QUERY DEF

Layer 3 Abnormality Log Entity Definitions
Override: the overriding bit
q931: Q.931
pkt:  Packet
abn1: DISCONNECT received
abn2: DISCONNECT transmitted
abn3: RELEASE received
abn4: RELEASE transmitted
abn5: RELEASE COMP received
abn6: RELEASE COMP transmitted
abn7: Status message received
abn8: Status message transmitted
abn9: Progress message transmitted
abn10: msg rcvd less than minimum length
abn11: msg rcvd with invalid protocol discriminator info
abn12: msg rcvd with invalid call ref value
abn13: SETUP msg rcvd with cal ref flag incorrectly set to 1
abn14: Restart request transmitted
abn15: Restart request received
abn16: Reset request transmitted
abn17: Reset request received
abn18: Clear request transmitted
abn19: Clear request received
abn20: Diagnostic packet transmitted
abn21: Diagnostic packet received
l3SD:  Layer 3 Service Disruption
```

Figure 20-38 shows the MAP display generated when the L3LOGCTL QUERY STATUS command is entered.

Figure 20-38 MAP display of response to the L3LOGCTL QUERY STATUS command

```
>L3LOGCTL QUERY STATUS
Loop Layer 3 Abnormality Log Reporting Status:
Override: OFF
Q931 ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7
OFF  ON   ON   ON   ON   OFF  ON   ON
ABN8 ABN9 ABN10 ABN11 ABN12 ABN13 PKT ABN14
OFF  OFF  OFF   ON    ON    OFF   OFF ON
ABN15 ABN16 ABN17 ABN18 ABN19 ABN20 ABN21 L3SD
OFF   ON    OFF   ON    OFF   ON    OFF   ON

Office Layer 3 Abnormality Log Reporting Status:
Q931 ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7
OFF  ON   ON   ON   ON   OFF  ON   ON
ABN8 ABN9 ABN10 ABN11 ABN12 ABN13 PKT ABN14
OFF  OFF  OFF   ON    ON    OFF   OFF ON
ABN15 ABN16 ABN17 ABN18 ABN19 ABN20 ABN21 L3SD
OFF   ON    OFF   ON    OFF   ON    OFF   ON
```

Figure 20-39 shows the MAP display generated when the L3LOGCTL SET ABN2 OFF Command is entered.

Figure 20-39 MAP display of response to the L3LOGCTL SET ABN2 OFF command

```
>L3LOGCTL SET ABN2 OFF
Loop Layer 3 Abnormality Log Reporting Status:
Override: OFF
Q931 ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7
ON   ON   OFF  ON   OFF  ON   ON   OFF
ABN8 ABN9 ABN10 ABN11 ABN12 ABN13 PKT  ABN14
OFF  OFF  OFF   ON    ON    OFF   OFF ON
ABN15 ABN16 ABN17 ABN18 ABN19 ABN20 ABN21 L3SD
OFF   ON    OFF   ON    ON    ON    OFF   ON

Office Layer 3 Abnormality Log Reporting Status:
Q931 ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7
ON   ON   OFF  ON   OFF  ON   ON   OFF
ABN8 ABN9 ABN10 ABN11 ABN12 ABN13 PKT  ABN14
OFF  OFF  OFF   ON    ON    OFF   OFF ON
ABN15 ABN16 ABN17 ABN18 ABN19 ABN20 ABN21 L3SD
OFF   ON    OFF   ON    ON    ON    OFF   ON
```

Figure 20-40 shows the MAP display generated when the L3LOGCTL SETOVR ON command is entered.

Figure 20-40 MAP display of response to the L3LOGCTL SETOVR ON command

```
>L3LOGCTL SETOVR ON
Loop Layer 3 Abnormality Log Reporting Status:
Override: ON
Q931 ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7
ON   ON   OFF  ON   OFF  ON   ON   OFF
ABN8 ABN9 ABN10 ABN11 ABN12 ABN13 PKT  ABN14
OFF  OFF  OFF   ON    ON    OFF   OFF  ON
ABN15 ABN16 ABN17 ABN18 ABN19 ABN20 ABN21 L3SD
OFF   ON    OFF   ON    ON    ON    OFF   ON

Office Layer 3 Abnormality Log Reporting Status:
Q931 ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7
ON   ON   OFF  ON   OFF  ON   ON   OFF
ABN8 ABN9 ABN10 ABN11 ABN12 ABN13 PKT  ABN14
OFF  OFF  OFF   ON    ON    OFF   OFF  ON
ABN15 ABN16 ABN17 ABN18 ABN19 ABN20 ABN21 L3SD
OFF   ON    OFF   ON    ON    ON    OFF   ON
```

L3LOGCTL command usage

Following are examples of how the command L3LOGCTL can be used to block or unblock logs from being generated. In all of the examples, ABN1 is used as a sample entity.

Turn ON/OFF a single log on an individual line

Procedure 20-7 and Procedure 20-8 describe the steps to turn on or off a single log for an individual line.

Procedure 20-7 To turn a log OFF

At the LTPISDN level of the MAP

1 Post the line with the desired log.

2 Use L3LOGCTL SET PKT ON to set the PKT log control to ON. Otherwise, even if ABN1 is set to ON, ABN1 logs are not generated.

3 Use LOGCTL SET ABN1 OFF to turn it OFF. This will inhibit the log.

Procedure 20-8 Two methods to turn a log ON

At the LTPISDN level of the MAP

1 The first method is for use when the entity is ON for the office in general.

- Post the line with the desired log.
- Verify that the log control entity PKT is ON.
- Since the entity is ON for the office, use L2LOGCTL SET ABN1 ON to turn the log ON for the line.

Note: This method also assumes that the office and line entities controlling Q.931 protocols are on. Turning these entities off is currently the equivalent of turning all the individual entities off (either on an office-wide basis or on an individual line basis). This is due to the fact that all layer 3 abnormality logs are related to Q.931. However, this will not always be the case. If future logs for layer 3 are not related to Q.931 protocol errors, then they will not be turned off simply because either the Q.931 log control entity for the line or the Q.931 log control entity for the office is off.

2 The second method is for use when the entity is OFF for the office in general.

- Post the line with the desired log.
- Verify that the log control entity PKT is ON.
- Use L3LOGCTL SETOVR ON to turn the line's override bit to ON.
- Use L3LOGCTL SET ABN1 ON to turn on the log.

Turn ON/OFF all logs for an individual line

Procedure 20-9 and Procedure 20-10 describe the steps to turn on or off all the individual entities for a line.

Procedure 20-9 To turn all the individual entities for a line OFF

At the LTPISDN level of the MAP

1 When all office log control entities are ON.

- Post the line with the desired log.
- Verify that the log control entity PKT is ON.
- Use L3LOGCTL SET ALL ON to turn on all the logs.

2 If any of the office entities are OFF, then the line's override bit is used.

3 Use L3LOGCTL SET ALL OFF to turn off all the logs.

- Post the line with the desired log.
- Verify that the log control entity PKT is ON.
- Use L3LOGCTL SETOVR to turn ON the override bit.

Turn ON a single log

Procedure 20-10 describes the steps to turn ON the logs for lines with their ABN1 entity set to ON using the log control entity in table ISDNVAR.

Procedure 20-10 To Turn the logs ON

At the CI level of the MAAP

1 Go to table ISDNVAR

2 Set ABN1 to ON.

To turn ON the ABN1 entity set to OFF, refer to "Turn ON/OFF a single log on an individual line."

Turn ON/OFF all logs for the entire office

To turn OFF the log entities for the office, set the value for the log entities in table ISDNVAR to OFF. This will only turn off the logs for lines that have their override bit set to OFF. Lines with their override bit set to ON will continue to have logs generated for all abnormalities for which the line's corresponding log entity is set to ON.

> ***Note 1:*** To turn OFF all logs, either all override bits must be set to OFF or all the log entities for all lines must be set to OFF.
>
> To turn ON all log entities, set all layer 3 log control entities in table ISDNVAR to ON. However, individual lines with individual entities set to OFF will not generate logs for those entities.
>
> ***Note 2:*** A L3LOGCTL SET ALL ON command must be issued before all layer 3 logs are truly turned on for all office lines.

Table Layer 3 abnormality log control

Table Layer 3 abnormality log control (L3ABNLOG) stores the reporting status for layer 3 controllable log reports for individual ISDN lines. Entries appear in this table only if they override the office-wide default status set for these log reports. The office-wide status for layer 3 abnormality log reports is set in office parameters in table ISDNVAR.

Entries in this table are made either by using table editor or the LTPISDN MAP level command L3LOGCTL. L3LOGCTL is a non-menu command that is used to set the layer 3 abnormality log report status in table L3ABNLOG for an individual ISDN line posted at the LTPISDN MAP level.

Table L3ABNLOG is dynamically updated to reflect changes made in the status of log reports for individual ISDN lines resulting from the use of the L3LOGCTL command.

> ***Note 1:*** For further information on table L3ABNLOG refer to the *Translations Guide*, 297-8001-350.
>
> ***Note 2:*** Field layer 3 service disruption log control (L3SD) was added to table L3ABNLOG in NA012.

Figure 20-41 shows an example of a tuple entered in to table L3ABNLOG as a result of using the L3LOGCTL command on an ISDN line.

Figure 20-41 MAP display example for table L3ABNLOG

```
                 LEN OVR Q931 ABN1 ABN2 ABN3 ABN4 ABN5 ABN6 ABN7 ABN8 ABN9 ABN10
 ABN11 ABN12 ABN13 ABN14 ABN15 ABN16 ABN17 LAPD18 ABN19 ABN20 ABN21 PKT L3SD
 -----------------------------------------------------------------------------
 HOST   01  0   1  00 OFF OFF   ON   ON   ON  ON   ON  ON    ON    ON   ON  OFF  ON
   ON     ON     ON    ON      ON   ON    ON        ON    OFF   OFF  ON   OFF
```

ISPGAUD command description

The use of the ISPGAUD command was expanded in NA008 to include layer 3 checking. This command causes an ISDN layer 2 and 3 audit to be run. This audit is in addition to the 24-hour audit that is run. The audit checks all the ISDN lines and reports that have exceeded the layer 2 or layer 3 high abnormality rate thresholds. A summary ISDN 201 log reports the total number of LENs exceeding the layer 2 threshold and the total number of LENs exceeding the layer 3 threshold. An ISDN 203 log reports the lines that exceeded the layer 2 high abnormality rate threshold and an ISDN 204 log reports the lines that exceeded the layer 3 high abnormality rate threshold. Each ISDN 204 log contains reports on up to ten LENs. If there are more than ten LENs included in the audit, two ISDN 204 logs are generated.

Note: The ISPGAUD is a non-resident command.

ISPGAUD command syntax

The syntax for the ISPGAUD command is:

ISPGAUD <node>

Figure 20-42 shows the MAP display generated when the ISPGAUD ALL command is entered.

Figure 20-42 MAP display of response to the ISPGAUD ALL command

```
>ISPGAUD ALL

Command started for all nodes
Resulting counts are:
Number of transmission reports      :1
Number of abnormality reports       :2
Total received frames               :83476
Total received errored frames       :0
Total transmitted frames            :122532
Total retransmitted frames          :531
First unacked/unlogged/next entry   :3 3 3
```

Figure 20-43 shows the MAP display generated when the ISPGAUD NODE 0 command is entered.

Figure 20-43 MAP display of response to the ISPGAUD NODE 0 command

```
>ISPGAUD NODE 0

Command started for node number 0.
Only layer 2 counts will be displayed.
Cannot obtain layer 3 counts on a per node basis.
Use Ispgaud all command to obtain total
layer 2 and layer 3 counts for the office.

Command started for node number 0.
Resulting counts are:
Number of transmission reports     :0
Number of abnormality reports      :0
Total received frames              :0
Total received errored frames      :0
Total transmitted frames           :0
Total retransmitted frames         :0
First unacked/unlogged/next entry  :0 0 0
```

TEI CHECK

One method of verifying that a subscriber's CPE has established a TEI with the DMS-100 switch is by using the TEI CHECK command. This command is issued from the LTPISDN level of the MAP terminal. Performing a TEI CHECK will cause the switch to send a TEI Management ID Request message to the subscriber's ISDN CPE.

If the CPE is properly configured at the subscriber site and within switch datafill, the CPE will respond with a TEI Management ID response messages containing the valid TEIs values as assigned by the DMS switch. The establishment of the TEIs is important because it is the first step in obtaining a layer 2 data link, and is an indicator that the switch is communicating with the customer's CPE. This example uses LEN 2-0-1-8, which has two LTIDs defined.

From the CI level of a MAP terminal type:

```
>MAPCI;MTC;LNS;LTP;LTPISDN
>POST L 2 0 1 8;TEI CHECK
```

The result displayed on the MAP screen is shown in Figure 20-44.

Figure 20-44 TEI CHECK MAP display

```
CM      MS      IOD     Net      PM      CCS      Lns  Trks    Ext     APPL
.       .       .       .        .       .        .    .       .       .


 LTPISDN
  0 Quit      POST        DELQ            BUSYQ         PREFIX
  2 Post_
  3           LCC PTY RNG .....LEN..........     DN    STA F S
LTA  TE  RESULT
  4 Termchk ISDN LOOP   HOST 02 0 01 08     548 4200 IDL
  5
  6 Sustate
  7 BCHCON
  8 Ltloopbk
  9 DCHCon
 10 TEST_     tei check
 11 Hold      ISDN TEI Status
 12 Next      TEI       69   70    (2 dynamic TEIs established)
 13           Status     D    D    (The 'D' indicates dynamic)
 14 TstSgnl   TEI mgmt request passed
 15 TEI_
 16 Qloop
 17 Qlayer
 18 Rlayer

 Time  10:30  >
```

TERMCHK

The TERMCHK Line Test Position ISDN (LTPISDN) MAP command provides information describing the states of both packet and circuit-switched terminals on an ISDN interface. Specifically, TERMCHK provides information regarding the terminal states and reasons for initialization failures on Basic Rate Access Functional (BRAFS) ISDN terminals. The execution of the command requires no other parameters. The only requirement is to have a valid ISDN LEN posted. See Figure 20-45 for an example of the TERMCHK command response.

Figure 20-45 Example of TERMCHK response on integrated NI-2 ISDN terminal

```
>TERMCHK
LEN HOST 01 1 14 26
Circuit Switched Services:
===================

TEI: 64      LTID: ISDN 200

    Service: Circuit Switched     Protocol Status: 3
     DN: 873-2450      KEY: 1
     DMS TSPID: 123456789012345678
     CPE SPID: 12345678901234567800  AUTO SPID ATTEMPTED: Y
     L3 Init result: Initialized


 Packet Switched Services:
 ====================

  TEI: DYN         LTID: ISDN 200
     Service: LAPD Packet Switched  Protocol Status: 2
       DN: 873-2450    KEY: 25

 Unussed Logical Terminal Profiles:
 ==========================

 No Unused ISDN Logical Terminals have been detected.
```

Table 20-23 lists the TERMCHK response lines and their meanings.

Table 20-23 TERMCHK response descriptions for circuit-switched services (Sheet 1 of 2)

Line	Description
1	provides an association between the physical terminals TEI and the provisioned logical terminal
2	provides the service type circuit-switched service. The range is circuit, LAPB packet, or LAPD packet-switched. The protocol layer is - -, 2, or 3.
3	provides the DN of the service and the key where the DN is located
4	provides the provisioned TSPID for circuit-switched service terminals

Table 20-23 TERMCHK response descriptions for circuit-switched services (Sheet 2 of 2)

Line	Description
5	provides the CPE SPID AND TID for FITs failing to initialize
6	provides the layer 3 initialization result for terminals with circuit-switched service

If a problem occurs during the attempt to query the status of the associated packet service, the DMSPH Query Status is displayed. The Query Status is intended to give greater detail as to why the packet service data could not be queried. Table 20-24 shows the DMSPH query status information that is displayed.

Table 20-24 DMSPH query failure status range

DMSPH packet failure return code	Hex representation	User display output
XLIU_ERROR	1	Query failed-XLIU in invalid state
MSG_ERROR	2	Query failed-Resources unavailable
TIMEOUT	3	Query failed-XLIU message time-out
UNMAPPED_LTID	4	Query failed-Provisioning error

Table 20-25 TERMCHK response descriptions for packet-switched services (Sheet 1 of 2)

Line	Description
1	provides an association between the physical terminals TEI and the provisioned logical terminal
2	provides the service type of packet service. The range is circuit, LAPB packet, or LAPD packet-switched service. The protocol layer status is _ _, 2, or 3.

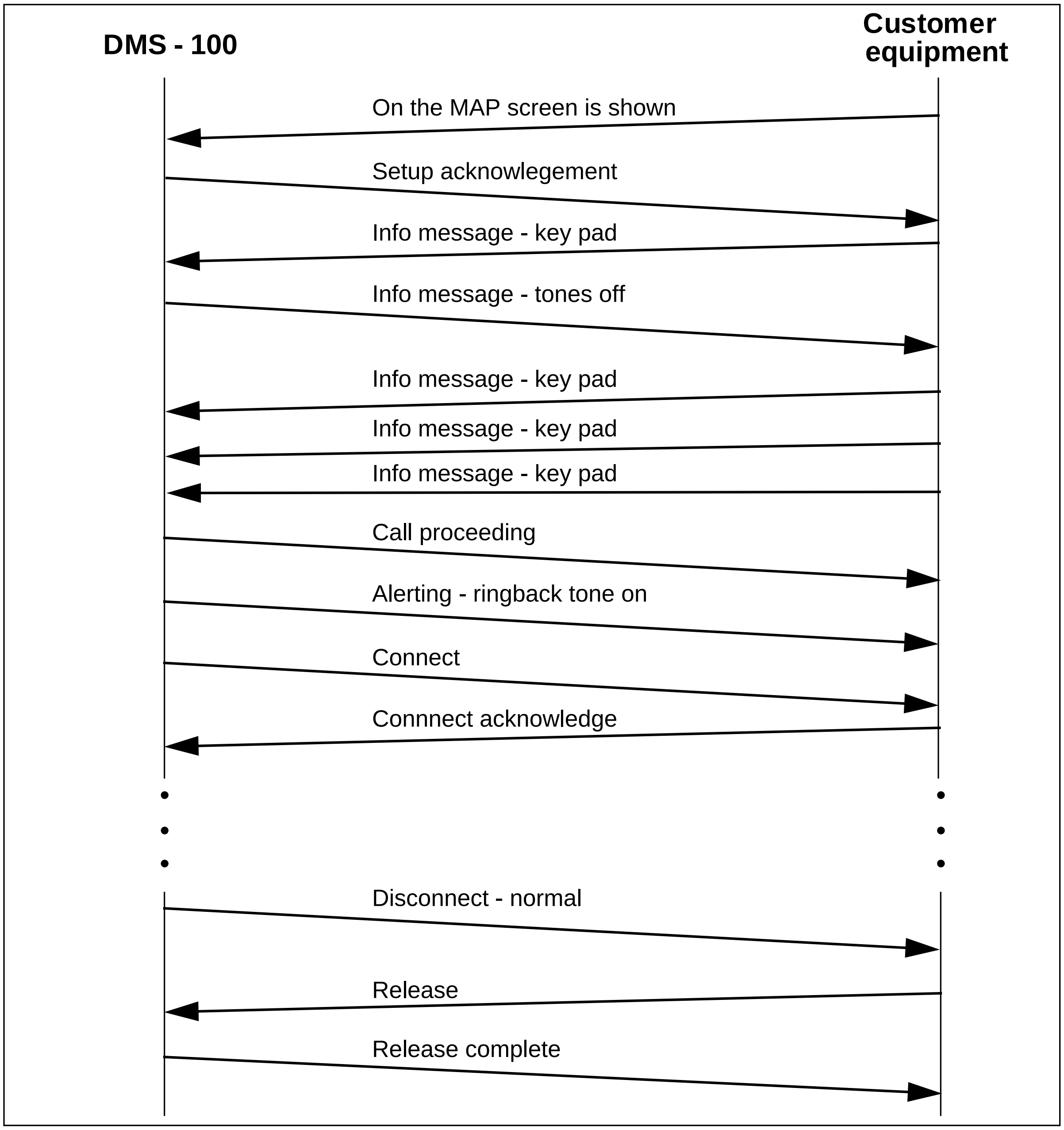
Table 20-25 TERMCHK response descriptions for packet-switched services (Sheet 2 of 2)

Line	Description
3	provides the DN of the packet service and the key where the DN is located
4	provides the DMSPH query status. This line is only displayed if an error occurred during the data retrieval of terminal data from the DMSPH. The range of potential failure reasons is provided in Table 20-24.

Call processing messaging

Figure 20-46 depicts the message flow of an typical outbound call from an ISDN telephone to the DMS-100 switch. This messaging is performed out-of-band, meaning the D-channel. The D-channel is used for call setup, supplemental feature activation/deactivation, and call tear down. After the call is set up and a B-channel is identified for use, the voice or data connection is delivered on the selected B-channel.

Figure 20-46 Call processing flow



The following information is a Layer 3 (Q.931) protocol trace of the information in Figure 20-46. As seen in the trace, a message is comprised of mandatory and optional information elements (IE) that contain fields of information relevant to the state of the call. The left side of the trace represents messages from the DMS-100 switch. The right side is the ISDN CPE. Refer to Table 20-26.

Table 20-26 Q.931 protocol (Sheet 1 of 7)

DMS switch	ISDN CPE
Port B 07:34:53 289 160	C SAPI= 0 (CCP) TEI = 71
	I 2 2 23
	Q921:00 8F 04 04
	PD= 08 UCC Ref= O 01
	M 05 SETUP
	I 04 Bearer Capability Len=3
	80 Coding standard CCITT
	Transfer capability Speech
	90 Transfer mode Circuit
	Transfer rate64 kbits/s
	A2 Layer 1 protocol G.711 u-law
	I 6C Calling party Num Len=12
	21 Type National
	Numbering plan ISDN/Telephony
	80 Screening Indicator (00)
	Presentation Indicator Presentation allowed
	Address digits 9195484200
	Signal Missing
	Q931:08 01 01 05 04 03 80 90 A2 6C 0C 21 80 39 31 39 35 34 38 34 32 30 30
	--
C SAPI= 0 (CCP) TEI= 71	Port B 07:34:53 560 400
I 2 3 14	
Q921:02 8F 04 06	

Table 20-26 Q.931 protocol (Sheet 2 of 7)

DMS switch	ISDN CPE
PD=08 UCC Ref=D 01	
M0D SETUP ACKnowledge	
I18 Channel Identification Len=1	
89 Interface Implicitly identified	
Interface type Basic	
IndicateD-channel exclusive Yes	
Channel indicator Not D-Channel	
Channel selection B1	
I1E Progress indicator Len=2	
82 Coding standard CCITT	
Location Local public	
88 Progress description	
DMS Switch	ISDN CPE
In-band info available	
I34 Signal Len=1	
00 Dial tone on	
Q931:08 01 81 0D 18 01 89 1E 02 82 88 34	
01 00	
--	
Port B 07:34:55 484 720	C SAPI= 0 (CCP) TEI= 71
	I 3 3 7
	Q921:00 8F 06 06
	PD=08 UCC Ref=O 01
	M 7B INFOrmation
	I 2C Keypad Len=1
	7

Table 20-26 Q.931 protocol (Sheet 3 of 7)

DMS switch	ISDN CPE
	Q931:08 01 01 7B 2C 01 37
	--
C SAPI= 0 (CCP) TEI= 71	Port B 07:34:55 560 400
I 3 4 7	
Q921:02 8F 06 08	
PD=08 UCC Ref=D 01	
M7B INFOrmation	
I 34 SignalLen=1	
3F Tones off	
Q931:08 01 81 7B 34 01 3F	
--	
Port B 07:34:55 879 040	C SAPI= 0 (CCP) TEI= 71
	4 4 7
	Q921:00 8F 08 08 PD=08 UCC Ref=O 01
	M 7B INFOrmation
	I 2C Keypad Len=1
	5
	Q931:08 01 01 7B 2C 01 35
	--
Port B 07:34:56 100 920	C SAPI= 0 (CCP) TEI= 71
	I 5 4 7
	Q921:00 8F 0A 08 PD=08 UCC Ref=O 01
	M 7B INFOrmation
I 2C Keypad Len=1	
	5
	Q931:08 01 01 7B 2C 01 35

Table 20-26 Q.931 protocol (Sheet 4 of 7)

DMS switch	ISDN CPE
	--
Port B 07:34:56 734 220	C SAPI= 0 (CCP) TEI= 71
	I 6 4 7
	M 7B INFOrmation
	I 2C Keypad Len=1
	0
	Q931:08 01 01 7B 2C 01 30
	--
C SAPI= 0 (CCP) TEI= 71	Port B 07:34:56 920 040
I 4 7 26	
Q921:02 8F 08 0E	
PD=08 UCC Ref=D 01	
	M 02 CALL PROCeeding
I+95 Shift Locking Codeset=5	
I+2A UnknownLen=19	
808804373535308001108001148001 14	
800114	
Q931:08 01 81 02 95 2A 13 80 88 04 37 35	
35 30 80 01 10 80 01 14 80 01 14 80	
01 14	
--	
C SAPI= 0 (CCP) TEI= 71	Port B 07:34:56 953 040
I 5 7 11	
Q921:02 8F 0A 0E	
PD=08 UCC Ref=D 01	

Table 20-26 Q.931 protocol (Sheet 5 of 7)

DMS switch	ISDN CPE
	M 01 ALERTing
I 1E Progress indicator Len=2	
82 Coding standard CCITT	
Location Local public	
88 Progress description	
In-band info available	
I 34 SignalLen=1	
01 Ring back tone on	
Q931:08 01 81 01 1E 02 82 88 34 01 01	
--	
C SAPI= 0 (CCP) TEI= 71	Port B 07:35:00 557 600
I 6 7 7	
Q921:02 8F 0C 0E	
PD=08 UCC Ref=D 01	
	M 07 CONNect
I 34 SignalLen=1	
3F Tones off	
Q931:08 01 81 07 34 01 3F	
--	
Port B 07:35:00 631 040	C SAPI= 0 (CCP) TEI= 71
DMS Switch	ISDN CPE
	I 7 7 4
	Q921:00 8F 0E 0E PD=08 UCC Ref=O 01
	M 0F CONNect ACKnowledge
	Q931:08 01 01 0F
	--

Table 20-26 Q.931 protocol (Sheet 6 of 7)

DMS switch	ISDN CPE
C SAPI= 0 (CCP) TEI= 71 I 8 8 8 Q921:02 8F 10 10 PD=08 UCC Ref=D 01 **M 45 DISConnect** I 08 Cause Len=2 82 Coding standard CCITT Location Local public 90 Cause value 16 Normal call clearing Diagnostics None Cause value 16 Q931:08 01 81 45 08 02 82 90 --- ---	Port B 07:45:01 858 100
Port B 07:45:01 938 720	C SAPI= 0 (CCP) TEI= 71 I 8 9 4 Q921:00 8F 10 12 PD=08 UCC Ref=O 01 **M 4D RELease** Q931:08 01 01 4D ---
C SAPI= 0 (CCP) TEI= 71 I 9 9 4 Q921:02 8F 12 12 PD=08 UCC Ref=D 01	Port B 07:45:02 005 660

Table 20-26 Q.931 protocol (Sheet 7 of 7)

DMS switch	ISDN CPE
	M 5A RELease COMplete
Q931:08 01 81 5A	

QCOUNTS

QCOUNTS is a CI level query command. It is used to determine on an LTID or trunk basis virtual call attempts and protocol counts. This command sends a request to the XLIU to which the XSG is mapped and displays protocol and protocol abnormality counts information to the user. The information displayed includes link level counts, packet level counts, link level protocol abnormality counts and packet level protocol abnormality counts. The QCOUNTS command is used to query and reset protocol and protocol abnormality counts for open systems interconnection (OSI) levels 1, 2, and 3 of the X.25 and X.75 protocol.

> ***Note:*** The QCOUNTS command does not support FCS errors for LAPD. The corresponding counters are set to zero.

In the NA014 software release, the parameter logical channel number (LCN) was added to the QCOUNTS command by the Communication Assistance for Law Enforcement Act—Packet Provisioning, Intercept and Delivery feature (59018020). This parameter was added in response to the 1994 Communication Assistance for Law Enforcement Act (CALEA), public law 103-404. This law requires that telephone switch manufacturers assist law enforcement agencies in the lawful electronic surveillance of traffic over the network. The addition of the LCN parameter makes the DMS switching system compliant with CALEA technical standard J-STD-025. The US Network Broadcast Delivery (USNBD) feature makes the DMS compliant with the CALEA regulations.

The LCN parameter is designed to accept the entry of Law Enforcement Agency (LEA) logical terminal identifiers (LTID) and LCNs. Using the LTID option with an LEA LTID and LCN allows the user to obtain operational measurement (OM) information for the corresponding permanent virtual circuit (PVC) connection and virtual link. This applies to cases where the PVC, virtual link, and LEA DN are all in the same switching system. Using the CLLI option with the CLLI member number and the LCN of the LEA end allows the collection of OM information in cases where the LEA DN is located in a different switching system.

> ***Note:*** If the user enters an non-LEA LTID or CLLI with the QCOUNT command LCN option, the following error message displays:

```
ERROR: QCOUNTS DISPLAY WITH LCN IS VALID FOR VIRTUAL
LINKS ONLY
```

QCOUNTS command syntax

The syntax of the QCOUNT command is as follows:

```
<selection> {LTID<ltgrp> STRING
                 <ltnum> {1 to 1022}
                 <count level> {LINK,
                                PACKET,
                                ALL,
                                LCN <lcn number> {0 to 2048}},
            CLLI<clli> STRING
                 <extrknm> {0 to 9999}
                 <count level> {LINK,
                                PACKET,
                                ALL,
                                LCN <lcn number> {0 to 2048}}
            XSG <xsg number> {0 to 749}
                 <xsg level> {BRD,
                              CHNL <chnl number> {1 to 31}
                              OVLD}}
[<reset> {RESET,
          RESETNODISP}]
```

Figure 20-47 shows the MAP display of the link level (layer 2) counts obtained by using the QCOUNTS LTID LINK command on LTID PKT 3.

Figure 20-47 MAP display of layer 2 protocol and abnormality counts obtained using QCOUNTS LTID LINK command on LTID PKT 3

```
>QCOUNTS LTID PKT 3 LINK

LAYER 2 PROTOCOL AND ABNORMALITY COUNTS
---------------------------------------

Frames Received:
 I:           0 RR:      0 RNR:     0 SABME:        0
 DM:          0 DISC     0 UA:      0 FRMR:         0

Frames Transmitted:
 I:          0 RR:    0 RNR:      0 SABME:       1192
 DM:         0 DISC:  0 UA:      2 FRMR:            0

Rejects Received:        0  Rejects Transmitted:    0

MANAGEMENT DATA LINK ERRORS:
----------------------------

Unsolicited Supervisory Response :                  0
Peer Re-establishment (SABME) :                     0
Unsolicited DM Response (F set) :                   0
Unsolicited DM Response (F clear) :                 0
Unsolicited UA Response (F set) :                  0
Unsolicited UA Response (F clear):                  0
Unsuccessful Re-transmission (SABME) :            298
Unsuccessful Re-transmission (STATUS) :             0
Receipt of FRMR Response :                          0
Receipt of Unimplemented Frame :                    0
Receipt of Information Field not Permitted :        0
Receipt of Wrong Size Frame :                       0
N201 Error:                                         0
N (r) Error :                                       0
Total Frames Received :                             0
Total Frames Received in error :                    0
Percentage Frames Received in error :            0.0%
Total Frames Transmitted :                       1192
Total Frames Re-Transmitted :                     894
Percentage Frames Re-Transmitted :              75.0%
Total Layer 2 Service Disruptions :        0
Layer 2 Individual Protocol Abnormality Counts :
ABN1        ABN2       ABN3       ABN4       ABN5

----        ----       ----       ----       ----
----        ----       ----       ----       ----
 0           0          0          0          0
ABN6        ABN7       ABN8       ABN9       ABN10

----        ----       ----       ----       -----
 0           0          0          0          0

 Total Layer 2 High Protocol Abnormalities :        0
 Counts last reset : 1999/2/1  00:32:53
```

Under certain conditions, the Unsuccessful Re-transmission (SABME) counter will be pegged the same as the ABN9 counter. However, under normal conditions these two counters are pegged separately. The SABME counter pegs Management Data Link (MDL) errors and the ABN9 counter pegs Layer 2 packet protocol abnormalities. The ABN9 counter pegs only if the log control boolean for pegging ABN9 protocol abnormalities for the link in question is set. This results in the generation of ISDN 307 logs. If the log control boolean for the ABN9 counter is not set this counter is not pegged and ISDN 307 logs are not generated.The Unsuccessful Re-transmission (SABME) counter always pegs, since this counter is used for MDL purposes.

Under certain conditions, the N (r) counter will be pegged the same as the ABN5 counter. However, under normal conditions these two counters are pegged separately. The N (r) counter pegs Management Data Link (MDL) errors and the ABN5 counter pegs Layer 2 packet protocol abnormalities. The ABN5 counter pegs only if the log control boolean for pegging ABN5 protocol abnormalities for the link in question is set. This results in the generation of ISDN 307 logs. If the log control boolean for the ABN5 counter is not set this counter is not pegged and ISDN 307 logs are not generated.The N (r) counter always pegs, since this counter is used for MDL purposes.

Table 20-27 lists Packet layer 2 individual abnormality count names and their descriptions.

Table 20-27 Packet layer 2 individual abnormality count names

ABN name	Description	ABN name	Description
ABN1	DM received in response to SABME	ABN6	Frames received with information field too long
ABN2	DM sent in response to SABME	ABN7	Unexpected frames received
ABN3	Frames with bad control field	ABN8	FRMR frames received
ABN4	Received frames with bad information field	ABN9	Proper response not received after N200/N2 SABME
ABN5	Received frames with bad sequence number	ABN10	Other invalid frames received – non-FCS error

Figure 20-48 shows the MAP display of the link level counts obtained by using the QCOUNTS LTID PACKET command on LTID CGP 201.

Figure 20-48 MAP display of the packet level counts output resulting from using QCOUNTS LTID PACKET command on LTID CGP 201

```
>QCOUNTS LTID CGP 201 PACKET

                   LAYER 3 PROTOCOL COUNTS
                   -----------------------

Packets Received :
  VC, PVC :        0   RR :   0  RNR :    0    Data :   0
Packets Transmitted:
  VC, PVC :        0   RR :   0  RNR :    0    Data :   0
Virtual Call Attempts :
  Setup :          0   Originating :  0  Terminating :  0
Unsuccessful Virtual Call Attempts:
  Blocking :        0  Denied :      0
  Clearing :        0  Overload :    0

               LAYER 3 PROTOCOL ABNORMALITY COUNTS
               -----------------------------------

Restart Packets :
  Sent :         0   Received :       0
Reset Packets :
  Sent :         0   Received :       0
Clear Packets :
  Sent :         0   Received :       0
Diagnostic Packets : Received :       0

              LAYER 3 SERVICE DISRUPTION COUNTS
              ---------------------------------

Reset Packets Transmitted :           0
Clear Packets Transmitted :           0

                  LAYER 3 OVERLOAD COUNTS
                  -----------------------

Dynamic Window Congestion :
  local :          0     Remote :       0
Packets dropped due to Layer 3 congestion :
  Link :           0     VC :           0
Packets dropped due to :
  Layer 2 :        0     RNR :          0

Total  Layer 3 Service Disruptions :          0
Total  Layer 3 High Protocol Abnormalities :  0

  Counts last reset : 1998/05/20 02:07:35
```

An explanation of the output follows in Table 20-28 and Table 20-29.

Table 20-28 Layer 3 protocol counts

Function	Action	Description
Packets received:	NA	The number of packets received for VC and PVC, RR, RNR, and Data
Packets transmitted:	NA	The number of packets transmitted for VC and PVC, RR, RNR, and Data
Virtual call attempts	Setup	The total number of call request packets sent and received
	Orig	The number of originating call request packets
	Term	The number of terminating call request packets
Unsuccessful virtual call attempts	Blocking	Count of unsuccessful VC attempts because of blocking, before a call request packet is sent, because of no available internal resources (for example, no more logical channels)
	Denied	Count of unsuccessful VC attempts initiated by a call request packet that are denied, that is, do not result in a call connect packet
	Clearing	Count of unsuccessful VC attempts because of clearing causes for unconnected VCs
	Overload	Count of unsuccessful attempts blocked by active overload controls placed in effect (for example, buffers)

Table 20-29 Layer 3 protocol abnormality counts (Sheet 1 of 2)

Packet type	Description
Restart packets:	Restart packets with local procedural error cause, total received and sent
Reset packets:	Reset packets, local procedure error, incompatible destination or out of order (PVC only) cause. Total received and sent.

Table 20-29 Layer 3 protocol abnormality counts (Sheet 2 of 2)

Packet type	Description
Clear packets:	Clear packets due to invalid facility request, access barred, local procedure error, RPOA out of order cause. Total received and sent.
Diagnostic packets transmitted:	Number of diagnostic packets transmitted and sent

Figure 20-49 shows an example of the MAP display for the QCOUNTS LTID command used with the LCN parameter. All counts of receive ready (RR), receive not ready (RNR), Data and Reset packets received and transmitted are done in reference to the virtual finite state machine (FSM) or the interception access point. The packets received are the ones received by the virtual FSM from the remote LEA side. The packets transmitted are the ones transmitted to the remote LEA side.

Figure 20-49 Example of MAP display for QCOUNTS LTID command used with the LCN parameter

>QCOUNTS LTID PKT 12 LCN 1

```
                LAYER 3 PROTOCOL COUNTS
                -----------------------
Packets Received:
 VC,PVC:       0 RR:       0 RNR:   0 Data:   0
Packets Transmitted:
 VC,PVC:       0 RR:       0 RNR:   0 Data:   0
Virtual Call Attempts:
 Setup:        0 Originating: 0 Terminating:  0
Unsuccessful Virtual Call Attempts:
 Blocking:     0 Denied:      0
 Clearing:     0 Overload:    0
               LAYER 3 PROTOCOL ABNORMALITY COUNTS
               -----------------------------------
Restart Packets:
 Sent:     0 Received:        0
Reset Packets:
 Sent:     0 Received:        0
Clear Packets:
 Sent:     0 Received:        0
Diagnostic Packets:
 Sent:     0 Received:        0
              LAYER 3 SERVICE DISRUPTION COUNTS
              ---------------------------------
Reset Packets Transmitted:    0
Clear Packets Transmitted:    0
```

-continued-

Figure 20-49 Example of MAP display for QCOUNTS LTID command used with the LCN parameter

```
                  LAYER 3 OVERLOAD COUNTS
                  -----------------------

     Dynamic Window Congestion:
      Local:    0   Remote:      0
     Packets dropped due to Layer 3 congestion:
      Link:     0   VC:          0
     Packets dropped due to:
      Layer 2:  0   RNR:         0
     Layer 3 link queue congestion:       0

     VC_Q Congestion                0
```

-end-

Figure 20-50 shows an example of the MAP display for the QCOUNTS CLLI command used with the LCN parameter.

Figure 20-50 Example of MAP display for QCOUNTS CLLI command used with the LCN parameter

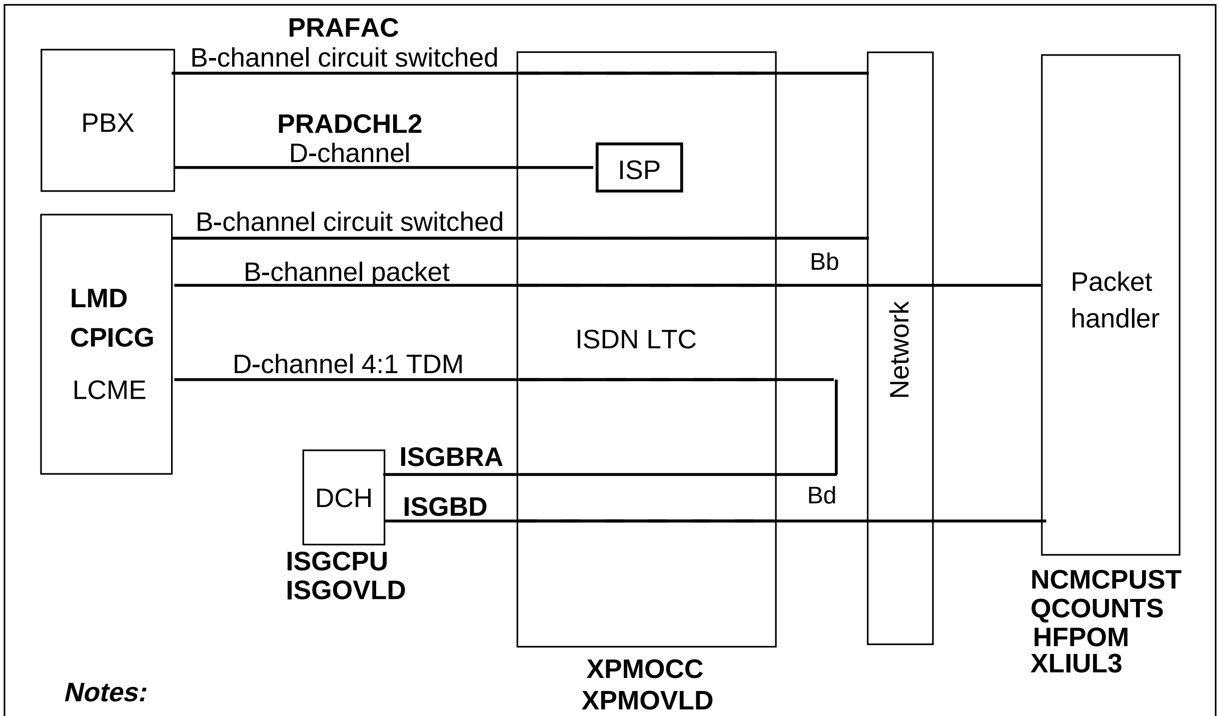
```
>QCOUNTS CLLI PL1X750G  LCN 1
                LAYER 3 PROTOCOL COUNTS
                -----------------------
Packets Received:
 VC,PVC:       0 RR:       0 RNR:   0 Data:   0
Packets Transmitted:
 VC,PVC:       0 RR:       0 RNR:   0 Data:   0
Virtual Call Attempts:
 Setup:        0 Originating: 0 Terminating:  0
Unsuccessful Virtual Call Attempts:
 Blocking:     0 Denied:      0
 Clearing:     0 Overload:    0
               LAYER 3 PROTOCOL ABNORMALITY COUNTS
               -----------------------------------
Restart Packets:
 Sent:     0 Received:        0
Reset Packets:
 Sent:     0 Received:        0
Clear Packets:
 Sent:     0 Received:        0
Diagnostic Packets:
 Sent:     0 Received:        0
              LAYER 3 SERVICE DISRUPTION COUNTS
              ---------------------------------
Reset Packets Transmitted:    0
Clear Packets Transmitted:    0
              LAYER 3 OVERLOAD COUNTS
              -----------------------

Dynamic Window Congestion:
 Local:   0 Remote: 0
Packets dropped due to Layer 3 congestion:
 Link:    0 VC:     0
Packets dropped due to:
 Layer 2: 0 RNR:         0
Layer 3 link queue congestion:  0

VC_Q Congestion          0
```

OM group points of measurement are shown in Figure 20-51.

Figure 20-51 DMS ISDN peripheral OM points of measurement



Notes:

LMD - 1 per LCME
ISGBRA- 1 per DCH
ISGBD- 1 per BD-channel
ISGCPU - 1 per DCH
ISGOVLD - 1 per DCH
PRADCHL2 - 1 per PRI D-channel
TRMTCU2 - 1 per office
BCSPCG - 1 per office
PRAFAC - 1 per PRI trunk
CPICG - 1 per customer group
NCMCPUST- 1 per XLIU
QCOUNTS - 1 per terminal or X.75 trunk (CI command)
HFPOM - 1 per
XLIU
XLIUL3 - 1 per
XLIU
XPMOVLD - 1 per XPM + peripheral
XPMOCC - 1 per XPM + peripheral

Maintenance for Rapid Messaging

In NA010, the Rapid Messaging feature provides mechanisms for the DMS-100 switching system to monitor and control the rate of SAPIO 0 D-channel messaging for the physical terminals associated with the LTIDs provisioned on an ISDN interface.

The controlling mechanism of the message rate is on an individual LTID basis and is provisionable. To control the message rate, the DMS-100 switching system changes the state of the LTID to “out of service” when it applies control and to “in service” when it removes control.

BRI Rapid Messaging introduces new LTID rapid messaging states. The current DMS-100 switching system maintenance support for NI-1 and NI-2 BRI configurations on an ISDN loop rather than an individual LTID basis remains unchanged.

> ***Note:*** In NA011 Rapid Messaging is supported for Internet Protocol Local Loop (IPLL) lines.

MAP display changes associated with Rapid Messaging

The MAP display changes associated with the Rapid Messaging feature are described below. Refer to Figure 20-52 for an example of the MAP display resulting from the use of the POST LT command.

- **LTP POST LT** command enhancements result in the display of the rapid messaging state of the posted LTID. The rapid messaging state for the posted LTID updates dynamically on the MAP screen display. To ensure that the LTID rapid messaging states are aligned between the computing module (CM) and the XPMs, the DMS-100 switching system runs a background audit and updates the LTID rapid messaging state if required. One of the following LTID rapid messaging states displays for the posted LTID providing the ISDN LEN is in an in-service state. Refer to for an example of the MAP display resulting from the use of the POST LT command.
  - INSV—in-service with no overload condition present on the LTID
  - OOST—out-of-service temporary where LTID is in a temporary overload state. The DMS-100 switching system automatically returns an LTID that is in the OOST state to the INSV state.
  - OOSP—out-of-service permanent indicates that the LTID is in permanent overload state and requires manual intervention
- **LTP Line diagnostic indicators** include two new indicators to inform operating company personnel when an ISDN LEN has an associated LTID in a rapid messaging out-of-service condition. The two new indicators appear on the LTP MAP display under the “F” field when an ISDN LEN is

posted. Report only lines do not display either of the two new diagnostic indicators. The two new line diagnostic indicators are described as follows.

- O—indicates more than one LTID on the posted ISDN LEN is out-of-service due to rapid messaging
- o—Indicates that only one LTID on the ISDN LEN is out-of-service due to rapid messaging

• **LNS MAP LTID threshold alarms** include two new LNS alarms that indicate to the operating company personnel when the number of ISDN LENs with out-of-service LTIDs cross an alarm threshold. The LTID out-of-service thresholds are set by office parameters RMSG_MAJALARM and RMSG_MINALARM located in table OFCVAR. The two LTID threshold alarms are described as follows.

- OMAJ—This alarm displays at the LNS MAP when the number of ISDN LENs with an "O" diagnostic indicator crosses one of the LNS alarm thresholds. This alarm indicates a minor, major, or critical alarm.
- OMIN—This alarm displays at the LNS MAP when the number of ISDN LENs with an "o" diagnostic indicator crosses one of the LNS alarm thresholds. This alarm indicates a minor, major, or critical alarm.

Figure 20-52 Example of MAP display resulting from the use of the POST LT command

```
CM    MS     IOD    NET     PM    CCS     Lns    TRKS   EXT
 .    .      .      .       .     .       .      .      .

 LTP
  0 QUIT  POST LTID DELQ        BUSYQ     PREFIX
  2 POST_ LEN HOST 01 0 00 01
  3       LCC PTY RNG                   STA F LTA TE RESULT
  4       ISDN LOOP   DN 613 621 4209  IDL O
  5 BSY
  6 RTS                                LTID ISDN   120 OOSP
  7 DIAG
  8
  9 AlmStat
 10 CktLoc
 11 Hold
 12 Next
 13
 14
 15
 16 Prefix
 17 LCO_
 18 Level_
   TEAM08
 Time  13:10
```

LTP MAP level command changes

The following LTP MAP commands are modified to support Rapid Messaging:

- **ALMSTAT command** queries or sets the LNS diagnostic alarm thresholds as a result of command input by operating company personnel. Two new diagnostic alarms are added in NA010: OMAJ and OMIN. Operating company personnel can query or set the minor, major, and critical thresholds for the OMAJ and OMIN diagnostic alarms. These two new alarms are described as follows.
  - OMAJ—specifies the minor, major, and critical alarm thresholds for the number of ISDN LENs with an “O” diagnostic indicator. An “O” diagnostic indicator displays when two or more LTIDs on the ISDN LEN are taken out-of-service due to rapid messaging.
  - OMIN—specifies the minor, major, and critical alarm thresholds for the number of ISDN LENs with an “o” diagnostic indicator. An “o” diagnostic indicator displays when one LTID on the ISDN LEN is taken out-of-service due to rapid messaging.
  - ALMSTAT display is enhanced to include Major RapidMSG (OMAJ) and Minor RapidMSG (OMIN) alarm thresholds and office totals for rapid messaging.
- **POST DF command** enhancements allow the posting line card diagnostic failures related to rapid messaging using the line card diagnostic fail types OMAJ and OMIN. Diagnostic line card failure types OMAJ and OMIN are described as follows:
  - OMAJ—Use this fail type to post a line or set of lines with an “O” diagnostic indicator. An “O” diagnostic indicator displays when two or more LTIDs on the ISDN LEN are taken out-of-service due to rapid messaging.
  - OMIN—Use this fail type to post a line or set of lines with an “o” diagnostic indicator. An “o” diagnostic indicator displays when one LTIDs on the ISDN LEN are taken out-of-service due to rapid messaging.
- **POST LT command** posts the ISDN line to be returned to service by LTID. After the LTID is posted, the RTS LT command is used to return the posted LTID to service. Using any other means to post the ISDN line before using the RTS LT command results in the return to service all of the out-of-service LTIDs on the ISDN line.
- **RTS command** enhancements allow the operating company personnel to recover one of more permanent out-of-service LTIDs. An LTID that is in the permanent out-of-service requires manual intervention to be returned to service. The newly added RTS command options LT and ALL allow the

operating company to perform this function. A description of RTS options LT and ALL follows:

- LT—Use this option to return to service the posted LTID or all LTIDs on a posted ISDN line. The LT option is valid for ISDN lines only. The DMS switching system does not allow the of use the RTS LT command if the posted ISDN line is either out-of-service or has no LTIDs attached to it.
- ALL—Use this option to return all LTIDs in the posted set to in-service.

Note 1: The LTID rapid messaging state is not affected when operating company personnel busy an ISDN line and return it to service.

Note 2: For specific information on alarm clearing procedures for rapid messaging alarms refer to *Alarm and Performance Monitoring Procedures*, 297-8001-543.

Recommendations for routing log

To locate a recurring fault, Nortel recommends that log reports be divided into five classes in table LOGCLASS. The scheme is shown in Table 20-30.

Table 20-30 Recommended log classes (Sheet 1 of 2)

Class	Equipment	Log name
1	LGC and LCME	PM 100 - PM 107
		PM 113 - PM 118
		PM 179 - PM 180
		PM 190 - PM 196
		PM 198 - PM 199
		PM 200
		PM 235
		PM 270
2	LINKS	PM 182 - PM 183
		PM 184
		PM 187 - PM 188

Note: The class number provided is intended to differentiate one class from another. It is not intended as the actual value to enter into table LOGCLASS.

Table 20-30 Recommended log classes (Sheet 2 of 2)

Class	Equipment	Log name
3	ISDN loop	ISDN 100 - ISDN 104
		ISDN 106 - ISDN 109
		ISDN 115 - ISDN 116
		ISDN 200 - ISDN 203
		LINE 100 - LINE 101
		LINE 107
		LINE 110
		LINE 118
		LINE 131
		LINE 145 - LINE 149
4	All equipment in classes 1 through 3	All log names in classes 1 through 3
5	All equipment in classes 1 through 3	All log names in classes 1 through 3

Note: The class number provided is intended to differentiate one class from another. It is not intended as the actual value to enter into table LOGCLASS.

Assign the first four classes of log reports to a DDU or an MTD in table LOGDEV. This routes log reports for ISDN peripheral modules, DS-1 links, DCH cards, and ISDN lines to system files on the DDU or MTD. The system automatically opens a file on the DDU or MTD to receive these log reports when they are sent. A file of log reports must be on a DDU or MTD if the DMS SCANLOG program is to be used. These files can then also be browsed by means of LOGUTIL commands or dumped to a printer.

Associate the fifth class of reports with a printer. This ensures that a hard copy of the reports will be available even if a fault should prevent accessing the files on the DDU or MTD.

For more complete information concerning log reports, refer to the *Log Report Reference Manual*, 297-8001-840.

Table 20-31 ISDN logs (Sheet 1 of 5)

Equipment	Log name	General description
AMA	AMA 118	reports status of all AMA options contained in table AMAOPTS
PM	PM 100	diagnostic fail
PM	PM 101	checksum fail
PM	PM 102	state change to system busy
PM	PM 103	state change to offline
PM	PM 104	state change to unequipped
PM	PM 105	state change to C-side busy
PM	PM 106	state change to in-service
PM	PM 107	state change to C-side busy
PM	PM 108	the peripheral processor has a firmware or hardware error
PM	PM 109	T1 carrier line changed to system busy
PM	PM 113	message congestion during high traffic
PM	PM 114	load or test failure on PM
PM	PM 115	miscellaneous trouble during normal operation
PM	PM 116	message error report from PM
PM	PM 117	trouble during normal operation
PM	PM 118	miscellaneous trouble during normal operation. Defines affected PM plane.
PM	PM 128	PM changed to in-service trouble (ISTb)
PM	PM 179	hardware condition affected the normal operation of the switch or the PMs. Supplies information for the PM hardware exception report.
PM	PM 180	PM software exception report (SWERR), which can be hardware-related
PM	PM 181	PM exception occurred as a result of diagnostics
LINKS	PM 182	state change to manual busy

Table 20-31 ISDN logs (Sheet 2 of 5)

Equipment	Log name	General description
LINKS	PM 183	state change to system busy
LINKS	PM 184	link returned to service
LINKS	PM 187	carrier state change to system busy
LINKS	PM 188	carrier was returned to service
PM	PM 185	PM trap
PM	PM 189	PM software exception report (SWERR)
DCH	PM 190	state system busy
DCH	PM 191	state change to manual busy
DCH	PM 192	state change to C-side busy
DCH	PM 193	state change to offline
DCH	PM 194	state change to in-service trouble
DCH	PM 195	state changed to in-service
DCH	PM 196	state change to unequipped
DCH	PM 198	DCH fault which does not affect service
DCH	PM 199	diagnostic results
DCH	PM 235	DCH takeover
DCH	PM 270	congestion or overload of DCH/EDCH
DCH	PM 236	integrity condition of a network channel
LINE	LINE 100	diagnostic pass
LINE	LINE 101	diagnostic fail
LINE	LINE 107	insulation test required
LINE	LINE 118	failure to connect metallic test access (MTA)

Table 20-31 ISDN logs (Sheet 3 of 5)

Equipment	Log name	General description
LINE	LINE 131	the thresholds of errored seconds (ES) or severely errored seconds (SES) were exceeded. Indicates whether the ES or SES value pertains to far-end block errors (FEBE) or near-end block errors (NEBE) as reported by loop performance monitoring. Reports performance threshold crossings on individual mp-eoc line units on a 2B1Q loop. Note: The MAP command QLAYER at the LTPISDN level of the MAP terminal can be used to query the ES and SES counters to obtain their exact values.
LINE	LINE 145	change of U-SYNC status. Indicates a loss of signal at Layer 1 of 2B1Q u-loop interface and location of signal loss (NT1 or an mp-eoc unit). Also indicates loss of synchronization word (LOSW) on individual mp-eoc line units, an mp-eoc line unit failure (node failure), and the recovery of the signal.
LINE	LINE 146	change of ST-SYNC status
LINE	LINE 147	maintenance initiated by the customer changed the NT test mode
LINE	LINE 148	Layer 1 basic line monitoring (BLM) parameters were refreshed. The layer 1 BLM audit detected a mismatch between the BLM data stored on the 2B1Q line card and the data stored in table BLMTHRSH for the loop in the DMS-core. Also indicates time of day refreshed by update from CC directly to line card.
LINE	LINE 149	LCME audit detected a difference between the stored Mp-eoc configuration (in table LNMPEOC) and the actual configuration
LINE	LINE 205	system detected incoming message overflow on an ISDN line
CPE/MISC	ISDN 100	terminal not available for message traffic
CPE/MISC	ISDN 101	DCH could not be put into traffic level because the loop was unavailable for message traffic
CPE/MISC	ISDN 102	duplicate TEIs on loop - both removed from service
CPE/MISC	ISDN 103	manual action has changed state of Bd channel
CPE/MISC	ISDN 104	sync lost on Bd channel
CPE/MISC	ISDN 106	layer 1 (physical) of D-channel has failed
CPE/MISC	ISDN 107	system failed to restore a TEI

Table 20-31 ISDN logs (Sheet 4 of 5)

Equipment	Log name	General description
CPE/MISC	ISDN 108	system restored a TEI ***Note:*** If the XPM software executes National ISDN Logical Link Manager (NI LLM) introduced in XPM81, ISDN 108 logs are not generated. Software loads using older versions of Logical Link Manager generate ISDN 108 logs.
CPE/MISC	ISDN 109	previously failed D-channel returned to service
CPE/MISC	ISDN 115	subscription limits exceeded - too many TEIs
ISDN	ISDN 113	a layer 3 packet protocol abnormality on a packet link detected
ISDN	ISDN 116	TEI not assigned (switch unable to assign a TEI)
ISDN	ISDN 120	routine test (abnormality detected during an id_check)
ISDN	ISDN121	identity verify message (peer initiates an id_check with an incorrect A value).
ISDN	ISDN 122	unsolicited response (peer sends an unexpected frame to the host for the current lapd state)
CPE/MISC	ISDN 200	up to ten faulty ISDN with peg counts and percentages of frames received in error and retransmitted
CPE/MISC	ISDN 201	overall switch percentage of frames received in error and retransmitted and the number of LENs reporting these errors or experiencing a high protocol abnormality rate
CPE/MISC	ISDN 202	RLAYER command was used to reset layer 1, 2, or 3 performance count registers for a LEN
CPE/MISC	ISDN 203	high layer 2 abnormality rate exceeds threshold
CPE/MISC	ISDN 204	high layer 3 abnormality rate exceeds threshold
CPE/MISC	ISDN 205	exceeds layer 2 transmission performance level threshold
CPE/MISC	ISDN 301	layer 3 protocol abnormality detected
CPE/MISC	ISDN 302	parameter downloading abnormality identified
CPE/MISC	ISDN 303	layer 3 packet abnormality counter exceeds capacities
CPE/MISC	ISDN 304	layer 2 protocol abnormality detected
CPE/MISC	ISDN 305	ISDN line exceeds the service disruption threshold
CPE/MISC	ISDN 306	layer 2 packet abnormality counters exceeds capacities

Table 20-31 ISDN logs (Sheet 5 of 5)

Equipment	Log name	General description
CPE/MISC	ISDN 307	layer 2 packet abnormality encountered
CPE/MISC	ISDN 308	exceeds layer 2 service disruption threshold
CPE/MISC	ISDN 309	exceeds layer 3 service disruption threshold
CPE/MISC	ISDN311	layer 3 circuit switched BRI line service disruption count threshold exceeded
CPE/MISC	ISDN312	layer 3 service disruption counter capacity reached for circuit
CPE/MISC	ISDN 313	layer 3 packet protocol abnormality detected
CPE/MISC	RMSG 600	BRI LTID is placed temporary out-of-service
CPE/MISC	RMSG 601	BRI LTID is placed permanent out-of-service
CPE/MISC	RMSG 602	BRI LTID returns to inservice
CPE/MISC	RMSG 603	BRI LTID reaches an overload condition treatment state

OM set-up procedure

This procedure is used to manually set up operational measurements (OM).

Procedure 20-11 Set up OMs manually

At the MAP terminal

1 Define OM class for ISDN in the following manner:

```
CI:
 > OMCLASS ISDNHHR DOUBLE
 > OMCLASS ISDNASSM DOUBLE
```

2 Add OM groups to the class:

```
> OMACCGRP ISDNHHR ADD GROUP PM
> OMACCGRP ISDNHHR ADD GROUP PM1
> OMACCGRP ISDNHHR ADD GROUP LMD
> OMACCGRP ISDNHHR ADD GROUP ISGBD
> OMACCGRP ISDNHHR ADD GROUP ISGBRA
> OMACCGRP ISDNHHR ADD GROUP TRK
> OMACCGRP ISDNASSM ADD GROUP PM
> OMACCGRP ISDNASSM ADD GROUP PM1
> OMACCGRP ISDNASSM ADD GROUP LMD
> OMACCGRP ISDNASSM ADD GROUP ISGBD
> OMACCGRP ISDNASSM ADD GROUP ISGBRA
> OMACCGRP ISDNASSM ADD GROUP TRK
```

Note: To see which groups are already included in an existing CLASS, enter the following command at the MAP terminal:

```
> OMDUMP CLASS omclass_name FORMAT
```

3 Add fields to the class:

```
>OMACCFLD ISDNHHR PM ADD ALL
>OMACCFLD ISDNHHR PM1 ADD ALL
```

```
>OMACCFLD ISDNHHR LMD ADD ALL
>OMACCFLD ISDNHHR ISGBD ADD ALL
>OMACCFLD ISDNHHR ISGBRA ADD ALL
>OMACCFLD ISDNHHR TRK ADD ALL
>OMACCFLD ISDNASSM PM ADD ALL
>OMACCFLD ISDNASSM PM1 ADD ALL
>OMACCFLD ISDNASSM LMD ADD ALL
>OMACCFLD ISDNASSM ISGBD ADD ALL
>OMACCFLD ISDNASSM TRK ADD ALL
```

4 Delete all group keys from OMACCKEY:

```
>OMACCKEY ISDNHHR PM DELETE ALL
>OMACCKEY ISDNHHR PM1 DELETE ALL
>OMACCKEY ISDNHHR LMD DELETE ALL
>OMACCKEY ISDNHHR ISGBD DELETE ALL
>OMACCKEY ISDNHHR ISGBRA DELETE ALL
>OMACCKEY ISDNHHR TRK DELETE ALL
>OMACCKEY ISDNASSM PM DELETE ALL
>OMACCKEY ISDNASSM PM1 DELETE ALL
>OMACCKEY ISDNASSM LMD DELETE ALL
>OMACCKEY ISDNASSM ISGBD DELETE ALL
>OMACCKEY ISDNASSM ISGBRA DELETE ALL
>OMACCKEY ISDNASSM TRK DELETE ALL
```

5 Determine the OMACCKEY keys specific to the ISDN frames and trunks:

- For the PMs (ISDN LGC / ISDNLTC / DTCI / RCCI / LGCO / DTCO / RCCO), post them, and use the QUERYPM function to determine and record their node numbers.
- For the LCMEs, post them, and use the QUERYPM function to determine and record their internal numbers.
- For the PRI trunks, find the value of ADNUM in table CLLI for your trunk group entry.
- For the DCHs, use key names “DCHOM” and “DCHBX02OM”.
- For the ISGs, position on the ISGs in table ISGDEF and record which channels are BD. Then in the ISG level, perform a QUERYPM on each of the BD channels and record their OM index.
- For the ISGs, post the DCHs and record the ISG numbers being used on each in service DCH.

6 Add the keys identified previously to table OMACCKEY:

```
> OMACCKEY ISDNHHR PM ADD KEY pm_node_number (Note)
> OMACCKEY ISDNHHR PM1 ADD KEY DCHOM
> OMACCKEY ISDNHHR PM1 ADD KEY DCHJBX02OM
> OMACCKEY ISDNHHR LMD ADD KEY lcme_int_no (Note)
> OMACCKEY ISDNHHR ISGBD ADD KEY om_index (Note)
> OMACCKEY ISDNHHR ISGBRA ADD KEY isg_no (Note)
> OMACCKEY ISDNHHR TRK ADD KEY adnum_for_PRATEST1
> OMACCKEY ISDNHHR TRK ADD KEY adnum_for_PRATEST2
> OMACCKEY ISDNASSM PM ADD KEY pm_node_number (Note)
> OMACCKEY ISDNASSM PM1 ADD KEY DCHOM
> OMACCKEY ISDNASSM PM1 ADD KEY DCHJBX02OM
> OMACCKEY ISDNASSM LMD ADD KEY lcme_int_no (Note)
> OMACCKEY ISDNASSM ISGBD ADD KEY om_index (Note)
> OMACCKEY ISDNASSM ISGBRA ADD KEY isg_no (Note)
> OMACCKEY ISDNASSM TRK ADD KEY adnum_for_PRATEST1
> OMACCKEY ISDNASSM TRK ADD KEY adnum_for_PRATEST2
```

Note: Repeat this entry for each ISDN PM.

7 Define accumulating time in table OMACC by positioning on class ISDNHHR and changing the tuple as follows:

```
CLASS        ENABLED   WHEN
ISDNHHR         Y                          Half Hourly C00
ISDNASSM       Y                        DAILY <start of test>
C00 <end of
                                                  test> C00
```

8 Activate OM report in table OMPRT by finding a spare tuple (without a class) and changing this tuple to read as follows:

```
REPNO ACTIVE SUPZERO    ID                CLASS
REP    BUFFOUT   OUTDEV
231                    Y                 N    ALLCLASS
ISDNHHR   AUTO                N
                              SINK
```

The report number can differ. In some cases, all tuples in this table will already have a class associated with them. In this instance ask the subscriber.

9 Edit table LOGDEV to determine the <printer_name> to be used for printing logs. If table LOGDEV is empty, select <printer_name> from table TERMDEV and datafill table LOGDEV as follows:

DEV	ALT	CLASSES	FORMAT	PRIORITY	GUAR
PRT1	NONE	(0-31)	STD	N	N

<printer_name> can differ from PRT1. Quotation marks must be used when entering CLASSES field using the table editor, as follows:

'(0-31)'. If the tuple is present, record the classes listed.

10 Edit table LOGCLASS to activate the report numbers established in step 8:

REPNAME	CLASS	THRESHOLD	SUPRESS	TUNITS	SYSLOG
OMPR 231	2	0	N	0	Y

The report can differ. Choose a class that is already being sent to the printer.

11 Activate log via LOGUTIL:

```
> ADDREP printer_name OMPR 231
> ADDREP printer_name PM 106 128 181
> RESUME OMPR 231
> ADDCLASS printer_name 2
> STARTDEV printer_name
```

For ISDN BRI, there are several traffic-sensitive areas that can reach engineered limits. System administrators should track congestion, usage, and traffic in these areas to help them with provisioning decisions.

The performance factors for ISDN BRI are listed in Table 20-32 along with their associated OMs.

Table 20-32 ISDN BRI performance factors and OMs

Performance factor	OM
BD-channel traffic	ISGBD
D-channel traffic	ISGBRA
DCH or EDCH processor occupancy	ISGCPU
DCH OR EDCH overload	ISGOVLD
LCME traffic	LMD
LCME real time	LMD
LGC traffic	LMD, XPMLNK
LGC overload	PMOVLD
Line traffic	LINAC
DS30A link availability	XPMLNK
DS30 link availability	XPMLNK
DS-1 link availability	DS1CARR

The following information and Figure 20-53 through Figure 20-59 show some of the OMs. These OMs are broken down to show their specific subfields and a brief explanation on some of the more important subfields. A complete detailed explanation of each OM can be found in the *Operational Measurements Reference Manual*, 297-8001-814.

BCAPCG: Collects information on bearer capability (BC) for each customer group. This OM value is increased when the call originator is not successful in reaching the desired call appearance because of BC incompatibility. This OM is broken down into the following register.

CGWRNGBC: Counts calls that do not complete because the bearer capability of the call originator (who belongs to a particular customer group) is not compatible with the bearer capability of the caller party. If the originator is a POTS station, the register value is not increased. An associated log is LINE138 text “CNAC.”

Related to OM **TRMTCU2,** subfield **TCUCNAC** counts the number of call treatments **CALL_NOT_ACCEPTED (CNAC)** is given to the originator of a call when the BC of the originator and the terminator are not compatible.

Figure 20-53 OM group ISGBRA

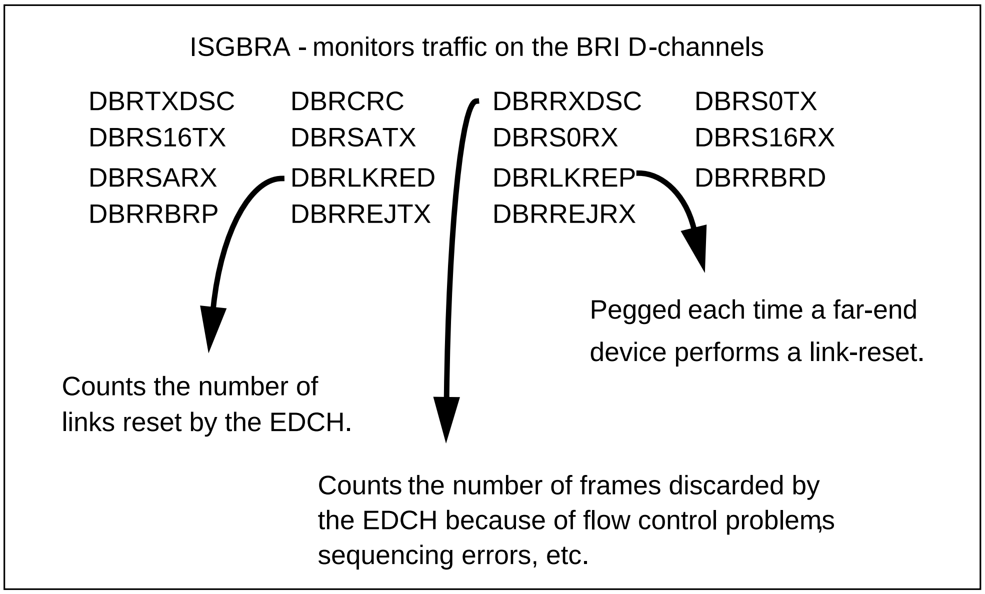


Figure 20-54 OM group ISGCPU

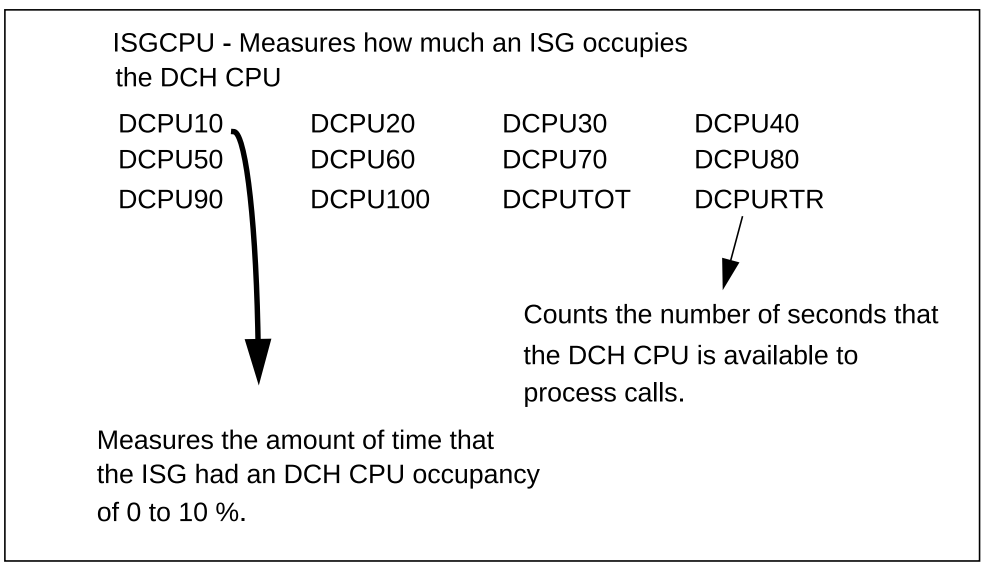


Figure 20-55 OM group ISGOVLD

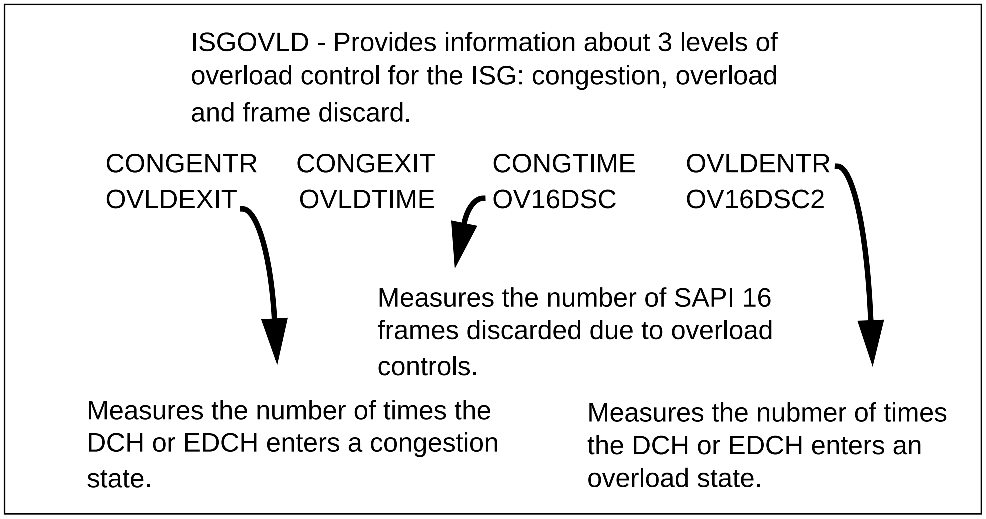


Figure 20-56 OM group BCAPCG

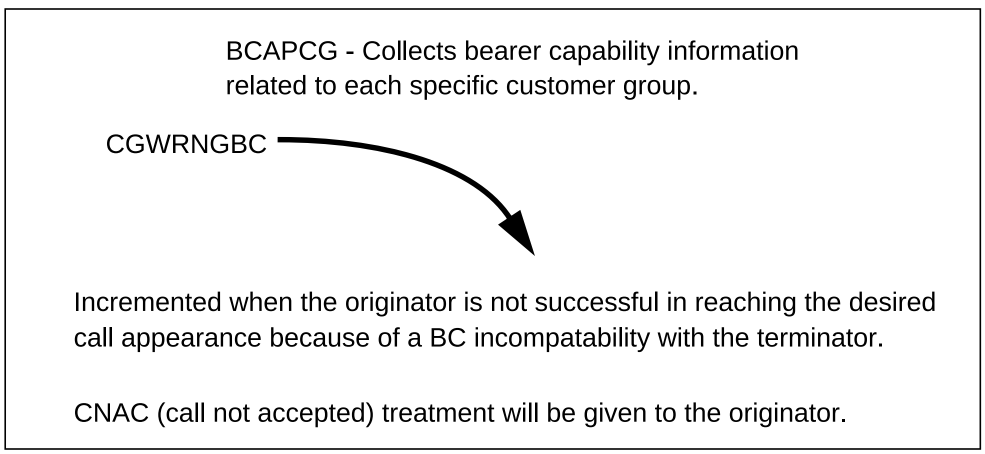


Figure 20-57 OM group ISDNPDOM

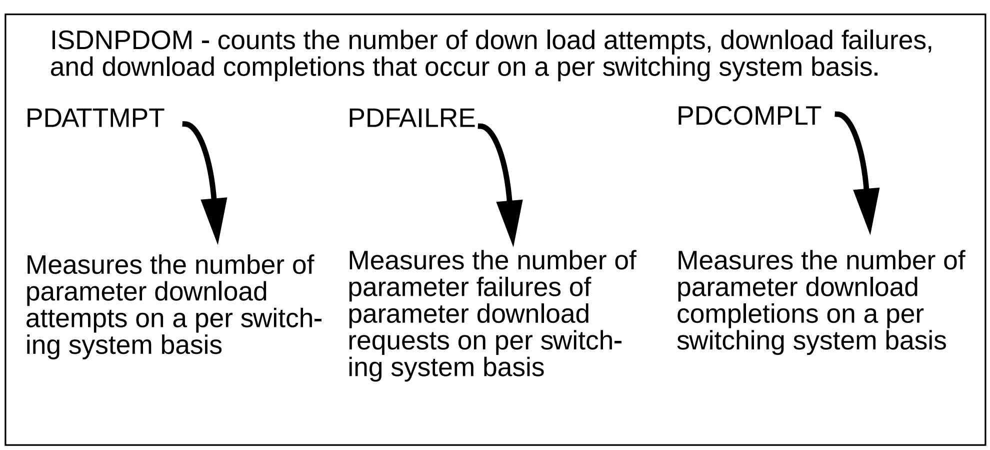


Figure 20-58 OM group AUTSPID

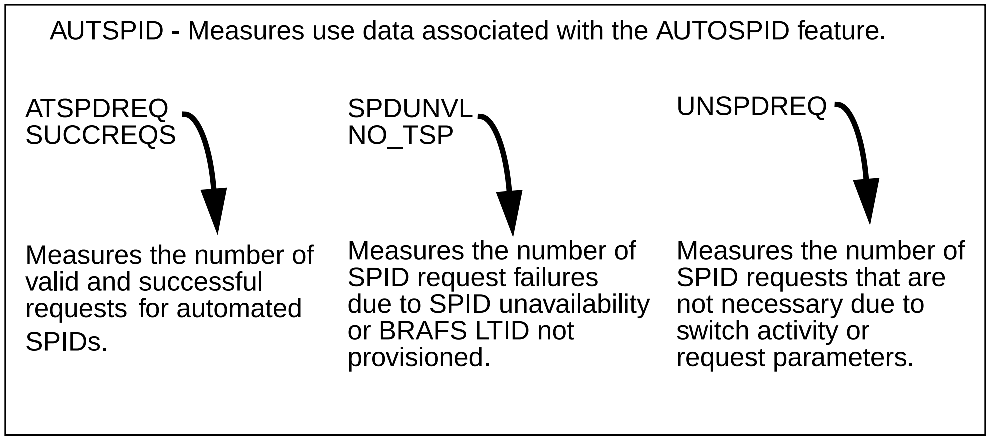


Figure 20-59 OM group RMSGOMGP

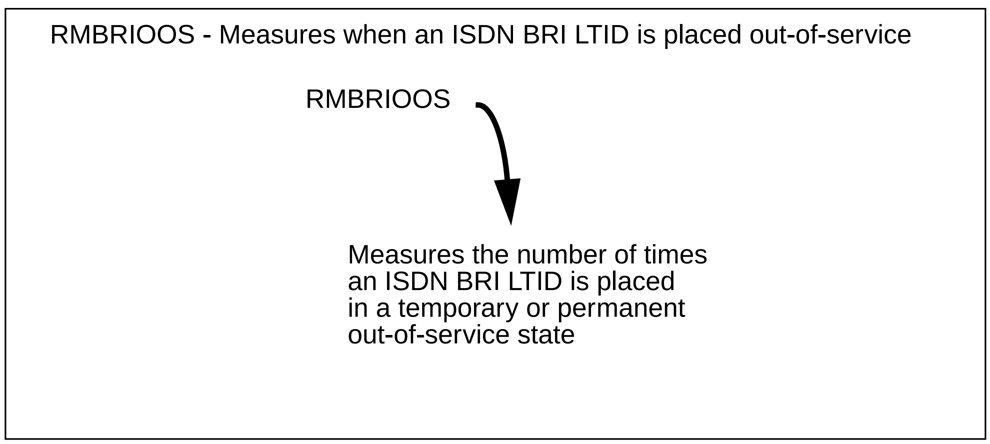
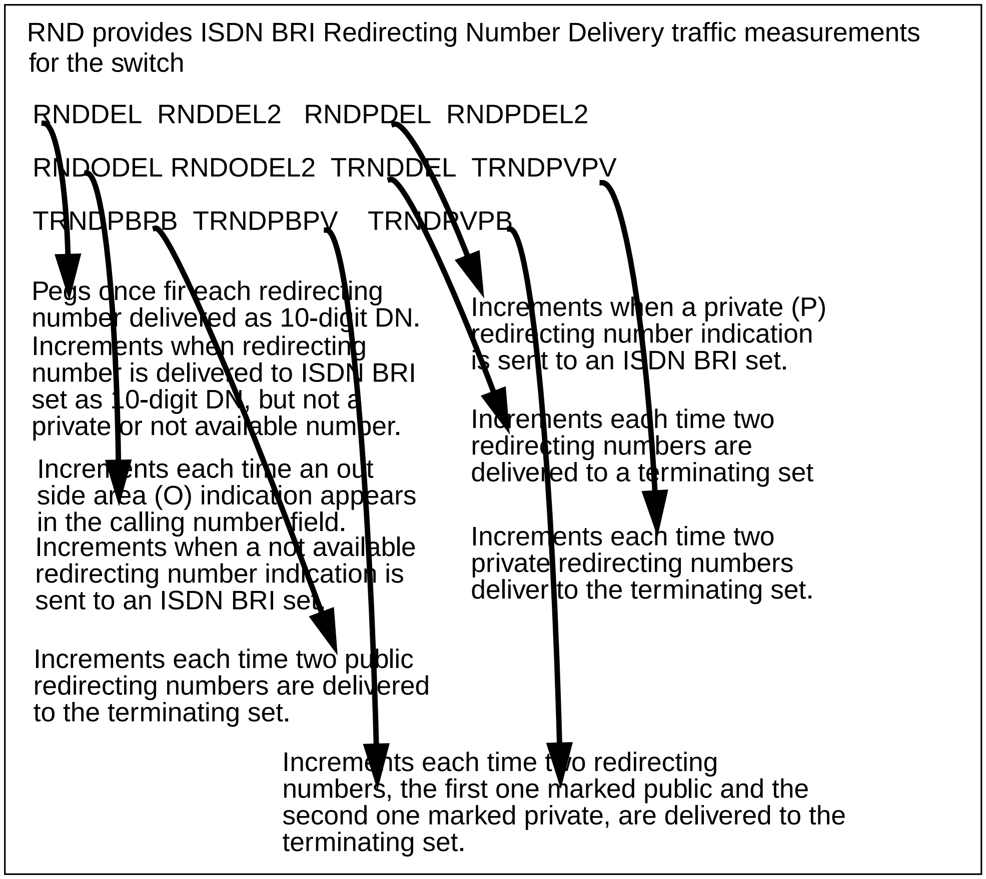


Figure 20-60 OM group RND



DISPCALL tool

DISPCALL is a low-level internal diagnostic tool that monitors data associated with call deaths, calls in progress, or calls being held for analysis. DISPCALL displays call processing data areas such as call condense blocks (CCB), call data blocks (CDB), message buffers, extension blocks, and protected and unprotected data for call processing agents.

The DISPCALL commands available are

- HELP—displays DISPCALL commands and a brief description
- CLEAR—clears all buffers
- DEATH—enables or disables data collection during the death of a call
- DISPTID—converts the terminal identifier (TID) number of an agent to a call process identifier (CPID)
- FREE—deallocates and frees all buffers

- QUERY—displays the following:
  - — number of allocated buffers
  - — number allocated buffers currently in use
  - — current settings of the death parameters
- QUIT—quits DISPCALL
- SAVELEN—takes a snapshot of the CCD for a specified LEN
- SAVETID—takes a CCD snapshot of a call specified by supplying the TID of an agent or terminal
- SET—allocates the buffers needed to save the call data
- SHOW—displays the collected data

Procedure 20-12 Using DISPCALL while collecting data when a call dies

At the MAP terminal enter

1 Type ‘DISPCALL’.

2 Type ‘QUERY DISPCALL’.

3 If 0 appears in the ALLOCATED column, type ‘SET type num’ where the type of buffer is CCB, CDB, MBUFF, EXT, PROT, or UNPROT, and the number of buffers is the maximum for that type (that is, CCB maximum number is 30, for EXT the maximum number is 20).

4 If 0 appears in the ALLOCATED column, type ‘SET type num’ where the type of buffer is CCB, CDB, MBUFF, EXT, PROT, or UNPROT, and the number of buffers is the maximum for that type (that is, CCB maximum number is 30, for EXT the maximum number is 20).

5 To enable data collection, type ‘DEATH ON’.

- Periodically determine how many buffers are in use by entering 'QUERY DISPCALL'.
- Display all the information associated with the call by entering 'SHOW CALL buffer format'. Where 'buffer' indicates which buffer you would like displayed and 'format' should be 'h' for hex or 'f' for formatted. In general, pick f. To obtain a hard copy of the data of each in-use buffers, enter 'SHOW type buffer format' for each buffer. For example, to display the data associated with the first CCB buffer in a formatted form type 'SHOW CCB 0 F'.
- Periodically clear the buffers in order to make room for storing more failures, by entering 'CLEAR'.

6 To disable data collection, type ‘DEATH OFF’.

7 To exit DISPCALL type ‘QUIT’.

Procedure 20-13 Collecting data for a call specified by terminal identifier

At the MAP terminal complete the following steps

1 Follow steps 1-3 from the section “Using DISPCALL while collecting data when a call dies.”

2 To save the CCB, and protected and unprotected data for the specified node and terminal number, type 'SAVETID nodeno termno' while the call is up. An ISDN LTID using the SAVETID command requires an extra step. The step is to use the CALLTRAK tool to obtain the correct TID value to be used in the SAVETID command. After entering the CALLTRAK tool, use the SELECT command and SELECT the LTID in question. Then enter the STATUS command and obtain the TID information associated with the key in question. If the CALLTRAK tool is not available, then use the QL command of the ISDBG tool.

3 Display all the information associated with the call by entering 'SHOW CALL buffer format'. To display the collected information for each buffer type, enter 'SHOW type buffer format'.

4 To exit DISPCALL type 'QUIT'.

Procedure 20-14 Collection data for a call specified by line equipment number

At the MAP terminal complete the following steps

1 Follow steps 1-3 from the section “Using DISPCALL while collecting data when a call dies.”

2 To save the CCB, and protected and unprotected data for a specified LEN, type 'SAVELEN len' while the call is up.

3 Follow steps 3 and 4 from the section “Collecting data for a call specified by terminal identifier.”

Interpreting DISPCALL output

The following is an example of DISPCALL output. Refer to Figure 20-61.

Figure 20-61 DISPCALL output

