297-2401-010

DMS-100 Family

Integrated Services Digital Network

Product Guide

BCS36 and up Standard 08.02 December 1993

northern telecom

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Publication history

December 1993

BCS36 Standard 08.02

- added additional DMS packet handler information
- added enhanced D-channel handler (EDCH) information
- added the DS512 link option
- modified numerous illustrations
- updated XPM PLUS information
- updated message protocol and tone generator card (MPC) information

September 1993

BCS36 Preliminary 08.01

- added DMS packet handler information
- added information on the enhanced ISDN signaling preprocessor (EISP) card and the unified processor (UP) cards for DTCI
- modified the “List of terms”
- updated the DPN document section in the “Finding ISDN information” chapter
- removed European Telecommunications Standards Institute (ETSI) information

March 1993

BCS35 Standard 07.02

- added new sections for the CLASS group of features and lists of documentation relating to ISDN; updated the software features lists

December 1992

BCS35 Preliminary 07.01

- added information on the National ISDN-1 (NI-1) and European Telecommunications Standards Institute (ETSI) basic rate interface (BRI) protocols, and on the flexible timers used by these variants
- added information on the enhanced services test unit (ESTU) and transaction language 1 (TL1) line testing capabilities

July 1992

BCS34 Standard 06.01

- added information on the enhanced ISDN signaling preprocessor (EISP) card and the unified processor (UP) cards
- added a software chapter
- added DMS packet handler information
- added information on and illustrations of the cabinetized frames for the peripheral modules
- updated the documentation section

October 1991

BCS33 Standard 05.01

- added information on the TL1 interface

March 1991

BCS32 Standard 04.01

- added information on enhanced line concentrating module (LCME) support for plain ordinary telephone service (POTS) and Datapath (including the capability to datafill ring generator options for the LCME)
- included peripheral module-level support for layer 1 performance monitoring of 2B1Q loops
- added documentation abstracts to the chapter “Finding ISDN Information”

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About this document

Integrated Services Digital Network Product Guide provides an overview of the DMS-100 Family equipment that makes up the integrated services digital network (ISDN). It is written for personnel who have an understanding of ISDN protocols and terminology as defined by the Consultative Committee on International Telephony and Telegraphy (CCITT), and have an understanding of the DMS-100 Family of switches. Information about DMS packet handler equipment, DPN Family equipment, and customer premises equipment that connects to the DMS-100 is also included.

When to use this document

Northern Telecom (NT) software releases are referred to as batch change supplements (BCS) and are identified by a number, for example, BCS29. This document is written for DMS-100 Family offices that have BCS36 and up.

More than one version of this document may exist. The version and issue are indicated throughout the document, for example, 01.01. The first two digits increase by one each time the document content is changed to support new BCS-related developments. For example, the first release of a document is 01.01, and the next release of the document in a subsequent BCS is 02.01. The second two digits increase by one each time a document is revised and rereleased for the same BCS.

To determine which version of this document applies to the BCS in your office, check the release information in *DMS-100 Family Guide to Northern Telecom Publications,* 297-1001-001.

How to identify the software in your office

The *Office Feature Record (D190)* identifies the current BCS level and the NT feature packages in your switch. You can list a specific feature package or patch on the MAP (maintenance and administration position) terminal by typing

>PATCHER;INFORM LIST identifier

and pressing the Enter key.

where
identifier is the number of the feature package or patch ID

You can identify your current BCS level and print a list of all the feature packages and patches in your switch by performing the following steps. First, direct the terminal response to the desired printer by typing

>SEND printer_id

and pressing the Enter key.

where
printer_id is the number of the printer where you want to print the data

Then, print the desired information by typing

>PATCHER;INFORM LIST;LEAVE

and pressing the Enter key.

Finally, redirect the display back to the terminal by typing

>SEND PREVIOUS

and pressing the Enter key.

How ISDN documentation is organized

This document is part of ISDN documentation that supports the Northern Telecom line of ISDN products. ISDN documentation is a subset of the DMS-100 Family library.

The DMS-100 Family library is structured in numbered layers, and each layer is associated with an NT product. To understand ISDN products, you need documents from the following layers:

- DMS-100 Family basic documents in the 297-1001 layer
- DMS-100 Family ISDN customer premises equipment documents in the 297-2451 layer
- DPN Family documents in the 241-0001, 241-1001, and 241-2001 layers

- Meridian 1 (SL-1 architecture) documents in the 553-2201, 553-2301, 553-2311, 553-2811, and 553-2901 layers
- Meridian 1 (SL-100 architecture) documents in the 555-4001 and 555-4011 layers

ISDN documents and other documents that contain related information are listed in “Finding ISDN information” in this document.

References in this document

The following documents are referred to in this document.

Number	Title
	Consultative Committee on International Telephony and Telegraphy blue book on ISDN
297-0001-003	*NTP Index for Documentation*
297-1001-100	*DMS-100 Family System Description*
297-1001-801	*DMS-100 Feature Description Manual*
297-2401-350	*ISDN BRI Translations Guide*
297-2711-010	*Remote Switching Center Product Guide*

Understanding ISDN

This chapter describes the integrated services digital network (ISDN), the key components of ISDN, the services ISDN provides, and ISDN signaling methods. Understanding ISDN is discussed in this chapter as follows:

ISDN overview on page 1-2 defines ISDN and National ISDN-1 protocol.

Key components of ISDN on page 1-4 describes the main components that provide ISDN services: the DMS-100 ISDN node and customer premises equipment.

OSI reference model on page 1-9 describes the implementation of ISDN through the first three layers of the OSI model.

ISDN services on page 1-10 describes the two methods ISDN provides for accessing the voice and data networks: basic rate interface (BRI) and primary rate interface (PRI).

ISDN signaling methods on page 1-15 describes the two signaling methods ISDN supports to communicate between the subscriber's terminal and the switch: functional and stimulus.

ISDN overview

ISDN is a collection of standardized national and international digital telecommunication interfaces and signaling protocols that provide digital circuit-switched voice and data, as well as packet-switched data services.

These standard interfaces and protocols are defined by the I- and Q-series of recommendations published by the Consultative Committee on International Telephony and Telegraphy (CCITT). The 2B1Q interface protocol provides the foundation for standardized ISDN and complies with American National Standards Institute (ANSI) and the Bellcore requirements for ISDN services.

Figure 1-1 shows an example of a DMS-100 ISDN configuration.

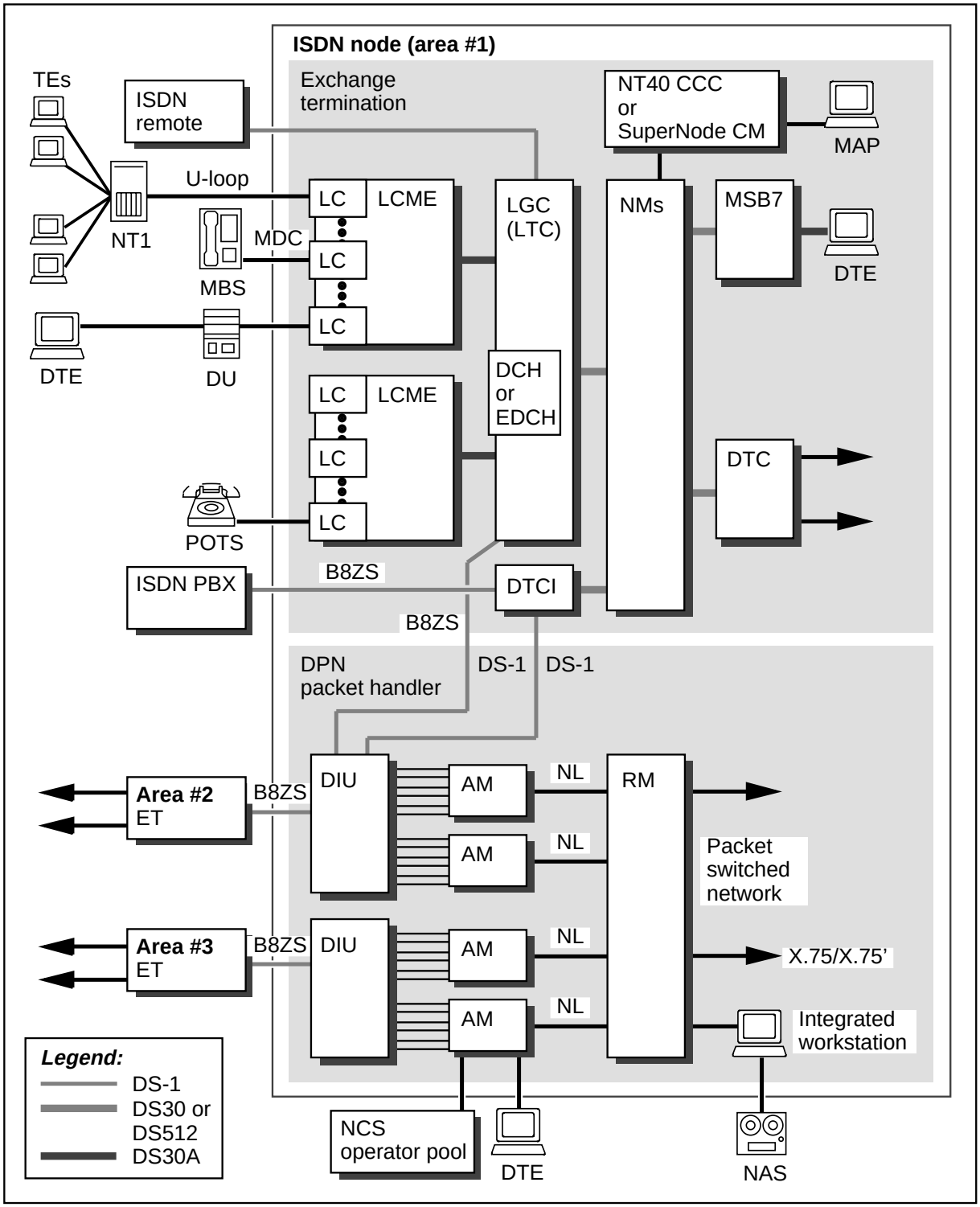
National ISDN-1

The Corporation for Open Systems (COS) is a nonprofit organization of switch vendors, Bell operating companies, computer and data equipment manufacturers, and major ISDN users. It was formed to encourage the widespread deployment of a standards-based telecommunications network-ISDN-through vendor cooperation. National ISDN-1 (NI-1) represents the commitment of COS to develop and market a standards-based ISDN offering.

National ISDN-1 and the agreement on ISDN standards was needed because each vendor offered a slightly different version of ISDN that was incompatible with equipment from other vendors. The implementation of the new standards allows all ISDN products to interwork with other vendors' products and allows many new services on the public network. Compliance with the National ISDN-1 agreement removes the barriers that have delayed ISDN deployment: unstable standards, proprietary implementations, and the lack of a commercially viable set of calling features and services.

Figure 1-1xxx
Example of a DMS-100 ISDN configuration

FW-30445



Key components of ISDN

The key components of ISDN are the DMS-100 ISDN node, which is made up of the exchange termination and the packet handler, and customer premises equipment.

The individual components of an ISDN network vary according to the services required and the method of accessing the voice and data networks. Different DMS-100 peripherals are used in each case to provide ISDN services.

Centralized operation, administration, and maintenance is achieved with the integrated ISDN OAM processor. The OAM processor serves as a mediation device between the exchange termination and the DPN packet handler. The OAM processor allows information to be transferred to and from the DPN packet handler and the maintenance and administration position (MAP).

The operation, administration, and maintenance function of the DMS packet handler is integrated and handled through the MAP.

Two types of packet handlers are supported by the DMS-100 ISDN: the DMS packet handler and the DPN packet handler. Figure 1-2 shows the key components of a DMS-100 ISDN with a DMS packet handler, and figure 1-3 shows the key components of a DMS-100 ISDN with a DPN packet handler.

DMS-100 ISDN node

A DMS-100 ISDN node consists of a DMS-100 circuit switch and a data networking system switch used as a packet handler. The circuit switch is called the exchange termination and is a gateway to the circuit-switched (voice and data) network. The packet handler performs packet switching (data) operations and is a gateway to the packet-switched network. The ISDN switch supports both ISDN and non-ISDN lines and trunks.

Exchange termination

The exchange termination is based on standard DMS-100 Family switches, peripherals, and software. The DMS-100 switch is based on the DMS SuperNode or NT40 switch. The DMS SuperNode switch has faster processing power than the NT40 switch, and has a built-in interface to fiber transmission systems.

Figure 1-2xxx
Key components of a DMS-100 ISDN using a DMS packet handler

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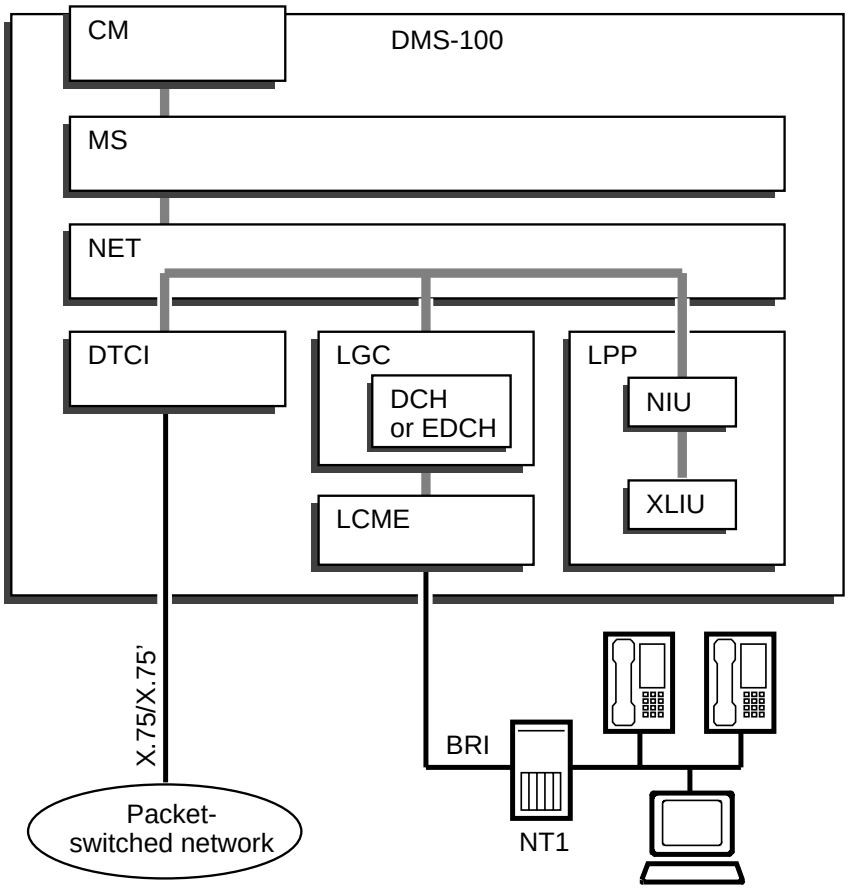
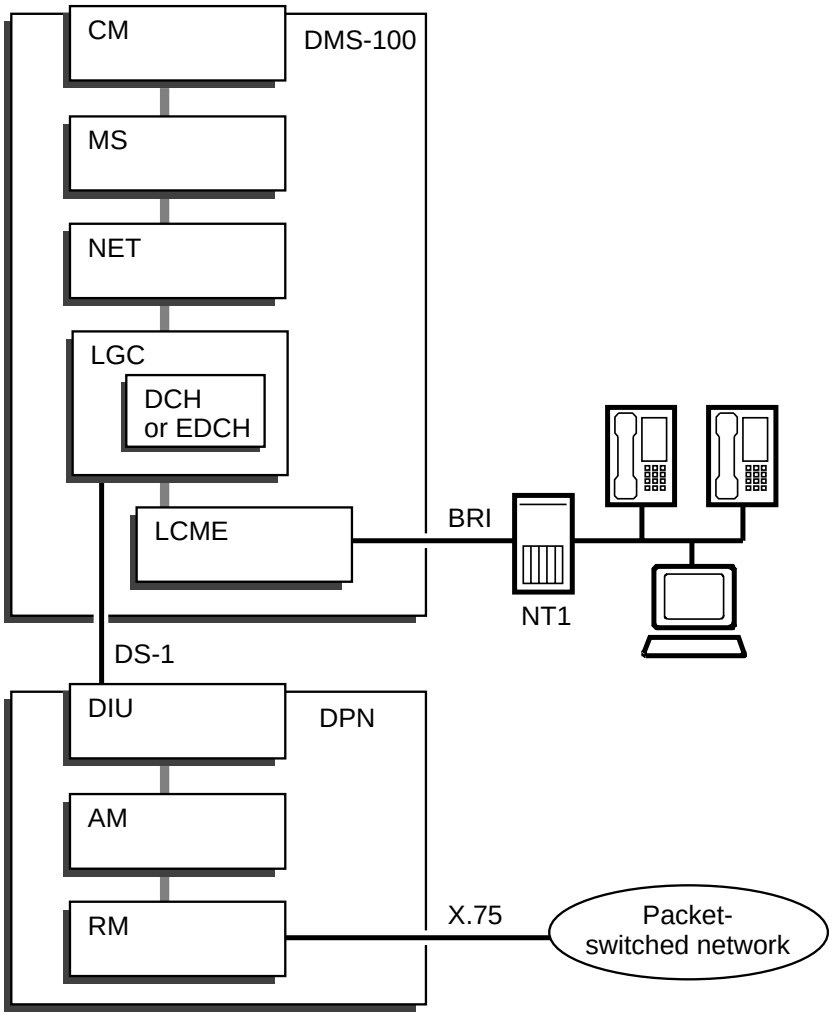


Legend:

CM	Computing module	LPP	Link peripheral processor
DCH	D-channel handler	MS	Message switch
DTCI	ISDN digital trunk controller	NET	Network
EDCH	Enhanced D-channel handler	NIU	Network interface unit
LCME	Enhanced ISDN line concentrating module	NT1	Network termination 1
LGC	ISDN line group controller	XLIU	X.25/X.75/X.75' link interface unit

Figure 1-3xxx
Key components of a DMS-100 ISDN using a DPN packet handler

FW-30971



Legend:

AM	Access module	LGC	ISDN line group controller
CM	Computing module	MS	Message switch
DCH	D-channel handler	NET	Network
DIU	Digital interworking unit	NT1	Network termination 1
DPN	Data Packet Network	RM	Resource module
EDCH	Enhanced D-channel handler		
LCME	Enhanced ISDN line concentrating module		

DMS packet handler

The DMS packet handler (DMS PH), illustrated in figure 1-2, provides ISDN X.25 packet service as an integrated peripheral of the DMS SuperNode system. The DMS PH is fully compliant with NI-1 standards.

The packet handler routes data packets to and from destinations in accordance with the addresses of the originating and destination terminals associated with each call. The packet handler uses components to access the packet-switched network and to support setup, maintenance, and billing for packet calls from ISDN terminals.

Service access from the CPE (terminal equipment) to the DMS PH is through a basic rate interface (BRI), which provides CCITT X.25 LAPB compliance on 64-kbit/s B-channels and X.25 LAPD compliance on 16-kbit/s D-channels. The CCITT-compliant X.75 and X.75' protocols provide trunk access to other ISDN nodes and connection to the packet-switching network.

The PH is an application specific unit (ASU) that resides in the link peripheral processor (LPP) or single-shelf LPP (SSLPP) in the DMS SuperNode switch. The LPP is a frame cabinet that consists of network interface units (NIU) and X.25/X.75/X.75' link interface units (XLIU).

DMS packet handler services

The following services are provided by DMS PH:

- switched virtual circuits
- permanent virtual circuits (PVC)
- ISDN number and routing capabilities (E.164)
- public packet switched network (PPSN) and public switched data network (PSDN) interworking
- escape to X.121 data numbering
- X.121 address routing (up to 14 digits)
- called address and recognized private operating authority and interexchange carrier (RPOA/IEC) preselect routing
- inband user-to-user signaling
- hunting notification through called line address modification notification (CLAMN)
- X.75 and X.75' network utilities
- calling number identification
- closed user groups (CUG)
- hunt groups (HG)
- PVC type II billing

Trunk access

Within the U.S. local access and transport area (LATA) jurisdiction, calls between switches use the X.75 prime protocol (X.75'), which offers the same facilities as X.75 protocol, with enhanced billing services.

Support

To ensure compliance with the U.S. LATA operations, all access services support both signaled and provisioned recognized private operating agency (RPOA) facilities. This allows the customer to select inter-exchange carriers (IEC) on a call-by-call basis.

The DMS PH supports the equal access E.164 numbering system and X.121 address routing. It also supports escape to E.164 or X.121 numbering systems and support for RPOA translations. For more information on BRI protocols, see the *ISDN BRI Translations Guide*, 297-2401-350.

Billing

DMS PH billing supports automatic message accounting (AMA) packet billing according to Bellcore technical requirements (TR862). The billing information for each call is collected in the XLIU. At the end of each call, segment counts for each rate period are forwarded to the DMS-core, which then builds the AMA record. Depending on the call duration, intermediate segment counts are forwarded during the actual call.

DPN packet handler

The DPN packet handler consists of a digital interface unit (DIU), an access module (AM), and a resource module (RM). Refer to *NTP Index for Documentation*, 297-0001-003, for more information on the DPN packet handler.

Customer premises equipment

Customer premises equipment (CPE) is located at the customer site, and may consist of a combination of the following components:

- U-loop
- S/T bus
- network termination 1 (NT1)
- ISDN terminal adapters
- ISDN terminals

OSI reference model

The open systems interconnections (OSI) model was developed by the CCITT and International Standards Organization (ISO) to standardize manufacturing protocols. The OSI model consists of seven layers:

- layer 1-physical layer
- layer 2-data link layer
- layer 3-network layer
- layer 4-transport layer
- layer 5-session layer
- layer 6-presentation layer
- layer 7-application layer

Each layer defines the activity required to support the functionality, interfaces, and interconnections within a network. Figure 1-4 illustrates the seven layers of the OSI model.