```
>
**
** Call Data Dump (0) for CALLID #0052 #0004 saved at 1995/03/19
20:00:29.055 SUN.
**
** CCB Dump (0) for CALLID #0052 #0004 saved at 1995/03/19 20:00:29.055
SUN.
CPTLB :
 LINK/CPMBPTR  = FFFF0000   MYINDEX     = 52 00   PROCQD        = N
 STATE         = LINKED  AUDIT          =   0000  LINKCOUNT     = 0002
 LETTERCOUNT   =   0003  LETTERC        =   C201  WAKEID        = FFFF
 LETTERQ       = ******  CCBTIMEQ.SUCC = ******  CCBTIMEQ.PREV = FFFF0000
 UP_OVER_WARM  = N       ECCBINDEX      = 00 00
EXTPTR         = 03095208   SEQNO =   0004  CS = TALKIN  XBITS     = 0000
FORCEUNAVAIL = N          IBN   = N        SA = N       FASTSEQNO = 00C4
CMI            =   017E     CCBFC =   0000
RECEIVER       = <NIL>
CONFIG = NIL_CONFIG    FAILED_CALL_ATTEMPT = N  SEQ_NUM = 0
CCBFA :
 IN_OFFHK        = N       OUT_OFFHK      = N       JOINT_HOLD       = N
 CHARGE          = Y       RINGING        = N       CALL_ESTABLISHED = Y
 CALLED_PTY_HOLD = N       ANI_PRESENT    = N       TWC_IN_EFFECT    = N
 MFST_SIGNAL     = NIL_MF  REVERTIVE_CALL = N       CALL_TRACE       = N
 TERM_ON_RC      = N       FX_TRK_CALL    = N       COIN_ORIGINATOR  = N
 THE REST ? = 0410
PORT1PERM :
 AGENT   = LEN RSCS 02 1 11 05   DN 6759003  KEY  1
 PATHEND :
  EN_SHELF = 00  SLOT = 10  LINK = 01  CHANNEL = 046
  NETWORK_DS0  = 0005 002E  LOGICAL = N  GAIN = 2  LOSS = 3
  INTEG_VAL = 115  PREFERRED_PL = 1
 PMCHNL =      28E  PORT    = 01  CFWBIT        = N AGENT_SUSPECT=N
THREAD =    00C7  FMTCODE = 05  UTR_AVAILABLE=N SME_AGENT=N
 TID    : NODE_NO = 060  TRMNL_NO_MSN = 0  TRMNL_NO_LSB = B1  TSI=9
 AIN_AGENT = N
 FMTAREA:
  04CE AE7A 04CA 96B4 1802 0342 0000 0000 04C5 3D30
 AGENTEXTHEAD = 02CFCD28
PORT2PERM :
 AGENT   = LEN HOST 01 0 01 16   DN 9424003
 PATHEND :
  EN_SHELF = 00  SLOT = 11  LINK = 00  CHANNEL = 178
  NETWORK_DS0  = 0008 00B2  LOGICAL = N  GAIN = 2  LOSS = 3
INTEG_VAL = 115  PREFERRED_PL = 0
 TID    : NODE_NO = 036  TRMNL_NO_MSN = 0  TRMNL_NO_LSB = 31   TSI = 0
 AIN_AGENT = N
 FMTAREA:
  04CE 1A02 04CA 74B0 0881 0101 0000 0000 04C5 989C
 AGENTEXTHEAD = FFFF0000
 XLAB:
  RC            = XLA_RO  TXSEL       =   0000  TX_TRMT       = UNDT
  IBN_TRMT_SET = N       MIN_DIGITS =   0008  MAX_DIGITS    = 0008
  PREFIX_FENCE =   0001  DATA_VER    = N       OC            = LCL
  TRAN_SYS      = NA      TYPECALL    = NP      NPA_ADDED     = N
  TX_POS        = NONE    TXROUTE/TERM_AGENT = LEN HOST 01 0 01 16   DN
9424003
```

-continued-

Figure 20-61 DISPCALL output

```
  CALLED_DR    = 99424003
  RTE          = Y       POS        = N       RETRANSLAT   = N
  CALLING_DR/AUTH_CODE_DR = 06196759003
  SCREENING_IN = N       CAN_LCS    = N       EAOSS_CALL   = N
  XLASTAGE     = BALANC  ADP        = Y       BLK_OVLP     = Y
  LONGHAUL     = N       HTRP       =       0  SNPA        = 619
  XLT_FROM     =      1  HTRC       = N       VALID_/PRIVL = N
  XLA_REPL_SEL = N       IDDD_ARS   = N       ISDN_XLA     = N
  COUNT_OF_DIGITS_DIALED = OTHER_DIGS_DIALED
  AMAPRT_PREFIX_FENCE_COUNT = 1
  AMA_PRET_NAME = P351
  ANI_INFO :
   ONI = N      HOT = N      TDN = N     COIN = N
   RSP = N   ANI_FAIL = N   IC_INC = N   ANI_AIOD = N
  AMADATA :
   HEX DUMP: 0003 0086 003C 0000 0000 0000 0000 0000
   AMADATA_STATUS = CDATA_INCCB
   AMAPRET_STATUS = AMAPRET_NAME_INUSE
   ENTRYID_PRESENT = N    AMA_CALL_DETAIL_REC = N
   CALLDATA: 0086 003C 0000 0000 0000 0000 0000
    NET_INFO    = 003C 0086
    PREXLA_AREA = 0000 0000 0000
    EXTDR       = 0000 0000
SOURCEPARMS :
 VALID_SOURCEPARMS = Y       NCOS       =     0  DESTIN        =IAGRP_
 CUSTGRP        =     BNR   SUBGRP     =   0000  CALL_CHARACTER =0000
 DGCOLL_TABLE      =   0001  SOURCE     = IBNLIN  OWAT_ZONE      = 000D
 SOURCE_TRC        =   0000  SMDR       = Y       SMDRB          = N
 ACR               = N       INTRAGROUP = Y       ENABLE_CRL     = Y
CRL_REQUIRED      = Y       ATTDNDOV   = N       DNDPREEMPT     = N
 DISA_ENCOUNTERED  = N       ARS_AUTH_E = N      IBN_PREFIX_FENCE = 0001
RTEB:
ROUTE           = DNT_RT  RC               = RTR_ME  RTE_TYPE = DNT
  ROUTE_CHAIN    = IN_CHA  PREV_SATELLITE   = N       CHOICE   = DIRECT
  OHQT_APPLIED   = N       QUEUEING_ACTIVE  = N       OHQ      = N
  CANCSTDL       = N       INHIBIT_QUEUEING = N       HUNT     = Y
  PREEMPT_SEARCH = N       BC               = NILBC
  PRECEDENCE     = AV_ROUTINE
 TRMT       = UNDT    POS         =   0000  TFR            = NIL_TF
 ANI_SPILL = N       ANI_SPILL_9 = N       RECORDING_REQD = Y
 LEAS_CALL = N       LOCAL_CALL  = Y
TS_OMREG      = Y       CONN_FAILURE     = N    SEIZE_FAILURE    = N
AV_CALL       = N       RESELECT         = N    DIST_RING        = N
FTR_IN_EFFECT = N       SD_ORIG          = N    SDVOICE          = N
FORCE_CC_TIMI = N       AC_ATTACHED      = N    NET_AC_ATTACHED  = N
SCWID_CALL    = N       ACBAR_CALL       = N    NFA_DIALED       = N
EAEO_DATA :
 EA_CARRIER = NILC    EA_LOCAL = N    EA_OCS_NEEDED = N
 CALL_EVENT = INITIAL_EVENT
MILDATA :
 CDTYP     = TERMI   COI        = 0000  CIS     = ISTRK
TTIDX = 0000
 TRAF_TYPE = VOICE   PFXLT_FROM = 0000  PFIXCNT
=   0000  DSTSW = 0000
 SDPAL_TXROUTE = <NIL>
NSSDATA :
```

-continued-

Figure 20-61 DISPCALL output

```
    NSS_ANI   = NN      SUPPRESS_ANI = N     NSS_BILL_PTY = CALLING
   TCN_CALL  = N      TCN_VALID_REMOTE = N TCN_VALID_BOTH = N
   CALLED_DR    = 99424003
   RTE          = Y       POS        = N       RETRANSLAT   = N
   CALLING_DR/AUTH_CODE_DR = 06196759003
   SCREENING_IN = N       CAN_LCS    = N       EAOSS_CALL   = N
   XLASTAGE     = BALANC  ADP        = Y       BLK_OVLP     = Y
   LONGHAUL     = N       HTRP       =      0  SNPA         = 619
   XLT_FROM     =      1  HTRC       = N       VALID_/PRIVL = N
   XLA_REPL_SEL = N       IDDD_ARS   = N       ISDN_XLA     = N
   COUNT_OF_DIGITS_DIALED = OTHER_DIGS_DIALED
   AMAPRT_PREFIX_FENCE_COUNT = 1
   AMA_PRET_NAME = P351
   ANI_INFO :
    ONI = N      HOT = N      TDN = N     COIN = N
    RSP = N   ANI_FAIL = N   IC_INC = N   ANI_AIOD = N
   AMADATA :
    HEX DUMP: 0003 0086 003C 0000 0000 0000 0000 0000
    AMADATA_STATUS = CDATA_INCCB
    AMAPRET_STATUS = AMAPRET_NAME_INUSE
    ENTRYID_PRESENT = N    AMA_CALL_DETAIL_REC = N
    CALLDATA: 0086 003C 0000 0000 0000 0000 0000
     NET_INFO    = 003C 0086
     PREXLA_AREA = 0000 0000 0000
     EXTDR       = 0000 0000
 SOURCEPARMS :
  VALID_SOURCEPARMS = Y       NCOS       =     0  DESTIN        =IAGRP_
  CUSTGRP        =     BNR   SUBGRP     =   0000  CALL_CHARACTER =0000
  DGCOLL_TABLE      =   0001  SOURCE     = IBNLIN  OWAT_ZONE      = 000D
  SOURCE_TRC        =   0000  SMDR       = Y       SMDRB          = N
  ACR               = N       INTRAGROUP = Y       ENABLE_CRL     = Y
 CRL_REQUIRED      = Y       ATTDNDOV   = N       DNDPREEMPT     = N
  DISA_ENCOUNTERED  = N       ARS_AUTH_E = N      IBN_PREFIX_FENCE = 0001
 RTEB:
 ROUTE          = DNT_RT  RC              = RTR_ME  RTE_TYPE = DNT
   ROUTE_CHAIN    = IN_CHA  PREV_SATELLITE   = N       CHOICE   = DIRECT
   OHQT_APPLIED   = N       QUEUEING_ACTIVE  = N       OHQ      = N
   CANCSTDL       = N       INHIBIT_QUEUEING = N       HUNT     = Y
   PREEMPT_SEARCH = N       BC               = NILBC
   PRECEDENCE     = AV_ROUTINE
  TRMT      = UNDT    POS         =   0000  TFR           = NIL_TF
  ANI_SPILL = N       ANI_SPILL_9 = N       RECORDING_REQD = Y
  LEAS_CALL = N       LOCAL_CALL  = Y
 TS_OMREG      = Y       CONN_FAILURE     = N    SEIZE_FAILURE    = N
 AV_CALL       = N       RESELECT         = N    DIST_RING        = N
 FTR_IN_EFFECT = N       SD_ORIG          = N    SDVOICE          = N
 FORCE_CC_TIMI = N       AC_ATTACHED      = N    NET_AC_ATTACHED  = N
 SCWID_CALL    = N       ACBAR_CALL       = N    NFA_DIALED       = N
 EAEO_DATA :
  EA_CARRIER = NILC    EA_LOCAL = N    EA_OCS_NEEDED = N
  CALL_EVENT = INITIAL_EVENT
 MILDATA :
  CDTYP     = TERMI   COI        = 0000  CIS     = ISTRK
 TTIDX = 0000
  TRAF_TYPE = VOICE   PFXLT_FROM = 0000  PFIXCNT
 =   0000  DSTSW = 0000
  SDPAL_TXROUTE = <NIL>
```

-continued-

Figure 20-61 DISPCALL output

```
NSSDATA :
NSS_ANI   = NN      SUPPRESS_ANI = N     NSS_BILL_PTY = CALLING
TCN_CALL  = N      TCN_VALID_REMOTE = N TCN_VALID_BOTH = N
ECHOSUP  = <NIL>
OVLPD :
 REALCMI = 0  DRCOUNT = 0  OLSTATE = OLFIRST
PSTATE :  PROCESSOR = CROSS_PRCR STATE = 0000
MBI       =   0000  CHARGE    = N    DATA_CALL = N    TIMESTAMP  = 0947
0000
ORIGDISP  =   0000  TERMDISP  =   0000  OCC_CALL  = N    OCC_INCOM  = N
NO_INTRAS = N       EA_CALL   = N    PIC_CALL  = N   LATA_CALL  = INTRA
LATA
STATE_CAL = INTRAS  TRD_TIMIN = NO_TRD  NSCID     = NIL  CAC_CALL   = N
E911_CALL = N    TEEN_RNGCD=   0000  MEM_SEL_ACTIVE = N  VCDR       = N
BRAFS_ACO_NBC_INCR    = N           BTUP_CLLDCTRL  = N  MET_TYPE   = NO_
METERING
REPORT_IMMEDIATE_ANSWER    = N       NTC_CALL       = N  APPLY_SACB = N
** EXT Dump (0) for CALLID #0052 #0004 saved at 1995/
03/19 20:00:29.055
SUN.
 EXTENSION BLOCK
 EXTPTR/LINK = FFFF0000   AUDIT  = 1 STATE      = ******  EXTFC  = 115
Body:
  ** PRU=SMDR_PRU_FC,5  OWNER=,3  OVFL=0
XRU=FFFF0000  MRU=FFFF0000
  ORIG_AGENT  = LEN RSCS 02 1 11 05   DN 6759003  KEY  1
  TERM_AGENT  = LEN HOST 01 0 01 16   DN 9424003
  OWNER       = LEN RSCS 02 1 11 05   DN 6759003  KEY  1
  ORIG_DR     =  6196759003
  CALLED_DR   = 99424003
  ANS_TYPE        = ELECTRICAL_ANSW     ANSWER_TIMESTAM =     0100 0B2F
  OWNER       = LEN RSCS 02 1 11 05   DN 6759003  KEY  1
  ORIG_DR     =  6196759003
  CALLED_DR   = 99424003
  ANS_TYPE        = ELECTRICAL_ANSW     ANSWER_TIMESTAM =     0100 0B2F
  BLOCK_ID        =               1     CONSOLE_NUMBER  =          255
  CONV_10MS       =       0000 0000     CUSTGRP         = BNR
  DCI_CODE        =               0     DCI_SMDR_ACTIVE = N
  DCI_CODE        =               0     DCI_SMDR_ACTIVE = N
  ORIG_FC         =               0     PIN_OR_TCN      = NO_PIN_TCN
  SUBGRP          =               0     TERM_FC         =            0
  TIME            =     0 0000 0000     TRD_TIMING_USED = NO_TRD

  AC_EXTENDED        = N   AC_OVERFLOW       = N   ADP
= Y
  TRUNK_ANI_PRESENT  = N   ANI_FAIL          = N
ANSWERED        = Y
  ARS                = N   CDR               = N   CFW_LOCKED_RU    = Y
  CLD_DISC           = N   CURRENT           = Y   EXPENSIVE_ROUTE  = N
  FGD_ANI_SMDR       = N   FLASH_TIME_ORIG   = N   FLASH_TIME_TERM  = N
  MODEM_POOL_USED    = N   MSN_PRESENT       = N   NO_MCD_DONE      = Y
  NTC_REQUESTED      = N   NTWKSMDR          = N   ONI              = N
  OP_TRK_ANI_REQUEST = N   OVERLAP_GENERATED = N   SERV_ANAL        = N
```

-continued-

Figure 20-61 DISPCALL output

```
SMDR_REQD          = Y   SMDRITC           = N   TIMESTAMP_SET    = Y
  TONEBURST          = N   VALID_TRUNK       = N   VPN_ONNET_CALL   = N
  ZERO_TIME          = Y   ICC_PAYPHONE_ORIG = N   ICC_PAYPHONE_TERM= N
  ICC_MOBILE_ORIG    = N   ICC_MOBILE_TERM   = N   DIGS_MISSING     = N
  OUTP_DIGS_MISSING  = N   DISA_CALL         = N   MSN_ANI_MAPPING  = N
  MSN_REORIG         = N   MSN_TREATMENT     = N

** PROT Dump (0) for CALLID #0052 #0004 saved at 1995/03/19 20:00:29.055
SUN.   0881 0713 031F 0198

** PROT Dump (1) for CALLID #0052 #0004 saved at 1995/03/19 20:00:29.055
SUN.   1802 1C73 031F 0A20

** UNPROT Dump (0) for CALLID #0052 #0004 saved at 1995/03/19
20:00:29.055 SUN.   0029 0718
** UNPROT Dump (1) for CALLID #0052 #0004 saved at 1995/03/19
20:00:29.055 SUN.

  0029 0718
```

-end-

Note: The information in each field of a DISPCALL represents a snapshot of memory, and could be a transitory state between several values.

The major fields that often help to debug a problem are

- STATE: state or configuration of the CCB
- CS: CCB call state
- CMI: Cross Matrix Index used to categorize a connection, such as a line-to-line or trunk-to-trunk
- AGENT: LEN and DN associated with the dialed number
- THREAD: agent's thread index
- NODE_NO: node number
- TRMNL_NO_MSN: most significant nibble of the terminal number
- TRMNL_NO_LSB: least significant byte of the terminal number
- XLAB: translations block
- TX_TRMT: extended treatment
- TXROUTE/TEM_AGENT: translation route identifier or terminating agent CPID
- CALLING_DR/AUTH_CODE_DR: calling directory number or authorization code for the DMS-250

- VALID_SOURCEPARMS: indicates whether the source parameter area is valid for a call
- ROUTE: route identifier
- CHOICE: route choice
- TRMT: treatment
- FTR_IN_EFFECT: boolean indicating whether the Feature Processing Environment (FPE) needs to be accessed to implement special features
- FORCE_CC_TIMI: boolean indicating whether to force CC timing
- PSTATE: processor entry point

Often the information gathered with DISPCALL can show you where to look for more information. For instance, the TX_TRMT or TRMT field indicate that you can check logs for that particular treatment. If you are getting these logs, capture a LOGTRACE of it. By investigating the procedure LOGTRACE lists, you can extract a call scenario.

For more information, see the *DISPCALL User Guide*, TAM-1001-003.

21 BRI multiple terminal maintenance

Description

The basic rate interface (BRI) multiple terminal maintenance feature provides operating company personnel with a maintenance interface used to access information describing the states of both packet and circuit-switched terminals on an ISDN interface.

- It provides a mechanism to determine the state of the physical and provisioned integrated services digital network (ISDN) BRI terminals.
- It assists in debugging service profile identifier (SPID) initialization problems associated with ISDN BRI terminals.

By accessing the TERMCHK command through the LTPISDN level of the MAP (maintenance and administration position) display, operating company personnel can determine the following information:

- the terminal states
- the initializing failure reasons for basic rate access functional set (BRAFS) ISDN terminals

This feature decreases the time required to resolve ISDN terminal initialization issues. Because terminal initialization issues may be resolved faster, the cost of maintaining ISDN BRI on the DMS-100 Switch is reduced.

The design of BRI multiple terminal maintenance is divided into the following areas:

- LTPISDN MAP-level command (CM)
- MAP query and reply message (CM/XPM and CM/XLIU)
- layer 3 data management (XMS-based peripheral module [XPM])

LTPISDN MAP level command (CM)

The user accesses the new TERMCHK command at the LTPISDN level of the MAP screen. The user needs no additional parameters to execute the command. The only requirement is a valid, posted ISDN line equipment number (LEN). The TERMCHK command queries the associated XMS-based peripheral module (XPM) and DMS packet handler (DMSPH) for the data. It then displays the data on the MAP screen.

The following list provides the primary events associated with the TERMCHK command:

- The TERMCHK command is executed from the LTPISDN line test position (LTP) MAP level.
- A message is sent to the XPM to identify active terminal endpoint identifiers (TEI) on the posted LEN.
- TERMCHK query messages are sent to the XPM to obtain more detailed status information for the active TEIs on the posted LEN.
- The status of the DMSPH logic terminal identifiers (LTID) on the posted LEN is obtained from messaging to the associated X.25/X.75 link interface units (XLIU).
- The CM prepares the data for output.
- Output is displayed to the TERMCHK user.

The TERMCHK command provides the following information:

- TEIs
- associated packet-switched and/or circuit-switched primary directory numbers (PDN)
- ISDN service types (circuit-switched, link access procedure on the D-channel [LAPD] packet-switched, link access procedure balanced [LAPB] packet switched)
- protocol layer status (layer 2 or layer 3)
- provisioned DMS-100 terminal service profile identifiers (TSPID)
- incorrect customer premises equipment (CPE) SPIDs
- the terminal initialization status
- circuit-switched service initialization failure reasons
- DMSPH query status failure reasons for terminals on the posted ISDN interface

MAP query and reply message (CM/XPM and CM/XLIU)

The BRI multiple terminal maintenance feature adds new messaging between the CM and the XPM as well as between the CM and the XLIU. The CM solicits a response from the XPM, requesting information on the physical terminals on the ISDN interface. The XPM responds with the data for each terminal.

The CM also queries the XLIU for information on the status of layer 2 and layer 3 for the following packet terminals:

- LAPD
- LAPB

The MAP terminal displays initialization failure data, provided the data is available in the associated XLIU.

Layer 3 data management (XPM)

For most of the required data for circuit-switched terminals, the new TERMCHK command is already available in the XPM. However, the XPM now stores the invalid SPIDs that were used in failed initialization attempts. It also stores the initialization result for all ISDN circuit-switched terminals. The XPM stores up to 100 invalid SPIDs. A modified circular buffer stores and manages the invalid SPIDs. Modifications are implemented to this circular buffer that prevent a cycling terminal’s overuse of the 100 available slots in the invalid SPID buffer. (A cycling terminal is an ISDN terminal that is constantly unsuccessful in trying to establish layer 3.)

Limitations and restrictions

The following limitations and restrictions apply to BRI multiple terminal maintenance:

- The TERMCHK command is valid on all ISDN BRI line types except the remote concentrator unit (RCU) and the NT6X05DA ISDN line drawer (ILD). The command is valid for BRAFS, default service, packet fully-initializing terminal (FIT) (DMSPH only), and non-initializing terminals (NIT).
- Each peripheral stores a maximum of 100 invalid SPIDs. The SPID values used during a successful terminal initialization are not stored for future retrieval. When issuing a TERMCHK command, the display informs operating company personnel if an invalid SPID is no longer available due to being overwritten by a more recent failure. The operating company personnel could then instruct the user to reinitialize the terminal. If the initialization attempt fails, the SPID is stored in the invalid SPID circular buffer. This SPID replaces the oldest entry in the table. The operating company personnel can then execute the TERMCHK command to obtain additional information regarding the initialization failure.
- The display of data associated with packet NIT and FIT services with a dynamic TEI does not include its associated TEI. For these terminals, a DYN is displayed to signify a dynamic TEI.
- The TERMCHK command displays only data for BRAFS ISDN terminals.

Interactions

The following items describe the interactions between BRI multiple terminal maintenance and other functionalities:

- Feature AF7240, Auto and Freeformat SPID. The TERMCHK command informs the operating company personnel if the terminal attempted to initialize using AutoSPID.
- Feature AF7346, Default Service. The TERMCHK command informs the operating company personnel if the terminal has default service.
- Feature AF7327, 8 logical terminals on a BRI loop (CM portion). The TERMCHK command provides initialization data on up to eight fully-initializing terminals on an ISDN interface.

Datafill

BRI multiple terminal maintenance modifies table LTPDEF. It adds a new tuple entry in table LTPDEF to accommodate the TERMCHK command. The LTPDEF tuples for the L2LOGCTL and L3LOGCTL commands are moved to a new, non-menu LTPISDN MAP display index. The CMDINDEX and POSITION fields are expanded from 0 - 31 to 0 - 63. This doubles the number of available commands that can be implemented under each LTP sublevel.

Table 21-1 shows the affected fields in table LTPDEF.

Table 21-1 Changed fields in table LTPDEF

Field name	Range of values	Status	Default values
KEYDEF			
SUBLEVEL	String range	Unchanged	None
CMDINDEX	Range 0 through 63	Changed	0 through 63
COMMAND			
CMDSRC	String range	Unchanged	LTPISDN
REFINE FOR LTPISDN			
CMD	String range	Changed/new	None
POSITION	Range 0 through 63	Changed	0 through 63

The following list describes the changed fields in table LTPDEF:

- CMDINDEX is the first part of a two-part key into table LTPDEF.
- CMD represents LTP commands available at the MAP terminal. Four refinements exist for the LTPMAN, LTPLTA, LTPISDN, and LTPDATA.
- POSITION represents the specific position of the command in the associated LTP sublevel.

Datafill sequence

There are no prerequisites.

LTPDEF table sizing

Table LTPDEF ranges in size from a minimum of 0 tuples to a maximum of 512 tuples.

Dump and restore

Use the reformat procedure LTPDEF_TABLE_SUB_LTPISDN_REFORMAT to accomplish the following tasks:

- move the L2LOGCTL tuple to a new index and position
- move the L3LOGCTL tuple to a new index and position
- add the TERMCHK tuple

Figure 21-1 shows the MAP display when moving the L2LOGCTL tuple to a new index and position before introduction of the BRI multiple terminal maintenance feature.

Figure 21-1 Moving the L2LOGCTL, old position

```
 KEYDEF            COMMAND                POSITION
 ------------------------------------------------------
LTPISDN  4        LTPISDN L2LOGCTL       4
```

Figure 21-2 shows the MAP display when moving the L2LOGCTL tuple to a new index and position after the introduction of the BRI multiple terminal maintenance feature.

Figure 21-2 Moving the L2LOGCTL, new position

```
KEYDEF            COMMAND                POSITION
------------------------------------------------------
LTPISDN  32       LTPISDN L2LOGCTL       32
```

Figure 21-3 shows the MAP display when moving the L3LOGCTL tuple to a new index and position before introduction of the BRI multiple terminal maintenance feature.

Figure 21-3 Moving the L3LOGCTL, old position

```
KEYDEF              COMMAND                  POSITION
-------------------------------------------------------
LTPISDN  5          LTPISDN L3LOGCTL         5
```

Figure 21-4 shows the MAP display when moving the L3LOGCTL tuple to a new index and position after the introduction of the BRI multiple terminal maintenance feature.

Figure 21-4 Moving the L3LOGCTL, new position

```
KEYDEF              COMMAND                  POSITION
-------------------------------------------------------
LTPISDN  33         LTPISDN L3LOGCTL         33
```

Figure 21-5 shows the MAP display when adding the TERMCHK tuple.

Figure 21-5 Adding the TERMCHK tuple

```
KEYDEF              COMMAND                  POSITION
-------------------------------------------------------
LTPISDN 4            LTPISDN TERMCHK          4
```

User interface

The BRI multiple terminal maintenance feature adds a new MAP terminal command, TERMCHK, at the LTPISDN level. This command is issued on a posted ISDN line and has no parameters. The command displays the line's TEIs, provisioned SPIDs, CPE SPIDs, the initialization result, and the status of layer 2 and layer 3 for each TEI.

TERMCHK is a menu, RES command. It targets the DMS SuperNode and BNR Reduced Instruction Set Computer (BRISC) processors.

To access the LTPISDN level of the MAP display, type

>MAPCI;MTC;LNS;LTP;LTPISDN

To return to the CI position, type

>QUIT ALL

Responses for the TERMCHK HELP command

Figure 21-6 depicts the HELP response for the TERMCHK command on a posted BRI LEN. There are no additional parameters associated with the TERMCHK command.

Figure 21-6 TERMCHK HELP command on a posted BRI LEN

```
>HELP TERMCHK
TERMCHK- Provides initialization status information for Basic
         Rate Access Functional terminals on an ISDN LEN posted
         in the Control Position of the MAP.
```

Figure 21-7 depicts the HELP response for the TERMCHK command when a LEN is not posted.

Figure 21-7 TERMCHK HELP command when a LEN is not posted

```
>HELP TERMCHK
The TERMCHK command queries the protocol status of the
physical Basic Rate Access Functional Sets (BRAFS) on an ISDN
LEN. The command also provides layer three initialization
information for the circuit switched and/or packet switched
service(s) on a physical terminal. In addition, it shows the
provisioned BRAFS logical terminals (i.e., LTIDs) that are not
associated with a physical terminal on the posted ISDN LEN.
The TERMCHK command is only valid for the following terminals:
ISDN lines.
To view a TERMCHK command syntax, POST a terminal the TERMCHK
command is valid for.
```

Figure 21-8 depicts the HELP response for the TERMCHK command when the posted LEN is not ISDN. Note that LINE TYPE varies based on the type of LEN posted, for example, plain old telephone service (POTS) or COIN.

Figure 21-8 TERMCHK HELP command when a posted LEN is not ISDN

```
>HELP TERMCHK
TERMCHK command is not valid on ‘LINE TYPE’ lines.
```

TERMCHK display field descriptions

Figure 21-9 depicts the layout of the fields associated with the response for an integrated FIT physical terminal.

Figure 21-9 TERMCHK sample response on a 2BD FIT terminal

```
Circuit Switched Services:
=========================

TEI:  64       LTID: ISDN 200
   Service: Circuit Switched          Protocol Status:  3
    Directory Number: 6198732450       KEY: 1
    DMS TSPID: 6198732450
    L3 Init result: Initialized

Packet Switched Services:
========================

TEI:  DYN       LTID: ISDN 200
   Service: LAPD Packet Switched       Protocol Status:  2
    Directory Number: 6198732450       KEY: 25