Figure 1-4xxx
The seven-layer OSI reference model

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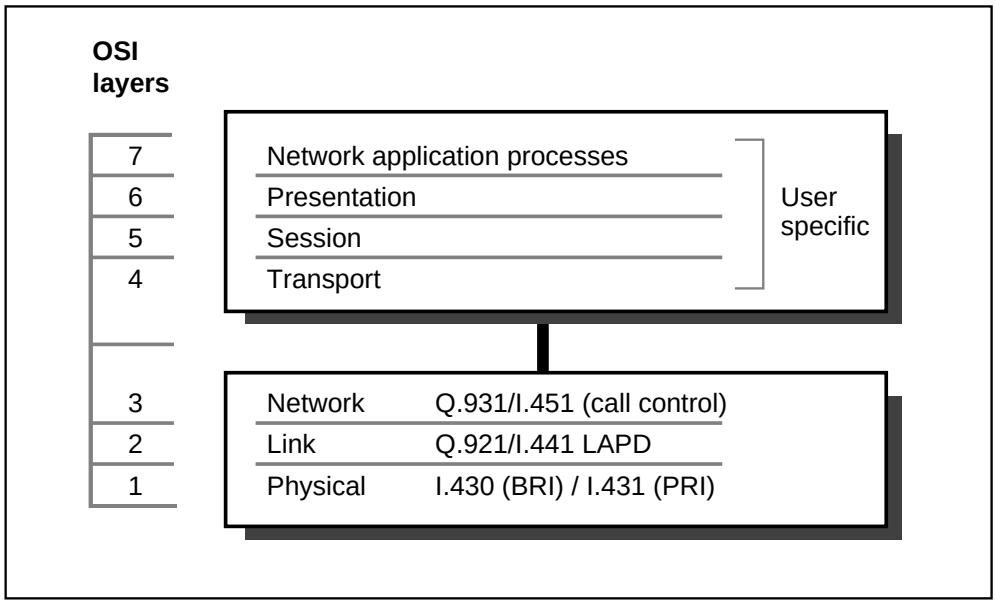


ISDN is implemented through layers 1 to 3 of the OSI model.

Layer 1-physical layer

The physical layer provides the physical characteristics between the ISDN interface and the network. These include the physical wire connections, transmission of electrical signals between endpoints, and activation and deactivation of the links.

Layer 2-data link layer

The data link layer provides the logical links between the CPE and the exchange termination.

There are two types of messaging formats for the data link layer:

- link access procedure D-channel (LAPD), used for circuit-switched call control and low speed D-channel packet data calls
- link access procedure balance (LAPB), used for high-speed B-channel packet data calls

Layer 3-network layer

The network layer provides the messaging format that enables the connection between two CPE devices. It provides routing and switching, and establishes, maintains, and clears circuit and packet call connections.

There are two types of messaging formats for the network layer:

- Q.931 format, used for circuit-switched voice and data calls
- X.25 format, used for B- and D-channel packet data calls

ISDN services

ISDN provides a variety of circuit-switched and packet-switched features to the subscriber. Many ISDN-compatible computers, data terminals, and telephone sets can access these advanced features through a single modular connector at the subscriber premises.

An ISDN switch offers subscribers two methods of accessing the voice and data networks: basic rate interface (BRI) for line service, and primary rate interface (PRI) for trunk service.

Both BRI and PRI also provide access to third-party vendors, known as enhanced service providers (ESP), which provide, for example, weather report, ticket office, and stock market services.

Basic rate interface

BRI allows a variety of computers, data terminals, and telephone sets to be connected to an S/T bus. The S/T bus is connected over the U-loop to the ISDN switch, which provides the circuit-switched and packet-switched services needed to

- set up outgoing and receive incoming voice and data calls
- transmit and receive voice information
- transmit and receive data using high-speed and low-speed connections

BRI provides two 64-kbit/s bidirectional data channels, known as B-channels, and one 16-kbit/s signaling channel, known as the D-channel.

This signaling method is referred to as 2B+D signaling. An additional 16-kbit/s channel is provided for maintenance purposes. Figure 1-5 illustrates a typical BRI configuration.

BRI provides access to

- circuit-switched voice and data services on the 64-kbit/s B-channels
- high-speed packet data services on a provisioned B-channel connection
- low-speed packet data services on the 16-kbit/s D-channel

The ISDN loop supports multiple subscriber terminals. A directory number (DN) directs calls to a specific ISDN loop, while the terminal endpoint identifier (TEI) and logical terminal identifier (LTID) route data and messaging to the appropriate terminal on the loop.

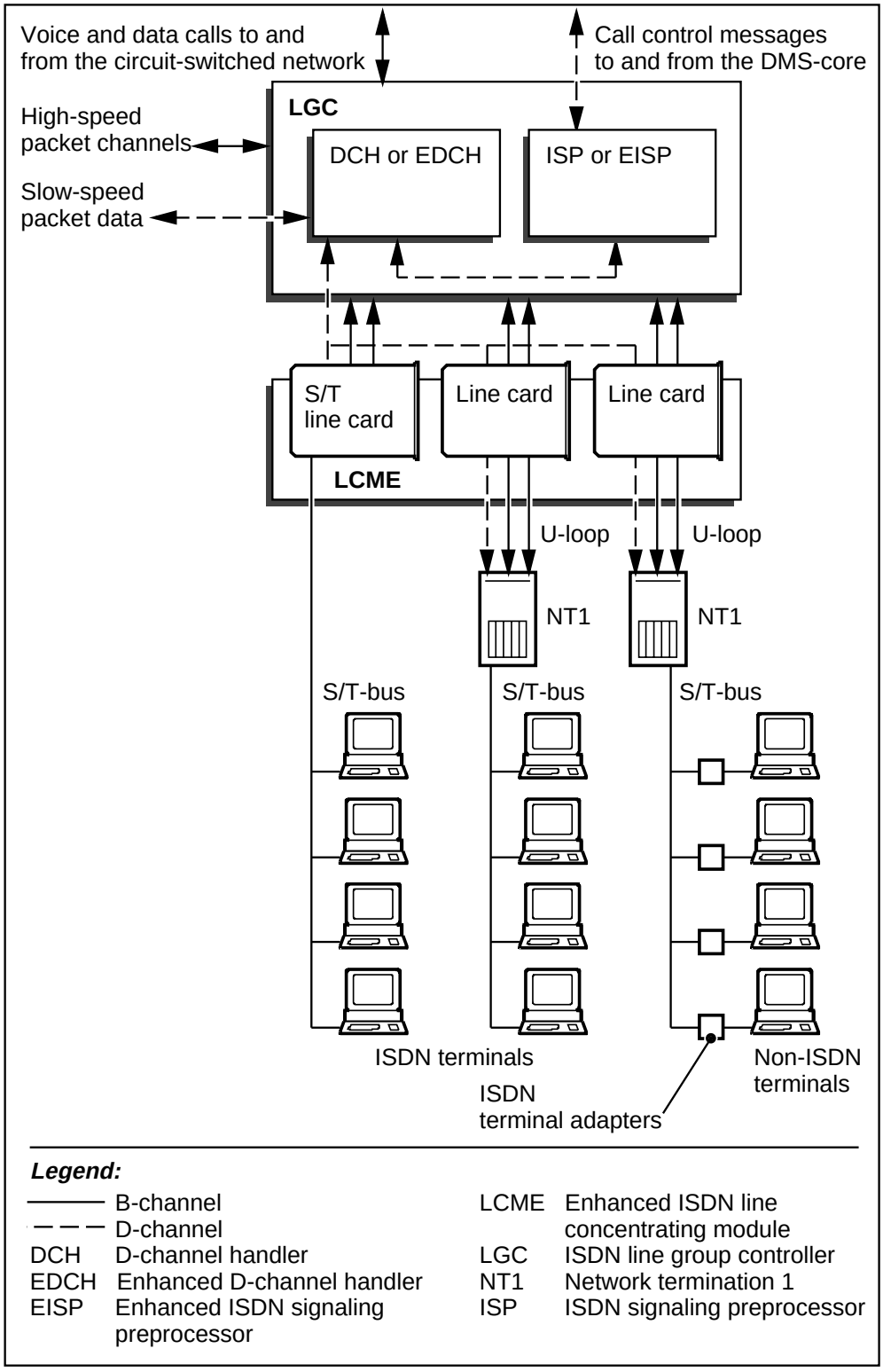
BRI works with a number of existing telephony agents, including

- BRI functional terminals
- integrated business network (Meridian Digital Centrex) lines
- Meridian business sets
- data units
- POTS lines
- IBN trunks
- POTS local trunks
- POTS toll trunks
- intertoll trunks (includes the equal access feature)
- automatic number identification (ANI) trunks
- centralized automatic message accounting (CAMA) position
- PRI trunks
- ISDN user part (ISUP)
- private branch exchange (PBX) trunks

BRI also provides access to supplementary services based on standard Bellcore and Meridian Digital Centrex (MDC) features, and on X.25 facilities offered by Northern Telecom's ISDN packet handler.

Figure 1-5
Basic rate interface configuration

FW-30478



Primary rate interface

PRI allows PBXs, interexchange carriers, and computers to be connected to the ISDN switch over digital trunks. Figure 1-6 illustrates a typical PRI configuration.

PRI provides twenty-three 64-kbit/s bidirectional B-channels, and one 64-kbit/s D-channel. This signaling method is referred to as 23B+D signaling.

PRI uses a digital primary rate transmission facility. In North America, the DS-1 standard 1.544-Mbit/s 24-channel format is used to carry ISDN signals for PRI between the ISDN exchange termination and a PBX, such as the Meridian 1 Communication System.

One DS-1 link configured for PRI carries 24 channels. If one channel is used for the ISDN D-channel, the remaining 23 channels can be datafilled as PRI B-channels. One D-channel can support up to 479 B-channels, on a maximum of 20 DS-1 links, provided that all DS-1 links reside on the same ISDN peripheral. This capability is referred to as nB+d.

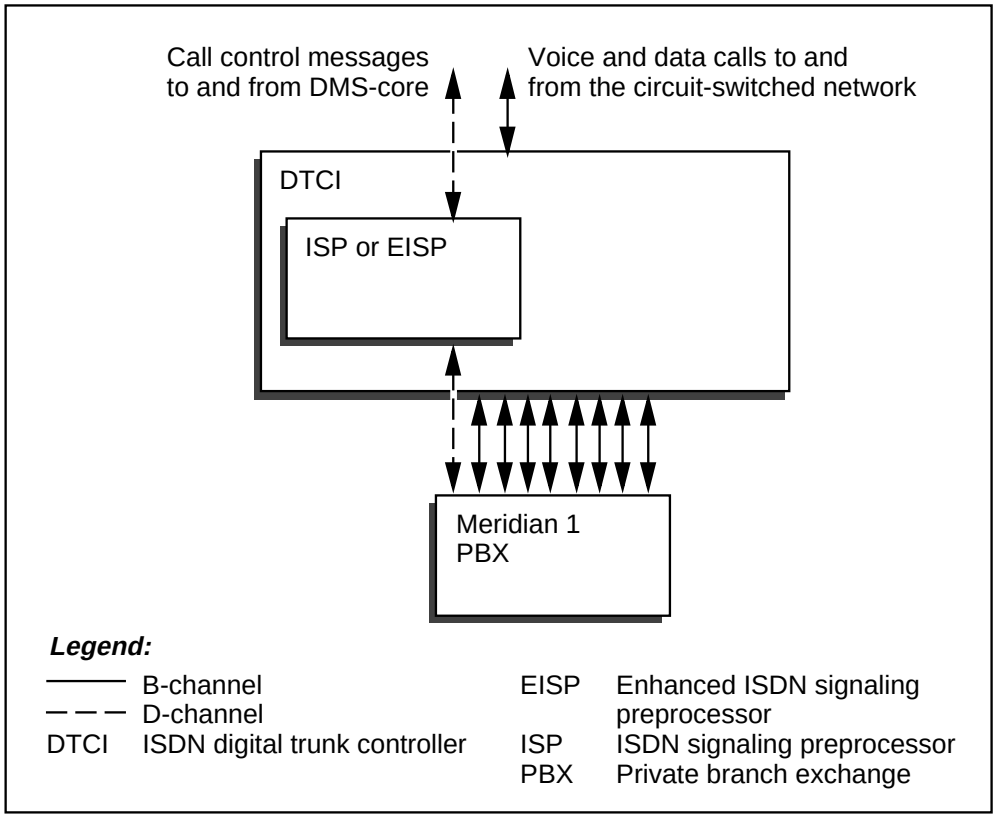
Northern Telecom's PRI implementation provides a 64-kbit/s or a 56-kbit/s D-channel. At the 64-kbit/s rate, the data stream is composed entirely of data (no bits are used for control information). If a 56-kbit/s DS-1 link is used, the B- and D-channels must also run at 56 kbit/s.

PRI supports circuit-switched voice and data access to the circuit-switched network. PRI also supports the following features:

- Integrated services access (ISA), also known as call-by-call service selection, which allows PRI trunk types to be dynamically re-allocated to accommodate changing traffic levels. Supported call types include public, DID/DOD, private, OUTWATS, INWATS, FX, and tie.
- Calling line identification, which displays the calling party number on the telephone set of the called party. A privacy option can be used to suppress the calling number display.
- Network call redirection service, which includes call forwarding, call pickup, and call transfer.
- Network ring again (NRAG) between DMS switches, which operates when the links between the DMS switches are PRI or CCS7 trunks.

Figure 1-6
Primary rate interface configuration

FW-30440



PRI works with a number of existing telephony agents, including

- POTS and MDC (lines and trunks)
- business sets, attendant consoles, and data units
- stimulus and functional signaling
- PRI PBX and intertoll trunks
- CAMA trunks
- equal access interexchange carrier (EAIEC) trunks
- Automatic Message Recording 5 (AMR5) trunks
- coin lines
- dialed loopback trunks
- operator (OP) trunks
- emergency service bureau (ESB) trunks

Flexible timers

The North American protocol variant of recommendation Q.931 network layer (OSI layer 3) duplicates the functions of timers provided by the European PRI (ETSI), Australian PRI (AUST PRI), and Japanese PRI (INS 1500). Previously hard-coded timers are now data-driven. This means that when the timer values need to be changed, an entry in a data table is changed. This software infrastructure maximizes the use of common procedures, minimizes unnecessary code redundancy between protocol variants, and increases maintainability of ISDN PRI software.

ISDN signaling methods

DMS-100 ISDN supports two signaling methods to communicate between the subscriber's terminal and the switch: functional (Bellcore) and stimulus (Meridian feature transparency).

Functional (Bellcore)

Functional signaling is based on a peer-to-peer exchange of information between an intelligent terminal and the network. This signaling method allows users to access new network features and services, and makes ISDN standardization easier. Functional signaling is used for National ISDN-1 implementation, which conforms to Bellcore standards.

Stimulus medium feature transparency

Stimulus signaling provides a master/slave relationship between the network and the CPE. The terminal reports feature key activation to the network, and the network interprets the report and returns prompts (such as audible tones and indicator lamp states) to the CPE.

Meridian feature transparency for BRI (BRAMFT) is an extended stimulus signaling protocol supported by the M5317T, M5317TX, and M5317TDX sets. The BRAMFT protocol allows the M5317TX and M5317TDX sets to support all MDC features currently available on non-ISDN Meridian business sets.

ISDN hardware

This chapter describes the architecture of the key components of the ISDN network, as follows:

Exchange termination on page 2-2 describes the components required to provide ISDN services. They include the ISDN line group controller (LGC), ISDN line trunk controller (LTC), ISDN digital trunk controller (DTCI), and the enhanced ISDN line concentrating module (LCME).

Cards of the LGC, LTC, and DTCI on page 2-20 describes the cards of the ISDN line group controller (LGC), ISDN line trunk controller (LTC), and ISDN digital trunk controller (DTCI).

ISDN remote switching center - SONET on page 2-33 describes the dual-unit node that interfaces remote networks to the circuit-switched and packet-switched networks.

DMS packet handler on page 2-35 describes the link peripheral processor consisting of the LPP-based X.25/X.75/X.75' link interface units (XLIU) and network interface units (NIU). The integrated ISDN OAM processor is described.

DPN packet handler on page 2-42 describes the DPN packet handler, consisting of the digital interworking unit (DIU), access module (AM), and resource module (RM), and the integrated ISDN OAM processor.

Customer premises equipment on page 2-47 describes the components at the operating company premises. They include the U-loop, network termination 1 (NT1), S/T bus, ISDN universal terminal adapter (UTA), and ISDN terminals.

Exchange termination

The ISDN exchange termination is based on standard DMS-100 Family switches, peripherals, and software. Exchange termination routes the B- and D-channels for outgoing and incoming calls through the appropriate peripheral. The exchange termination can be configured for a variety of applications, using a combination of the following peripheral modules:

- ISDN line group controller (LGC)
- ISDN line trunk controller (LTC)
- ISDN digital trunk controller (DTCI)
- ISDN remote switching center-SONET (RSC-S)
- enhanced ISDN line concentrating module (LCME) for 2B1Q lines

Figure 2-1 shows the exchange termination components using a DMS packet handler. Figure 2-2 shows the exchange termination components using a DPN packet handler.

Figure 2-1xxx
Exchange termination components using a DMS packet handler

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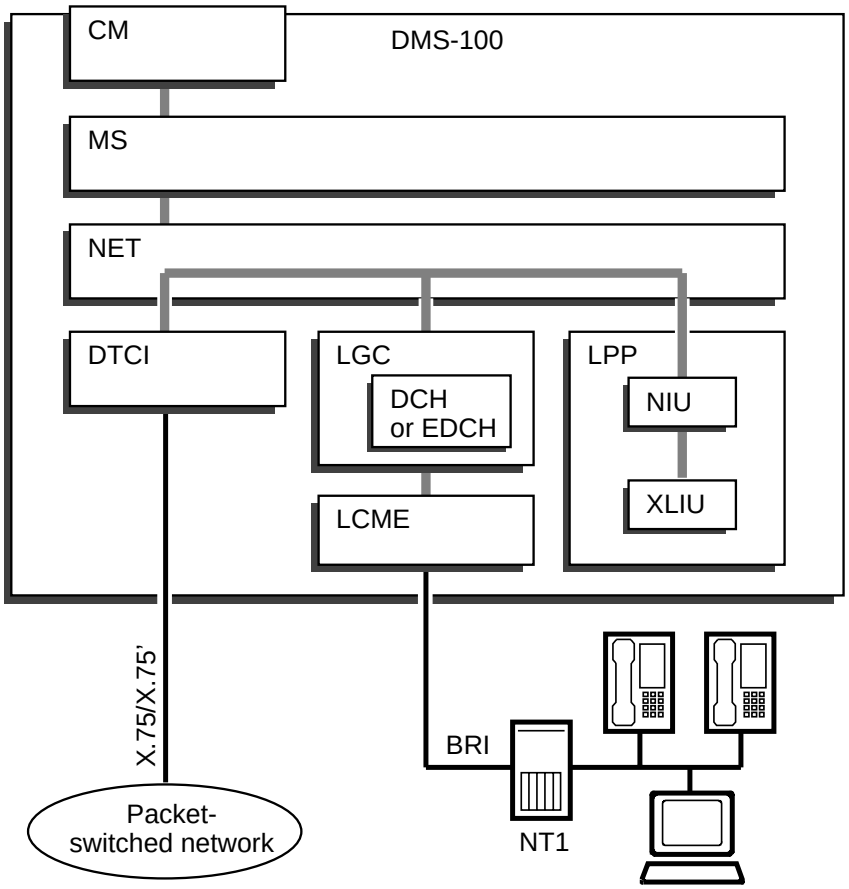
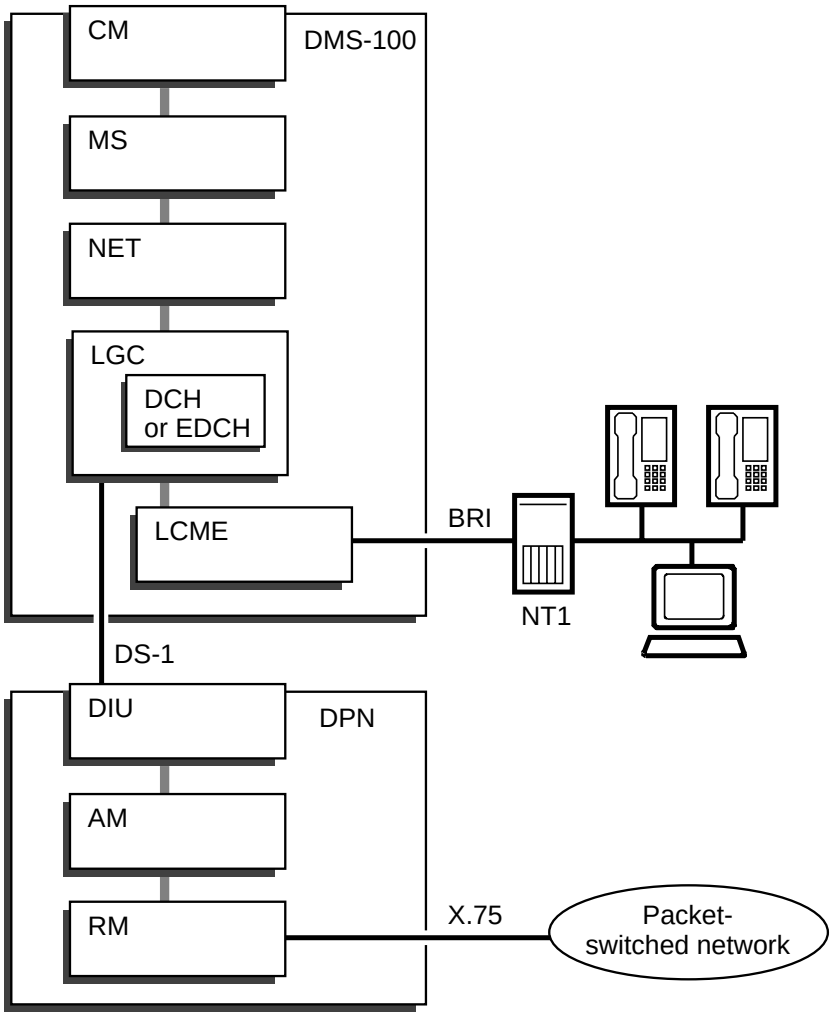


Legend:

CM	Computing module	LPP	Link peripheral processor
DCH	D-channel handler	MS	Message switch
DTCI	ISDN digital trunk controller	NET	Network
EDCH	Enhanced D-channel handler	NIU	Network interface unit
LCME	Enhanced ISDN line concentrating module	NT1	Network termination 1
LGC	ISDN line group controller	XLIU	X.25/X.75/X.75' link interface unit

Figure 2-2xxx
Exchange termination components using a DPN packet handler

FW-30971



Legend:

AM	Access module	LGC	ISDN line group controller
CM	Computing module	MS	Message switch
DCH	D-channel handler	NET	Network
DIU	Digital interworking unit	NT1	Network termination 1
DPN	Data Packet Network	RM	Resource module
EDCH	Enhanced D-channel handler		
LCME	Enhanced ISDN line concentrating module		

ISDN line group controller

The LGC is an XMS-based, dual-unit peripheral module that provides

- access for customer voice and data traffic to the circuit-switched and packet-switched networks
- D-channel handling and processing
- call processing for ISDN, MBS, POTS, and Datapath lines
- Q.931 call processing
- maintenance and diagnostic capabilities

Note: Throughout this document, LGC refers to the LGC equipped for ISDN unless specifically identified as a non-ISDN LGC.

The ISDN LGC supports LCMs and LCMEs. For ISDN basic rate interface (BRI), the LGC is configured with the LCME. If the LCME is fully configured for ISDN-only lines, one LGC supports

- one LCME (also 480 BRI loops) if 2B1Q U-type ISDN, POTS, or EBS line cards are equipped
- two LCMEs if only S/T-type line cards or Datapath line cards are equipped

A switch configured for ISDN, running only ISDN traffic, can support ten or more LGCs. The number of lines supported varies from office to office, depending on such factors as line characteristics and the real-time capacity of the switch. Figure 2-2 illustrates the location of the LGC or LTC in the network.

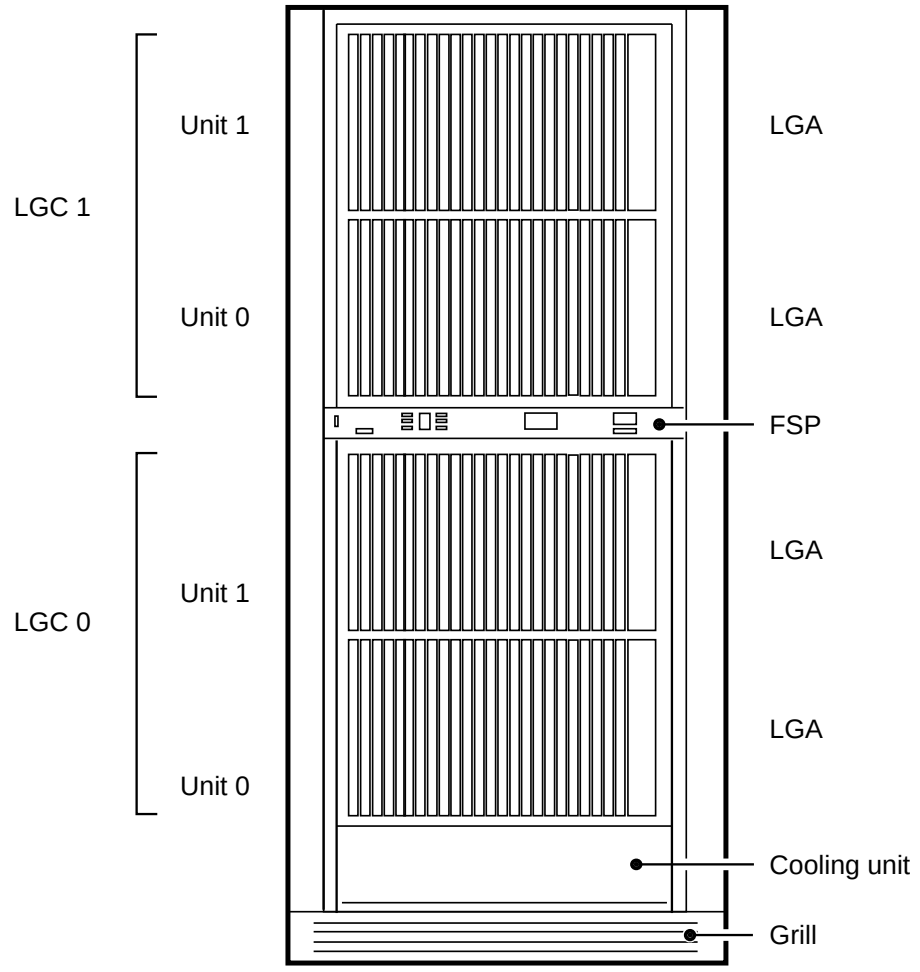
ISDN line group controller equipment frame

The ISDN line group controller equipment frame (LGE), shown in figure 2-3, contains the following:

- two LGCs
- a frame supervisory panel (FSP)
- a cooling unit

Figure 2-3xxx
ISDN line group controller equipment frame

FW30387



LGE 6X01AB

Legend:

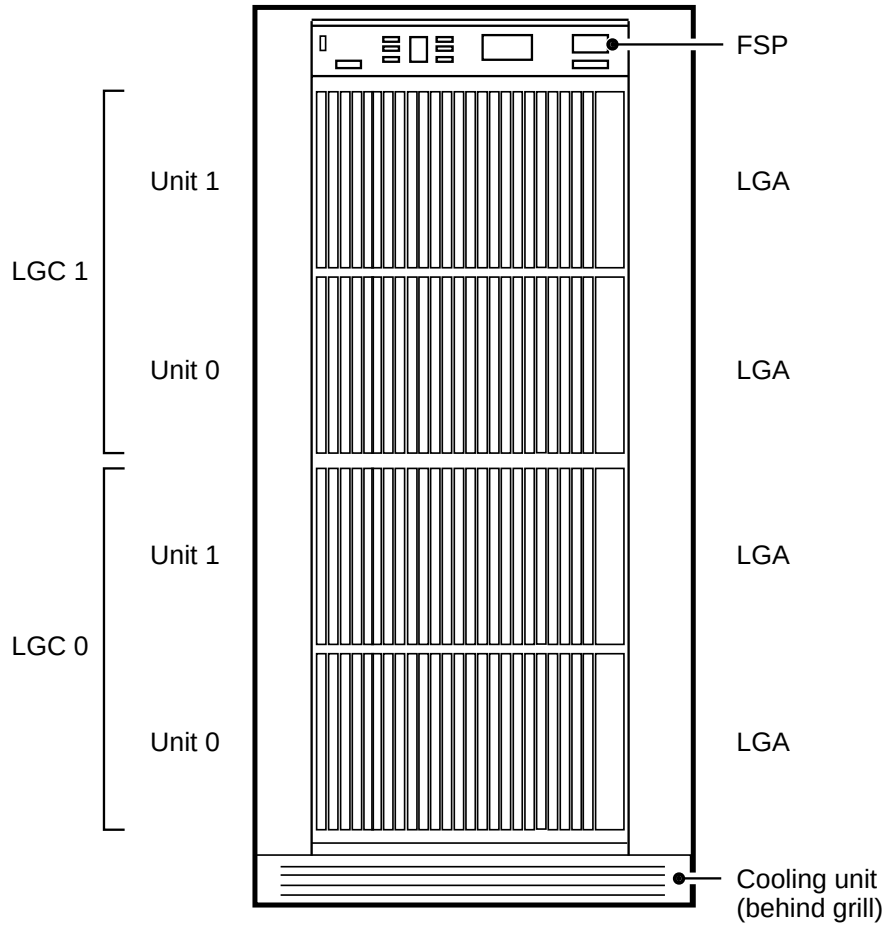
FSP	Frame supervisory panel
LGA	Line group array
LGC	Line group controller
LGE	Line group equipment

Cabinetized line group equipment

The cabinetized line group equipment (CLGE) is a general purpose cabinet version of the ISDN LGE. The CLGE is also known as the cabinetized common peripheral equipment (CCPE). As shown in figure 2-4, the CLGE contains two LGCs, an FSP, and a cooling unit.

Figure 2-4
Cabinetized line group equipment

FW30397



CLGE RX36AB

Legend:

CLGE Cabinetized line group equipment
FSP Frame supervisory panel
LGA Line group array
LGC Line group controller

ISDN line group controller configuration

An LGC contains two shelves called line group arrays (LGA). Each LGA consists of a set of interface cards and a set of cards forming the control complex. The LGC supports two configuration options, XPM and XPM PLUS.

Depending on the hardware selected, the options are

- EISP with UP (figure 2-5 shows the XPM PLUS configuration)
  - enhanced ISDN signaling preprocessor (EISP) card
  - unified processor (UP) card
- ISP with MP/SP (figure 2-6 shows the XPM configuration)
  - ISDN signaling preprocessor (ISP) card
  - master processor (MP) card
  - MP memory (MPM) card
  - signaling processor (SP) card
  - SP memory (SPM) card

The set of interface cards that provide the peripheral side (P-side), central side (C-side), and internal interfaces on each shelf are

- one or two DS30A cards
- a DS30 or DS512 card
- a combination of up to five DS-1 and D-channel handler (DCH) or enhanced D-channel handler (EDCH) cards

For each shelf, the following cards provide the LGC control complex:

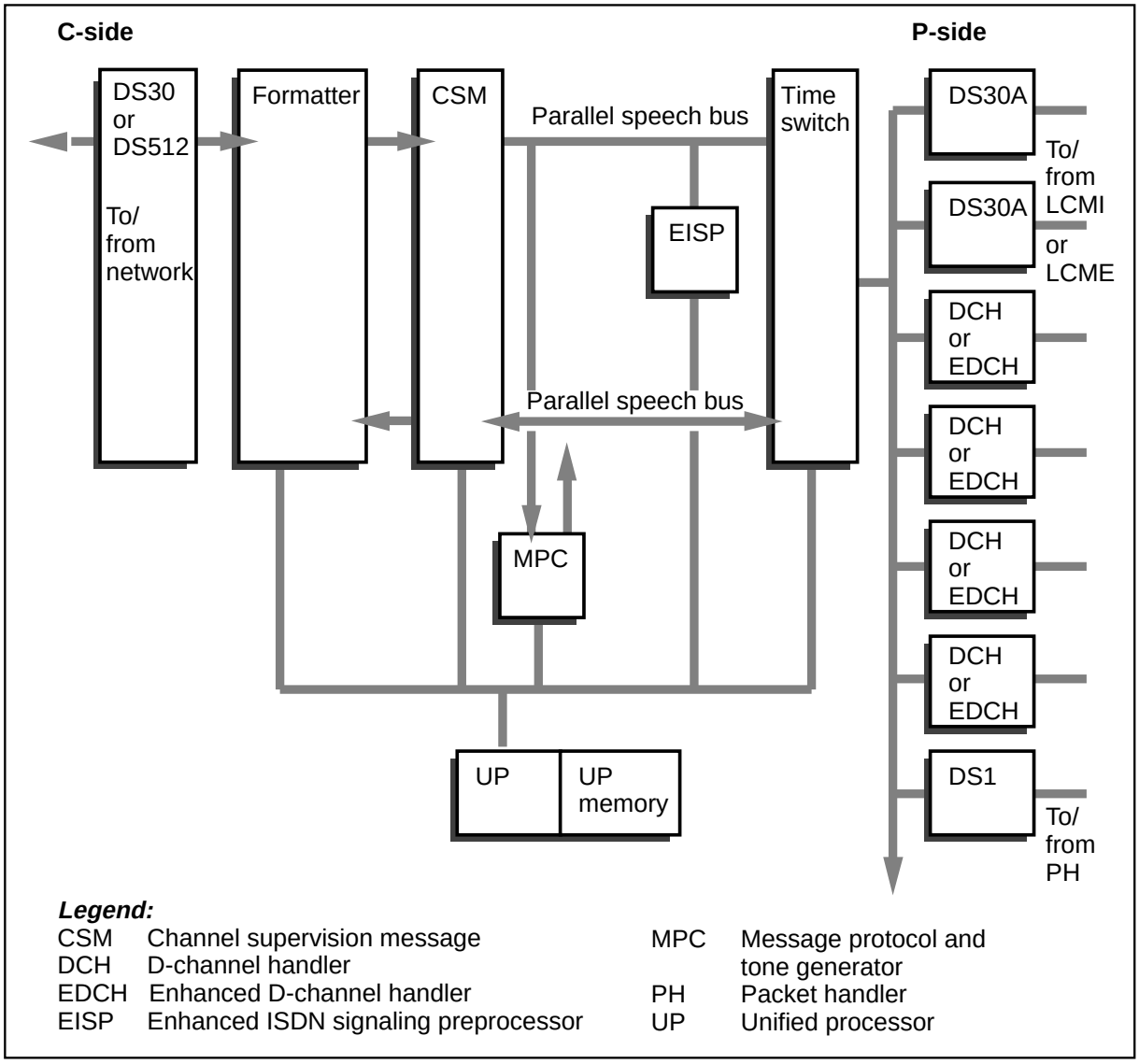
- time switch card
- message protocol and tone generator card (MPC)
- formatter (FORM) card
- channel supervision message (CSM) card
- processor cards

The P-side interface of the LGC consists of DS30A links to the LCME, and DS-1 links to the DPN packet handler. The C-side interface consists of a DS30 or DS512 link that carries information through both planes of the network modules to the core area of the DMS-100 Family switch, the DMS packet handler, and to other local peripheral modules such as the LTC.

Each DS30 or DS512 interface to the network module works in dual-plane mode. The receiver at the other end of the network connection, for example, the core area of the DMS-100 Family switch, can choose between two separate data streams and can switch data streams if a problem occurs.

Figure 2-5
ISDN LGC internal configuration for XPM PLUS

FW-30332

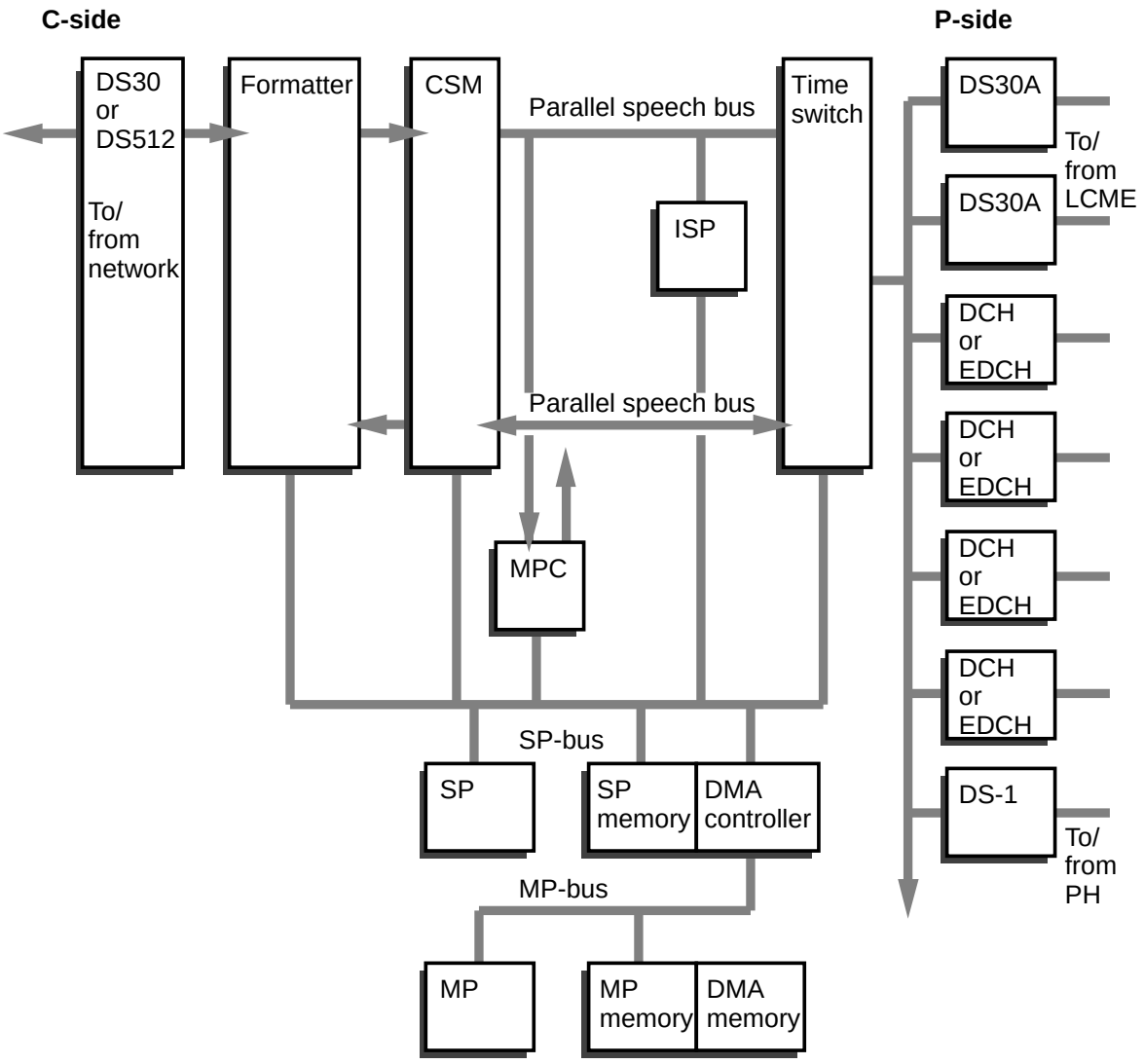


Legend:

CSM	Channel supervision message	MPC	Message protocol and tone generator
DCH	D-channel handler		
EDCH	Enhanced D-channel handler	PH	Packet handler
EISP	Enhanced ISDN signaling preprocessor	UP	Unified processor

Figure 2-6xxx
ISDN LGC internal configuration for XPM

FW-30371



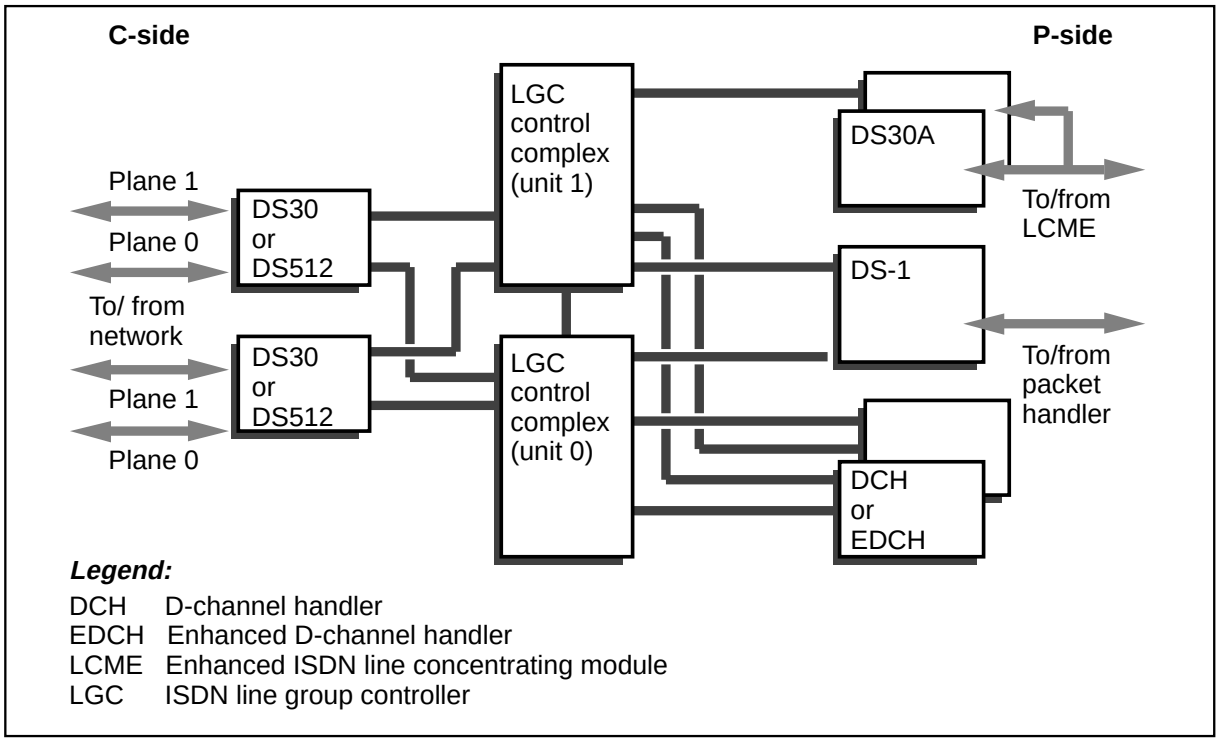
Legend:

CSM	Channel supervision message
DCH	D-channel handler
DMA	Direct memory access
EDCH	Enhanced D-channel handler
ISP	ISDN signaling preprocessor
LCME	Enhanced ISDN line concentrating module
MP	Master processor
MPC	Message protocol and tone generator
PH	Packet handler
SP	Signaling processor

The ISDN LGC provides duplicate LGC control complexes and interfaces. During normal operation, one control complex is active while the other is held in standby mode, ready to take over if the first control complex fails. Interfaces are connected to both control complexes as shown in figure 2-7 and if one fails, all communications can be switched to the reserve interface.

Figure 2-7
Duplex configuration of interfaces and LGCs

FW-30372



ISDN line group controller cards

The ISDN LGC cards are described on page 2-20. Most are identical to those of the ISDN line trunk controller and the ISDN digital trunk controller.

ISDN line trunk controller

The ISDN LTC provides BRI to the circuit-switched and packet-switched networks, as well as primary rate interface (PRI) to a private branch exchange (PBX). The ISDN LTC architecture is similar to that of the ISDN LGC. Figure 2-8 illustrates the ISDN LTC BRI and PRI configurations.