Unused Logical Terminal Profiles:
================================

No Unused ISDN BRAFS Logical Terminals have been detected.
```

Field descriptions for circuit-switched services

The line references and field descriptions in this section refer to Figure 21-9.

Line 1 The first line of the display provides an association between the physical terminal TEI and the provisioned logical terminal. This line provides the physical terminal TEI value and the associated provisioned terminal, that is, LTID.

Line 2 The second line of the display provides the service type of circuit-switched service. The service type range is circuit.

The protocol layer status of the service is

- --
- 2
- 3

TEIs that can be associated to an LTID use data lookup in the CM to determine the potential service types allowed on the terminal. Table 21-2 shows the correlation between the provisioned logical terminal access privilege (LTAP) and the service type.

Table 21-2 DMS provisioned access privileges

Logical terminal access privilege	Service displayed
CIRCUIT_SWITCHED (LTAP=B)	Circuit Switched
PACKET_SWITCHED_D (LTAP=D)	LAPD Packet Switched
PACKET_SWITCHED_B (LTAP=PB)	LAPB Packet Switched
CIRCUIT_AND_D_PACKET_SWITCHED (LTAP=BD)	Circuit Switched (Note)
TWO_B_CIRCUIT_SWITCHED (LTAP=2B)	Circuit Switched
TWO_B_CIRCUIT_D_PKT_SWITCHED (LTAP=2BD)	Circuit Switched and LAPD Packet Switched

Note: Historically, this access privilege was used to provide circuit switched and packet-switched service on the data packet network (DPN) platform. The current ISDN packet platform, DMSPH, does not support logical terminals with this access privilege. The TERMCHK command only provides packet data for DMSPH-based packet terminals.

Line 3 The third line of the display provides the directory number (DN) of the service as well as the key on which the DN resides.

Line 4 For terminals with a circuit-switched service, the fourth line of the display provides the provisioned TSPID for the terminal.

Line 5 For FIT terminals failing to initialize, the fifth line of the display contains the failed CPE SPID, which includes the SPID terminal identifier (TID). It also indicates whether an AutoSPID attempt was made on this terminal. The AutoSPID indication is only reset when the associated terminal loses layer 2. Note how this line is not displayed if the terminal is initialized or the initialization reason is unknown.

Line 6 For terminals with circuit-switched service, the sixth line of the display indicates the layer 3 initialization result.

Table 21-3 provides the range of allowable reasons for Layer 3 initialization.

Table 21-3 Layer 3 reason codes

Layer 3 SPID initialization failure reason	Hex representation	User display output
Reason Unknown	0	Reason Unknown
Non-Initializing	1	Non-Initializing
TermL Exceeded	2	TermL Exceeded
SPID Mismatch	3	SPID mismatch
SPID in Use	4	SPID in use
Invalid SPID	5	Invalid SPID
Initialized	6	Initialized
Init Not Required	7	Initialization not required
No LTIDs Provisioned	8	No Circuit-Switched BRAFS LTIDs provisioned

The following list describes the circuit-switched layer 3 initialization return codes:

- Reason Unknown

  This reason indicates the initialization reason could not be determined in the XPM.

- Non-Initializing

  This reason code is assigned when the terminal is successfully associated with a default LTID, that is, an NIT. This reason code is appropriate until the terminal attempts SPID initialization.

  An NIT failure reason changes from TermL Exceeded to Non-Initializing when it successfully associates with the default LTID. Such a transition occurs either when TermL is increased, through provisioning, or other NITs on the same BRI loop are removed.

- TermL Exceeded

  This reason code is used for NITs exclusively. This is because it refers to terminals that can not be associated with the default LTID because the TermL has been met on the BRI loop. In this case, the NIT attempts to associate with the default services, if available. This reason code is only transiently valid for an FIT that has failed to associate with the default LTID. It is only valid for an FIT before it has requested SPID initialization for the first time. However, once the terminal requests SPID initialization, the reason code is updated with a SPID failure reason if it fails initialization. If the terminal initializes successfully, the reason code is updated to reflect terminal initialization.

- SPID Mismatch

  This reason code indicates the SPID requested does not match a SPID that is datafilled for the loop.

- SPID in Use

  This reason code indicates the SPID requested is currently being used by another terminal on the same LEN.

- Invalid SPID

  This reason code indicates the SPID requested is considered invalid. For example, the incoming SPID request was not more than two digits.

- Initialized

  This reason code indicates the terminal is associated with a SPID. Therefore, layer 3 is up and initialized.

- Init Not Required

  This reason code indicates this type of terminal does not require initialization. This type of return would be applicable for static TEI terminals.

- No LTIDs Provisioned

  This return code indicates the CM detected the LEN is not provisioned with a BRAFS LTID capable of circuit-switched service. This is an LTID with circuit-switched access privilege capabilities. This return code overrides all other return codes when the LEN is not provisioned with a circuit-switched LTID, that is, an NIT or FIT.

Field descriptions for packet-switched services

The line references and field descriptions in this section refer to Figure 21-9.

Line 1 The first line of the display provides an association between the physical terminals TEI and the provisioned logical terminal. This line provides the physical terminal TEI value and the associated provisioned terminal, that is, LTID. For dynamic TEIs, DYN is displayed.

Line 2 The second line of the display provides the service type of LAPB packet or LAPD packet-switched service.

The service type range is

- LAPB packet
- LAPD packet switched

The protocol layer status of the service is

- --
- 2
- 3

Line 3 The third line of the display provides the DN of the packet service as well as the key upon which the DN resides.

Line 4 The fourth line of the display provides the DMSPH query status. This line is only displayed if an error occurs during the data retrieval of terminal data from the DMSPH. Table 21-4 provides the range of potential failure reasons.

Table 21-4 DMSPH query failure status range

DSMPH packet failure return code	Hex representation	User display output
XLIU_ERROR	1	Query failed--XLIU in invalid state
MSG_ERROR	2	Query failed--Resources Unavailable
TIMEOUT	3	Query failed--XLIU message time-out
UNMAPPED_LTID	4	Query failed--Provisioning Error

TERMCHK display examples

Each of the following sections provides examples of both the provisioning preconditions and the user output.

Default TSP display Figure 21-10 and Figure 21-11 depict the anticipated output for an ISDN BRAFS circuit-switched NIT physical terminal.

Figure 21-10 Provisioning preconditions for default TSP display

```
>QLEN 1 0 0 1
-------------------------------------------------------------

LEN:     HOST  01 0 00 1
ISG: 0 DCH: 0 ISG BRA CHANNEL: 1
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    33
PM TERMINAL NUMBER :    2
  TEI         LTID        CS    PS     BCH/ISG Bd
  ---     -------------   --    --     -------
DYNAMIC   ISDN        1    Y     N      -
DYNAMIC   ISDN        2    Y     N      -
DYNAMIC   ISDN     1022    Y     N      -

Where:

LTID:       Terminal Type:
ISDN 1      Circuit Switched FIT
ISDN 2      Circuit Switched FIT
ISDN 1022   Circuit Switched NIT %% TERML is set to 4.
```

Figure 21-11 TERMCHK response, default TSP display

```
>TERMCHK
LEN: HOST 1 0 0 1

Circuit Switched Services:
=========================

TEI: 64      LTID: ISDN 1
   Service: Circuit Switched      Protocol Status: 3
     Directory Number: 6198732401       KEY: 1
     DMS TSPID: 6198732401
     L3 Init result: Initialized

TEI:  65      LTID: ISDN 1022
   Service: Circuit Switched     Protocol Status: 3
     Directory Number: 6198732400    KEY: 1
     DMS TSPID: Default TSP
     CPE  SPID: 61972324??        Auto SPID Attempted: Y
     L3 Init result: Invalid SPID

TEI:  66      LTID: ISDN 1022
   Service: Circuit Switched    Protocol Status: 3
     Directory Number: 6198732400       KEY: 1
     DMS TSPID: Default TSP
     CPE  SPID: 6198732401    Auto SPID Attempted: N
     L3 Init result: SPID in use

TEI:  71      LTID: ISDN 1022
   Service: Circuit Switched    Protocol Status: 3
     Directory Number: 6198732400      KEY: 1
     DMS TSPID: Default TSP
     CPE  SPID: 619873250000    Auto SPID Attempted: N
     L3 Init result: SPID mismatch


TEI:  73      LTID: ISDN 1022
   Service: Circuit Switched     Protocol Status: 3
     Directory Number: 6198732400      KEY: 1
     DMS TSPID: Default TSP
     CPE  SPID: --------------------   Auto SPID Attempted: N
     L3 Init result: Non-Initializing

Packet Switched Services:
========================

No Physical ISDN BRAFS Terminals with Packet Switched
Services have been detected.

Unused Logical Terminal Profiles:
================================
LTID: ISDN 2
  Service: Circuit Switched     Protocol Status: --
    Directory Number: 6198732402       KEY: 1
    DMS TSPID: 6198732402
```

Default service display Figure 21-12 and Figure 21-13 depict the anticipated output for an ISDN BRAFS circuit-switched physical terminal that is associated with default service.

Figure 21-12 Provisioning preconditions for default service display

```
>QLEN 1 0 0 1
-------------------------------------------------------------

LEN:      HOST  01 0 00 1
ISG: 0 DCH: 0 ISG BRA CHANNEL: 1
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    33
PM TERMINAL NUMBER :    2
  TEI         LTID        CS    PS     BCH/ISG Bd
  ---     -------------   --    --     -------
DYNAMIC   ISDN        1    Y     N      -
DYNAMIC   ISDN        2    Y     N      -

Where:

LTID:       Terminal Type:
ISDN 1      Circuit Switched FIT
ISDN 2      Circuit Switched FIT
```

Figure 21-13 TERMCHK response, default service display

```
>TERMCHK
LEN: HOST 1 0 0 1

Circuit Switched Services:
=========================

TEI:  75   Associated with Default Service
   Service: Circuit Switched     Protocol Status: 3
     DMS TSPID: Default Service
     CPE  SPID: 61972324??       Auto SPID Attempted: N
     L3 Init result: Invalid SPID

TEI:  74   Associated with Default Service
   Service: Circuit Switched     Protocol Status: 3
     DMS TSPID: Default Service
     CPE  SPID: 6198732401 Auto SPID Attempted: N
     L3 Init result: SPID in use

TEI:  71   Associated with Default Service
   Service: Circuit Switched     Protocol Status: 3
     DMS TSPID: Default Service
     CPE  SPID: 619873240500     Auto SPID Attempted: N
     L3 Init result: SPID mismatch

TEI:  73   Associated with Default Service
   Service: Circuit Switched     Protocol Status: 3
     DMS TSPID: Default Service
     CPE  SPID: ---------------  Auto SPID Attempted: N
     L3 Init result: Non-Initializing

TEI: 64      LTID: ISDN 1
   Service: Circuit Switched      Protocol Status: 3
     Directory Number: 6198732401       KEY: 1
     DMS TSPID: 6198732401
     L3 Init result: Initialized

Packet Switched Services:
========================

No Physical ISDN BRAFS Terminals with Packet Switched
Services have been detected.

Unused Logical Terminal Profiles:
================================

LTID: ISDN 2
  Service: Circuit Switched     Protocol Status: --
    Directory Number: 6198732402       KEY: 1
    DMS TSPID:  6198732402
```

Default service display, TERML=1 Figure 21-14 and Figure 21-15 depict the anticipated output for an ISDN BRAFS circuit-switched physical terminal that is associated with default service.

Figure 21-14 Provisioning preconditions for default service display, TERML=1

```
>QLEN 1 0 0 1
--------------------------------------------------------------

LEN:     HOST  01 0 00 1
ISG: 0 DCH: 0 ISG BRA CHANNEL: 1
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    33
PM TERMINAL NUMBER :    2
  TEI         LTID        CS    PS     BCH/ISG Bd
  ---      -------------  --    --     -------
DYNAMIC   ISDN     1022    Y     N      -

Where:

LTID:       Terminal Type:
ISDN 1022   Circuit Switched NIT %% TERML is 1
```

Figure 21-15 TERMCHK response, default service display, TERML=1

```
>TERMCHKk
LEN: HOST 1 0 0 1

Circuit Switched Services:
=========================

TEI:  73      LTID: ISDN 1022
   Service: Circuit Switched     Protocol Status: 3
     Directory Number: 6198732400      KEY: 1
     DMS TSPID: Default TSP
     CPE  SPID: --------------------   Auto SPID Attempted: N
     L3 Init result: Non-Initializing

TEI:  74 Associated with Default Service
   Service: Circuit Switched     Protocol Status: 3
     DMS TSPID: Default Service
     CPE  SPID: --------------------      Auto SPID Attempted: N
     L3 Init result: TERML

Packet Switched Services:
========================

No Physical ISDN BRAFS Terminals with Packet Switched
Services have been detected.

Unused Logical Terminal Profiles:
================================

No Unused ISDN BRAFS Logical Terminals have been detected.
```

No default service display, TERML=1 Figure 21-16 and Figure 21-17 depict the anticipated output for an ISDN BRAFS circuit-switched terminal when default services is not enabled.

Figure 21-16 Provisioning preconditions for no fault service display, TERML=1

```
>QLEN 1 0 0 1
-------------------------------------------------------------

LEN:     HOST  01 0 00 1
ISG: 0 DCH: 0 ISG BRA CHANNEL: 1
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    33
PM TERMINAL NUMBER :    2
  TEI          LTID        CS    PS     BCH/ISG Bd
  ---     -------------    --    --     -------
DYNAMIC   ISDN     1022     Y     N      -

Where:

LTID:       Terminal Type:
ISDN 1022   Circuit Switched NIT %% TERML is 1
```

Figure 21-17 TERMCHK response, no default service display, TERML=1

```
>TERMCHK
LEN: HOST 1 0 0 1

Circuit Switched Services:
=========================

TEI:  73      LTID: ISDN 1022
   Service: Circuit Switched     Protocol Status: 3
     Directory Number: 6198732400      KEY: 1
     DMS TSPID: Default TSP
     CPE  SPID: --------------------   Auto SPID Attempted: N
     L3 Init result: Non-Initializing

TEI:  74     LTID: Not Associated
   Service: Circuit Switched     Protocol Status: 2
     CPE  SPID: --------------------   Auto SPID Attempted: N
     L3 Init result: TERML

Packet Switched Services:
========================

No Physical ISDN BRAFS Terminals with Packet Switched
Services have been detected.

Unused Logical Terminal Profiles:
================================

No Unused ISDN BRAFS Logical Terminals have been detected.
```

Packet service Figure 21-18 and Figure 21-19 depict the anticipated output for an ISDN BRAFS LAPB and LAPD packet-switched service physical terminal.

Figure 21-18 Provisioning preconditions for packet service

```
>QLEN 1 0 0 1
-------------------------------------------------------------

LEN:     HOST  01 0 00 1
ISG: 0 DCH: 0 ISG BRA CHANNEL: 1
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    33
PM TERMINAL NUMBER :    2
LEN HAS ONE NAILEDUP B-CHANNEL

  TEI         LTID        CS    PS     BCH/ISG Bd
  ---     -------------   --    --     -------
   21     ISDN      300    N     D     ISG Bd: 31
   22     ISDN      301    N     D     ISG Bd: 30
DYNAMIC   ISDN        1    Y     N      -
   -      ISDN      400    N     B     B2
Where:

LTID:       Terminal Type:
ISDN 300    LAPD Packet Switched
ISDN 301    LAPD packet Switched
ISDN 1      Circuit Switched FIT
ISDN 400    LAPB Packet Switched
```

Figure 21-19 TERMCHK response, packet service

```
>TERMCHK
LEN: HOST 1 0 0 1
Circuit Switched Services:
=========================

TEI:  71   Associated with Default Service
   Service: Circuit Switched        Protocol Status: 3
     DMS TSPID: Default Service
     CPE  SPID: 619873240500        Auto SPID Attempted: N
     L3 Init result: SPID mismatch

TEI: 64      LTID: ISDN 1
   Service: Circuit Switched        Protocol Status: 3
     Directory Number: 6198732401       KEY: 1
     DMS TSPID: 6198732401
     L3 Init result: Initialized

Packet Switched Services:
========================

TEI: 21      LTID: ISDN 300
   Service: LAPD Packet Switched    Protocol  Status: 2
     Directory Number: 6198732501       KEY: 1

TEI: 22      LTID: ISDN 301
   Service: LAPD Packet Switched    Protocol  Status: 3
     Directory Number: 6198732502       KEY: 1

TEI: N/A     LTID: ISDN 400
   Service: LAPB Packet Switched    Protocol Status: 3
   Directory Number: 6198732600          KEY: 1

Unused Logical Terminal Profiles:
================================

No Unused ISDN BRAFS Logical Terminals have been detected.
```

Integrated FIT terminal display Figure 21-20 and Figure 21-21 depict the anticipated output for an ISDN BRAFS physical terminal that is associated with an integrated LAPD packet and circuit-switched service FIT logical terminal.

Figure 21-20 Provisioning preconditions for integrated FIT terminal display

```
>QLEN 1 0 0 1
-------------------------------------------------------------

LEN:     HOST  01 0 00 1
ISG: 0 DCH: 0 ISG BRA CHANNEL: 1
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    33
PM TERMINAL NUMBER :    2

  TEI          LTID        CS    PS     BCH/ISG Bd
  ---     -------------   --    --     -------
DYNAMIC   ISDN      200    Y     D     ISG Bd: 31
DYNAMIC   ISDN      201    Y     D     ISG Bd: 31
Where:

LTID:       Terminal Type:
ISDN 200    LAPD Packet Switched & Circuit Switched Service FIT
ISDN 201    LAPD Packet Switched & Circuit Switched Service FIT
```

Figure 21-21 TERMCHK response, integrated FIT terminal display

```
>TERMCHK
LEN: HOST 1 0 0 1

Circuit Switched Services:
=========================

TEI:  64      LTID: ISDN 200
   Service: Circuit Switched        Protocol Status:  3
     Directory Number: 6198732450       KEY: 1
     DMS TSPID: 6198732450
     L3 Init result: Initialized

Packet Switched Services:
========================

TEI:  DYN      LTID: ISDN 200
   Service: LAPD Packet Switched    Protocol Status:  3
     Directory Number: 6198732450       KEY: 25

Unused Logical Terminal Profiles:
================================

LTID: ISDN 201
   Service: Circuit Switched        Protocol Status:  --
     Directory Number: 6198732451       KEY: 1
     DMS TSPID:  6198732451
   Service: LAPD Packet Switched    Protocol Status:  --
     Directory Number: 6198732451       KEY: 25
```

Integrated NIT terminal display Figure 21-22 and Figure 21-23 depict the anticipated output for an ISDN BRAFS packet and circuit-switched integrated NIT terminal.

Figure 21-22 Provisioning preconditions for integrated NIT terminal display

```
>QLEN 1 0 0 1
-------------------------------------------------------------

LEN:     HOST  01 0 00 1
ISG: 0 DCH: 0 ISG BRA CHANNEL: 1
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    33
PM TERMINAL NUMBER :    2

  TEI         LTID        CS    PS     BCH/ISG Bd
  ---     -------------   --    --     -------
DYNAMIC   ISDN      200    Y     D     ISG Bd: 31
DYNAMIC   ISDN      201    Y     D     ISG Bd: 31
Where:

LTID:       Terminal Type:
ISDN 200    LAPD Packet Switched & Circuit Switched Service NIT
             %% TERML is 2
ISDN 201    LAPD Packet Switched & Circuit Switched Service NIT
```

Figure 21-23 TERMCHK response, integrated NIT terminal display

```
>TERMCHK
LEN: HOST 1 0 0 1
Circuit Switched Services:
=========================

TEI:  64      LTID: ISDN 200
   Service: Circuit Switched        Protocol Status:  3
     Directory Number: 6198732450       KEY: 1
     DMS TSPID: Default TSP
     CPE  SPID: 619873245000    Auto SPID Attempted: Y
     L3 Init result: SPID mismatch

TEI:  65      LTID: ISDN 200
   Service: Circuit Switched        Protocol Status:  3
     Directory Number: 6198732450       KEY: 1
     DMS TSPID: Default TSP
     CPE  SPID: 619873245000    Auto SPID Attempted: Y
     L3 Init result: SPID mismatch


Packet Switched Services:
========================

TEI:  DYN      LTID: ISDN 200
   Service: LAPD Packet Switched    Protocol Status:   3
     Directory Number: 6198732451       KEY: 25

Unused Logical Terminal Profiles:
================================

LTID: ISDN 201
   Service: Circuit Switched        Protocol Status:  --
     Directory Number: 6198732451       KEY: 1
     DMS TSPID: 6198732451
   Service: LAPD Packet Switched    Protocol Status:  --
     Directory Number: 6198732451       KEY: 25
```

LAPD packet only NIT terminal display Figure 21-24 and Figure 21-25 depict the anticipated output for an ISDN BRAFS packet only NIT terminal. An LAPD NIT requires SAPI 0 initialization prior to initiating SAPI 16 LAPD initialization procedures. As a result, a nonassociated circuit-switched service is displayed in addition to the packet-switched service.

Figure 21-24 Provisioning preconditions for LAPD packet only NIT terminal display

```
>QLEN 1 0 0 1
-------------------------------------------------------------

LEN:     HOST  01 0 00 1
ISG: 0 DCH: 0 ISG BRA CHANNEL: 1
CARDCODE:  BX27AA    PADGRP: NPDGP
PM NODE NUMBER     :    33
PM TERMINAL NUMBER :    2

  TEI         LTID        CS    PS     BCH/ISG Bd
  ---     -------------   --    --     -------
DYNAMIC   ISDN      200    N     D     ISG Bd: 31

Where:

LTID:       Terminal Type:
ISDN 200    LAPD Packet Switched NIT
```

Figure 21-25 TERMCHK response, LAPD packet only NIT terminal display

```
>TERMCHK
LEN: HOST 1 0 0 1
Circuit Switched Services:
=========================

NOTE: This LEN has LAPD packet NIT service on LTID: ISDN 200
One of the following non-associated services is required
for the initialization of the LAPD NIT. It does not
represent a circuit switched terminal initialization problem.

TEI:  64      LTID: Not Associated
   Service: Circuit Switched        Protocol Status:  2
     CPE  SPID: 619873240100    Auto SPID Attempted: N
     L3 Init result: No Circuit Switched BRAFs LTIDs provisioned

Packet Switched Services:
========================

TEI:  DYN      LTID: ISDN 200
   Service: LAPD Packet Switched    Protocol Status:   3
     Directory Number: 6198732451       KEY: 25

Unused Logical Terminal Profiles:
================================

No Unused ISDN BRAFS Logical Terminals have been detected.
```

22 BRI verification-office equipment

Description

Integrated services digital network (ISDN) basic rate interface verification-office equipment (BRIV-OE) is a service assurance feature used by the operating company installation and maintenance personnel. This feature provides dial access from the customer premises for the operating company personnel to retrieve the office equipment (OE) identification. The OE identification identifies the termination of the access line in use.

The BRIV-OE call follows the normal call control signaling procedures defined in the requirement TR-TSY-000268. The BRIV-OE call is accessed by dialing an operating company defined 3-digit access code or a 7-digit directory number. The operating company can designate either number on a switch basis. This number is a dedicated software number that can not be used for any other purpose. It does not require physical equipment to support it. The BRIV-OE call can be accessed over the basic rate interface (BRI) access line at the customer premises through a fully initializing terminal (FIT). It also can be accessed over the BRI access line at the customer premises through a noninitializing terminal (NIT). For an NIT, or for an FIT that can not be initialized properly, the BRIV-OE capability must be provided as a default service. When the operating company personnel gains access, the OE information associated with the line equipment number (LEN) is retrieved and formatted. This information appears on the terminal display panel in the form, OE=<OE identification value>.

The user can take down the BRIV-OE call. The BRIV-OE timer on the switch also can take down the call if the user does not release the call before the timer expires. The BRIV-OE timer is set to 60 s and is not provisionable. If the user takes down the call, the OE id value is not displayed on the MAP (maintenance and administration) terminal. The OE id value display is cleared after the call is taken down. Also, the OE id value display is cleared upon an incoming call.

The BRIV-OE call supports both the circuit mode data (CMD) information and voice and voiceband data information (VI) call types. In order to use the BRIV-OE capability, the ISDN terminal must have the capability to display the call control display information. Protocol version control (PVC) -2 functional terminals are fully supported. The following information comprises the display text for a PVC-2 terminal:

- 3-character leading indication (OE=)
- 15-character line equipment number (LEN) (site name, frame, enhanced ISDN line concentrating module [LCME] unit, line subgroup, and circuit)
- 2-character trailing indication for the termination of the line (-S for termination in the switch or -I for termination in a remote peripheral)

PVC-1 functional terminals also are supported. However, they have limitations on the message type that carries the OE information and on the presentation of the OE information. Those PVC-1 limitations are

- The OE id value is sent to the terminal to a notify message instead of an information message. Note this differs from the TR-NWT-0001329 requirement that OE id value be sent to an information message.
- The display text is sent as called number (CDN) in the notify message. It is limited to 15 characters. As a result, the terminal display panel shows only the 15-character LEN. The terminal display panel does not show the leading indication of OE= or the trailing indicator for the line termination.

Table 22-1 contains sample display text for PVC-2 and PVC-1 functional terminals:

Table 22-1 Display examples of PVC-2 and PVC-1 terminals

Term Type	**Display example**																			
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**2**
PVC-2	O	E	=	H	O	S	T		1	2		1		0	8		0	4	-	S
PVC-1	H	O	S	T		1	2		1		0	8		0	4					

ISDNBRIVOE is displayed in the terminating directory number (DN) field of the MAP display to indicate an on-going BRIV-OE call when the following conditions exit:

- an ISDN line or B channel is in the posted position or on hold at the MAP display line test position (LTP) level
- a BRIV-OE call is made from that ISDN line or B channel

Call translations are datafilled to route the BRIV-OE call to a terminating agency identified by a common language location identifier (CLLI). In addition, the translations are also entered to provision the BRIV-OE call as a default service.

Message protocols

As required by TR-NWT-0001329, the OE id value is sent to the ISDN terminal in a Q.931 information message. This is true for PVC-2 functional terminals only. PVC-1 functional terminals do not support the information message. Instead of an information message, a Q.931 notify message is used to send the OE information to PVC-1 functional terminals.

Table 22-2 summarizes the OE information messages.

Table 22-2 OE information messages

Term type	PVC-2	PVC-1
Term requirements	TR-NWT-0001329	None
Message	Q.931 information	Q.931 notify
OE information	Display text IE	FAC: CDNM
Display text tag	Status	NA
Display text length	20 characters	15 characters

Hardware requirements

The DN 9596300, or the DN chosen by the office to access the BRIV-OE call, is a software number that does not require hardware to support it.

Limitations and restrictions

The following limitations and restrictions apply to BRIV-OE:

- ISDN PVC-1 functional terminals act differently than ISDN PVC-2 functional terminals.
- The ISDN terminal must have a display panel.
- The layer 3 connection must be established for the terminal.
- There must be at least one B channel available to the call.
- The CLLI ISDNBRIVOE is reserved for the BRIV-OE call.
- It is possible the OE value will be overwritten or cleared due to an incoming call.
- The BRIV-OE call is dropped upon XMS-based peripheral module (XPM) warm switch of activity (SWACT).

Interactions

BRIV-OE does not require the default service feature. If the default service feature is present, you can access the BRIV-OE capability as a default service.

Translation tables datafill

To enable the BRIV-OE capability in an office, the translation tables in the central control must be entered to

- define a CLLI for a BRIV-OE call
- define a 3-digit code or a 7-digit access number and route the translations to the defined CLLI
- datafill the BRIV-OE call as a default service

Define a CLLI

Use Table 22-3, Table CLLI, to define a CLLI for the BRIV-OE call. The following table describes the datafill for table CLLI.

Table 22-3 Table CLLI

CLLI	ADNUM	TRKGRSIZ	ADMININF
ISDNBRIVOE	1234	1	ISDN_BRIV_LINE

Note 1: Enter datafill provided in column CLLI exactly as it appears.

Note 2: Datafill provided in columns TRKGRSIZ and ADMININF is recommended datafill.

Note 3: Datafill provided in column ADNUM is for example only.

Table 22-4 provides the field descriptions for table CLLI.

Table 22-4 Field descriptions for table CLLI

Field	Description
CLLI	Common language location identifier
ADNUM	Administrative number
TRKGRSIZ	Trunk group size
ADMININF	Administrative information

Translations for a 3-digit code or a 7-digit access number

In table STDPRTCT (standard pretranslator control), position at EXTPRTNM (external pretranslator name) for the ISDN lines. Then, select subtable

STDPRT (standard pretranslator). Table 22-5 describes the datafill for subtable STDPRT.

Table 22-5 Table STDPRTCT subtable STDPRT

FROM DIGS	TODIGS	PRERT SEL	TYP CALL	NOPRE DIG	CLLI	MIN DIGSR	MAX DIGSR	POS
234	234	S	DD	0	ISDNBRIVOE	3	3	NONE
9596300	9596300	S	DD	0	ISDNBRIVOE	7	7	NONE

Note 1: Enter datafill provided in columns PRERT SEL, TYP CALL, NOPRE DIG, CLLI, MIN DIGSR, MAX DIGSR, and POS exactly as it appears.

Note 2: Datafill provided in columns FROMDIGS and TODIGS is for example only.

Table 22-6 provides the field descriptions for table STDPRTCT subtable STDPRT.

Table 22-6 Field descriptions for table STDPRTCT subtable STDPRT

Field	Description
FROMDIGS	Suggested dialed number to invoke ISDN BRIV-OE call
TODIGS	Suggested dialed number to invoke ISDN BRIV-OE call
PRERTSEL	Pre routine selector
TYPCALL	Type of call
NOPREDIG	Number of prefix digits
CLLI	Common language location identifier
MINDIGSR	Minimum number of digits
MAXDIGSR	Maximum number of digits
POS	Position

Alternate translations for a 7-digit access number

In table HNPACONT (home number plan area control), position at STS (serving translation scheme) for the central office. Then, select subtable

HNPACODE (home number plan area code). Table 22-7 describes the datafill for subtable HNPACODE.

Table 22-7 Table HNPACONT subtable HNPACODE

FROMDIGS	TODIGS	CDRRMT	RR
9596300	9596300	LRTE	78

Note 1: Enter datafill provided in column CDRRMT exactly as it appears.

Note 2: Datafill provided in columns FROMDIGS and TODIGS is recommended datafill.

Note 3: Datafill provided in column RR is for example only.

Table 22-8 provides the field descriptions for table HNPACONT subtable HNPACODE.

Table 22-8 Field descriptions for table HNPACONT subtable HNPACODE

Field	Description
FROMDIGS	Suggested dialed number to invoke ISDN-BRIV-OE call
TODIGS	Suggested dialed number to invoke ISDN-BRIV-OE call
CDRRTMT	LRTE (route in subtable RTEREF)
RR	Route reference index in subtable RTEREF

In Table HNPACONT as shown in Table 22-9, position at STS for the central office. Then, select subtable RTEREF (route reference). The following table describes the datafill for subtable RTEREF.

Table 22-9 Table HNPACONT subtable RTEREF

RTE	RTESEL	CONNTYPE	CLLI
78	S	D	ISDNBRIVOE

Note 1: Enter datafill provided in columns RTESEL, CONNTYPE, and CLLI exactly as it appears.

Note 2: Datafill provided in column RTE is for example only.

Table 22-10 provides the field descriptions for table HNPACONT subtable RTEREF.

Table 22-10 Field descriptions for table HNPACONT subtable RTEREF

Field	Description
RTE	Route reference index. This is referenced in table HNPACONT subtable HNPACODE.
RTESEL	Route selector S indicates the call is routed out of the table entry in RTEREF.
CONNTYPE	Connection type is not used. D is the default.
CLLI	CLLI that the translation routes to

In table LCASCRCN (local calling area screening control), position at NPALOCNM (NPA local calling area name) for the central office. Then, select subtable LCASCR (local calling area screening). Table 22-11 describes the datafill for subtable LCASCR.

Table 22-11 Table LCASCRCN subtable LCASCR

FROMDIGS	TODIGS
959	959
Note: Datafill provided in columns FROMDIGS and TODIGS is recommended datafill.	

Table 22-12 provides the field descriptions for table LCASCRCN subtable LCASCR.

Table 22-12 Field descriptions for table LCASCRCN subtable LCASCR

Field	Description
FROMDIGS	Suggested dialed number to invoke ISDN BRIV-OE call
TODIGS	Suggested dialed number to invoke ISDN BRIV-OE call

Translations for default service

The default service for NI-2 terminals is implemented by feature AF7346.

User interface

An indication for a BRIV-OE call is added to MAP LTP level display for the POST and HOLD commands. The BRI verification-office equipment feature does not create any new directories or change any existing directories. It does change the displays for the lines on control or hold positions.

POST command

POST is a menu RES command. Its target is both the Digital Multiplex System (DMS) SuperNode and the BNR Reduced Instruction Set Computer (BRISC). Use the POST command to display the information of a loop by posting its LEN, DN, or some other identification. The BRIV-OE feature does not change any syntax or parameter definitions for the POST command. It requires no system action or user action.

The only change is on the terminating DN field of the MAP display. It shows a BRIV-OE call if there is one BRIV-OE call currently associated with the posted line. See Figure 22-1 for a sample MAP display.

Figure 22-1 POST, one BRIV-OE call on the loop