Like the LGC, the LTC is an XMS-based, dual-unit peripheral module that performs similar functions including

- D-channel handling and processing
- call processing for ISDN, MBS, POTS, and Datapath lines
- LAPD and LAPB packet services
- maintenance and diagnostic capabilities

The P-side interface of the ISDN LTC consists of DS30A links to the LCME, and DS-1 links to the circuit-switched network and to the packet handler. The C-side interface consists of a DS30 or DS512 link that carries information through both planes of the network modules to the core area of the DMS-100 Family switch, and to other local peripheral modules.

A flow and overload control system is provided for PRI facilities. This system applies only to incoming Q.931 messages from the PRI D-channel; it does not include BRI stimulus and functional calls or PRI terminations from the central controller. In an overload situation, the PRI overload control system delays incoming messages on PRI trunks and presents them to call processing in regulated quantities when real time is available. In this way, the PRI overload control system ensures that the impact on service is regulated and predictable.

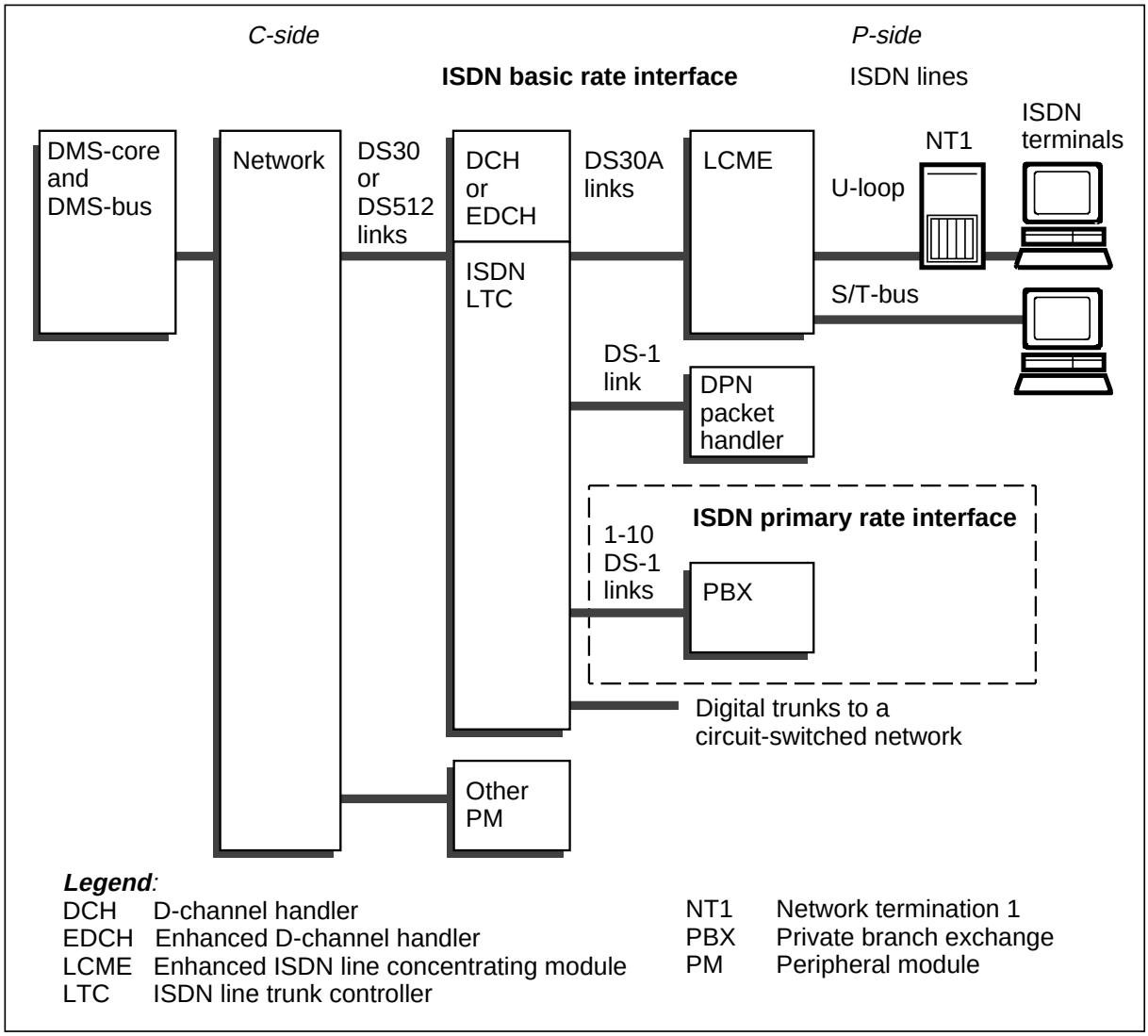
ISDN line trunk controller cards

The ISDN LTC cards are described on page 2-20. Most are identical to those of the ISDN line group controller and the ISDN digital trunk controller, except that the universal tone receiver (UTR) card resides between the ISP and MPC.

Universal tone receiver card The UTR card is an optional card that identifies and processes pulse code modulation tones from 32 voice channels.

Figure 2-8xxx
ISDN LTC basic and primary rate interface configurations

FW30375



ISDN digital trunk controller

The DTCI provides PRI to a PBX. Its architecture is similar to that of the LGC/LTC equipped for ISDN.

Like the LGC and LTC, the DTCI is an XMS-based, dual-unit peripheral module that performs functions similar to the ISDN LGC, including D-channel handling and processing, maintenance, and diagnostics.

While the LGC performs call processing for ISDN BRI lines, the DTCI performs call processing for PRI trunks. The LTC can be equipped to perform call processing for both BRI lines and for PRI trunks.

The DTCI supports PRI trunks as well as A/B bit signaling trunks, and the two types of trunks can be provisioned on the same DS-1 link. PRI is supported on up to 20 DS-1 links connected to the PBX. Each DS-1 link has 24 channels, which provide a total of 480 PRI channels. Although the DTCI supports up to 32 D-channels, a single PRI D-channel can control all 20 DS-1 links residing on the DTCI. Typically, more than one D-channel should be datafilled to allow for sparing. All DS-1 links that share a D-channel must be present on the same DTCI.

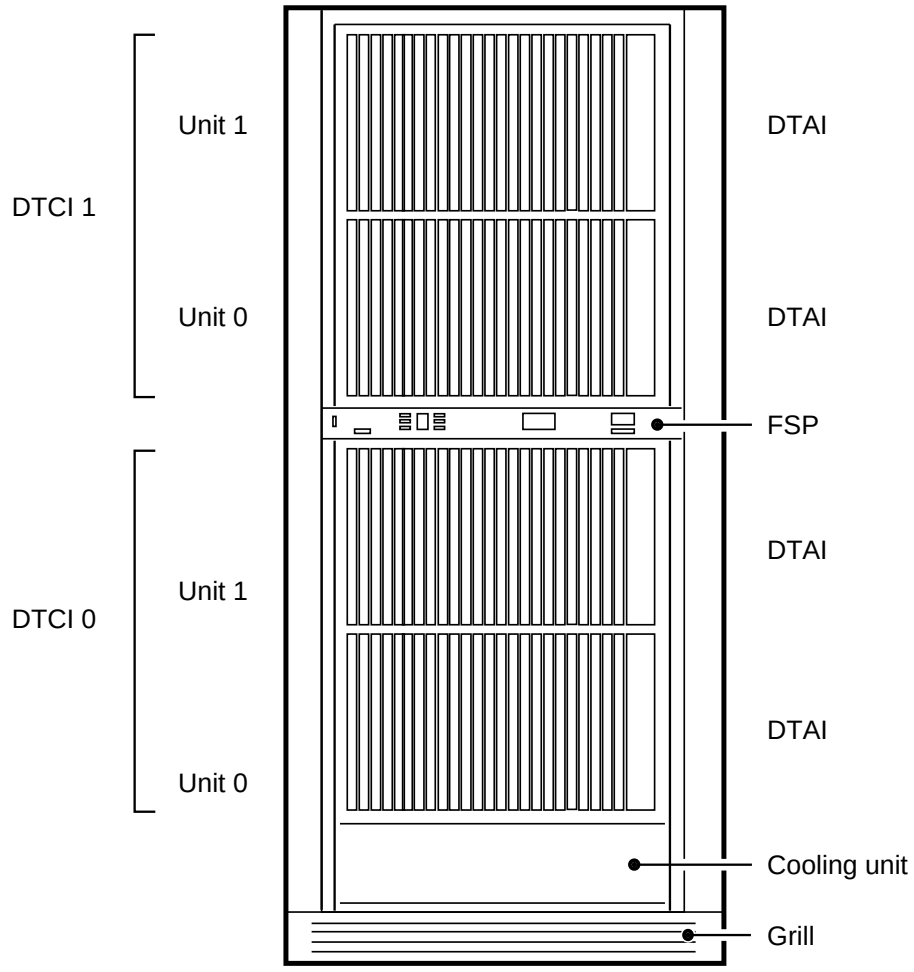
A flow and overload control system, identical to that of the LTC, is provided for PRI facilities.

ISDN digital trunk equipment frame

The DTEI frame contains the DTCI, and is illustrated in figure 2-9. The DTEI contains two DTCIs, a cooling unit, and an FSP.

Figure 2-9
ISDN digital trunk equipment frame

FW30399



DTEI 6X01AB

Legend:

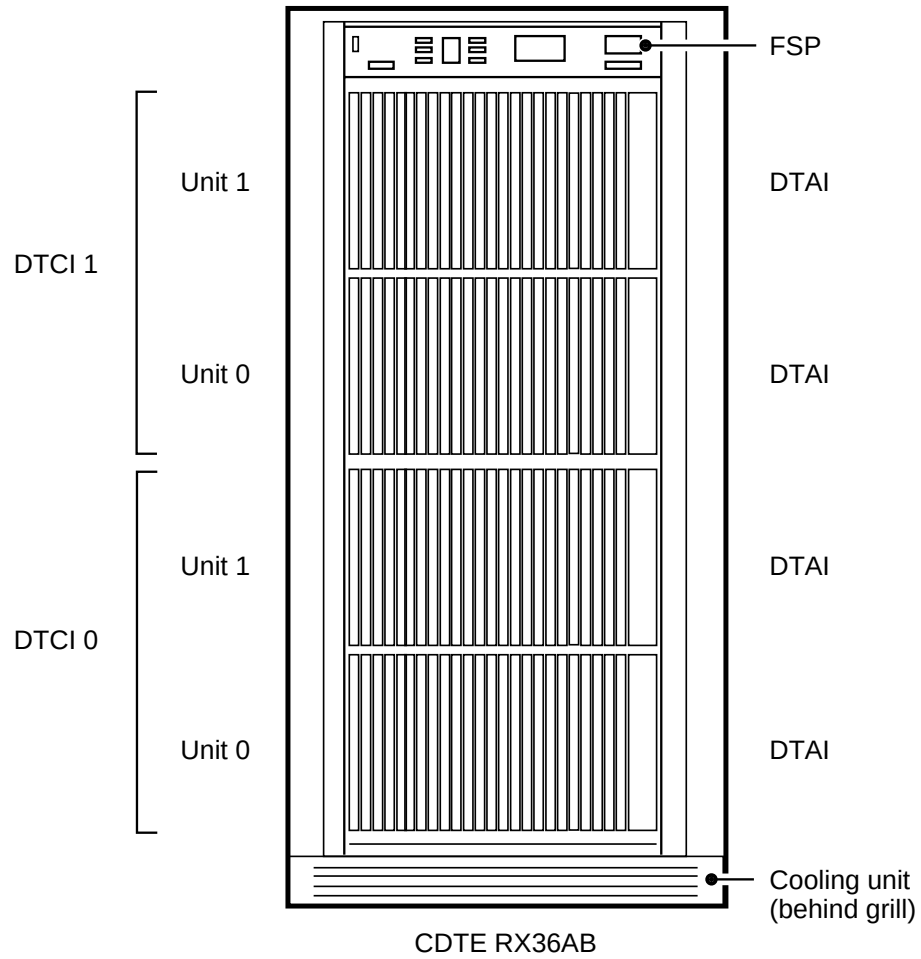
DTAI	ISDN digital trunk array
DTCI	ISDN digital trunk controller
DTEI	ISDN digital trunk equipment
FSP	Frame supervisory panel

Cabinetized digital trunk equipment

The cabinetized digital trunk equipment (CDTE) is a general purpose cabinet version of the DTEI frame. The CDTE is also known as the cabinetized common peripheral equipment (CCPE). The CDTE contains two DTCIs, an FSP, and a cooling unit. Figure 2-10 illustrates the CDTE frame.

Figure 2-10
Cabinetized digital trunk equipment

FW30397



CDTE RX36AB

Legend:

DTAI ISDN digital trunk array
DTCI ISDN digital trunk controller
FSP Frame supervisory panel

ISDN digital trunk controller configuration

A DTCI has two shelves, also known as DTAIs (unit 0 and unit 1). As with the LGC, the DTCI supports two configuration options, XPM and XPM PLUS. Depending on the hardware selected the options are

- EISP with UP (figure 2-11 shows the XPM PLUS configuration)
  - enhanced ISDN signaling preprocessor (EISP) card
  - unified processor (UP) card
- ISP with MP/SP (figure 2-12 shows the XPM configuration)
  - ISDN signaling preprocessor (ISP) card
  - master processor (MP) card
  - MP memory (MPM) card
  - signaling processor (SP) card
  - SP memory (SPM) card

Each shelf has the following cards providing C-side and P-side interfaces:

- DS30 or DS512 interface card (C-side)
- up to five DS-1 cards (P-side)

Each shelf has the following cards providing the DTCI control complex:

- time switch card
- message protocol and tone generator card (MPC)
- formatter (FORM) card
- channel supervision message (CSM) card
- processor cards

Figure 2-11xxx
DTCI internal configuration for XPM PLUS

FW-30950

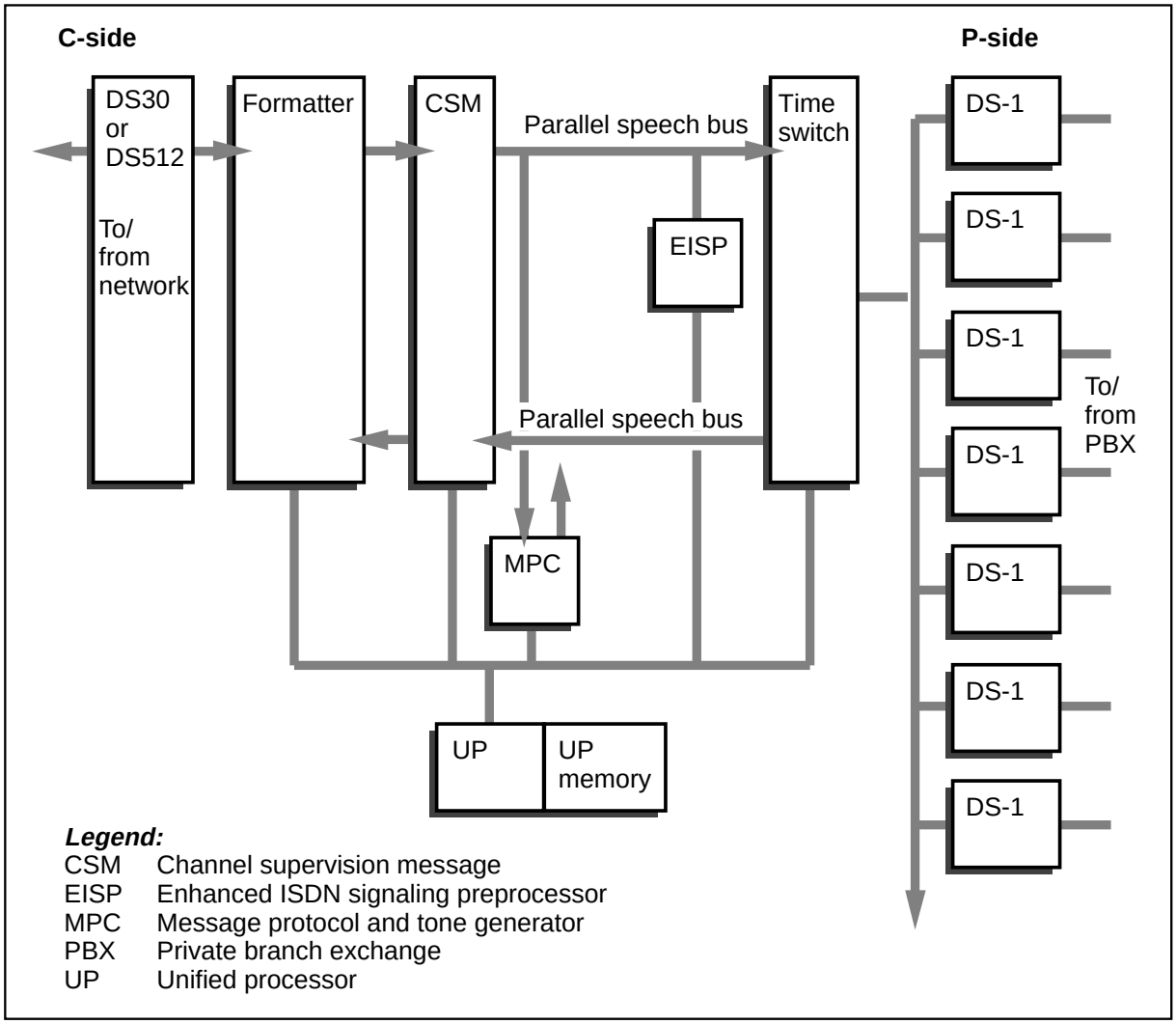
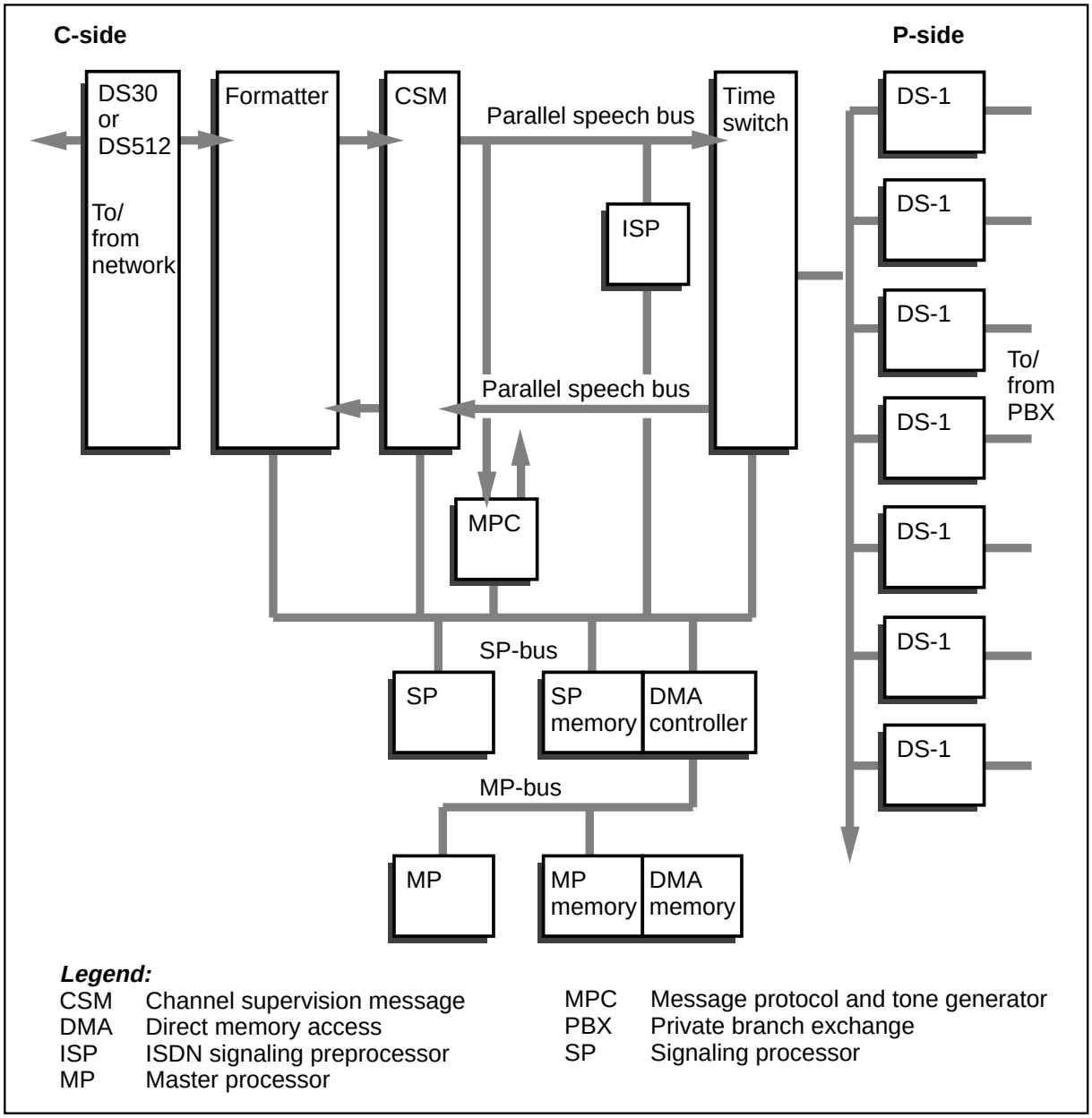


Figure 2-12
DTCI internal configuration for XPM

FW-30379



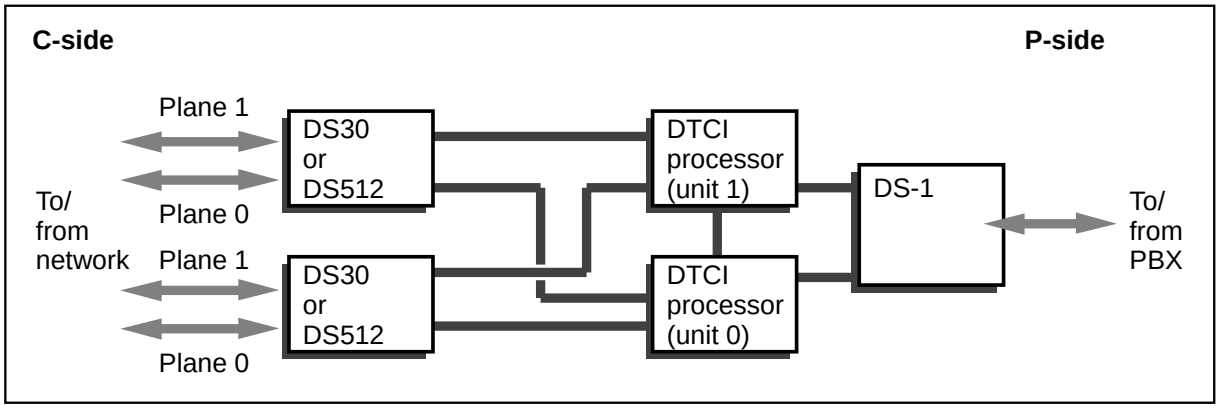
Legend:

CSM	Channel supervision message	MPC	Message protocol and tone generator
DMA	Direct memory access	PBX	Private branch exchange
ISP	ISDN signaling preprocessor	SP	Signaling processor
MP	Master processor		

The DTCI provides duplicate control complexes and interfaces, one in each shelf. Each DTCI has slots for up to ten DS-1 cards; five in each of the two shelves. During normal operation, one DTCI control complex is active. The other DTCI control complex is on standby, ready to take over if the first one fails. All interfaces are connected to both DTCI control complexes, as shown in figure 2-13. If an interface fails, all communications are switched automatically to the reserve interface.

Figure 2-13
Duplex configuration of interfaces and DTCI control complexes

FW-30380



Each DS30 or DS512 interface to the network module works in dual-plane mode. The receiver at the other end of the network connection (for example, the DMS-core) can choose between two separate data streams and can switch data streams if a problem occurs.

ISDN digital trunk controller cards

The DTCI cards are described below. Most are identical to those of the ISDN line group controller and the ISDN line trunk controller.

Cards of the LGC, LTC, and DTCI

The cards described below reside in the LGC, LTC, or DTCI.

Channel supervision message card The CSM card manages the speech link between the DTCI, or the LGC or LTC, and other peripheral modules, reporting error conditions to the SP card.

D-channel handler card The DCH card is the primary interface to all BRI channels. Of the thirty-two 64-kbit/s channels connected to each DCH, one is used for ISP messaging link (communications with ISP or EISP) and four are used for packet data (Bd links), leaving 27 channels for D-channel signaling. When the D-channels are multiplexed (at a ratio of 4:1), the DCH can handle 108 D-channels.

The DCH card transmits and receives data using the LAPD procedures specified by the Consultative Committee on International Telephony and Telegraphy (CCITT) in recommendations Q.921 and TR793. The tasks performed by the DCH card include

- setting up communication with an ISDN terminal on request from the terminal, LGC or LTC MP, or UP
- maintaining a logical link with ISDN terminals sending or receiving data
- setting up communication with the packet handler on request from the packet handler, LGC or LTC MP, or UP
- maintaining a connection with the packet handler as long as data flows over the Bd channel
- verifying and routing D-channel frames according to their type (D-call control or D-packet)

Each DCH card occupies one DS-1 slot and communicates with the LGC or LTC through the DS60 links. A DCH card uses an odd-numbered port from the 20 available peripheral ports but makes two DS-1 ports unavailable.

An ISDN LGC or LTC supports up to ten active DCH cards, and is provisioned with a minimum of two DCH cards, and at least one spare. The spare DCH card contains the necessary data for all ISDN service groups (ISG), so it can take over for any ISG. An ISG defines the services that a DCH card provides, and allocates the channels within the DCH card. All static data and dynamic updates sent to each ISG are also sent to the spare DCH.

Takeover occurs for the following reasons:

- a takeover command from the MAP
- detecting a fault in a DCH card
- a system action other than fault detection

The DCH overload control capability ensures that circuit-switched SAPI 0 traffic is given priority over packet-switched (SAPI 16) traffic during overload.

DS-1 card The DS-1 card carries B- and D-channel packet data to and from the DPN packet handler, or the PBX, converting between the unipolar signal type used for internal LGC, or LTC, or DTCI, communication and the bipolar encoded signal used on a DS-1 link. The DS-1 card in the LGC, or LTC, or the DTCI, supports both bipolar line codes ZCS and B8ZS. The ZCS line code uses bit insertion and supports DS-0 channel data rates of 56 kbit/s. The B8ZS line code is a zero substitution scheme that supports DS-0 channel data rates of 64 kbit/s unrestricted.

The DS-1 card supports two DS-1 ports, each of which terminates one DS-1 link (24 channels). The DS-1 card is not duplicated within the LGC or LTC module. The DS-1 card is not required when a DMS packet handler is used for packet data. The NT6X50AA version of the DS-1 card supports 56 kbit/s only, while the NT6X50AB version of the DS-1 card supports both 56 kbit/s and 64kbit/s.

DS30A card The DS30A card carries the B- and D-channel data between the LCME and the LGC or LTC, converting between the signal type used for internal LGC or LTC communication and the bipolar signal used on a DS30A link. Each DS30A card supports ten DS30A ports; each port can terminate one DS30A link (32 channels). The DS30A card is duplicated within an LGC or LTC module, since a minimum of two DS30A cards are required for each LGC or LTC to provide redundant signaling links to the LCME. The D- and B-channels, which carry circuit-switched or packet-switched data, can be shared across the DS30A links.

DS30 card The DS30 card converts the signal type used for internal LGC, or LTC, or DTCI, communication to the bipolar encoded signal used on a DS30 link. The duplicated transmissions received by the DS30 card are passed on to the formatter card. Each DS30 card supports eight DS30 links, servicing one DS30 (32 channels) through each DS30 port.

DS512 card The DS512 card performs the interface function for 512 pulse code modulation (PCM) channels to connect to a fiber link and to the enhanced network (ENET). The card connects to the formatter card on one side and to the XPM DS512 link paddle board (NT6X40GA) on the other.

Enhanced D-channel handler card

The enhanced D-channel handler (EDCH) card is an upgraded version of the DCH. The EDCH has a 20-MHz 68020 processor with a full 32-bit data bus and 4 Mbytes of memory. The increase in processing speed and memory capacity are necessary to accommodate future increases in data traffic using ISDN BRI services, as well as to incorporate all the functionality of the DCH.

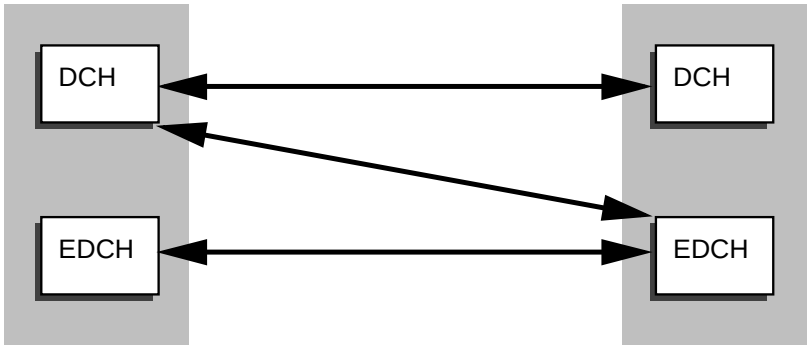
Other hardware changes are the addition of write-protection circuitry for the on-board DRAM and the use of the R66C MCM chip to handle processor block support functions. The R8071A chips used in the EDCH have similar functionality to the R8071 chips.

Since the EDCH has some hardware components that are different than those in the DCH, it has additional diagnostic tests for these components. The EDCH diagnostics in the ROM address the appearance of the R66C chip, the memory upgrade, the features of the R8071A chip, and the write-protected memory. This memory is also tested from RAM, and other RAM-level tests are enhanced.

Figure 2-14 shows the available pathways between DCH and EDCH cards.

Figure 2-14xxx
Compatability of DCH and EDCH cards

FW-30661



Note: To be compatible, the DCH and EDCH must contain the same card load.

Enhanced ISDN signaling preprocessor card The enhanced ISDN signaling preprocessor (EISP) card provides the same capabilities as the ISP card and provides the following enhancements:

- memory upgrade from 1 Mbyte to 4 Mbytes
- clock speed upgrade from 16 MHz to 20 MHz
- data bus upgrade from a 16-bit width to a 32-bit width

The EISP is used with the unified processor (UP) card.

Formatter card The formatter card converts the parallel bit stream used on the internal speech bus to a serial DS30 or DS512 bit stream, and the serial DS30 or DS512 bit stream to a parallel bit stream.

Under the control of the SP or UP card, the formatter provides the path for the exchange of call control information and packet data. In the LGC or LTC the path exists between the DCH, or the EDCH, and the LCME and the packet handler. In the DTCI the path exists between the ISP, or EISP, and the PBX.

ISDN signaling preprocessor card The ISP card provides call control messaging functions for the LGC, LTC, and the DTCI. The ISP receives information from the DCH or EDCH of the LGC or LTC, or the D-channels of the DTCI, on the speech bus. The information is then processed and transferred to either the MP memory or SP memory as appropriate, through the SP A-bus. Information flows from the processors to the DCH or EDCH cards, or D-channels, in a similar manner.

There is one ISP card for each LGC or LTC, or DTCI, unit. The ISP card resides in a spare slot (slot 16) and consists of a processor segment, memory, and a multichannel HDLC chip.

In the LGC or LTC, the ISP provides D-channel handler maintenance functions and an interface between the DCH or EDCH cards, the SP card, and the MP card. The LGC or LTC units operate in a mate configuration with an active and an inactive unit. Only the active LGC communicates with the DCH or EDCH cards.

In the DTCI, the ISP provides D-channel maintenance functions and an interface between the D-channels and other processors in the DTCI: the signaling processor (SP) and master processor (MP). The ISP includes the layer 1 termination point for D-channels, layer 1 and layer 2 protocol handling, layer 3 message packaging into layer 2 frames for the PBX, and support for 32 D-channels.

Master processor card The MP card runs the programs that control the operation and maintenance of the LGC or LTC or the DTCI.

Master processor memory card The two MP memory cards provide random access memory (RAM) for the MP card.

Message protocol and tone generator card The MPC supervises the receipt of all incoming control messages and the transmission of all outgoing control messages between the LGC or LTC and the LCME, or the DTCI and the PBX, and between the LGC or LTC, or DTCI, and the DMS-core.

In the LGC or LTC, the MPC supports the transfer of messages, using DS30 or DS512 protocol on the control channel between the LGC or LTC and the core area, and DMSX protocol on the control channel between the LGC or LTC and the LCME.

Signaling processor card The SP card controls the formatter card, channel supervision message card, and time switch card. The SP card collects all incoming control messages from the MPC and passes all outgoing control messages to the MPC for transmission. The SP card recognizes core-to-peripheral and peripheral-to-core control messages, and routes them back to the MPC to be transmitted onward.

Signaling processor memory card The SP memory card provides RAM for the SP card, and a direct memory access area, which is the link between the MP card and SP card.

Time switch card The time switch card converts the serial stream received from the DS30A interface card or DS-1 interface card to the parallel stream on the internal speech bus, and converts the parallel stream to the serial stream.

Under the control of the SP, the time switch also associates the DS30A or DS-1 channels with any of the time slots on the parallel speech bus, and transfers data between the associated channel and time slot.

Unified processor card The unified processor (UP) card replaces the MP and SP processor cards and their associated memory cards with a single card. The UP card contains both the processor and memory.

The UP card provides the same functionality as the MP/SP cards and their memory cards, and provides several advantages:

- replaces five cards with one card, providing room for further expansion
- achieves an increase in real-time capacity
- provides an increase in addressable memory
- lowers power consumption of the shelf
- allows additional maintenance on the 2B1Q line cards which are in the subtending LCME. This maintenance includes performance measurement testing, threshold detection testing, and line card-to-NT1 loop loss measurements.

The UP card is used in conjunction with the NTMX71AA bus terminator card. The bus terminator card terminates the address, data, and control signals from the UP on the peripheral backplane.

Enhanced ISDN line concentrating module

The LCME is a dual-unit peripheral module that terminates BRI loops on line cards, and provides access to the circuit-switched and packet-switched networks.

The LCME supports the following line types:

- ISDN (standard) 2B1Q U-interface
- ISDN S/T interface
- POTS
- Meridian business set (MBS)
- Datapath

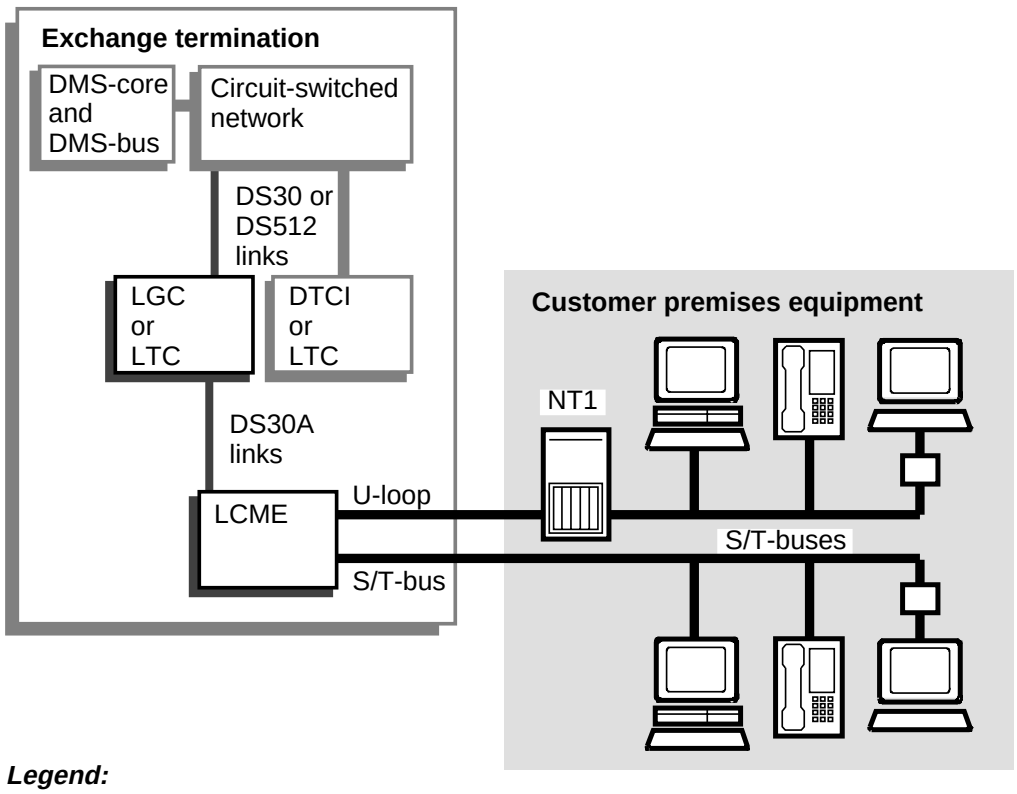
It also provides access to the ISDN B- and D-channels. B-channels are handled like normal speech channels, and are allocated on a per-call basis. Any B-channels provisioned for X.25 service receive a dedicated DS30A channel. These packet B-channels are assigned as part of the service provisioning process.

As shown in figure 2-15, the LCME is connected on its C-side to an LGC or LTC. Four 16-kbit/s D-channels can be 4:1 time-division multiplexed (TDM) by the LCME onto a single C-side 64-kbit/s DS30A channel. The D-channels are assigned to particular DS30As when the loop is activated

during switch configuration. The LCME can terminate up to 18 DS30A ports. This C-side capacity can provide nonlimiting channel bandwidth for up to 239 ISDN lines, even during takeover conditions.

Figure 2-15
The LCME in the network

FW30479



Legend:

DTCI	ISDN digital trunk controller
LCME	Enhanced ISDN line concentrating module
LGC	ISDN line group controller
LTC	ISDN line trunk controller
NT1	Network termination 1

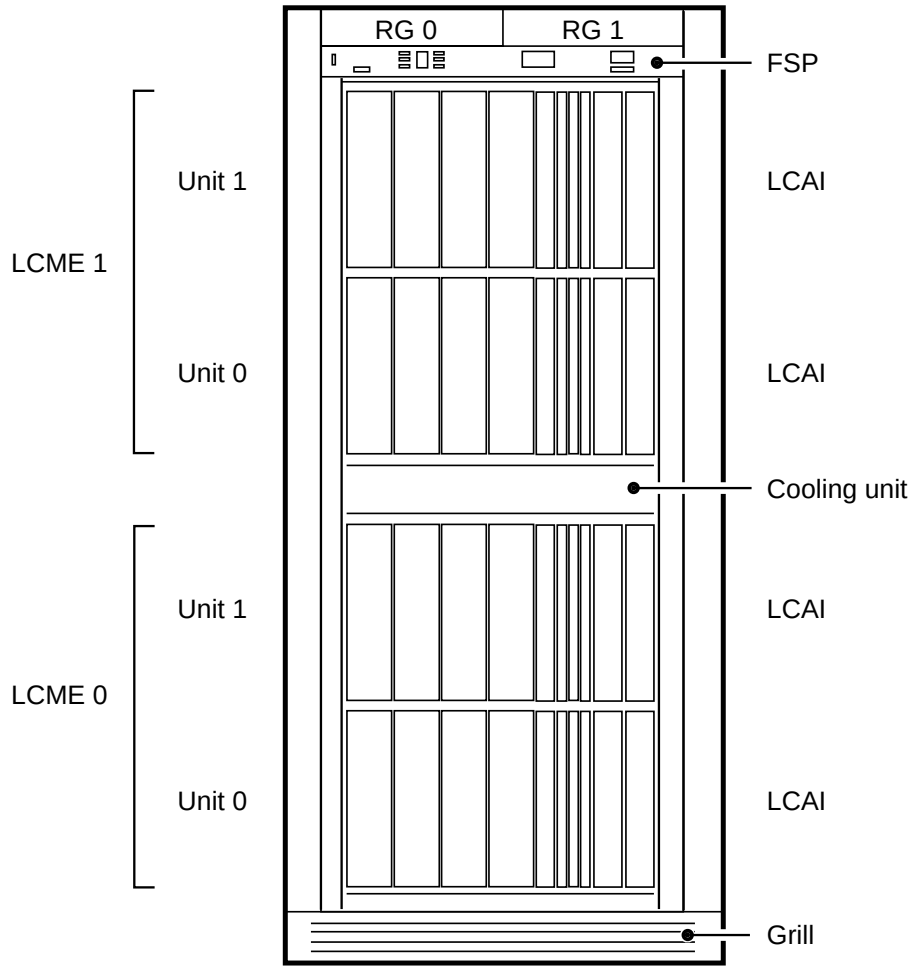
Enhanced ISDN line concentrating equipment

Figure 2-16 shows how the ISDN line concentrating equipment (LCEI) is configured. A standard LCEI frame can support the following:

- two LCME modules
- a cooling fan
- an FSP
- two ringing generators

Figure 2-16xxx
Enhanced ISDN line concentrating equipment frame

FW30193



LCEI BX30AB

Legend:

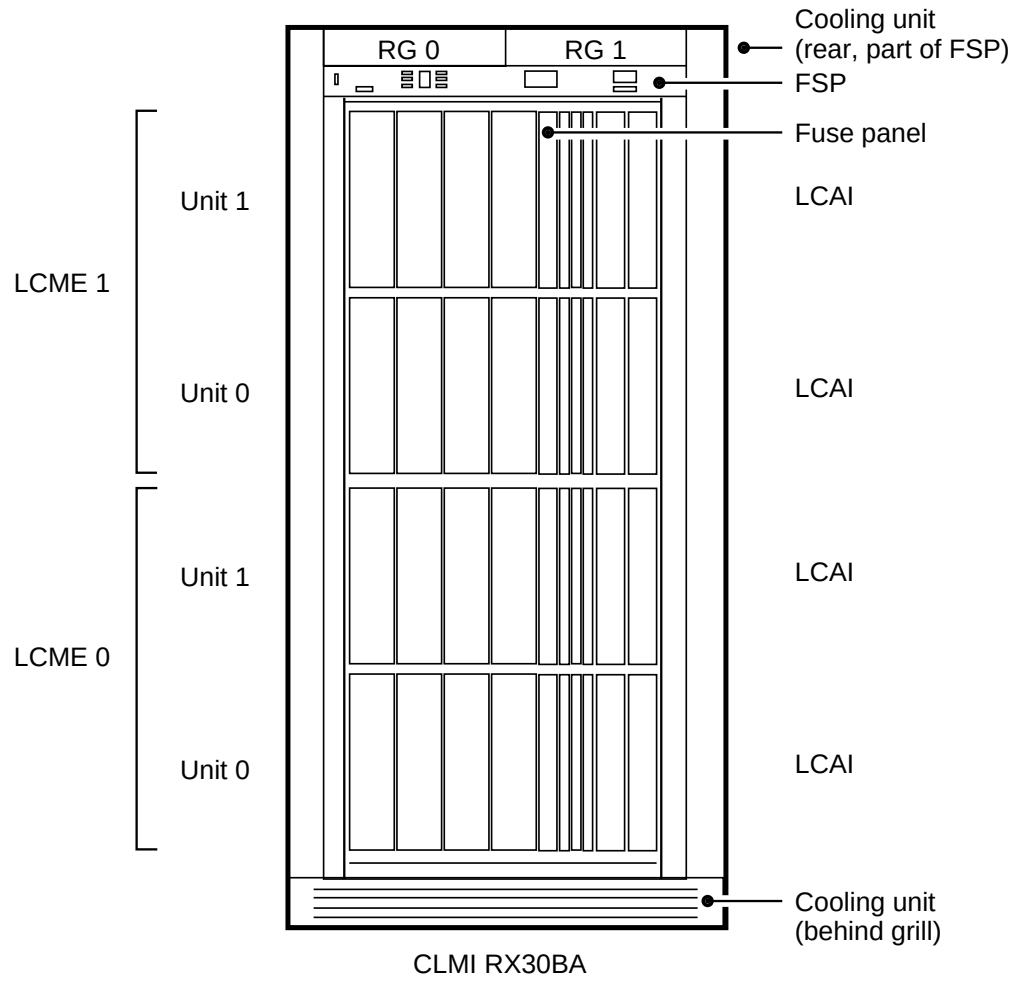
FSP	Frame supervisory panel
LCAI	ISDN line concentrating array
LCEI	ISDN line concentrating equipment
LCME	Enhanced ISDN line concentrating module
RG	Ringing generators

Cabinetized line module ISDN

The cabinetized line module ISDN (CLMI) is a general purpose cabinet version of the LCEI frame. As figure 2-17 shows, it contains an FSP, a cooling unit (located in the rear of the FSP), two ringing generators, and two LCMEs.