```
LTP
 0 Quit     POST        DELQ         BUSYQ        PREFIX
 2 Post_    LEN SLCM 04 0 07 11
 3          LCC PTY RNG                        STA F S LTA TE RESULT
 4 Bsy      ISDN LOOP         DN 613 723 4104 CPB     ISDNBRIVOE
 6 Rts
 7 Diag
 8
 9 AlmStat
 .......
 .......    >POST L HOST 04 0 07 11
 .......
```

When two calls are on the same loop, the MAP screen displays only the terminating DN for the most recently connected call. Figure 22-2 shows this situation. A recent call made to 723-4104 overwrites the information for the existing BRIV-OE call made on another B channel.

Figure 22-2 POST, two calls on the same loop

```
LTP          POST        DELQ         BUSYQ        PREFIX
 0 Quit      LEN SLCM 04 0 07 11
 2 Post_     LCC PTY RNG                         STA F S LTA TE RESULT
 3           ISDN LOOP         DN 613 723 4104 CPB      613 723 4106
 4 Bsy
 6 Rts
 7 Diag
 8
 9 AlmStat
 .......
 .......
 .......
```

HOLD command

HOLD is a menu RES command. Its target is both the DMS SuperNode and the BRISC. Use the HOLD command to put the posted line on hold. The BRIV-OE feature does not change any syntax or parameter definitions for the HOLD command. It requires no system action or user action.

The only change is on the terminating DN field of the MAP display. It shows a BRIV-OE call if there is one BRIV-OE call currently associated with the posted line. See Figure 22-3 for a sample MAP display.

Figure 22-3 HOLD, one BRIV-OE call on the loop

```
LTP
 0 Quit      POST        DELQ         BUSYQ        PREFIX
 2 Post_     LEN SLCM 04 0 07 11
 3
 4 Bsy       LCC PTY RNG                         STA F S LTA TE RESULT
 6 Rts       ISDN LOOP         DN 613 723 4104 CPB     ISDNBRIVOE
 7 Diag
 8
 9 AlmStat                     H1 613 723 4104 CPB     ISDNBRIVOE
 .......                       H2 613 723 4104 CPB     ISDNBRIVOE
 .......
 .......
             >POST L HOST 04 0 07 11
```

When two calls are on the same loop, the MAP screen displays only the terminating DN for the most recently connected call. Figure 22-4 shows a posted line and its two B channels on HOLD. Both channels have a call connected. The BRIV-OE call on the B1 channel was made before the call on the B2 channel.

Figure 22-4 HOLD, two calls on the same loop

```
LTP
 0 Quit       POST        DELQ         BUSYQ        PREFIX
 2 Post_      LEN SLCM 04 0 07 11
 3            LCC PTY RNG                        STA F S LTA TE RESULT
 4 Bsy
 6 Rts        ISDN LOOP          DN 613 723 4101 CPB     ISDNBRIVOE
 7 Diag
 8
 9 AlmStat                       H1 613 723 4104 CPB     ISDNBRIVOE
 .......                         H2 613 723 4104 CPB     ISDNBRIVOE
 .......
 .......
```

23 Echo station X.25 loopback testing

Description

The Echo station X.25 user loopback testing feature allows an end user to check network connections for X.25 packet calls as described in Telcordia Technologies general requirement, GR2839. The end user sets up the X.25 loopback test by making an X.25 packet call to an ISDN directory number (DN) that represents the echo station. The echo station echoes back to the end user the data packets sent to it by the end user.

To begin an X.25 loopback test using echo station, the end user generates a call request packet where the address matches the E.164 address assigned to the echo station. The call attempt routes through the network like a normal call. When the call request packet reaches the terminating switch, the switch identifies the address and routes the call request packet to the echo station. After a call connects, the user transmits a data packet to the echo station.

The echo station performs the following functions as part of the X.25 packet call loopback testing:

- extracts the content of the user data field from the incoming data packet
- places the contents of the user data field of the incoming data packet in the user data field of a new data packet
- transmits the new data packet to the end user

The DMS switching system uses normal call clearing procedures to terminate a call to an echo-station. Call establishment and clearing procedures for calls to an echo station are identical to those for calls to any DN. If the duration of a call to an echo station takes longer than the provisioned timeout value, the echo station generates a call clearing packet and clears the call.

The echo station is a software simulation of an ISDN terminal. Echo station X.25 loopback testing does not require an extended multiprocessor system (XPM) or a network interface unit (NIU). However, the echo station does require an X.25 or X.75 link interface unit (XLIU). The echo station DN is an X.25 packet DN with access privilege PB. The echo station DN is a software entity within the XLIU, which loops back the end user data packet call to the end user. The DMS switching system allows the provisioning of a maximum of five echo station DNs for an XLIU.

Limitations and restrictions

The following limitations and restrictions apply to the Echo station X.25 user loopback testing feature:

- The echo station is internal to the DMS.
- An echo station DN can answer a maximum of 16 simultaneous calls.
- The only type of Closed User Group (CUG) that has access to this feature is Ordinary Closed User Group (OCUG).
- The echo station DN can be shared with a BRI voice call type.
- A permanent virtual circuit (PVC) is not allowed for an echo station DN.
- An echo station only supports the looping back of data packets sent to it to by the end user.
- An echo station is provisioned using the ADD command at the ECHOCI level of the MAP.
- An echo station can not be provisioned using SERVORD.
- An echo station can not be a member of a hunt group.
- A maximum of five echo stations can be provisioned to an XLIU.
- An echo station DN must be a primary DN.
- Use of the CHA command is not supported in table LTMAP for an echo station LTID (logical terminal identifier).
- PB is the only valid access privilege for an echo station.
- The LTCLASS for an echo station is BRAFS.
- Only an echo station can have the option ES.
- The ES option is only allowed with an ISDNKSET.
- An echo station LTID can not be changed to non-echo station LTID.
- A non-echo station LTID can not be changed to an echo station LTID.
- An echo station LTID is not datafilled in table LTDEF
- Layer 2 and layer 3 packet abnormality counts do not peg for the echo station.

Operational measurements for echo station

The Echo station X.25 user loopback testing feature introduces no new operational measurements (OM). The Echo station X.25 user loopback testing feature does not modify any existing OMs. OFZ OMs peg for echo station calls.

Interactions

There are no interactions between the Echo station X.25 user loopback testing feature and other software features.

Logs

The Echo station X.25 user loopback testing feature has no log reports related to it.

Office parameter information

The Echo station X.25 user loopback testing feature adds office parameter ECHO_STATION_BILL_PARM to table ISDNVAR. Office parameter ECHO_STATION_BILL_PARM is new in NA012. This office parameter determines if to the echo station DNs are billed. If office parameter ECHO_STATION_BILL_PARM is set to ON, the DMS switching system will bill calls to all of its echo stations and AMA120B records generate. The default setting for office parameter ECHO_STATION_BILL_PARM is OFF. For additional information on office parameter ECHO_STATION_BILL_PARM, refer to the ISDN office parameters chapter of this document or to the *Office Parameters Reference Manual*, 297-8001-855.

ECHOCI MAP level

The Echo station X.25 user loopback testing feature creates a new CI interface called ECHOCI. The ECHOCI MAP level is used to add or remove an echo station or modify its parameters. The ECHOCI MAP level uses the following commands:

- ADD—used to provision an echo station DN on an XLIU service group
- REM—used to remove an echo station DN from service
- MOD—used to modify an echo station’s parameters
- HELP—used with ADD, REM, or MOD commands gives user an explanation of what these commands are used for
- HELP—used with the ECHOCI command gives user explanation of all ECHOCI commands
- ECHOCI—used to display help for all ECHOCI commands
- QUIT—used to get out of the ECHOCI MAP level

Figure 23-1 shows an example of the MAP display that results from the use of the HELP ECHOCI command.

Figure 23-1 MAP display resulting from use of HELP ECHOCI command

```
CI:
>ECHOCI
Welcome to ECHOCI tool
Type HELP EVHOCI for help on ECHOCI tool.
>HELP ECHOCI
**** Tool to Provision Echo Station ****

COMMAND ADD: PROVISIONS ECHO STATION DN/LTID
             COMMAND FORMAT: ADD <LTID> <DN> <CUSTGRP>
             <SUBGRP> <ncos> <TIMEOUT> <MINUTES>

COMMAND MOD: CHANGES ECHO STATION RELATED PARAMETERS FOR
             SPECIFIED LTID
             COMMAND FORMAT: MOD <LTID> <TIMEOUT> <MINUTES>

COMMAND REM: DE-PROVISIONS ECHO STATION LTID/DN
             COMMAND REM: REM <LTID>

QUIT       : QUITS FROM ECHOCI
```

Figure 23-2 shows an example of the MAP display when using the ADD command to add an echo station. Before using the ADD command, check that an LTID with PB access privilege exists in table LTDEF.

Figure 23-2 MAP display example when using ADD command to add an echo station

```
CI:
>ECHOCI
Welcome to ECHOCI tool
Type HELP ECHOCI for help on ECHOCI tool.
>ADD
LTID:
>PKT 200
DN:
>6213456
CUSTGRP
>WINGGRP
SUBGRP:
>0
NCOS:
>0
NPA
>613
TIMEOUT:
>Y
MINUTES:
>15
COMMAND AS ENTERED:
ADD PKT 200 6213456 WINGGRP 0 0 613 Y 15
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
ECHO STATION LTID PKT 200 IS PROVISIONED.
```

Note: Valid TIMEOUT value range is 1–30 minutes.

Table 23-1 lists the error messages related to the ECHOCI ADD command and their causes.

Table 23-1 Error messages associated with the ADD command

ECHOCI ADD command error message	Explanation of cause of error message
LTID XXX IS ALREADY DATAFILLED ECHO STATION PROVISIONING FAILED	User specifies an echo station LTID that already exists in table KSETINV.
LTID IS NOT DATAFILLED IN TABLE LTDEF ECHO STATION PROVISIONING FAILED	User specifies an echo station LTID that is not datafilled in table LTDEF.
PB IS THE ONLY VALID ACCESS PRIVILEGE FOR AN ECHO STATION LTID ECHO STATION PROVISIONING FAILED	User specifies an LTID that is not a valid echo station LTID.
FOR AN ECHO STATION LTID, LTCLASS SHOULD BE BRAFS ECHO STATION PROVISIONING FAILED	User specifies an LTID that does not have LTCLASS BRAFS assigned to it.
<Table Control error message> example: Echo Station LTID XXX provisioning incorrect ECHO STATION PROVISIONING FAILED	Table control is unable to add echo station to tables KSETINV and KSETLINE.
SECONDARY DN CAN NOT BE PROVISIONED TO AN ECHO STATION LTID	User attempts to associate a secondary DN with echo station LTID in table KSETLINE.
NO OPTIONS ARE ALLOWED TO BE PROVISIONED TO AN ECHO STATION LTID	User attempts to add option to echo station LTID in table KSETLINE.

Figure 23-3 shows an example of the MAP display when using the MOD command to modify an echo station’s parameters. The TIMEOUT value modified by the MOD command effects calls after the change is made.

Figure 23-3 MAP display example when using MOD command to modify an echo station's parameters

```
CI:
>ECHOCI
Welcome to ECHOCI tool
Type HELP ECHOCI for help on ECHOCI tool.
ECHOCI:
>REM
LTID:
>PKT 200
TIMEOUT:
>N
COMMAND AS ENTERED:
MOD PKT 200 N
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
PARAMETERS CHANGED FOR ECHO STATION LTID PKT 200
```

Table 23-2 lists the error messages related to the MOD command and an explanation of their causes.

Table 23-2 Error messages associated with the MOD command

ECHOCI MOD command error message	Explanation of cause of error message
LTID XXX IS NOT PROVISIONED MODIFY OPERATION FAILED	User attempts to use MOD command on an LTID that does not exist in table KSETINV.
LTID XXX IS NOT ECHO STATION. THE ECHO STATION CI CAN NOT BE USED TO MODIFY LTID. MODIFY OPERATION FAILED.	User attempts to use MOD command on an LTID that is not an echo station LTID.
ISDN TERMINAL IS BUSY. TRY AGAIN LATER. ECHO STATION MOD OPERATION FAILED.	User attempts to use MOD command on an echo station LTID that is call processing busy (CPB).
<Table Control error message> MODIFY OPERATION FAILED	Table control operation fails for echo station LTID in table KSETINV.

Figure 23-4 shows the MAP display when using the REM command to unprovision an echo station LTID. The user must delete tuples in tables LTMAP, DNCTINFO, and DNCHNL that are related to the echo station LTID before using the REM command on it.

Figure 23-4 MAP display example when using REM command to unprovision an echo station LTID

```
CI:
>ECHOCI
Welcome to ECHOCI tool
Type HELP ECHOCI for help on ECHOCI tool.
ECHOCI:
>REM
LTID:
>PKT 200
COMMAND AS ENTERED:
REM PKT 200
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
ECHO STATION LTID PKT 200 DELETED
```

Table 23-3 lists the error messages related to the REM command and an explanation of their causes.

Table 23-3 Error messages associated with the REM command

ECHOCI REM command error message	Explanation of cause of error message
LTID XXX IS NOT ECHO STATION THE ECHO STATION CI CAN NOT BE USED TO DELETE LTID. ECHO STATION DEPROVISIONING FAILED.	User attempts to use REM command with an LTID that is not an echo station LTID.
LTID XXX IS NOT PROVISIONED ECHO STATION DEPROVISIONING FAILED	User attempts to use REM command on an LTID that has not been provisioned.
<Table Control error message> ECHO STATION DEPROVISIONING FAILED	Table control delete operation fails for tables KSETINV and KSETLINE.

Datafill for X.25 user loopback testing feature

Table 23-4 shows the tables that require datafill when provisioning an echo station LTID. The tables are listed in the order of datafill. Table 23-4 shows sample datafill for each table it lists. For additional information on each of these tables refer to *Customer Data Schema Reference Manual*, 297-8001-351.

Table 23-4 Datafill example for provisioning an echo station (Sheet 1 of 2)

Table name	Example tuple datafill	Source of tuple datafill
LTGRP	PKT 200 (SAPI16)	User enters datafill using table control.
LTDEF	PKT 200 PB BRAFS $ ***Note:*** PB is only valid access privilege for an echo station. BRAFS is only valid LTCLASS for echo station.	User enters datafill using table control.
KSETINV	PKT 200 ISDNKSET 2 ES Y 15 $ ***Note:*** New option parameter, echo station (ES) is added to table. ES option reserves LTID for the echo station.	User uses ECHOCI command ADD to provision echo station. The DMS switch automatically adds echo station to table as a result.
KSETLINE	PKT 200 1 DN N 6211001 WINGGRP $ BRI PMD N$ ***Note:*** Entry includes DN assigned to echo station.	User uses ECHOCI command ADD to provision echo station. The DMS switch automatically adds echo station to table as a result.
DNCTINFO	6136211108 PMD PMD (FSA N) (RCA N) (CUGS N) (TCN N) (FCPN N) (ICB N) (LCP N) $ ***Note:*** Defines X.25 facilities for echo station DN.	User enters datafill using table control.
DNCHNL	6136211105 B B (LCA (SLCN 1) (NPVC 0) (NOWI 0) (NNRC 1) (NOWO 0) $) (PLSQ MOD8) (NDWS N) (NDPS N) (DTCA N) $ ***Note:*** Contains layer 2 (not used) and layer 3 parameters for echo station.	User enters datafill using table control.
CUGINFO	X.25 6136211001 0 2543 0 X25 N Y ***Note:*** Assigns echo station to OCUG.	User enters datafill using table control.

Table 23-4 Datafill example for provisioning an echo station (Sheet 2 of 2)

Table name	Example tuple datafill	Source of tuple datafill
XSGDEF	8 MS 21 0 1 30 Y	User enters datafill using table control.
LTMAP	PKT 200 XSG 8 $ ***Note:*** New logical terminal selector XSG added to identify XLIU to which echo station is mapped.	User enters datafill using table control.

Figure 23-5 shows an example of the MAP display when adding datafill that maps an echo station LTID to an XLIU service group (XSG) in table LTMAP.

Figure 23-5 Example MAP display when mapping echo station LTID to an XSG

```
CI:
>TABLE LTMAP
TABLE: LTMAP
>ADD
LTKEY:
>PKT 200
MAPTYPE:
>XSG
XSG:
>12
OPTION:
$
TUPLE TO BE ADDED:
PKT 200 XSG 12$
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
TUPLE ADDED
```

Table 23-5 lists the error messages related to adding tuples to table LTMAP for echo stations and an explanation of their causes.

Table 23-5 Error messages associated with table LTMAP entries for echo stations (Sheet 1 of 2)

Table LTMAP error messages	Explanation of cause of error message
MAXIMUM 5 ECHO STATION LTID CAN BE ASSIGNED TO A XSG	User tries to assign more than five echo station LTIDs to one XLIU.
ECHO STATION LTID CANNOT BE MAPPED TO A LEN	User tries to map an echo station LTID to a line equipment number (LEN).
NON ECHO STATION LTID CAN NOT BE MAPPED TO XSG	User tries to map a non-echo station LTID to an XSG or user tries to map an LTID to an XSG when the LTID is only datafilled in table LTDEF.

Table 23-5 Error messages associated with table LTMAP entries for echo stations (Sheet 2 of 2)

Table LTMAP error messages	Explanation of cause of error message
ECHO STATION LTID CANNOT BE MAPPED TO A CLLI	User tries to map an echo station to a CLLI.
NO OPTIONS ARE ALLOWED TO BE PROVISIONED TO AN ECHO STATION LTID	User tries to datafill options for an echo station LTID.
XSG IS NOT DEFINED IN TABLE XSGDEF	User tries to map an XSG that is defined in table XSGDEF without an XLIU assignment to an echo station LTID.
NO XLIU IS ASSIGNED TO THE XSG DEFINED IN TABLE XSGDEF	User tries to change the XSG assigned to echo station LTID to an XSG without an XLIU assignment in table XSGDEF.
CHANGE OPERATION IS NOT ALLOWED FOR ECHO STATION LTID. DELETE THE TUPLE AND ADD A NEW TUPLE	User tries to use table editor CHA command to change the XSG number assigned to an echo station LTID.
Table DNCTINFO is not datafilled for this LTID	User tries to add an echo station LTID to table without having a corresponding DN tuple in table DNCTINFO.
Table DNCHNL is not datafilled for this LTID	User tries to add an echo station LTID in table without having a corresponding tuple in table DNCHNL. Error message occurs even if there is an entry in table DNCTINFO for the echo station DN.

Figure 23-5 shows an example of the MAP display that occurs when adding the parameters for an echo station DN in table DNCHNL. Table DNCHNL contains the layer 2 and layer 3 parameters for a DN. However, echo station DN does not use layer 2 parameters.

Figure 23-5 Example MAP display when adding echo station DN parameters (Sheet 1 of 3)

```
CI:
>TABLE DNCHNL
TABLE: DNCHNL
>ADD
6136211105 B
CHNL:
>B
B_OPTIONS:
>LLFSQ
```

—continued—

Figure 23-5 Example MAP display when adding echo station DN parameters (Sheet 2 of 3)

```
LLFSQ:
>MOD8
B_OPTIONS:
>T1
T1:
>2
B_OPTIONS:
>T2
T2:
>10
B_OPTIONS:
>T3
T3:
>3
B_OPTIONS:
>N2
N2:
>12
B_OPTIONS:
>LCA
LCA_OPTIONS:
>SLCN
LCA_OPTIONS:
>NPVC
LCA_OPTIONS:
>NOWI
NOWI:
>12
LCA_OPTIONS:
>NNRC
NNRC:
>16
LCA_OPTIONS:
>NOWO
NOWO:
>0
B_OPTIONS:
>PLSQ
PLSQ:
>MOD8
B_OPTIONS:
>NDWS2
SUBSCRIBED:
>Y
```

—continued—

Figure 23-5 Example MAP display when adding echo station DN parameters (Sheet 3 of 3)

```
IPLWS:
>4
OPLWS:
>4
B_OPTIONS:
>NDPS
SUBSCRIBED:
>Y
IMPS:
>64
OMPS:
>64
B_OPTIONS:
>DTCA
SUBSCRIBED:
>Y
IDTCA:
>9600
ODTCA:
>9600
TUPLE TO BE ADDED:
6136211105 B B (LLFSQ MOD8)(LLWS 2)(T1 12)(T2 1)(T3 2)
(N2 12)(LCA (SLCN 1)(NPVC 0)(NOW1 12)(NNRC 20)(NOWO 0)
$)(PLSQ MOD8)(NDWS Y 4 4)(NDPS Y 64 64)(DTCA Y 9600 9600)
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
TUPLE ADDED
WARNING: ECHO STATION DOES NOT SUPPORT L2 PARAMETER
```

—end—

Table 23-6 lists the warning messages related to adding tuples table DNCHNL for echo station DNs and an explanation of their causes.

Table 23-6 Warning messages related to table DNCHNL data entries (Sheet 1 of 2)

Table DNCHNL warning messages	Explanation of cause of warning message
WARNING: ECHO STATION DOES NOT SUPPORT L2 PARAMETER ***Note:*** All layer 2 parameters entered are accepted with the preceding warning.	User tries to datafill layer 2 parameters for echo station DN.

Table 23-6 Warning messages related to table DNCHNL data entries (Sheet 2 of 2)

Table DNCHNL warning messages	Explanation of cause of warning message
WARNING: NPVC FOR ECHO STATION CAN NOT BE GREATER THAN 0	User tries to add parameter NPVC with value other than 0.
WARNING: NOWO FOR ECHO STATION CAN NOT BE GREATER THAN 0	User tries add parameter NOWO with a value greater than 0.

Table 23-7 lists the error messages related to adding tuples to table DNCHNL for echo station DNs and an explanation of their causes.

Table 23-7 Error messages associated with table DNCHNL data entries

Table DNCHNL error messages	Explanation of cause of error message
ECHO STATION SUPPORTS ONLY B CHANNEL TYPE	User tries to provision a D channel for an echo station.
ERROR: ECHO STATION SUPPORTS ONLY PLSQ MOD8	User tries to provision the PLSQ parameter with a value of MOD128.
ERROR: ECHO STATION CAN NOT HAVE NNRC > 16 PROVISIONED ON IT	User tries to provision the NNRC parameter with a value greater than 16.
ERROR: ECHO STATION CAN NOT HAVE NOWI + NNRC >16 PROVISIONED ON IT	User tries to provision parameters NOWI and NNRC with a combined total value greater than 16.
ERROR: ECHO STATION SHOULD HAVE EQUAL IMPS AND OMPS	User tries to provision parameters IMPS and OMPS with different values.
ERROR: NPVC FOR ECHO STATION CAN NOT BE GREATER THAN 0	User tries to select a value greater than zero for LCA parameter NPVC.
ERROR: NOWO FOR ECHO STATION CAN NOT BE GREATER THAN 0	User tries to select a value greater than zero for LCA parameter NOWO.

Service order and echo stations

Echo stations are not provisioned using SERVORD. Echo station provisioning is done using table editor and ECHOCI MAP level commands. Table 23-8 lists the SERVORD commands that do not support echo station LTIDs or DNs. The table lists the error messages that display if an end user tries to use the listed commands with an echo station LTID or DN.

Table 23-8 Error messages related to trying to use blocked SERVORD commands with echo station LTID or DN

SERVORD command	Error message
SLT ATT	SLT command can not be used for Echo station LTID/DN
SLT DET	SLT command can not be used for Echo station LTID/DN
NEW	The NEW command can not be used for an Echo Station LTID/DN. Please use ECHOCI to modify Echo station data.
OUT	The OUT command can not be used for Echo Station LTID/DN. Please use ECHOCI to modify Echo Station data.
EST	EST command can not be used for an Echo Station LTID/DN
ADD	ADD command can not be used for an Echo Station LTID/DN
SETPH	SETPH command can not be used for an Echo Station LTID/DN
ADDPH	ADDPH command can not be used for an Echo Station LTID/DN
CHAPH	CHAPH command can not be used for an Echo Station LTID/DN
DELPH	DELPH command can not be used for an Echo Station LTID/DN
SUS	SUS command can not be used for an Echo Station LTID/DN
RES	RES command can not be used for an Echo Station LTID/DN
CHG	CHG command can not be used for an Echo Station LTID/DN

Default value assignment for X.25 parameters and facilities

Table SVCDATA defines a default service profile for packet DNs that includes X.25 and facility parameter values. If an echo station is datafilled in table

DNCHNL without options, the DMS switch reads default values for all the DNCHNL options from table SVCDATA and assigns them to the DNCHNL tuple. Figure 23-6 shows an example of the MAP display when adding an echo station DN without options to table DNCHNL.

Figure 23-6 Example of MAP display when adding echo station DN without options

```
CI:
>TABLE DNCHNL
TABLE DNCHNL:
>ADD
KEY:
>6136215000 B
CHNL:
>B
B_OPTIONS:
>$
TUPLE TO BE ADDED
          6136215000 B
B $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
WARNING: ECHO STATION DOES NOT SUPPORT L2 PARAMETER.
TUPLE ADDED
```

Table DNCHNL X.25 option parameters do not apply to echo station DNs. Therefore the default X.25 parameter values supplied by table SVCVDATA for an echo station DN in table DNCHNL are overridden by a set of echo station specific default values supported by the Echo Station User Loop Back Testing feature listed in Table 23-9.

Table 23-9 Table DNCHNL X.25 parameters default values

X.25 parameter	Default value
NPVC	0
NOWO	0
DTCA	9600 bit/s
PLSQ	MOD8

Figure 23-7 shows an example of the MAP display of a tuple for an echo station DN in table DNCHNL. The Echo Station User Loop Back Testing feature supplies the X.25 parameters in the tuple.

Figure 23-7 Example of MAP display of echo station DN tuple in table DNCHNL

```
TABLE DNCHNL

          KEY                                   OPTIONS
- - - - - - - - - - - - - - - - - - - - - - - - - - - - -
     6136215000 B
B (LLFSQ MOD8) (LLWS 7) (T1 20) (T2 2) (T3 5) (N2 3)
(LCA (SLCN 1) (NPVIC 0) (N0WI 0) (NNRC 1) (NOW0 0) $)
(PLSQ M0D8) (NDWS N) (NDPS N) (DTCA N) $
```

Figure 23-8 shows an example of the MAP display when provisioning X.25 facilities for an echo station DN in table DNCTINFO.

Figure 23-8 Example of MAP display when provisioning echo station DN X.25 parameters (Sheet 1 of 2)

```
CI:
>TABLE DNCTINFO
TABLE: DNCTINFO:
>ADD
KEY:
>6136211105 PMD
CT:
>PMD
PMD_OPTION:
>NUI
SUBSCRIBED:
>N
PMD_OPTION:
>FSA
SUBSCRIBED
>N
PMD_OPTION:
>RCA
SUBSCRIBED:
>N
PMD_OPTION:
>ICS
SUBSCRIBED:
>N
PMD_OPTION:
>CUGS
SUBSCRIBED:
>Y
CUGFSEL:
>OCUG
PRFGUG:
>Y
PMD_OPTION:
>TCN
SUBSCRIBED:
>Y
```

—continued—

Figure 23-8 Example of MAP display when provisioning echo station DN X.25 parameters (Sheet 2 of 2)