Figure 2-17
Cabinetized line module ISDN

FW30398



CLMI RX30BA

Legend:

FSP	Frame supervisory panel
CLMI	Cabinetized line module ISDN
LCAI	ISDN line concentrating array
LCME	Enhanced ISDN line concentrating module
RG	Ringing generators

Enhanced ISDN line concentrating module configuration

Each LCME consists of two units, or ISDN line concentrating arrays (LCAI). Each unit occupies a separate shelf in the frame and consists of the following components:

- four line drawers, each providing space for up to 60 line cards (the quantity depends on the type of lines installed)
- four ISDN bus interface cards (BIC), one in each line drawer
- two ISDN digroup controller cards (DCC)
- one LCME processor card
- single-slot 2B1Q U-interface ISDN line cards (U-ISLC), POTS, or MBS line cards
- double-slot S/T-interface ISDN line cards (S/T-ISLC) or Datapath cards
- four point-of-use power supply (PUPS) cards, one in each drawer
- two power converters
- up to nine DS30A links for connection to an LGC or LTC

Each 2B1Q ISDN line terminates on a line card in the LCME line drawer. The line cards transmit and receive messages and data between the subscriber loop and the BIC.

Loadsharing and takeover

Loadsharing and takeover occur when there is a hardware or software fault or when a maintenance routine is initiated at the MAP.

Both LCAIs of the LCME are in service and active when operating normally. Each unit controls four line drawers. When the LCME operates in takeover mode, only one unit is active. The active unit controls all lines in all drawers, without causing any blocking of service to the ISDN lines. This is possible because each unit is equipped with two DCCs.

In normal operation with both LCAIs active, the data needed to set up a call is sent to both the active DCC and the standby DCC. If a takeover occurs, the standby DCC has all the connections established, ensuring that calls set up before the takeover are not lost.

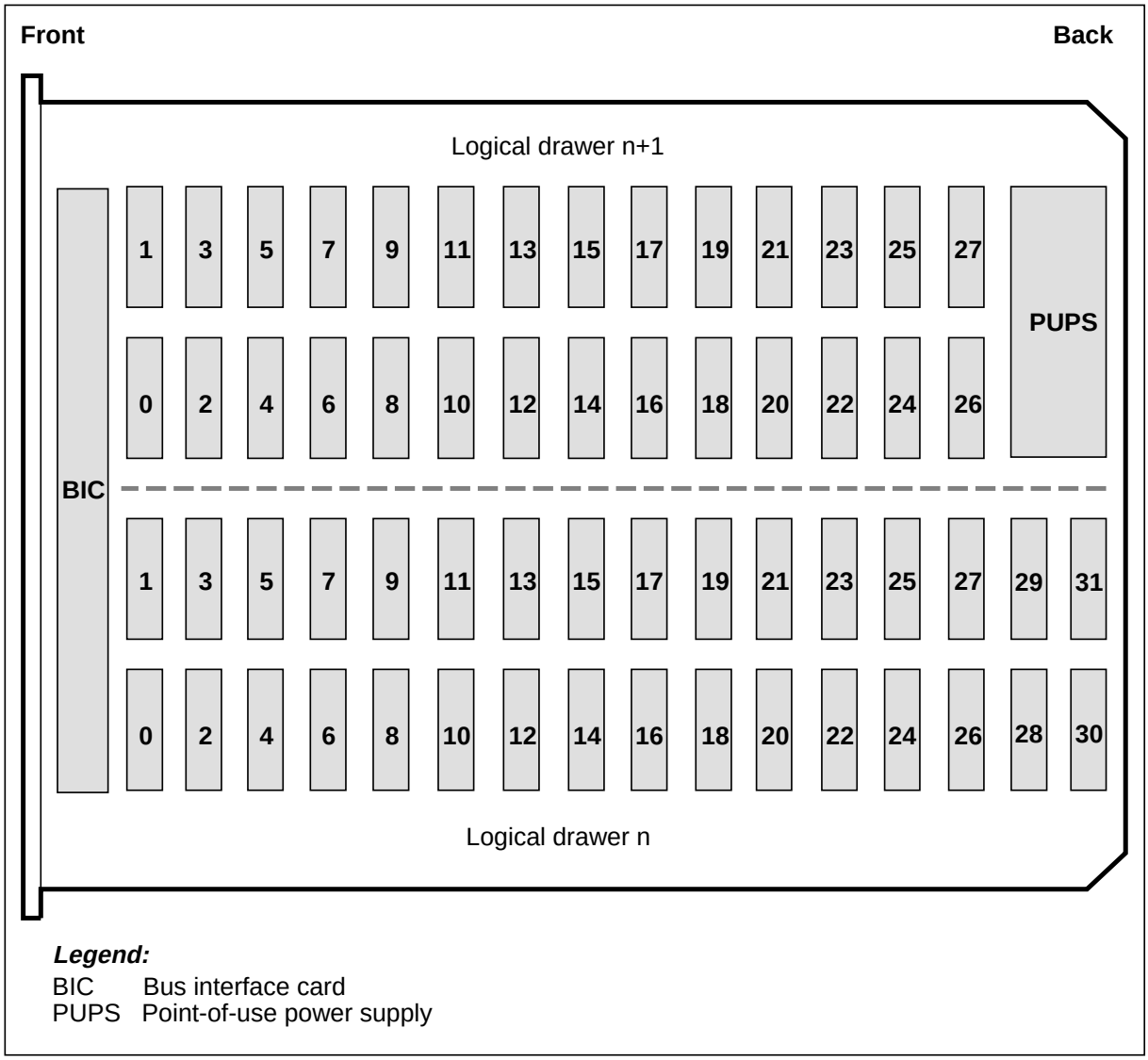
Enhanced ISDN line concentrating module line drawer

Each LCME has up to eight line drawers (four for each LCAI), each with space for up to 60 single-slot line cards. The line drawer supports 2B1Q U-interface and S/T-interface line cards, as well as POTS, MBS, and Datapath cards.

Each physical line drawer is divided into two logical line drawers. Each logical drawer supports up to 32 lines, except for the N+1 drawers, which support 28 lines because four slots are reserved for PUPS cards. The physical line drawer and its logical drawers are shown in figure 2-18.

Figure 2-18
Physical and logical layout of the LCME line drawer

FW30169



Enhanced ISDN line concentrating module cards

The number of lines supported by the LCME depends on the type and combination of line cards required. An LCME fully configured with a single type of line card supports 240 S/T-interface lines or 480 2B1Q U-interface lines. Alternatively, the LCME supports 480 POTS or MBS lines, or 240 Datapath lines. If more than one type of line is supported, the number of lines supported varies.

Table 2-1 summarizes LCME line card provisioning.

Table 2-1
LCME line card provisioning

Card name	Card type	Quantity in logical drawer	Quantity in physical drawer	Total cards in LCME
2B1Q U-line card	Single-slot	32 (N) or 28 (N+1)	60	480
S/T line card	Double-slot	16 (N) or 14 (N+1)	30	240
POTS line card	Single-slot	32 (N) or 28 (N+1)	60	480
MBS line card	Single-slot	32 (N) or 28 (N+1)	60	480
Datapath line card	Double-slot	16 (N) or 14 (N+1)	30	240

Note 1: Even-numbered (N) logical line card drawers can contain up to 32 single-slot cards, but odd-numbered (N+1) drawers, which also contain the PUPS cards, can only contain up to 28 single-slot cards.
Note 2: Double-slot line cards must start in an even slot.
Note 3: If POTS lines are datafilled in an LCME, the ring generator option must also be datafilled.

2B1Q U-interface ISDN line card The U-ISLC occupies one of the 60 slots available for line cards in the line drawer. With a single-slot U-ISLC line card, the LCME drawer supports 60 ISDN lines.

The U-ISLC terminates and exchanges data between the L-bus that connects the line card to the BIC, and the U-loop that connects the line card and the NT1. The card also provides a wide range of control and maintenance facilities that can be used for loop maintenance and testing, maintenance message processing, and self-diagnostics.

The 2B1Q line card has additional maintenance capabilities, provided by an on-board maintenance processor and its firmware. The maintenance processor provides the following maintenance and control functions:

- message transaction processing
- serial control port interface control
- U-subsystem maintenance
- line card self-diagnostics

Bus interface card For each LCME, there is a total of four BIC cards, one in each line drawer. The C-side of each ISDN line card is linked to the BIC through an L-bus.

The BIC performs the following functions:

- provides connections between the line cards and the three digroups
- serves as a message transceiver between the LCME processor and the line cards, and executes commands sent by the LCME processor via the serial communications link, including connection requests and loopback requests
- scans line cards in order to detect a change in supervision bits
- receives control messages from the DCCs and passes on control messages from the DCCs to the line cards
- time switches the two B-channels and the D-channel between the DCCs and the line card
- multiplexes four ISDN line card 16-kbit/s D-channel data streams, from the line card to the LCME processor, onto one 64-kbit/s digroup channel; in the opposite direction, it demultiplexes the digroup channel into four D-channel data streams
- monitors the status of the point-of-use power supply (PUPS), reporting to the LCME whenever the status of the PUPS changes
- splits the M-channel off each ISDN line and terminates it

Digroup controller cards The digroup controller cards (DCC) allow the LCME to connect its line drawers to the DS30A links, which in turn connect to an ISDN LGC or ISDN LTC.

The DCCs provide B- and D-channel connections among up to 18 DS30A ports (to the LGC or LTC) and 12 P-side digroups. Three digroups terminate to one physical line drawer.

D-channels have permanent connections datafilled in the switch; B-channel connections are dynamic and are assigned and taken down for each call.

The DCC performs these additional functions:

- provides a clear connection between the processor card and the DS30A channel that is used as the control channel between the LCME and the LGC or LTC
- applies looparound tests to the digroup links between the DCC and the BIC
- supports the setup of looparounds between DS30A channels to allow the LGC or LTC to test the DS30A channels between the LGC or LTC and the LCME

L-bus interface card The L-bus interface card is a bidirectional link between the BIC and each line card, and sends data and control messages to the line cards and receives responses. There are 60 L-buses, one for each line card in the line drawer.

Processor card The processor card performs the following functions:

- carries out all processing performed by the LCME
- generates and responds to control messages sent from and to the DMS-core
- transfers messages between the LGC or LTC and the LCME
- exchanges the line card and M-channel control, maintenance, and test messages to the BIC

Power converter cards Each LCAI is equipped with two power converters, each containing one 6X53BA card and one 6X53EA card. The power converter provides ±5V output for the shelf common control circuit cards, and ±15V output for the line drawers. Both shelf power converters can supply power for the mate LCAI during a takeover.

A PUPS, BX71AA, is located in each of the physical line drawers. It converts the -48V input and provides a +5V output to the line card slots.

ISDN remote switching center-SONET

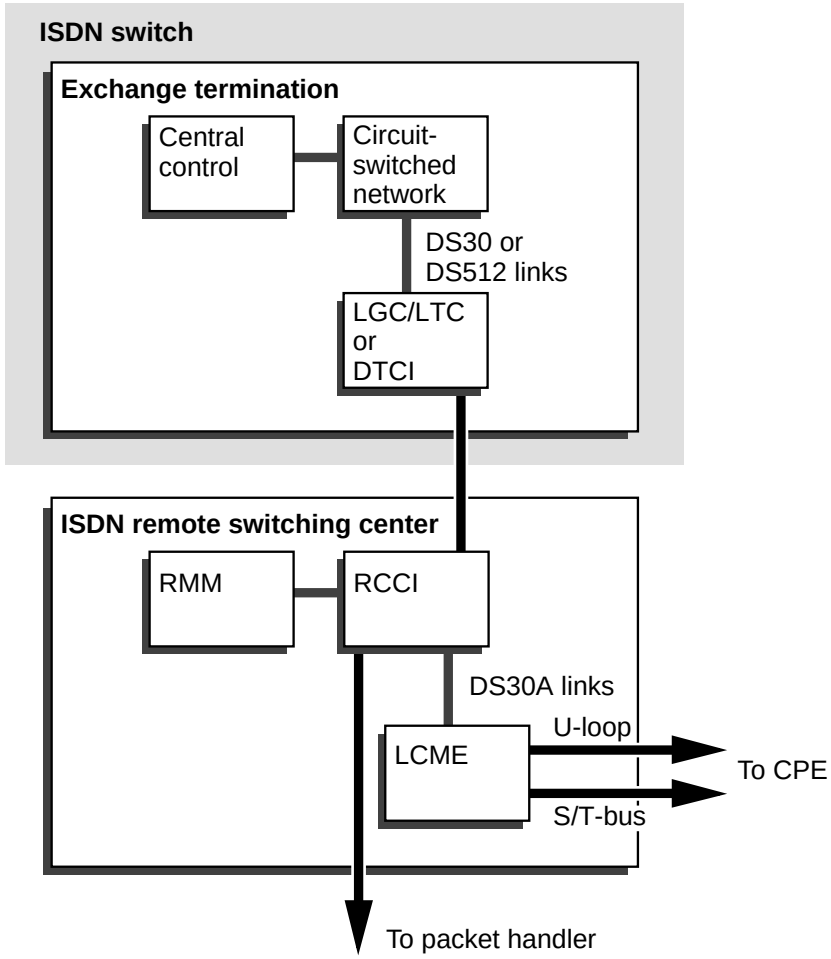
The ISDN remote switching center-SONET is a dual-unit node that performs similar functions to the other peripheral modules, interfacing remote networks to the circuit-switched and packet-switched networks.

As shown in figure 2-19, the ISDN remote cluster controller (RCCI) connects an LCME to another peripheral module, which may be an LGC, an LTC, or a DTCI. In the remote configuration, a remote maintenance module (RMM) provides the remote OAM services.

Refer to *Remote Switching Center Product Guide*, 297-2711-010, for more information on the RCCI.

Figure 2-19
The RCCI in the network

FW-30443



Legend:

CPE	Customer premises equipment
DTCI	ISDN digital trunk controller
LCME	Enhanced ISDN line concentrating module
LGC	ISDN line group controller
LTC	ISDN line trunk controller
RCCI	ISDN remote cluster controller
RMM	Remote maintenance module

DMS packet handler

The DMS PH is an integrated peripheral of the DMS SuperNode. The DMS PH is implemented as an application on a link peripheral processor (LPP). The LPP is a DMS SuperNode equipment cabinet that provides the interface between the DMS-core and DMS-bus and the CCS7 signaling network.

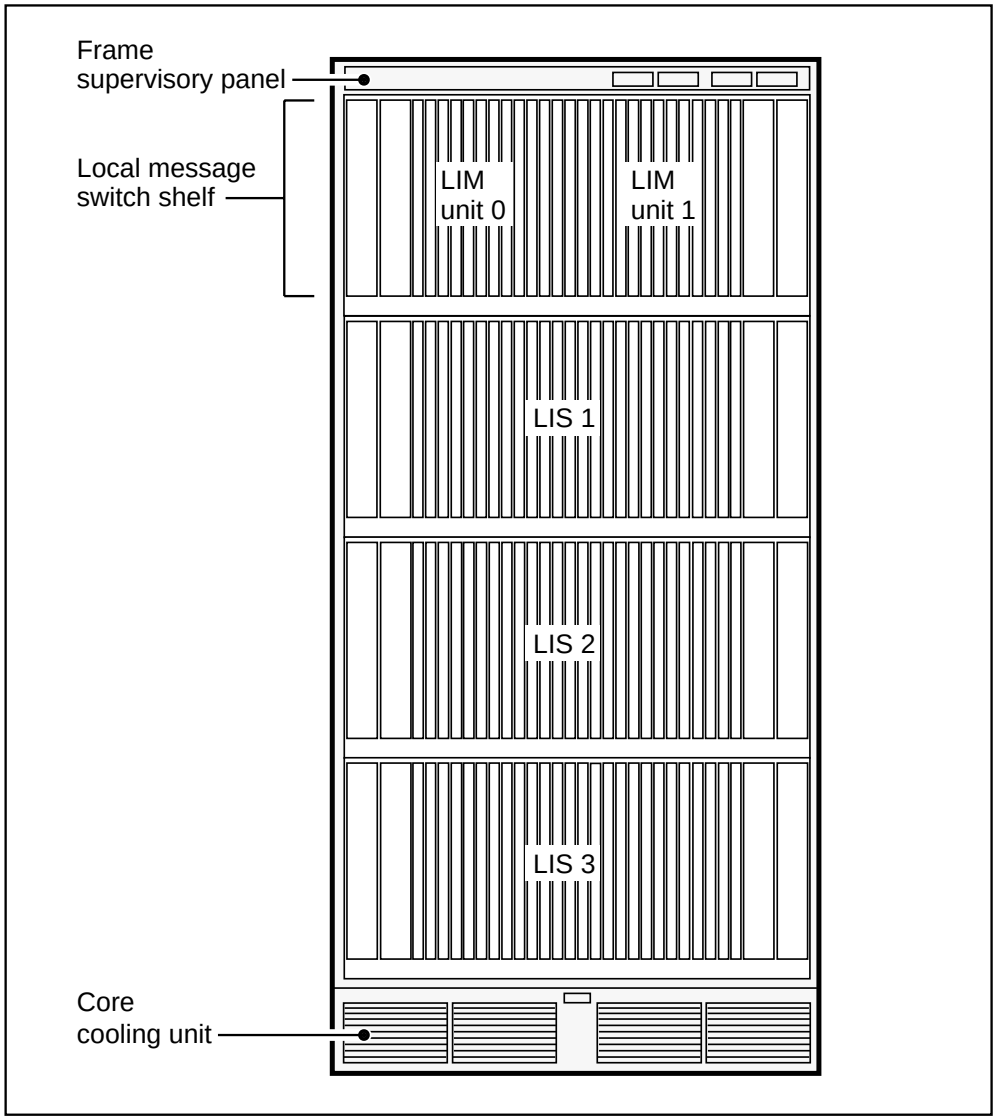
Link peripheral processor configuration

The physical configuration of an LPP is illustrated in figure 2-20. The LPP consists of the following components:

- a frame supervisory panel (FSP), which provides power distribution and contains alarm circuits
- an LMS shelf (also known as a LIM), which contains the cards and paddle boards for the two LMSs and F-buses
- up to three link interface shelves, which contain the ASUs
- a core cooling unit, which provides mechanical ventilation for the equipment housed in the LPP cabinet

Figure 2-20xxx
LPP configuration

FW-30196



An LPP configured for ISDN consists of the following components:

- X.25/X.75/X.75' link interface units (XLIU)
- a link interface module (LIM), which routes messages between XLIUs or from an XLIU to the computing module, on the frame transport bus (F-bus) using the local message switches (LMS) for routing. A LIM consists of the following components:
  - two LMSs operating in load-sharing mode
  - a duplicated F-bus, which provides data communication between the LIU and the ASUs
  - individual F-bus taps for each LIU
- a network interface unit (NIU), which provides the interface between the network module and the channel bus (C-bus) that links the XLIUs. Network access is through up to four DS30 links.

Figure 2-21 shows an LPP frame configuration with NIUs and the XLIUs.

The DMS PH can be installed in the standard 4-shelf LPP using the 2-slot link interface shelf (LIS) (that is, the 36-position LPP package shown in figure 2-22). The DMS PH can also be installed on a single-shelf LPP.

XLIUs can be provisioned for X.25, X.75, and X.75' service. Although XLIUs can process both X.25 and X.75/X.75' packets, this configuration is only recommended for small installations. For larger installations, it is recommended that XLIUs be dedicated to either X.25 or X.75/X.75' service.

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 a maximum of 512 terminals for each XLIU.

Both X.75 and X.75' trunks can be terminated on the same XLIU, one trunk for each XLIU DS-0 channel. Trunk traffic should be estimated for each channel, then channel allocation may be done for each XLIU.

Only one LPP may be equipped with XLIUs in each DMS SuperNode. The XLIU can coexist with the the CCS7 link interface unit (LIU7) in the LPP. For a minimum DMS PH configuration, a single XLIU can be added to any LPP shelf that is already equipped with the NIU pair.

Up to ten XLIUs per LIS can be added, one at a time, as shown in figure 2-22. Up to 30 XLIUs are allowed in one LPP. In this last configuration, each of the three shelves must have its own NIU pair for terminating the network links.

One NIU pair is provided in each LIU shelf occupying the two center slot positions on the shelf. The middle slots are used only to provide the proper power redundancy and to limit the intercard cable lengths.

> ***Note:*** To permit the DMS PH to function with channelized access, the NIU requires the EX22BB version of the integrated processor and frame bus interface (IPF).

This DMS PH implementation, based on the LPP, provides the following benefits:

- By adding XLIUs and software for packet services on existing LPPs for CCS7, it can also provide ISDN packet services.
- DMS packet handler can be configured with other application-specific units (ASU) such as Dataspan, SSP, and STP on the same link interface shelf.
- DMS packet handler is fully compliant with National ISDN-1 standards and can meet future standards as they develop.

Link interface module configuration

The LMS shelf houses two LMSs, designated LMS 0 and LMS 1. The LMSs are high-capacity communication hubs that control messaging between the ASUs in the link interface shelves and between the LPP and the DMS-bus. As well as controlling messaging, each LMS also accepts the external composite clock signals that provide network timing for the signaling links that connect to the ASUs.

Each F-bus is an 8-bit bus that forms the data communication path between an LMS and the link interface shelves. F-bus 0 is dedicated to LMS 0, and F-bus 1 is dedicated to LMS 1.

Each LMS and F-bus operates in a load-sharing mode with its mate. This ensures system reliability in the event of an LMS or F-bus failure, because either LMS plane has adequate capacity to carry the full message load of a LIM, and each F-bus has the capacity to carry the full LIM load.

To ensure timing reliability, one clock signal is provided to each LMS, providing each ASU with two sources for its composite clock signal.

Each LMS is connected to each plane of the DMS-bus through two DS30 links, and the LMSs are connected to each other through two DS30 links.

> ***Note:*** The MAP refers to the LMS shelf as the LIM. At the MAP, LMS 0 is known as LIM unit 0, and LMS 1 is LIM unit 1.

Figure 2-21xxx
LPP frame (36-position) with NIUs and XLIUs

FW30485

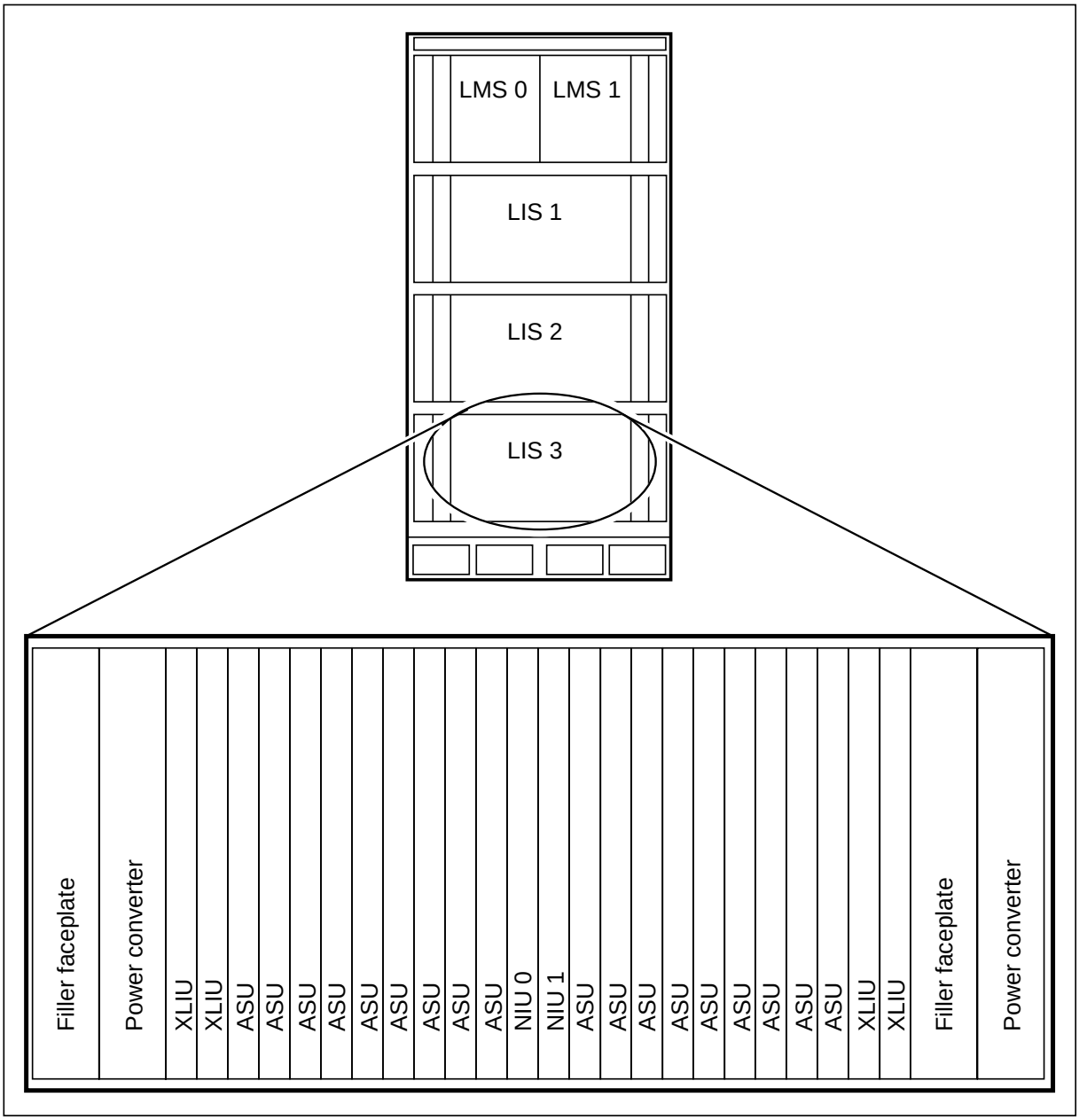
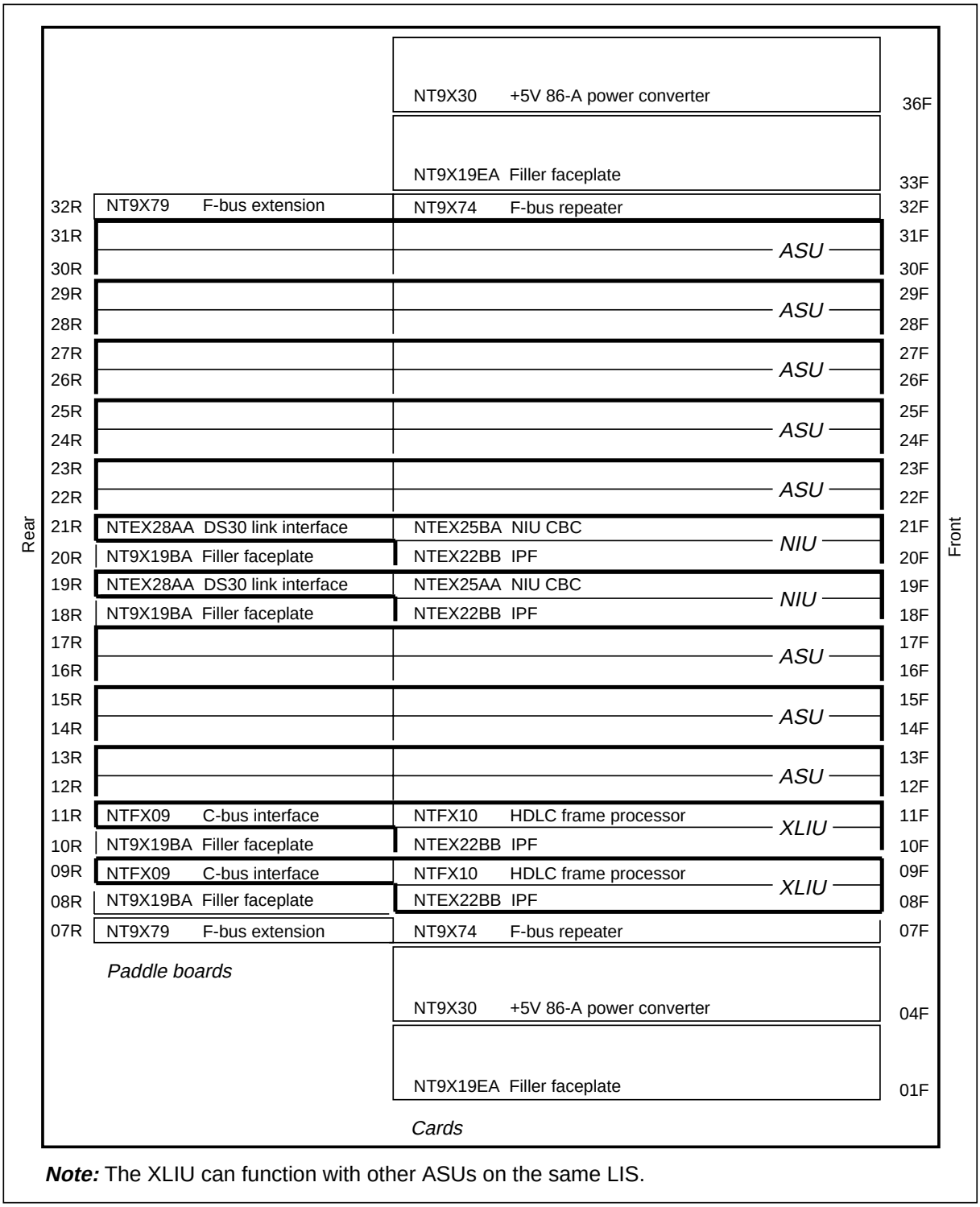


Figure 2-22xxx
LPP 2-slot link interface shelf plan view

FW30571



Note: The XLIU can function with other ASUs on the same LIS.

X.25/X.75/X.75' interface unit configuration

The XLIU provides the X.25 and X.75 protocol processing for the DMS PH. Protocol processing requires the XLIU to handle the first three layers of the OSI layered protocol model. A description of those layers follows:

- for layer 1, the physical layer, the XLIU provides data bit stream synchronization
- for layer 2, the data link layer, the XLIU provides high density link controller (HDLC) frame processing, which controls the link access procedures (LAPB and LAPD) that handle data exchange between terminal or network equipment and the DMS SuperNode
- for layer 3, the network layer, the XLIU provides X.25/X.75 packet format and control procedures

The XLIU is a 3-card unit that contains the following parts:

- a high density link controller frame processor (HFP), NTFX10, which provides layer 2 processing for X.25 or X.75 protocol
- an IPF interface, NTEX22, which provides X.25 or X.75 layer 3 processing and F-bus access
- a channel bus interface paddle board (CIP), NTFX09, which provides C-bus access to the HDLC ports on the HFP

Two configurations of XLIU peripherals are available. XLIUs can be provisioned for a combined X.25, X.75, and X.75' service (for small-sized installations) or for a dedicated X.25 or X.75/X.75' service (for large-sized installations). Activity can be manually switched from one XLIU to a spare XLIU. The XLIU is configured for redundant access to the C-bus.

The XLIU supports 31 channels operating at 160 data packets per second (at 60% CPU load) and 512 links (X.25, X.75 and X.75'). Each XLIU has sufficient memory to support up to 4096 simultaneous calls (2048 originating and 2048 terminating calls).

Integrated processor and frame bus interface card The IPF card uses a processor, with 8 Mbytes of program and data store, which handles packet layer protocol and maintenance functions. The processor cell uses Northern Telecom's proprietary support operating system (SOS) to ensure optimal assignment of CPU resources to protocol handling, call control, and maintenance functions.

The IPF card also contains

- a processor bus (P-bus) interface to provide access and control within the XLIU
- an F-bus interface to provide access to the F-bus for connectivity to other XLIUs in the LPP and, by way of the DMS-bus, to the DMS-core

High density link controller frame processor card The HFP card terminates 32 HDLC channels, one of which is used for continuous testing. The card also directly receives data into packet memory without processor intervention. A single processor chip with 2 Mbytes of program storage handles link layer protocol functions. The HFP also has 512 kbytes of packet memory which is directly accessible from the HDLC component, the processor, and the layer 3 processor on the IPF card.

Channel bus interface paddle board card The CIP card interfaces with the two C-buses on the LPP shelf backplane and passes data from selected channels to and from the HFP. The CIP supports channel C-bus loopbacks outward (toward the network) and inward (toward the HFP) provided at the C-bus electrical interface. The loopbacks diagnose data integrity on the LPP backplane and the HFP card.

Network interface unit configuration

The NIU implements channelized access for the various ASUs. Access to the XLIU is provided by the NIU. The NIU is a warm-spared peripheral that provides the interface between the network module (NM) and the channelized bus (C-bus), or the LPP shelf. Network access is through up to four redundant DS30 links for a total of 120 channels on each LIS.

The NIU is a 6-card redundant unit that consists of the following parts:

- a channel bus controller (CBC), NTEX25, which connects the network modules to the XLIU (and other ASUs) through a parallel C-bus
- an integrated processor and frame (IPF) bus interface, NTEX22, which connects the network modules to the XLIU through the F-bus
- a DS30 link interface paddle board (LPB), NTEX28, which supports four DS30 links to the network modules

One NIU pair is provided in each LIS to terminate DS30 links from the network module (NM) as shown in figure 2-23. For proper duplication, the NIU is provisioned as a pair of duplicated 3-card sets.

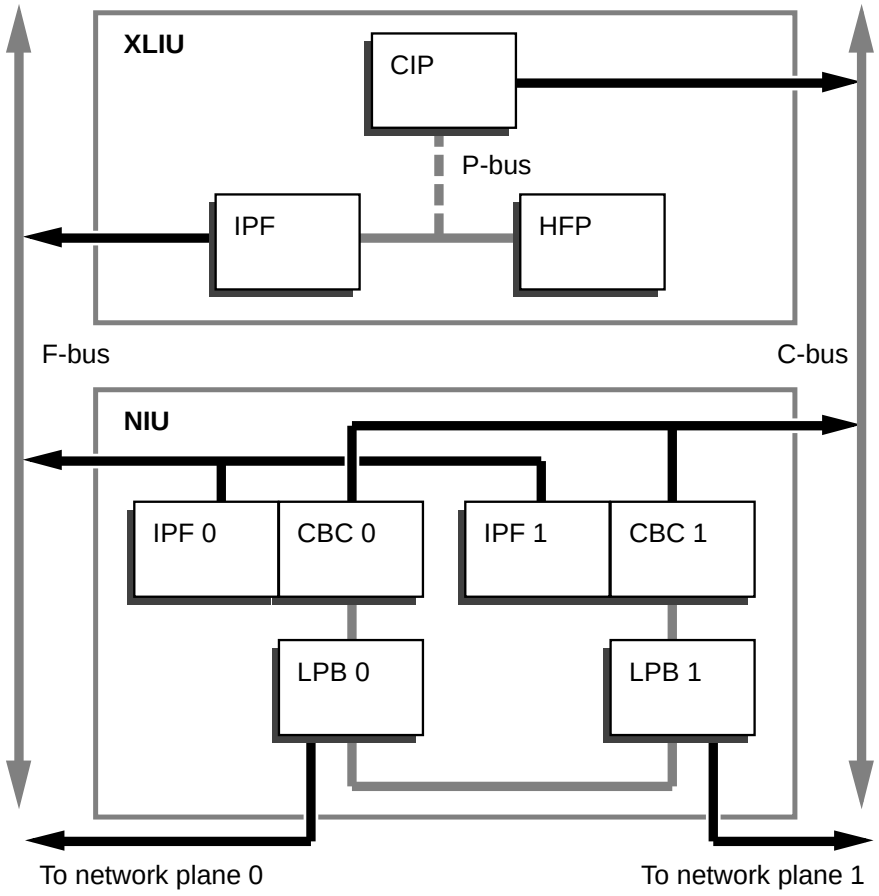
DPN packet handler

The DPN packet handler is a stand-alone unit that interacts with the DMS-100 switch to provide ISDN packet call processing and handling functions. It connects the DMS-100 controller peripheral to the public packet-switched network, or to another DMS-100 ISDN node.

For more information on the DPN packet handler, refer to *NTP Index for Documentation*, 297-0001-003.

Figure 2-23xxx
DMS PH card interconnection

FW-30570



Legend:

CBC	Channel bus controller	LPB	Link interface paddle board
CIP	Channel bus interface paddle board	NIU	Network interface unit
HFP	High density link controller frame processor	XLIU	X.25/X.75/X.75' link interface unit
IPF	Integrated processor and frame bus interface		

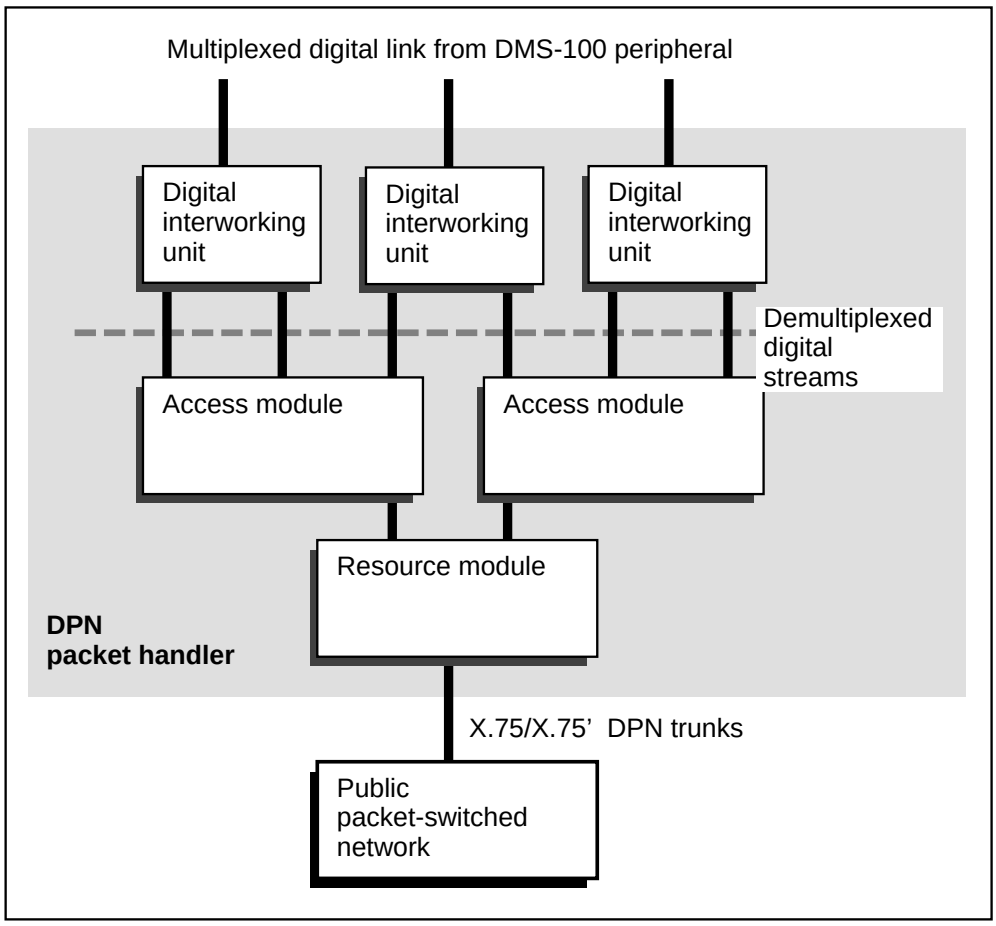
DPN packet handler components

The three key components of the DPN packet handler, shown in figure 2-24, are the

- digital interworking unit (DIU)
- access module (AM)
- resource module (RM)

Figure 2-24
Architecture of the DPN packet handler

FW-30480



Digital interworking unit

The DIU provides the connection between the DMS-100 controller peripheral and DPN access module through 1.544 Mbit/s DS-1 digital trunks. Each DMS-100 controller peripheral requires at least one DS-1 link to the DIU. The DIU demultiplexes the DS-1 signals received from the DMS-100 controller peripheral into V.35 format, 64-kbit/s serial data streams, which are then sent to the ports on the AM. For data sent in the opposite direction, the DIU changes the data in V.35 format to DS-1 format.

A DIU consists of one shelf equipped with at least one supervisory processor module, two SPM paddle boards (SPMPC), two power converters, and one alarm termination paddle board. One DIU subsystem is required for each DS-1 link from the DMS-100. A total of 16 slots per shelf are available for DIU subsystems.

Access module

The AM is the access protocol processor of the packet handler. The AM provides access to the resource modules of the DPN from local subscriber packet lines and from the DIU. The AM supports the LAPD link layer protocol for user packet mode data on the basic rate D-channel, as well as B-channel services such as X.25 LAPB. In addition, the AM supports X.75/X.75' gateways to public and private packet-switched networks.

A distributed processing architecture is built around a single processor which uses a dual common bus as its interface. The basic architectural components are the processor element (PE), the peripheral interface (PI), and the common memory.

Resource module

The RM provides X.75/X.75' gateways for interworking with public packet-switched networks.

The prime functions of the RM are to

- perform packet-switching operations on data packets sent from the AM, or from digital trunks in the packet-switched network
- return the switched packets back to the AM for format conversion and distribution to the appropriate destination, or out to terminals in the packet-switched network through a digital trunk

When outgoing D-packet or B-packet data enters the RM from the controlling peripheral, the destination may be

- a subscriber packet line
- the packet-switched network through a digital trunk of the packet-switched network
- a terminal on another ISDN line

If the destination is to a local terminal on another ISDN line, the data packets are returned to the AM, through the DIU, then back to the appropriate DMS-100 ISDN line and terminal.

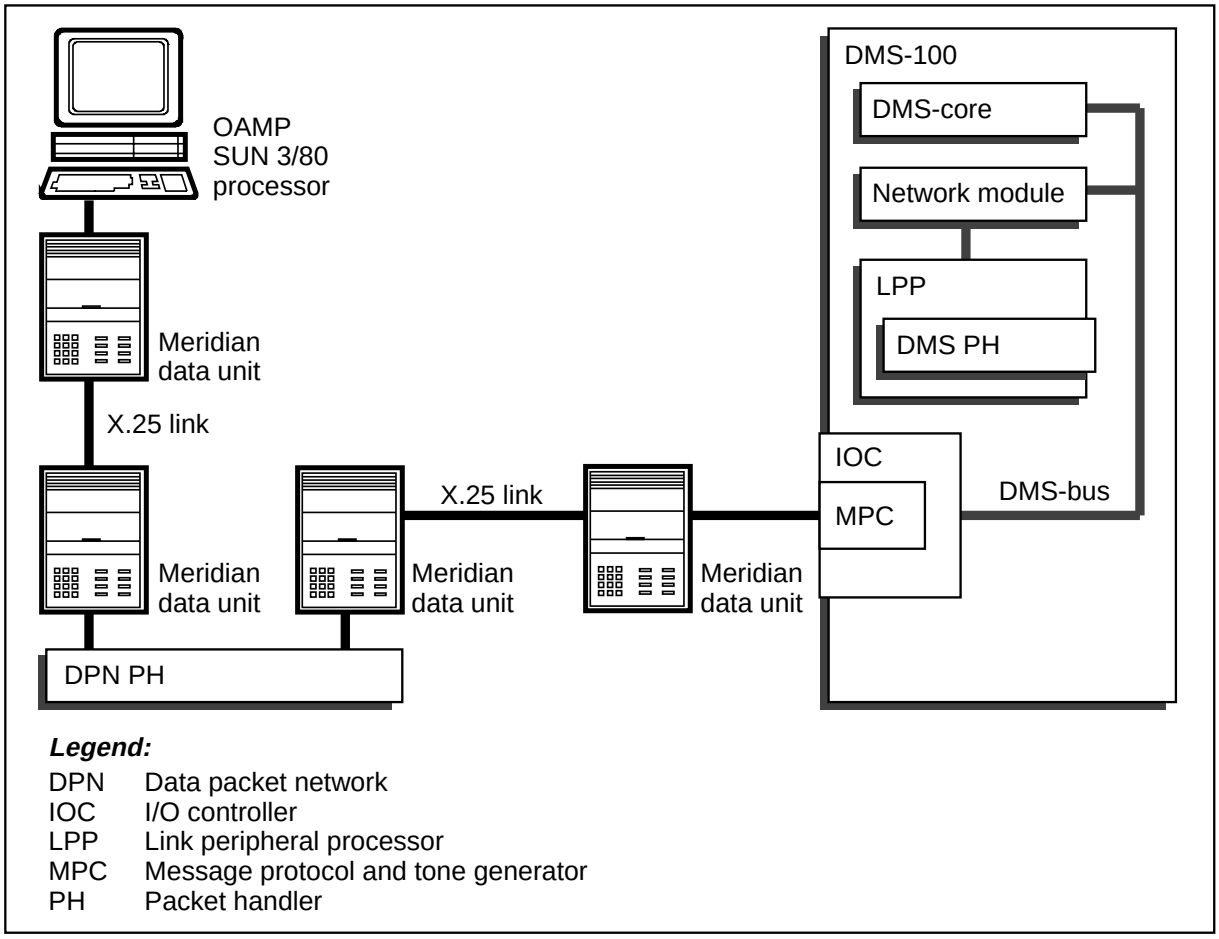
Integrated ISDN OAM processor

The integrated ISDN OAM processor provides an interface between the MAP (maintenance and administration position) at the DMS-100 switch exchange termination and the DPN packet handler, as shown in figure 2-25. This configuration results in centralized operation, administration, and maintenance.