```
PMD_OPTION:
>FCPN
SUBSCRIBED:
>Y
PMD_OPTION:
>OCB
SUBSCRIBED:
>Y
PMD_OPTION:
>ICB
SUBSCRIBED:
>Y
PMD_OPTION:
>LCP
SUBSCRIBED:
PMD_OPTION:
>RPOAB
SUBSCRIBED:
>Y
TUPLE TO BE ADDED:
6136211105 PMD
PMD (NUI N) (FSA N) RCA N) (ICS N) (CUGS Y OCUG Y)(TCN Y)
(FCPN Y) (OCB N) (ICB N) (LCP N) (RPOAB N)
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
TUPLE ADDED
WARNING: ECHO STATION DOES NOT SUPPORT
         NUI, ICS, OCB, ICB, LCP, RPOAB
```

—end—

Table 23-10 lists the error messages related to adding tuples to table DNNCTINFO for echo station DNs and an explanation of their causes.

Table 23-10 Error messages related to table DNCTINFO data entries (Sheet 1 of 2)

Table DINCTINFO error messages	Explanation of cause of error message
ECHO STATION DOES NOT SUPPORT NUI	User tries to provision a NUI for an echo station DN.
ECHO STATION DOES NOT SUPPORT ICS	User tries to provision ICS for an echo station DN.
ECHO STATION DOES NOT SUPPORT CUGOAIA ECHO STATION DOES NOT SUPPORT CUGOA ECHO STATION DOES NOT SUPPORT CUGIA	User tries to provision CUGOAIA, CUGOA, and CUGIA under CUG for an echo station DN.
ECHO STATION DOES NOT SUPPORT OCB	User tries to provision OCB for an echo station DN.

Table 23-10 Error messages related to table DNCTINFO data entries (Sheet 2 of 2)

Table DINCTINFO error messages	Explanation of cause of error message
ECHO STATION DOES NOT SUPPORT ICB	User tries to provision ICB for an echo station DN.
ECHO STATION DOES NOT SUPPORT RPOAB	User tries to provision RPOAB for an echo station DN.
ECHO STATION DOES NOT SUPPORT LCP	User tries to provision LCP for an echo station DN.

Default value assignment for X.25 parameters and facilities

Table SVCDATA defines a default service profile for packet DNs that includes X.25 and facility parameter values. If an echo station is datafilled in table DNCTINFO without options, the DMS switch reads and assigns default values to it from table SVCDATA. Figure 23-9 shows an example of the MAP display when adding an entry for an echo station DN without options in table DNCTINFO.

Figure 23-9 Example of MAP display when adding echo station DN without options

```
CI:
>TABLE DNCTINFO
TABLE DNCTINFO:
>6136215000 PMD
CT:
>PMD
PMD_OPTION:
>$
TUPLE TO BE ADDED:
           6136215000 PMD
PMD $
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT
>Y
WARNING: ECHO STATION DOES NOT SUPPORT
         NUI, ICS, OCB, ICB, LCP, RPOAB
```

Many of the X.25 facilities defined as options in table DNCTINFO do not apply to an echo station DN. Because of this the DMS switch overrides the default values supplied to table DNCTINFO for an echo station DN by table SVCDATA. For example, a tuple added to table DNCTINFO for an echo station without option OCB being defined is datafilled by the DMS switch with default data from table SVCDATA. The default value for OCB in table SVCDATA is Y. However, the echo station software does not support the OCB option. Because of this, the DMS switch overrides the table SVCDATA default and sets the OCB option to N in table DNCTINFO.

Figure 23-10 shows an example of the MAP display of a tuple for an echo station DN in table DNCTINFO. Echo Station User Loop Back Testing feature supplies the X.25 parameters shown in the tuple.

Figure 23-10 Example of MAP display of echo station DN tuple in table DNCTINFO

```
TABLE DNCTINFO
          KEY                                OPTIONS
- - - - - - - - - - - - - - - - - - - - - - - - - - -
        6136215000 PMD
PMD (NUI N) (FSA N) (RCA N) (ICS N) (CUGS N) (TCN N)
(FCPN N) (OCB N) (ICB N) (LCP N) (RPOAB N) $
```

Figure 23-11 shows an example of the MAP display when provisioning a tuple for an echo station DN in table CUGINFO.

Figure 23-11 Example of MAP display when adding echo station DN tuple

```
CI:
>TABLE CUGINFO
TABLE CUGINFO:
>ADD
KEY:
>X25 6136215000 1
DNIC:
>2543
ITLK:
>0
ACCESS:
>X25
CUGIAB:
>N
CUGOAB:
>Y
TUPLE TO BE ADDED:
X25 6136215000 1 2543 0 X25 N Y
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
>Y
TUPLE ADDED
```

Table 23-11 lists the error messages related to adding tuples to table CUGINFO for echo station DNs and an explanation of their causes.

Table 23-11 Error messages related to table CUGINFO data entries

Table CUGINFO error messages	Explanation of cause of error message
ECHO STATION DN SUPPORTS ONLY FOR OCUG CUG ACCESS. FOR OCUG CUG ACCESS CUG INDEX VALUE CAN BE ONLY ZERO	User tries to add data to table for echo station DN with CUG INDEX greater than 0.
INCOMING CALLS CAN NOT BE BARRED FOR ECHO STATION DN	User tries to datafill CUGIAB (Closed User Group incoming access barring facility) with a value of Y in table. Only value allowed for echo station DN is N.
OUTGOING CALLS SHOULD ALWAYS BE BARRED FOR AN ECHO STATION DN	User tries to datafill CUGOAB (Closed User Group outgoing access barring facility) with a value of N in table. Only value allowed for echo station DN is Y.

Figure 23-12 shows an example of the MAP display when mapping an echo station LTID to an XLIU XSG in table LTMAP. The logical terminal selector XSG is new in NA012. The value range for XSG number is 0-749. The maximum number of echo station LTIDs that a user can assign to an XSG is five. A user must add an XSG to table XSGDEF before adding it in field XSG in table LTMAP.

Figure 23-12 Example of MAP display when adding echo station LTID tuple

```
CI:
>TABLE LTMAP
TABLE LTMAP:
>ADD
LTKEY:
>PKT 200
MAPTYPE:
>XSG
XSG:
>12
OPTION:
>$
TUPLE TO BE ADDED:
PKT 200 XSG 12 $
ENTER Y TO CONFIRM, N TO REJECT, OR E TO EDIT.
>Y
TUPLE ADDED
```

Table 23-12 lists the error messages related to adding tuples to table LTMAP for echo station LTIDs and an explanation of their causes.

Table 23-12 Error messages related to table LTMAP data entries

Table LTMAP error messages	Explanation of cause of error message
MAXIMUM 5 ECHO STATION LTID CAN BE ASSIGNED TO A XSG	User tries to map more than 5 echo station LTIDs to an XSG.
ECHO STATION LTID CANNOT BE MAPPED TO A LEN	User tries to map an echo station LTID to a LEN.
NON ECHO STATION LTID CAN NOT BE MAPPED TO XSG	User tries to map an non-echo station LTID to an XSG.
ECHO STATION LTID CAN NOT BE MAPPED TO A CLLI	User tries to map an echo station LTID to a CLLI.
NO OPTINS ARE ALLOWED TO BE PROVISIONED TO AN ECHO STATION LTID	User tries to include an option in the mapping of an echo station LTID.
XSG IS NOT DEFINED IN TABLE XSGDEF	User tries to map an echo station LTID to an XSG that is not entered in table XSGDEF.
NO XLIU IS ASSIGNED TO THE XSG DEFINED IN TABLE XSGDEF	User tries to map an echo station LTID to an XSG that is not assigned to an XLIU in table XSGDEF.
CHANGE OPERATION IS NOT ALLOWED FOR ECHO STATION LTID. DELETE TUPLE AND ADD NEW TUPLE.	User tries to modify echo station LTID tuple using table editor CHA command.
TABLE DNCTINFO IS NOT DATAFILLED FOR THIS LTID	User tries to add tuple for echo station LTID in table without having a corresponding tuple for the DN associated with the LTID in table DNCTINFO.
TABLE DNCHNL IS NOT DATAFILLED FOR THIS LTID	User tries to add echo station LTID to table without having a corresponding tuple in table DNCHNL.

Query command QPHF used with echo station

The query packet handler facility (QPHF) command is a CI command the can be used to display the packet handler information for a queried entity including

- an echo station DN
- an echo station LTID
- an XSG

QPHF command with DN option

The QPHF command with the DN option displays the packet handler information provisioned for the echo station DN. The information display includes the X.25 facilities provisioned for the echo station DN in table DNCTINFO and the DN and channel type provisioned in table DNCHNL.The display does not include channel information. The display shows the mapping information for the echo station LTID as a string that starts with XSG number followed by the phrase echo station. If the echo station LTID is not mapped to an XSG, the display displays the message: “Unable to provide mapping for echo Station Link.” Figure 23-13 shows the MAP display that results from using the QPHF DN command where the LTID related to the echo station DN mapped to an XSG. Figure 23-14 shows the MAP display that results from using the QPHF DN command where the LTID related to the echo station DN where the LTID related to with the echo station DN is not mapped to an XSG.

Figure 23-13 Example of MAP display for QPHF DN command where LTID is mapped to XSG

```
CI:
>QPHF DN 5551001

          DN INFORMATION (B Channel)
           -------------------------------
NUI:  NO FSA: NO RCA: NO TCN: NO ICB: NO
FCPN: NO RPOAB: NO LXP: NO CUGS: NO OCB: NO
SLCN: 1 NPVC:    0 NOWI: 0 NNRC:  1 NOWO: 0
NDPS: NO LLFSQ: N/A N2: N/A T2: N/A NI: NA
DTCA: NO IDCTA: 64000 ODTCA: 64000 IPLWS: 2
OPLWS: 2 PLSQ: MOD8 NDWS: NO

MAPPING
-------
LTID: PKT 100
XSG: 100 ECHO STATION
TIMEOUTS: NO MINUTES: N/A

         CUG INFORMATION
         ---------------
TYPE: X25 DN: 6135551001
DNIC: 2525 INTERLOCK: 0 IAB: NO OAB: YES INDEX: 0
```

Figure 23-14 Example of MAP display for QPHF DN command where LTID is not mapped to XSG

```
CI:
>QPHF DN 5551001

           DN INFORMATION (B Channel)
           -------------------------------
NUI:  NO FSA: NO RCA: NO TCN: NO ICB: NO
FCPN: NO RPOAB: NO LXP: NO CUGS: NO OCB: NO
SLCN: 1 NPVC:    0 NOWI: 0 NNRC:  1 NOWO: 0
NDPS: NO LLFSQ: N/A N2: N/A T2: N/A NI: NA
DTCA: NO IDCTA: 64000 ODTCA: 64000 IPLWS: 2
OPLWS: 2 PLSQ: MOD8 NDWS: NO

MAPPING
-------
LTID: PKT 102
Unable to provide mapping for Echo Station Link
```

QPHF command with LTID option

The QPHF with the LTID option displays the packet handler information for the echo station LTID. The display shows the following information:

- types of calls ongoing at time command is entered
- layer 3 status
- mapping information including
  - — DN
  - — key number
  - — XSG number
  - — link information

Figure 23-15 shows an example of the MAP display that results from the use of the QPHF LTID command. The MAP display of the QPHF LTID command does not include PVC and outgoing SVC call information.

Figure 23-15 Example of MAP display for QPHF LTID command

```
CI:
>QPHF LTID PKT 1

               LINK INFORMATION
               ----------------

              TYPE: X.25 B    LTID: PKT 1

MAPPING
-------
XSG: 100 ECHO STATION
TIMEOUT: NO MINUTES: N/A
DN: 6135551001, KEY: 1

CALL INFORMATION
----------------
svc:       0 call
incoming svc:  0 call

Layer 3 link status: down
```

Figure 23-16 shows an example of the MAP display that results from entering the QPHF command with the XSG option.

Figure 23-16 Example of MAP display for QPHF command entered with XSG option

```
CI:
>QPHF XSG 100

                   XSG INFORMATION
                   ---------------
XSG EXT INDEX: 100 CURRENT NUMBER OF LINKS: 8
XLIU INDEX: 0  MAXIMUM NUMBER OF CHANNELS: 30
XSG 100 IS AVAILABLE FOR USE BY AUTO RESOURCE
ASSIGNMENT NUMBER OF ECHO STATION: 1

MAPPING
-------
CHANNEL: 1 X.25 PB
CHANNEL: 2 X.25 PB
CHANNEL: 3 X.25 PB
CHANNEL: 4 X.25 PB
CHANNEL: 5 X.25 Bd
CHANNEL: 6 X.25 Bd
CHANNEL: 7 X.25 Bd
LTID: PKT 100 ECHO STATION
```

Figure 23-17 shows an example of the MAP display that results from the use of the QPHF command with the XSG option where the echo station has not been mapped. If only the echo station link child is present and no channel child is present on the XSG, the message “No Physical Channels mapped” displays.

Figure 23-17 Example of MAP display for QPHF XSG command entered where echo station is not mapped, only channel child is present

```
CI:
>QPHF XSG 100
                   XSG INFORMATION
                   ---------------
XSG EXT INDEX: 100 CURRENT NUMBER OF LINKS: 5
XLIU INDEX: 0  MAXIMUM NUMBER OF CHANNELS: 30
XSG 100 IS AVAILABLE FOR USE BY AUTO RESOURCE
ASSIGNMENT NUMBER OF ECHO STATION: 0

MAPPING
-------
CHANNEL: 1 X.25 PB
CHANNEL: 2 X.25 PB
CHANNEL: 3 X.25 PB
CHANNEL: 4 X.25 PB
CHANNEL: 5 X.25 Bd
No Echo Station Links mapped
```

Figure 23-18 shows an example of the MAP display when using the QPHF command with the XSG option where no channel child is present. Only the echo station is present as shown in the following display.

Figure 23-18 Example of MAP display of QPHF command with XSG command where no channel child is present

```
CI:
>QPHF XSG 102
                   XSG INFORMATION
                   ---------------
XSG EXT INDEX: 102 CURRENT NUMBER OF LINKS: 0
XLIU INDEX: 2 MAXIMUM NUMBER OF CHANNELS: 30
XSG 100 IS AVAILABLE FOR USE BY AUTO RESOURCE
ASSIGNMENT NUMBER OF ECHO STATION: 4

MAPPING
-------
No Physical channels mapped.
LTID: PKT 601
LTID: PKT 201
LTID: PKT 301
LTID: PKT 401
```

Figure 23-19 shows an example of the MAP display when using the QPHF command with the XSG ALL option.

Figure 23-19 Example of MAP display of QPHF command with XSG ALL option

```
CI:
>QPHF XSG 100 ALL

             MAPPINGS FOR XSG 100
             ---------------------

CHANNEL:   1 LTID: PKT 5 DN: 6135551105
           No active call (s) on this LTID.

CHANNEL:   2 LTID: PKT 6 DN: 6135551106
           No active call(s) on this LTID.

CHANNEL:   6

CHANNEL:   7 LTID: PKT 3 DN: 6135551103
           No active call(s) on this LTID:

ECHO DATA: LTID: PKT 100 DN: 6135551022
           No active call(s) on this LTID.
```

Figure 23-20 shows an example of the MAP display for the QPHF XSG ALL command where there is no mapping for echo station LTIDs. Only the data for the echo station displays.

Figure 23-20 Example of MAP display for QPHF XSG ALL command when there is no channel mapping

```
CI:
>QPHF 102 ALL

              MAPPINGS FOR XSG 102
              --------------------

  No Physical Channels mapped.
ECHO DATA: LTID: PKT 601 DN: 6136667706
           No active call(s) on this LTID.
ECHO DATA: LTID: PKT 201 DN: 6135557702
           No active call(s) on this LTID.
ECHO DATA: LTID: PKT 301 DN: 6135557703
           No active call(s) on this LTID.
ECHO DATA: LTID: PKT401 DN: 6135557704
           No active calls on this LTID.
```

Packet resource reassignment tool

The packet resource reassignment tool (PHRRCI) is used to move an echo station LTID from one XSG to another XSG. The PHRRCI tool is accessed from the CI level of the MAP by entering, PHRRCI. The command syntax for using the MOVE command to move an echo station LTID from one XSG to another is:

Move <BPKT-LTID> TO <XSG or XLIU destination> [XSG number {0 to 749}]

Note: For additional information on PHRRCI refer to *Integrated Services Digital Network Basic Rate Maintenance Guide*, 297-2401-501.

Figure 23-21 shows an example of the MAP display when moving an echo station LTID from one XSG to another using the PHRRCI level command MOVE.

Figure 23-21 Example of MAP display when using the PHRRCI command move

```
CI:
>PHRRIC:
PHRRCI Packet Resource Reassignment Tool:
>MOVE PKT 200 TO XSG 3
Request Queued at position 1
INFO - Current LTMAP entry has been removed <PKT 200>
INFO - New LTMAP entry for ES has been successfully created

RESULT - LTID <PKT 200> successfully moved from XSG 2 to
XSG 3
WARNING - The LTID may not have returned to service
          successfully. Manual intervention may be required

Done
```

Note: Post the echo station DN at the LTP level of the MAP to determine its status.

Table 23-13 lists the error messages related to the PHRRCI level MOVE command and an explanation of their causes.

Table 23-13 Error messages related to with PHRRCI level command MOVE

PHRRCI MOVE command error messages	Explanation of cause of error message.
ERROR-XSG xxx has no space for ES links	User tries to move an echo station LTID to an XLIU which already has the maximum of five echo station LTIDs mapped to it.
ERROR- New XSG add in LTMAP failed for ECHO STATION	User tries to move echo station LTID to new XSG and addition to table LTMAP fails.

Maintenance activity on echo station directory number

Perform maintenance on the echo station DN at the line test position (LTP) level of the MAP. Determine the status of an echo station DN by posting it at the LTP level of the MAP. Access the LTP level of the MAP by entering the following command:

>MAPCI;MTC;LNS;LTP

Post an echo station DN at the LTP MAP level by entering the following command:

>POST D <7 digit echo station DN>

Figure 23-22 shows an example of the LTP level MAP display when posting an echo station DN in the control position.

Figure 23-22

```
CM      MS     IOD     NET      PM     CCS     LNS      TRKS     EXT   APPL
 •       •      •       •        •      •       •         •        •     •
LTP
  0 Quit    POST         DELQ            BUSYQ           PREFIX
  2 Post_   LEN   ES  XLIU 100
  3         LCC  PTY RNG                                STA F  S  LTA TE RESULT
  4         ISDN                 DN 613 555 1001 IDL
  5 Bsy                                                   K#     1  PMD
  6 RTS                                 LTID PKT             1
  7 Diag
  8
  9 AlmStat
10 Cktloc
11 Hold
12 Next
13
14
15 FullDn
16Prefix
17LCI_
18Level_
   LTPTP0
Time 02:50 >
```

Note 1: If an echo station LTID is not mapped to an XSG, XLIU information does not display when the echo station DN is posted at the LTP MAP level.

Note 2: If an echo station DN is posted using the POST D command at the LTP MAP level, the number of the XSG it is mapped to displays instead of the LEN number.

Table 23-14 lists the different states of an echo station DN that are the result of using maintenance commands at the LTP MAP level.

Table 23-14 Echo station DN maintenance transition states

LTP command	DN initial state	DN final state	Message type/error type
Bsy	IDL	ManB	
	ManB	ManB	
	PSU	ManB	
	CPB	CPD	
	CPD	CPD	The line is already deloaded
	NEQ	NEQ	Inappropriate command for an unassociated LTID
RTS	IDL	IDL	
	MAnB	IDL (If XLIU is InSv)	
	ManB	PSU (If XLIU is InSv)	
	PSU	PSU	
	CPB	CPB	RTS denied on CPB/CPD lines
	CPD	CPD	RTS denied on CPB/CPD lines
	NEQ	NEQ	Inappropriate command for an unassociated LTID
FRLS	IDL	ManB	
	ManB	ManB	
	PSU	ManB	
	CPB	CPD>ManB	
	CPD	ManB	
	NEQ	NEQ	Inappropriate command for an unassociated LTID

The state of echo station also changes as a result of the change in the state of the XSG/XLIU it is mapped to. Table 23-15 shows the relationship between the state of the echo station and the XSG it is mapped to.

Table 23-15 ECHO station state transitions due to XSG/XLIU transitions

XSG/XLIU transition	Initial state of echo station	Final state of echo station
any transition	ManB	ManB
PMB->INSV, SYSB->INSV	PSU	IDL
InSv->PMB,INSv->SYSB	IDL	PSU

Table 23-16 lists the transition states of an echo station due to provisioning activity.

Table 23-16 Echo station state transition due to provisioning activity

Provisioning action	Initial state of echo station	Final state of echo station
Echo station provisioned using ECHOCI		NEQ
Echo station mapped to an XSG in table LTMAP and XLIU is INSv	NEQ	IDL
Echo station mapped to an XSG in table LTMAP and XLIU is not InSv	NEQ	PSU
Echo station unmapped to an XSG in table LTMAP	IDL or PSU	NEQ

24 Problem case 1: no dialtone received or limited dialing capability

Description

An ISDN customer complains that either no dialtone is received at a particular ISDN set or that the only directory numbers that can be dialed from a set are those associated with default services. The LTPISDN MAP command TERMCHK can be used to troubleshoot this problem. The TERMCHK command can be used to verify that the service profile identification (SPID) that is programmed in the ISDN set is the same as the SPID stored for that set in the ISDN switching system.

Note: For more information on the TERMCHK command, refer to the “BRI multiple terminal maintenance” chapter in this guide.

Troubleshooting steps

Use the following instructions to verify the correct SPID is programmed in the ISDN set:

At a MAP terminal

1 Post the LEN associated with the ISDN set with the problem indicated at the LTPISDN MAP level. Use the TERMCHK command on the LEN. Refer to Figure 24-1.

```
>MAPCI;MTC;LNS;LTP;LTPISDN
>POST L HOST 1 0 1 16
>TERMCHK
```

2 Check the results of the TERMCHK command to verify that the SPID programmed in the ISDN set is the same as the SPID stored for that set in the DMS switching system. Refer to Figure 24-2.

The TERMCHK command shows that the mismatch occurred between the computing module (CM) and the customer premises equipment (CPE).

3 Correct the CPE SPID to match the DMS SPID. Refer to the specific ISDN CPE set user’s manual for the procedure to enter the correct SPID into the ISDN set.

4 Use the cpe user’s manual to program the CPE, SPID, then repeat steps 1 and 2.

Figure 24-1 shows an example of the MAP display referred to in step 1.

Figure 24-1 Example of MAP display showing response to the Post L command on LEN 1 0 1 16

```
CM    MS   IOD   Net   PM   CCS   Lns    Trks    Ext    APPL
 .     .    .     .     .    .     .      .       .      .

LTPISDN
0  Quit       POST         DELQ      BUSYQ       PREFIX
2  Post_      LEN HOST 01 0 01 16
3             LCC PTY RNG                    STA F S TE RESULT
4  Termchk    ISDN LOOP      DN 613 723 5201 IDL
6  Sustate
7  BCHCON
8  Ltloopbk
9  DCHCon
10 TEST_
11 Hold
12 Next
13
14 TstSgnl
15 TEI_
16 Qloop
17 Qlayer
18 Rlayer
   TEAM05
Time 12:39 >
```

Figure 24-2 shows an example of the MAP display referred to in step 2.

Figure 24-2 Example of MAP display showing the results display from using the TERMCHK command on LEN 1 0 1 16

```
LEN HOST 01 0 01 16
Circuit Switched Services:
=========================
TEI: 64 Associated with Default Service
Service : Circuit Switched
DMS TSPID: Default Service
CPD SPID: 540100223344

Packet Switched Services:
========================
No physical ISDN BRAFS Terminals with Packet Switched
Services have been detected.

Unused Logical Terminal Profiles:
================================
LTID: WITS 1
Service: circuit Switched Protocol Status: --
Directory Number: 6137235201 KEY: 1
DMS TSPID: 6137235201
```

25 Problem case 2: verification of connectivity between 2B1Q line card and CPE

Description

When new customer premises equipment (CPE) is installed, it is necessary to verify the connectivity between the 2B1Q line card located in the central office and the CPE. This can be done without the assistance of the test center or the central office by accessing the BRIV 108 test trunk from the CPE.

Verification steps

Use the following steps to verify connectivity between the 2B1Q line card and the CPE:

At the CPE location perform the following steps

1 At the CPE, go off-hook.

2 Dial the BRIV 108 test trunk access DN, for example, 99591090#.

> ***Note:*** The DN used in step 2 to access the BRIV 108 test trunk is just an example. The BRIV 108 DN is translations dependent. It will vary from office to office.

3 Verify that the confirmation tone is heard followed by silence. This sequence of tone and silence indicates that there is a connection between the CPE and the 2B1Q line card.

4 At the CPE, go on-hook to release the connection.

Troubleshooting steps

If dial tone followed by silence is not heard at the CPE, the following steps can be taken to isolate the cause of the problem. These steps require the assistance of the test center at the central office.

At the CPE perform the following steps

1 Request that the test center post the ISDN line being tested at the LTPISDN MAP level using the following command sequence.

>MAPCI;MTC;LNS;LTP;POST L 1 0 1 16

2 Request that the test center verify that the posted line is in the idle (IDL) state as shown in the following MAP display example.

```
CM   MS   IOD   Net  PM  CCS  Lns  Trks  Ext APPL
.    .    .     .    .   .    .    .     .    .

LTPISDN
0 QUIT     POST     DELQ       BUSYQ     PREFIX
2 POST_    LEN HOST 01 0 01 16
3          LCC PTY RNG               STA F S LTA TE RESULT
4 Termchk ISDN LOOP DN 613 723 5012 IDL
6 Sustate
7 BCHCON
8 Ltloopbk
9 DCHCon
10 TEST_
11 Hold
12 Next
13
14 TstSgnl
15 TEI_
16 Qloop
17 Qlayer
18 Rlayer
TEAM05
Time 12:39 >
```

3 At the CPE, go off-hook.

4 Dial the BRIV 108 test trunk access DN, for example, 99591090#.

5 Request that the test center verify that the posted line is in the call processing busy (CPB) state and it is connected to the T108ISDN trunk group as shown in the following MAP display example.

```
CM    MS  IOD   Net   PM   CCS  Lns  Trks   Ext   APPL
.      .    .    .    .   .    .    .      .     .

LTPISDN
0 QUIT    POST     DELQ         BUSYQ      PREFIX
2 POST_   LEN HOST 01 0 01 16
3         LCC PTY RNG                STA F S LTA TE RESULT
4 Termchk ISDN LOOP DN 613 723 5012 CPB T108ISDN
6 Sustate
7 BCHCON
8 Ltloopbk
9 DCHCon
10 TEST_
11 Hold
12 Next
13
14 TstSgnl
15 TEI_
16 Qloop
17 Qlayer
18 Rlayer
TEAM05
Time 12:39 >
```

6 At the CPE, go on-hook, and request that test center verify that the posted line has returned to the IDL state.

7 Request that the test center post both B-channels of the line being tested and verify that they are both in the IDL state as shown in the following MAP display example. Only the B1 channel is shown in the example.

```
CM      MS    IOD    Net    PM    CCS   Lns   Trks   Ext   APPL
.       .     .      .      .     .     .     .      .     .

LTPISDN
0 QUIT    POST        DELQ    BUSYQ      PREFIX
2 POST_   LEN HOST 01 0 01 16
3         LCC PTY RNG            STA F S LTA TE RESULT
4 Termchk ISDN    B1         DN  IDL
6 Sustate
7 BCHCON
8 Ltloopbk
9 DCHCon
10 TEST_
11 Hold
12 Next
13
14 TstSgnl
15 TEI_
16 Qloop
17 Qlayer
18 Rlayer
TEAM05
Time 12:39 >
```

8 Request that test center perform routine test procedures including a line diagnostic test on the 2B1Q line card to further isolate the cause of the problem.

Note: The troubleshooting steps above are only a representative set of examples.

26 Problem case 3: mp-eoc trouble fault isolation

Description

An ISDN customer complains that no dialtone is received at a particular ISDN set.

Troubleshooting steps

Use the following instructions to troubleshoot an mp-eoc.

At a MAP terminal perform the following steps

1 Check the associated ISDN logs using LOGUTIL.

- **a** Use the LOGUTIL command to examine the ISDN logs that relate to the line being tested. The LINE131 log displays pertinent information about WHEN and WHERE the problem occurred, as shown in the following examples.

  CI:
  >LOGUTIL
  >OPEN LINE 131

  ```
  RTP5 LINE131 MAY24 13:37:49 5334 INFO Performance
  Monitoring (PM) Alert
  LEN HOST 01 0 14 16 DN 7235012
  Report Type PERFORMANCE ALERT
  Source MPLU 6 - FE SES CURR HR THRESHOLD OF 10 EXCEEDED
  ```

```
RTP5 LINE131 MAY24 13:37:49 5334 INFO Performance
Monitoring (PM) Alert
LEN HOST 01 0 01 16 DN 7235012
Report Type PERFORMANCE ALERT
Source MPLU 6 - FE ES CURR HR THRESHOLD OF 40 EXCEEDED
```

b A LINE145 log indicates WHEN and WHERE a loss of sync word (LOSW) problem occurred. It can also indicate a hardware fault, as shown in the following example:

LOGUTIL:
>OPEN LINE 145

```
RTP5 LINE145 MAY24 13:39:10 0321 INFO ISLC SIGNAL
Alarm
LEN HOST 01 0 1 16 DN 7235012
mp-eoc node failure report at MPLU 6 :LOOP state
remains IDL
```

Note: For detailed information about logs, refer to the *Log Report Reference Manual*, 297-8001-840

2 Determine the current state for the specific line.

a If the NT1 is not in-sync and the line is in lock out (LO) state, then determine the location of the MPLU problem. Use the LTPISDN MAP level command SUSTATE to determine the in-sync multipoint embedded operations channel line unit (MPLU). Refer to the following example:

>MAPCI;MTC;LNS;LTP;LTPISDN
>POST L 1 0 1 16
>SUSTATE

```
CM   MS   IOD   Net   PM   CCS  Lns  Trks  Ext APPL
 .    .    .     .     .    .    .     .    .    .

LTPISDN
0 QUIT    POST DELQ        BUSYQ      PREFIX
2 POST_   LEN HOST 01 0 01 16
3         LCC PTY RNG          STA F S LTA TE RESULT
4 Termchk ISDN LOOP DN 613 723 5012 LO
6 Sustate
7 BCHCON
8 Ltloopbk
9 DCHCon
10 TEST_
11 Hold
12 Next
13
14 TstSgnl
15 TEI_
16 Qloop
17 Qlayer
18 Rlayer
TEAM05
Time 12:39 >
```

Note: For more details, refer to the SUSTATE MAP command in the “ISDN maintenance” chapter of this guide.

b Place the line in segmented mode. This action causes the line unit to correct its layer 1 errors. Errors can come from a specific segment. If the line is in path mode (default mode) then the line card represents the cumulative errors of the entire U-loop (all the way to the NT1).

>MAPCI;MTC;LNS;LTP;LTPISDN
>POST L1 0 1 16
>L1BLMALM SETMODE SEG

c Perform a Qlayer L1 on the posted LEN. This action will show all the layer 1 errors (block, current, and previous errors) from the line card and all line units.

>MAPCI;MTC;LNS;LTPISDN
>POST L1 0 1 16
>QLAYER 11 BOTH

```
RTP5 LINE145 MAY24 13:39:10 0321 INFO ISLC SIGNAL
Alarm
LEN HOST 01 0 1 16 DN 7235012
mp-eoc node failure report at MPLU 6: LOOP state
remains IDL
```

d In the example, MPLU 6 reports a hardware fault. The following example shows the Qlayer performed on MPLU 6 only.

The output that displays indicates that far-end errors are emanating from MPLU 6. Note that the current ES/HR and SES/HR have crossed their thresholds in the far-end direction (from MPLU 6 toward the NT1). Our Line 131 logs confirm this.

>MAPCI NODISP;MTC;INS;LTPISDN;POST L1 0 1 16
>QLAYER L1 MPLU 6
Mp-eoc Line Unit 1:
PM Counts:
---BE NE--- ---BE FE---
C.Hr P.Hr C.Hr P.Hr
0 0 0 25

PM MODE: SEGMENTED

ALERTS:
---ES NE--- ---SES NE--- ---ES FE--- ---SES FE---
C. Hr C. Dy C.Hr C DY C. Hr C. Dy C.Hr C DY
ON ON ON ON ON ON ON ON

PM COUNTS:
---ES NE--- ---SES NE--- ---ES FE--- ---SES FE---
C. Hr C. Dy C.Hr C DY C. Hr C. Dy C.Hr C DY
0 1 0 1 65 65 35 35

Threshold Condition:
---ES NE--- ---SES NE--- ---ES FE--- ---SES FE---
C. Hr C. Dy C.Hr C DY C. Hr C. Dy C.Hr C DY
OFF OFF OFF OFF OFF OFF OFF OFF

Active Thresholds (NE) and (FE)
40 100 10 25 40 100 10 25
---ES NE--- ---SES NE--- ---ES FE--- ---SES FE---
P. Hr P. Dy P.Hr PDY TI P. Hr P. Dy P.Hr PDY
0 0 0 0 -1 1 0 1 0
0-2 0
0-3 0
0-4 0

3 If the logs contain only LINE 131 logs, then the connection between the NT1 and MPLU 6 should be checked. In the example, the hardware fault most likely caused the PM errors. The line unit has a hardware fault so the line unit itself should be replaced.

a Replace MPLU 6.

b Use SUSTATE to verify all units in sync and the line is in IDL state.

c Execute an RLAYER L1 CUR to reset the current layer 1 PM counts on the entire line.

d Execute another QLAYER L1 MPLU 6 to check the layer 1 counts again. The layer 1 errors should now be minimal.

Other possible actions

At a MAP terminal perform the following steps

1 If the Qlayer shows layer 1 counts above the thresholds (and the threshold condition bools are OFF), then there should be a corresponding LINE 131 log. If not, then the register line units are incorrectly reporting the errors. Execute the THR test on the line unit.

2 A LOOPBK can be set at a specific line unit. Then, a BERT test sends a bit pattern and verifies that it is received.

> ***Note:*** Use SUSTATE to check for existing loopbacks. If the BERT test reveals Layer 1 errors, but the Qlayer does not, then the line unit is likely faulty. Test the line unit with a DEF test.

3 Once you verify layer 1, proceed to troubleshooting layer 2 and layer 3.

27 Problem case 4: office equipment identification retrieval

Description

Verification of the proper termination of the access line associated with customer premises equipment (CPE) is required as part of the initial installation process or during that time when the office equipment is moved to a new location. Verification can be made by using the integrated services digital network (ISDN) Basic Rate Verification-Office Equipment (BRIV-OE) feature.

This feature provides dual access from the customer premises to retrieve for the operating company personnel to retrieve the office equipment (OE) identification. The OE identification identifies the termination of the access line in use.

If the customer dials the correct access number for the BRIV-OE from the ISDN terminal and gains access, the ISDN DMS switching system with the output displays OE= followed by the OE identification value will display on the terminal display panel.

The customer can identify the OE by dialing an access code from either a hand-held test unit or from an ISDN set.

Verification steps when using hand-held test equipment

At the CPE perform the following steps

1 Connect the hand-held test unit to the LEN to be verified.

2 From the hand-held test unit, dial the BRIV-OE access code.

3 Verify that the hand-held test equipment displays the LEN: OE= for example, Host 1 0 1 16

Verification steps when using an ISDN set

At the ISDN telephone set perform the following steps

1 From the ISDN telephone set, dial the BRIV-OE access code, for example, 9596300.

2 Verify that the phone set displays the LEN: OE= for example Host 1 0 1 16.

28 ISDN log reports

Introduction to ISDN log reports

NA014 does not introduce any new logs.

For information about ISDN BRI log reports, refer to *North American DMS-100 Log Report Reference Manual*, 297-8001-840, which includes the following information for each log report:

- Explanation
- Format
- Example
- Field descriptions
- Action
- Associated OM registers
- Additional information

Explanation

This section describes the subsystem of the specific log report and conditions when the log is generated.

Format

This section describes the format of the specific log report.

Example

This section provides a sample log report.

Field descriptions

This section describes each field of the log report. Information includes: Field, Value, and Description.

Action

This section provides a detailed description of the specific log report.

Associated OM registers

This section lists any associated operational measurements (OM).

Additional information

This section provides additional detailed information about the specific log report. This information includes field positions and descriptions of words within the log report.

29 ISDN operational measurements

Introduction

NA014 does not introduce any new operational measurements (OM).

For information about all other ISDN BRI OMs, refer to *North American DMS-100 Operational Measurement Reference Manual*, 297-8001-814, which includes the following information for each OM:

- OM description
- Release history
- Registers
- Group structure
- Associated OM groups
- Associated functional groups
- Associated functionality codes
- OM group register flowcharts
- Register descriptions

OM description

This section provides a brief description of what the OM group counts and how the data is used.

Release history

This section contains a history of changes to the OM group. The changes are described and the software releases associated with the changes are identified.

Registers

This section indicates how the registers in the OM group are arranged on the MAP display.

Group structure

This section describes the structure of the OM group, including the number of OM tuples, key fields, office parameters, and other datafill information that pertains to the group. If the description includes references to registers from a different OM group, these registers are identified by group name followed by an underscore and the register name. For example, OFZ_ORGFSET refers to register ORGFSET in group OFZ.

Associated OM groups

This section lists other OM groups that are associated with the OM group, if any.

Associated functional groups

This section lists functional groups that are associated with the OM group.

Associated functionality codes

This section lists functionality codes that are associated with the OM group.

OM group register flowcharts

This section provides a functional flowchart of all the registers that are associated with the OM group. The flowchart shows the sequence of events that causes the registers count values to increase, and the relationship between the registers in the group.

Register descriptions

This section provides a brief description of each register that is associated with the OM group.

Register descriptions are arranged alphabetically in each group. There are three types of registers:

- Peg register values are increased when an event occurs.
- Usage registers record activities or states at specified time intervals.
- High water registers indicate the maximum number of items in simultaneous use during the current transfer period.

Each register description contains the following sections:

- register <short name>
- register <short name> release history
- associated registers
- associated logs
- extension registers

Register <short name>

This section provides an expansion for the register acronym followed by a description of what the register counts. If the description included a reference to registers from a different OM group, these registers are identified by the group name followed by an underscore and the register name. For example, OFZ_ORGFSET refers to register ORGFSET in group OFZ.

Register <short name> release history

This section shows the software development stream in which the register was created and lists subsequent changes.

Associated registers

This section lists related registers and explains how they are related. This section can include validation formulas or useful equations. Registers from a different group are identified by a combination of the group name and register name, separated by an underscore, for example, OFZ_ORGFSET.

Associated logs

This section lists logs that are generated, together with events that are counted or related to the interpretation of OM data.

Extension registers

This section provides the name of the register that is used for overflow when the original register is full. The value in the extension register is multiplied by 65336 and added to the original register value to get the total count.

Appendix A Equipment ordering codes

NTI

The following table lists parts related to the NT1 interface.

Table A-1 NT1

Unit	Vendor part number	Nortel part number
NT1 Standalone	NTBX80AA	B0229816
2-Watt power supply	A0381081	A0381081
10-Watt power supply	NTBX81AA	B0229817
NT1 Rackmount basic card	NTBX84AA	B0229825
NT1 Rackmount star card	NTBX84BA	B0229826
NT1 Rackmount shelf	NTBX82AA	B0229818
NT1 Rackmount module	NTBX83AA	B0229819
NT1 Rackmount power	NTBX86AA	B0229820
NT1 Rackmount battery	NTBX89AA	B0299822

The following table lists the part numbers for the M5317 ISDN terminals.

Table A-2 Terminals (Sheet 1 of 2)

Unit	Vendor part number	Nortel part number
M5317		
M5317TX, Ash	NTFX00PA	B0239752
M5317TX, Black	NTFX00PB	B0239753
M5317TDX, Ash	NTFX00LE	B0239258
M5317TDX, Black	NTFX00LF	B0239259

Table A-2 Terminals (Sheet 2 of 2)

Unit	Vendor part number	Nortel part number
M5317TDE, Black		B0249893-CLP
M5317TDE, Ash		B0249894-CLP

The following table lists the part numbers for the connectors associated with the ISDN interface

Table A-3 Connectors

Unit	Vendor part number	Nortel part number
Distribution Connector	QCBIX1A	(A0266828)
Bridging Connector	QCBIX2A	(A0269923)
Multiplying Connector	QCBIX5A	(A0266827)
Key Apparatus Connector	QCBIX7A	(A0269925)
Modular Jack Connector (12 x 2 pairs)	QCBIX36B	(A0318898)
Modular Jack Connector (8 x 3 pairs)	QCBIX36C	(A0330864)
Modular Jack Connector (6 x 4 pairs)	QCBIX36D	(A0314173
Designation Strip	QCBIX20A	(A0270169)

The following table lists the part numbers for the tools associated with the BIX connector blocks

Table A-4 Tools

Unit	Vendor part number	Nortel part number
BIX Tool	QTBIX16A	(A0270165)
Pouch Tool	n/a	(CO054642)
BIX Test Probe	QTBIX17A	(A0270166)
Test Connector	QTBIX22A	(A0270171)
BIX Socket Wrench	NSQ2000L1	(A0207979)
Note: BIX connector equipment is optional. All listed BIX equipment may not be necessary for a given installation.		

BIX labels

The following tables list the part numbers for ISDN NT1 labels (1 U loop, 4 T loop) (P0704295)

Table A-5 Cable labels

Blank cable label color	Part number
Green	(P0588415)
Blue	(P0588416)
Red	(P0588418)

Table A-6 Blank labels

Blank label color	Part number
Green	(P0588400)
Yellow	(P0588416)
Red	(P0588418)
Blue	(P0588403)
Silver	(P0588404)
Purple/Violet	(P0588405)
White	(P0588406)

Table A-7 Modular jack labels

Modular jack label	Part number
White	(P0679239)
Purple/Violet	(P0588405)
Blue 2 pairs	(P0679236)
Blue 3 pairs	(P0679237)
Blue 4 pairs	(P0679238)
Green	(P0679235)
Yellow	(P0679233)

The following table lists the part numbers for the patch cords that can ordered

Table A-8 Patch cords

Patch Cord	Vendor part number	Nortel part number
2 Pair Patch Cord (3 feet)	NE-P4QFN1	(A0331574)
2 Pair Patch Cord (4 feet)	NE-P4QFN2	(A0331575)
2 Pair Patch Cord (6 feet)	NE-P4QFN3	(A0331576)
High Speed, 3 Pair Patch Cord (4 feet)	NE-P6Q81	(A0331577)
High Speed, 3 Pair Patch Cord (6feet)	NE-P6Q82	(A0331578)

Loop

The following table lists parts related to loops.

Table A-9 Cross-connecting wire

Jumper wire	Nortel part number
Z Cross-connecting Wire (1 pair)	(22208008)
Z Cross-connecting Wire (2pair)	(22208024)
Z Cross-connecting Wire (3 pair)	(22208113)

Terminating resistors

The following table lists parts relating to terminating resisters.

Table A-10 Terminating resister

Unit	Vendor part number	Nortel part number
Terminating Resister Box	AQ378866	(491-238) Note 1
8 Pin Teledapt Jack	NA800823	(KR 6351CI) Note 2
Note 1: Amphenol part number		
Note 2: Rova Products part number		

Adapters

The following table lists parts related to bridging adapters.

Table A-11 Adapters

Unit	Vendor part number	Nortel part number
T Bridging Adapter (6 pin) Note 1	NE267QB	(A0262656)
T Bridging Adapter (8 pin)	NA800822	(403-756349) Note 2
T Bridging Adapter (8 pin)		(BR241-444) Note 3

Note 1: Building standards are migrating to eight pin only

Note 2: Amphenol part number

Note 3: Brand Rex part number

Modular outlets

The following table lists parts related to modular outlets.

Table A-12 Modular outlets

Unit	Nortel part number
8 position, surface mount	(X9908301)
dual 8 position, surface mount	(X9908304)
8 position, flush mount	(X9908308)
dual 8 position	(X9908312)

List of abbreviations, acronyms, and terms

AAK
Answer Agent Key

ABS
Authorized Bearer Services

ACB
Automatic Call Back

ACD
Automatic Call Distribution

ACRJ
Anonymous Caller Rejection

ACOU
Additional Call Offering Unrestricted

ADO
add option

AFC
Additional Functional Call

AGA
Associated Group Assignment

AGI
Associated Group Indicator

AIMux
Async Inverse Multiplexing

AMA
Automatic Message Accounting

ANSI
American National Standards Institute

AR
Automatic Recall

ASEQ
asequentional

ASU
application specific unit

Asynchronous line diagnostics
Line diagnostic started with the DIAG NOWAIT command which runs in the background. This allows the user to perform additional function from the same MAP position while line diagnostic is being run.

ATT
attach

AWG
American wire gauge

2B1Q
two binary one quaternary

B8ZS
binary 8 zero substitution

Balun
a device that isolates a load from a grounded source

BC
bearer capability

BCLPIC
bearer capability primary inter-LATA carrier

BCNAME
bearer capability name

BCPIC
bearer capability primary intra-LATA carrier

Bellcore
Bell Communications Research

BERT
bit error rate test

BIC
bus interface card

BIX
building interoffice cross-connect

BLM
basic line monitoring

BNN
Bridged Night Number

B-pkt
B-channel packet

BRAFS
basic rate access functional set

BRI
basic rate interface

BRITE
basic rate interface transmission extension

BRIV
basic rate interface verification

BSY
busy

CA
call appearance

CACH
call appearance call handling

CALLOG
Call Login

CARES
call appearance reservation

CARRMTC
carrier maintenance

CBC
channel bus controller

CBE
Call Forward Busy External

CBU
Call forwarding Busy Unrestricted

CBI
Call Forward Busy Intragroup

CBUS
channel bus

CCB
call condense blocks

CCITT
International Telephone and Telegraph Consultative Committee

CCS7
Common Channel Signaling 7

CDB
call data blocks

CDE
Call Forward Do Not Answer External

CDI
Call Forward Do Not Answer Intragroup

CDU
Call Forward Do Not Answer Unrestricted

CFB
Call Forward Busy

CFD
Call Forward Do Not Answer

CFF
Call Forward Fixed

CFI
: Call Forward Intragroup

CFMDN
: Secondary Member Call Forwarding Programming on MADN

CFU
: Call Forwarding Universal

CFXDNCT
: call forwarding per DN per call type

CFW
: call forward

CHA
: change

CHAPH
: change packet handler parameters

CHF
: change feature

CI
: command interpreter

CLASS
: Custom Local Area Signaling Services

CM
: computing module

CMD
: circuit mode data

CNAC
: Call Not Accepted

CNAMD
: Calling Name Delivery

CND
: Calling Number Delivery

CNDA
: calling number delivery activation

CNDD
calling number delivery deactivation

CO
central office

CONF6C
6 port conference chain

CONFSIZE
conference size

COT
Customer Originated Trace

CPB
call processing busy

CPD
call processing deload

CPE
customer premises equipment

CPM
common peripheral module

CPK
Call Park

CPU
Call Pickup

CRBL
Call Reference Busy Limit

CRC
cyclic redundancy check

CREJ
call rejected

CS
circuit switched

CSD
circuit switched data

C-side
control-side

CT
call type

CTLPIC
call type primary inter-LATA carrier

CTPIC
call type intra-LATA carrier

CUG
closed user group

CUT
cutoff

DATAPATH
Nortel Networks system for providing direct circuit-switched digital data transmission through a DMS switching system over existing telephone networks

DBC
Default Bearer Capability

DC
direct call

DCC
disconnect conference circuit

DCC
digroup control card

DCH
D-channel handler

DCHCON
D-channel continuity

DCND
DTMF Calling Number Delivery

DCPK
Directed Call Park

DDU
disk drive unit

Default Terminal Profile
LTID used for NITs (can be of type 2B, B, or 2BD)

DEFLTERM
default logical terminal

DEL
deloaded

DET
detach

DET
error detection

DIAG
diagnostic

DID
direct inward dial

DM
disconnect mode

DMA
direct memory access

DMB
D-channel maintenance busy

DMCT
Denied Malicious Call Termination

DMSPH
DMS packet handler

DN
directory number

DNA
data network address

DNCT
directory number/call type

DND
Do Not Disturb

DNH
Distributed

DOD
direct outward dial

D-pkt
D-channel packet

DPN
Data Packet Network

DPPS
data packets per second

DRCW
Distinctive Ringing/Call Waiting

DS30A
A 32-channel transmission link between the line concentrating module (LCM) and controllers in the DMS-100 Family switches

DSEQ
desequential

DSME
DMS evolution

DS-1
digital signal level 1

DSI
data stream interface

DTA
digital test access

DTC
digital trunk controller

DTCI
ISDN digital trunk controller

DTEI
dynamic terminal endpoint identifier

DTMF
dual-tone multifrequency tone

Dynamic TEI
TEI that is automatically assigned to terminal using network/user software negotiation procedures

EBS
electronic business service

ECHOCI
Echo station command interpreter MAP level used to add, modify, and remove echo stations

Echo station
Echoes back user data packets sent to it be end user testing ISDN X.25 functionality.

ECM
Extended Call Management

EDCH
enhanced D-channel handler

EISP
enhanced ISDN signal processor

EKTS
electronic key telephone service

ELN
essential line

ENET
enhanced network

ES
errored seconds

ESA
emergency standalone

ESF
extended frame format

ESMU
enhanced subscriber carrier module urban

ET
exchange termination

ETSI
European Telecommunications Standards Institute

FBUS
frame transport bus

FC
Flexible calling

FCC
Federal Communications Commission

FEBE
far-end block error

FIT
fully initializing terminal

FRIU
frame interface unit

FRMR
frame reject frame

Generic TSPID
Serving Numbering Plan Area + Primary Directory Number

GIC
Group Intercom

GROUP
customer group

HASU
hardware assigned software unassigned

IBDN
integrated building distribution network

IBERT
integrated bit error rate test

IBN
integrated business network (see MDC)

ICE
ISDN Capacity Enhancement

ICM
Intercom

IDC
ISDN drawer controller

IDL
idle

IDT
integrated digital terminals

IE
information element

IID
interface identifier

ILD
ISDN line drawer

INB
installation busy

Integrated terminal
provides access to voice/circuit, as well as packet services

IOC
ISDN ordering code

IPH
integrated packet handler

ISDN
Integrated Services Digital Network

ISG
integrated signaling group

ISLC
ISDN line card

ISLCC
integrated services line card carrier

ISP
ISDN signaling preprocessor

ISTB
in service trouble

ISUP
ISDN userpart

ITU
International Telecommunications Union

IVDT
integrated voice data terminal

kbit/s
kilobits per second

KSH
Key Short Hunt

JNET
junctored network

L1BLMALM
layer 1 basic line monitoring alarm

LAN
local area network

LAPB
link access procedure balanced

LAPD
link access procedure on the D-channel

LATANAME
local access and transport area name

LC
line card

LCC
line class code

LCD
liquid crystal display

LCME
line concentrating module enhanced

LCN
logical channel number

LDTPSAP
Line Appearance on Digital Trunk

LED
light-emitting diode

LEN
line equipment number

LGA
line group array

LGC
line group controller

LGCI
ISDN line group controller

LIM
link interface module

LIS
link interface shelf

LMB
line module busy

LMS
local message switch

LO
lock-out

LOSDG
loss of signal with dying gasp

LOSW
loss of sync word

LPIC
intra-LATA primary inter-exchange carrier

LPP
link peripheral processor

LSG
line subgroup

LT
logical terminal

LTC
line/trunk controller

LTCI
ISDN line/trunk controller

LTCLASS
logical terminal class

LTG
line treatment group

LTID
logical terminal identifier

LULT
Line Unit Termination used in a remote digital terminal

LUNT
Line Unit Network Termination used in a central office terminal

MADN
multiple appearance directory number

MAP
maintenance and administration position

MAXKEYS
maximum keys

MB
manual busy

MBG
Multi-location Business Group

MBS

Meridian business set

MDC

Meridian Digital Centrex

MDN

Multiple Appearance Directory Number (see MADN)

MER

main equipment room

MFT

Meridian Feature Transparency

MLH

Multiple Line Hunt

MOD

modify command used at ECHOCI MAP level to modify data for echo stations

MP

master processor

MPC

message protocol and tone generator card

MP-eoc

multi-point embedded operation channel

MPLU

multipoint embedded operations channel line unit

MPLUFail

multipoint embedded operations channel line unit failure

MPH

Multiple Position Hunt

MTD

magnetic tape drive

MTU

metallic test unit

MWI
Message Waiting Indication

NDNAP
number of DN appearances

NCOS
network class of service

NEBE
Near-end block error

NEQ
not equipped

NI-1
national ISDN-1

NI-2
national ISDN-2

NI-3
national ISDN-3

NIT
non-initializing terminal

NIU
network interface unit

NIUF
North American ISDN Users' Forum

NNRC
number of non-restricted channels

NORTEL
Nortel Networks

NPI
numbering plan indicator

NRAG
network ring again

NT1
network termination 1

NTP
Nortel Networks technical publication

NTRS
no terminal responding

NUMLCN
numeric logical channel number

OAM
operation, administration, and maintenance

ODB
on-demand b-channel

OM
operational measurement

OPAC
outside plant access cabinet

OPM
outside plant module

OSI
open system interconnection

PABX
private automatic branch exchange

Packet-only NIT
Non-initializing terminal that only offers the capability to access packet services (not a voice circuit)

PAD
packet assembler/disassembler

PBL
Private Business Line

PBX
private branch exchange

PCL
product computing load

PDN
primary directory number

PEC
product equipment code

PFCNTL
Power Feature Control

PFDSP
Power Feature Display

PHRRCI
Packet Resource Reassignment tool

PIC
polyetheline/polylefin insulated cable

PIC
primary interexchange carrier

PM
peripheral module

PMODE
performance monitoring mode

PH
packet handler

POTS
plain old telephone service

PPSN
public packet switched networks

PRI
primary rate interface

PS
packet switched

P-side
peripheral-side

PS1
power source 1

PS2
power source 2

PS3
power source 2

PTS
per trunk signaling

PUPS
point-of-use power supply

PVC
protocol version control

Q.931
The CCITT recommendation that defines protocols for circuit switched call control at the network layer

QCOUNTS
query counts

QDCH
query D-channel

QDN
query directory number

QLAYER
query layer

QLEN
query line equipment number

QLOOP
query loop

QLT
query logical terminal

QPHF
query packet handler facility. Command gives user information on how a particular X.25 service group (XSG) is configured.

RBOC
regional Bell operating company

RCC2
remote cluster controller 2

RCNAME
routing characteristic name

RCU
remote concentration unit

REM
remove

RLAYER
reset layer

RLCM
remote line concentrating module

RMB
Random Make Busy

RN
redirecting number

RND
Redirecting Number Delivery

RNID
redirecting number identification

RPTR
repeater

RSC
remote switching center

RSC-S
remote switching center-SONET

RTEC
Raleigh Technical Education Center

RTS
return to service

SABME
set asynchronous balanced mode extended

SAPI
service access point identifier

SAPI 16
Low- speed packet data service on the D-channel

SAPI 0
the call control message for circuit-switched services

SBPB
simplified branched passive bus

SCA
Selective Call Acceptance

SCF
Selective Call Forwarding

SCMP
Series Completion

SCRJ
Selective Call Rejection

SCWID
Spontaneous Call Waiting ID

SDT
service disruption threshold

SDN
Secondary Directory Number

SERVORD
service order

SES
severely errored seconds

SETPH
set packet handler X.25 service parameters

SFC
single functional call

SHU
Stop Hunt

SLBRI
: Single Line ISDN

SLT
: set logical terminal

SLQ
: Single Line Queuing

SLVP
: Single-line Variety Package

SMA
: subscriber carrier module access

SMDI
: Simplified Message Desk Interface

SNA
: systems network architecture

SNPA
: serving numbering plan area

SOC
: software optionality controls

SOHO
: Small Office/Home Office

SORC
: Station Controlled Restriction Controller

SP
: signal processor

SPID
: service profile identifier

SPIDSFX
: service profile identifier suffix, which is a 1 to 4 digit number used in association with the service profile identifier (SPID) to identify two ISDN circuit switched devices on the same line with the same SPID, such as MADN numbers

STEI
: static terminal endpoint identifier

STP
signaling transport point

SUBGRP
customer subgroup

SVC
switched virtual circuit

SWACT
switch of activity

TA
terminal adapter

TCAP
transaction capabilities application part

TDM
time division multiplex

TERMCHK
terminal check

TERML
maximum number of non-initializing terminals (NIT) that can be supported on an LTID

THR
threshold

TID
terminal identifier

TEI
terminal endpoint identifier

TON
type of number

TR
terminating resistor

TS
time switch

TSP
terminal service profile

TRAVER
translations verification

TSPID
terminal service profile identifier

UCD
Uniform Call Distribution

UCDSD
Uniform Call Distribution Signal Distributor

Universal SPID
Value is 01010101010101. It is used to request automated SPID selection.

U-loop
The portion of a basic rate interface (BRI) that connects a network termination 1 (NT1) to a line concentrating module with ISDN (LCMI) or an enhanced line concentrating module with ISDN (LCME)

UATEI
User assigned TEI

UNATEI
user or network assigned terminal endpoint identifier

UP
unified processor

UPS
uninterruptable power supply

UTR
universal tone receiver

UTP
unshielded twisted pair

VBD
voice band data

VFG
Virtual Facility Group

VI
voiceband information

WWW
world wide web

X.25
A CCITT defined network layer protocol that is used in packet switching to establish, maintain, and clear virtual circuit connections between an ISDN terminal and a destination in the packet switching network

X.75
A CCITT-defined network layer protocol that is used in packet switching to establish, maintain, and clear virtual circuit connections between packet switching networks

XLIU
X.25/X.75 link interface unit

XPM
XMS-based peripheral module

XPM PLUS
XMS-based peripheral module product life upgrade strategy

XSG
X.25 signaling group

XSGCHNL
X.25 signaling group channel

DMS-100 Family

National ISDN BRI

Service Implementation Guide

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Nortel Networks
PO Box 13010
RTP, NC 27708-3010
Telephone: 1-877-662-5669
Electronic mail: cits@nortelnetworks.com

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How the world shares ideas.