The OAM processor is treated as a DMS-100 peripheral module for downloading and maintenance. The packet handler faults generate alarms on the DMS-100 MAP. The DMS-100 switch fault display and correction procedures can be used to correct DPN packet handler faults.

Figure 2-25xxx
DPN packet handler with integrated ISDN OAM configuration

FW-30515



Integrated service provisioning

Integrated service provisioning provides operations for new services to a customer, upgrading or downgrading service, or removing a service. Integrated service provisioning allows DMS SERVORD to be used for packet-switched ISDN terminals.

Integrated basic hardware configuration

The integrated basic hardware configuration allows X.25 processor elements and peripheral interfaces to be added or deleted on the DPN packet handler.

Integrated maintenance

The integrated maintenance provides access to troubleshooting aids developed for both circuit switching and packet switching.

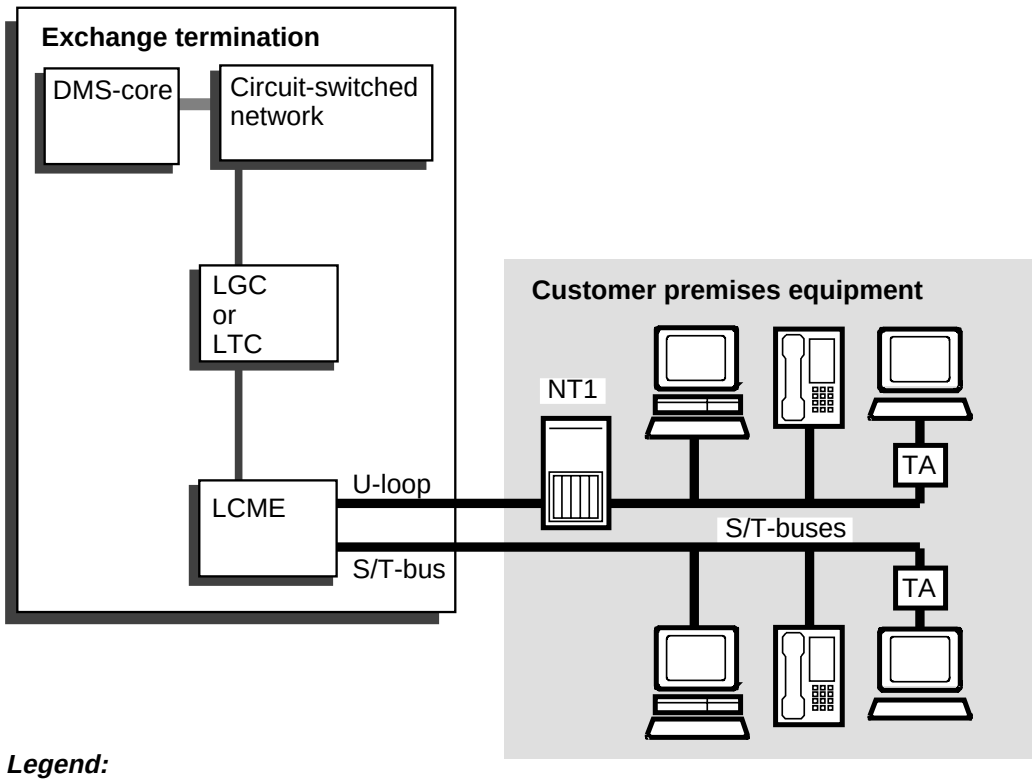
Customer premises equipment

Customer premises equipment (CPE) is located at the subscriber site. As shown in figure 2-26, CPE is composed of

- a U-loop
- a network termination 1 (NT1)
- an S/T bus
- an ISDN universal terminal adapter
- ISDN terminals, including digital telephone sets

Figure 2-26
CPE in the network

FW30481



Legend:

LCME Enhanced ISDN line concentrating module
LGC ISDN line group controller
LTC ISDN line trunk controller
NT1 Network termination 1
TA Terminal Adapter

U-loop

A U-loop (called the U-reference point by the CCITT), is the two-wire interface at the exchange termination between an NT1 and an ISDN U-line card. A U-loop carries time-division multiplexed B- and D-channel

information at 160 kbit/s between the NT1 and exchange termination. For each BRI, the associated U-loop terminates at a corresponding ISDN U-line card in the LCME.

Network termination 1

When the subscriber loop terminates in a U-line card, the NT1 provides a link between the central office equipment and CPE. When the ISDN line terminates in an S/T-line card, the ISDN switch acts as the network termination.

The NT1 is located on the customer premises and supports BRI service by providing two ANSI standard interfaces:

- a 2-wire interface for the subscriber loop, or U-loop, which connects the NT1 to the telephone network
- a 4-wire interface for the customer interface bus, known as the S/T bus, which connects the NT1 to up to eight ISDN terminals on the customer premises

At the physical layer, the NT1 converts the B- and D-channel information from the 2B1Q U-loop protocol on the network side to the CCITT standardized protocols for the S/T-bus on the user side, and vice versa.

The NT1 unit is available in two different types of packaging:

- the stand-alone packaging version of the NT1 (NTBX80XX) which contains one NT1 unit, and is typically desk- or wall-mounted at the user workstation
- the modular version of the NT1 (NTBX83XX), which contains up to 12 NT1 units, and is typically wall- or rack-mounted in the central equipment room

The star version of the NT1 provides two S/T-interfaces, enabling the connection of two S/T buses. Both versions of the NT1 offer terminal powering and battery back-up options.

S/T bus

The S/T bus is the electrical interface between the NT1 and ISDN telephones and terminal adapters. The bus consists of a transmit and receive pair, as well as two auxiliary pairs:

- one pair transmits B- and D-channel information from terminals on the interface to the network termination
- one pair receives B- and D-channel information from the network termination

Depending on the powering option selected, the transmit, receive, or auxiliary pairs can carry power to the terminals.

Up to eight ISDN terminals or terminal adapters may be connected to a series of connection points on the bus (called access points), with a full-duplex transmission rate on the S/T bus of 192 kbit/s consisting of

- two 64-kbit/s B-channels
- one 16-kbit/s D-channel

The S/T bus includes two channels used for maintenance messaging: the S-channel for messages to the terminals, and the Q-channel for messages from the terminals.

M5000TD-1 ISDN terminal adapter

The M5000TD-1 ISDN terminal adapter (TA) enables 64-kbit/s clear synchronous data access to a B-channel, and enables a non-ISDN terminal to access an ISDN line. The M5000TD-1 terminal adapter supports multiple data applications, such as video conferencing, PC or mainframe access, bridging of local and wide area networks, and voice call management. The M5000TD-1 terminal adapter fully complies to the Bellcore SR-1953 standards.

Four channels are available to the user. Each channel can be used for a different type of call. The TA supports circuit-switched voice calls on the B-channel, circuit-switched data calls on the B-channel, packet-switched calls on the B-channel, and packet-switched data on the D-channel. Up to four different calls can take place simultaneously.

The TA uses an enhanced version of the Hayes AT command set to control calls. The TA connects to an ac electrical outlet of 110 V through the adapter supplied with the unit.

A standard 2500 telephone set can be connected to the TA with a standard RJ11 connector. The 2500 set combined with the advanced AT command set provides access to a wide variety of Meridian voice features. A personal computer can be connected to the TA with a standard DB-25 connector configured for RS-232 or V.35 signaling. The TA connects to the NT1 with an RJ45 eight-pin connector.

Circuit-switched data calls can be set for either T-link protocol, V.120, 64-kbit/s clear synchronous, or I.515 rate adaptation, where the TA negotiates with the far-end for a compatible protocol.

ISDN terminals

ISDN terminals include voice and data devices such as M5317T ISDN Meridian business sets and M5209T ISDN Meridian business sets.

M5317T, TX, and TDX ISDN Meridian business sets

The M5317T ISDN Meridian business set is a digital telephone with a 2-line display. The top line provides information on incoming calls and feature status, and the bottom line provides walk-through information on how to use various features. The M5317T has 12 line/feature keys with corresponding LCD indicators. Feature datafill is downloaded to M5317T sets using the terminal test and configuration (TTC) feature. The M5317T also has a built-in adapter to plug directly into the access interface.

The M5317T allows functional signaling for basic call control and uses feature key management to access supplementary (Meridian Digital Centrex-based) services. Meridian feature transparency for BRI (BRAMFT) is an extended signaling protocol supported by the M5317T. The BRAMFT protocol provides the M5317T with access to all Meridian Digital Centrex features currently available on non-ISDN business sets.

The following options are also available for the M5317T:

- M5317TX is a full-featured voice set. In addition to the M5317T capabilities, it offers integrated handsfree operation, and can be powered from an NT1 power source.
- M5317TDX is a voice and data ISDN business set that provides circuit-switched and packet-switched data services. It has 12 line/feature keys, five context-sensitive soft keys, and an 80-character display. Additional capabilities include
  - D-channel packet data capabilities at up to 9600 bit/s
  - firmware that can be downloaded over the telephone line

M5209T, TDp, and TDcp ISDN Meridian business sets

The M5209T is a mid-range ISDN digital telephone with an integrated data option for simultaneous voice and data communication. A 2-line liquid crystal display shows the number called, call progress, and call duration.

The following options are also available for the M5209T:

- M5209TDp has voice and data capabilities. It can perform D-channel packet-switching (from 110 to 9600 bit/s with X.25 PAD).
- M5209TDcp has voice and data capabilities. It can also handle D-channel packet-switching (from 110 to 9600 bit/s, with X.25 PAD), and B-channel circuit-switching (from 110 to 19200 bit/s with T-link rate adaptation and the Hayes 1200 command set).

The M5209T supports functional and Meridian feature transparency (MFT) signaling. It has an RS-232C interface and is configured as data communication equipment (DCE). The M5209T is compatible with most computer communication software packages. The set connects to the S/T-interface of the NT1 with an RJ45 connector.

ISDN software

This chapter discusses the software packages available for ISDN. The software is discussed as follows:

Software requirements on page 3-2 discusses the basic software packages required to support ISDN capabilities, including the basic rate interface (BRI) and primary rate interface (PRI) software packages.

Software dependencies on page 3-11 discusses the common packages required to support ISDN capabilities.

DMS packet handler software on page 3-12 discusses the packages required to support DMS packet handler capabilities.

Additional software on page 3-14 discusses the software packages required to support additional ISDN capabilities.

CLASS features on page 3-16 discusses the common packages required to support the CLASS group of features.

Software requirements

This section describes the ISDN software packages.

ISDN base software

Table 3-1 lists the basic software packages required to support ISDN capabilities.

Table 3-1xxx
ISDN base software

Feature package number	Feature package title
NTXB85AA	ISDN International-Maintenance
NTXF44AA	DSN ISDN Basic Rate Access
NTXJ00AB	ISDN on Remote Switching Center
NTXJ51AA	ISDN Digital Test Access
NTXN87AA	Integrated Testing Base
NTXN89AA	ISDN Testing
NTXN91AA	TL-1 Testing Interface Base
NTXN93AA	TL-1 Testing Enhanced Business
NTXP38AA	Bd Channel Loopback
NTXQ27AB	MFT Display Enhancements
NTX750AC	ISDN Basic Access (with UP and EISP)
NTX750AD	ISDN Basic Access (with UP, EISP, and EDCH)

NTXB85AA (ISDN International-Maintenance)

This feature package provides the capability to perform maintenance and call processing for domestic and international trunks.

NTXF44AA (DSN ISDN Basic Rate Access)

This feature package enables a caller with the Executive Busy Override (EBO) feature to interrupt a busy multiple appearance directory number (MADN) party.

NTXJ00AB (ISDN on Remote Switching Center)

This feature package provides ISDN capabilities for the remote switching center, enabling an RSC equipped with an ISDN remote cluster controller (RCCI) to extend full 2B+D service up to 160 km (100 mi) from the DMS-100 ISDN node. Available as a field upgrade to remote switching centers already in service or for new remote switching center installations, the RCCI supports the T- and U-interfaces and provides basic rate access.

NTXJ51AA (ISDN Digital Test Access)

This feature package allows ISDN basic rate B-, D- and Bd channels to be monitored with a commercially available protocol analyzer from a local or remote location.

NTXN87AA (Integrated Testing Base)

This feature package modifies line maintenance utilities so they can be used by existing line maintenance and by integrated testing line maintenance.

NTXN89AA (ISDN Testing)

This feature package provides enhanced testing and maintenance capabilities for ISDN 2B1Q.

NTXN91AA (TL-1 Testing Interface Base)

This feature package provides the basic transaction language 1 system interface to the DMS switch. By using a TL-1 capable operations system, the OS can test and maintain DMS lines.

NTXN93AA (TL-1 Testing Enhanced Business)

This feature package provides enhanced capabilities for testing and maintaining ISDN 2B1Q lines through the OS TL1 interface.

NTXP38AA (Bd Channel Loopback)

This feature package allows individual calls on a DS-0 channel to be tested without taking down the entire DS-0 channel.

NTXQ27AB (MFT Display Enhancements)

This feature package provides the following enhancements for Meridian feature transparency (MFT) terminals:

- network-based handsfree control
- softkey availability on idle MFT terminals
- call forward programming for the power feature
- conversion of the MFT protocol to use the display text information element rather than the Meridian transparency information element to send display information
- softkeys reported as feature activators, rather than the Meridian transparency information element

NTX750AC (ISDN Basic Access [with UP and EISP])

This feature package provides the base XPM software and the North American Standard 2B1Q U-loop interface, using the unified processor (UP) and the enhanced ISDN signaling preprocessor (EISP).

In addition, this feature package provides the following:

- enhanced LCME diagnostic control
- fault event reporting
- recovery control
- a base software load
- basic peripheral module maintenance
- BRI MFT, which enables ISDN BRI terminals to use Meridian features
- BRI overload controls
- a D-channel handler (DCH) and an enhanced ISDN signaling preprocessor (EISP) buffer and processor audit
- special connection enhancements

NTX750AD (ISDN Basic Access [with UP, EISP, and EDCH])

This feature package provides the base XPM PLUS software and the North American Standard 2B1Q U-loop interface, using the unified processor (UP), the enhanced ISDN signaling preprocessor (EISP), and the enhanced D-channel handler (EDCH).

In addition, this feature package provides the following:

- enhanced LCME diagnostic control
- fault event reporting
- recovery control
- a base software load
- basic peripheral module maintenance
- BRI MFT, which enables ISDN BRI terminals to use Meridian features
- BRI overload controls
- an enhanced D-channel handler (EDCH) and enhanced ISDN signaling preprocessor (EISP) buffer and processor audit
- special connection enhancements

ISDN BRI base software

Table 3-2 lists the software packages required to support the BRI capabilities of ISDN.

Table 3-2xxx
ISDN BRI base software

Feature package number	Feature package title
NTXE25AA	ISDN Circuit Switch Modem Pooling
NTXF93AA	ISDN Provisioning
NTXJ51AA	ISDN Digital Test Access
NTXK76AA	International Basic Rate Access
NTXN87AB	Integrated Testing Base
NTXN89AA	ISDN Testing
NTXN93AA	TL1 Testing Enhanced Business
NTXN99AA	ISDN Inbound Modem Pooling
NTXV10AA	ISDN Non-initialization Terminals
NTX753AB	ISDN Functional Mode Basic Rate Services
NTX754AB	ISDN Electronic Key Telephone Service
NTX755AC	ISDN Supplementary Services Compliance
NTX756AA	ISDN Enhanced Display Services
NTX757AA	TR444 ISUP Interworking
NTX767AA	TR448 ISDN Digit Analysis Compliance - End Office
NTX768AA	TR448 ISDN Digit Analysis Compliance (toll office)
NTX769AA	TR444 ISUP Interworking (toll office)
NTX796AA	Info+ Enhanced Number Delivery-Basic Rate Interface

NTXE25AA (ISDN Circuit Switch Modem Pooling)

This feature package enables ISDN terminals and terminal adapters using T-link rate adaption to send synchronous and asynchronous data from ISDN to a destination in the plain ordinary telephone service (POTS) network over analog facilities. Modem-pool activation is automatic.

NTXF93AA (ISDN Provisioning)

This feature package provides integrated service provisioning for ISDN circuit- and packet-switched devices. Additions, deletions, and changes can be performed through SERVORD for B- and D-channel packet devices and for B-channel circuit-switched voice and data terminals.

NTXJ51AA (ISDN Digital Test Access)

This feature package allows ISDN basic rate B- and D- channels to be monitored with a commercially available protocol analyzer.

NTXK76AA (International Basic Rate Access)

This feature package provides protocol version control (PVC) to support the multiple layer 3 protocols for international services.

NTXN87AB (Integrated Testing Base)

This feature package modifies line maintenance utilities to allow them to be used by both the existing line maintenance and by ISDN TL1 line maintenance.

NTXN89AA (ISDN Testing)

This feature package provides ISDN transaction language 1 (ISDN-TL1) commands that an integrated testing system (ITS) uses to communicate with the DMS system to maintain ISDN two-binary one-quaternary (2B1Q) lines.

NTXN93AA (TL1 Testing Enhanced Business)

This feature package provides ISDN transaction language 1 (ISDN-TL1) commands that an integrated testing system (ITS) uses to communicate with the DMS system to maintain ISDN two-binary one-quaternary (2B1Q) lines.

NTXN99AA (ISDN Inbound Modem Pooling)

This feature package allows terminals in non-ISDN networks using voiceband modems to establish calls to ISDN circuit-switched data terminals.

NTXV10AA (ISDN Non-initialization Terminals)

This feature package provides inbound modem pooling (IMP) capability for the ISDN by using synonymous directory numbers to activate IMP.

NTX753AB (ISDN Functional Mode Basic Rate Services)

This feature package provides a protocol for functional signaling for basic rate services, in compliance with TR268. It also provides base protocol requirements for some supplementary services.

NTX754AB (ISDN Electronic Key Telephone Service)

This feature package enables ISDN functional signaling terminals to share directory numbers with ISDN and non-ISDN sets (MADN SCA capability), and to bridge another MADN member into an established call, or invoke the privacy option to deny a bridging attempt.

NTX755AC (ISDN Supplementary Services Compliance)

This feature package provides the ISDN equivalent version of the Meridian Digital Centrex Three-Way Calling/Call Transfer feature, and can be deployed transparently in multivendor and multinode environment.

NTX756AA (ISDN Enhanced Display Services)

This feature package displays the name and reason information to the BRI functional terminals, in compliance with ANSI standards.

NTX757AA (TR444 ISUP Interworking)

This feature package provides compliance to Bellcore TR444, which allows ISDN to extend beyond a single node for network-wide service by mapping ISDN Q.931 loop signaling onto ISDN user part (ISUP) signaling.

NTX767AA (TR448 ISDN Digit Analysis Compliance - End Office)

This feature package provides an increased level of compliance to Bellcore TR448 for local offices. It allows an operating company to route calls over selected trunks, depending on their bearer capabilities.

NTX768AA (TR448 ISDN Digit Analysis Compliance [toll office])

This feature package provides an increased level of compliance to Bellcore TR448 for toll offices.

NTX769AA (TR444 ISUP Interworking [toll office])

This feature package provides an interworking capability for a toll office to process and route calls by signaling information to the originating party when no ISDN route is available.

NTX796AA (Info+ Enhanced Number Delivery-Basic Rate Interface)

This feature package provides enhanced number delivery for inter-LATA and intra-LATA over BRI. It provides call setup with terminating AMA billing records, calling number, called number, and automatic number identification (ANI) information.

ISDN PRI common software packages

Table 3-3 lists the common software packages available for supporting ISDN PRI capabilities.

Table 3-3xxx
Available ISDN PRI software packages

Feature package number	Feature package title
NTX757AA	TR444 ISUP Interworking
NTX790AC	ISDN Primary Rate Access Base
NTX791AA	ISDN PRI: Network Ring Again
NTX792AA	ISDN PRI: Network Name Display
NTX793AA	PRI Integrated Services Access
NTX794AA	PRI CCS7 Interworking
NTX795AA	Info+ Enhanced Number Delivery-Primary Rate Interface
NTX797AA	PRI Message Waiting Indication
NTXE64AA	#4ESS AT&T Interworking
NTXJ43AA	#5ESS AT&T Interworking
NTXJ55AA	ISDNAP
NTXK55AA	Emergency Services Over ISDN
NTXN14AA	Trunks as SCAI ACD Agents
NTXN34AA	ISUP/PRI to SMDI Interface
NTXN53AA	Enhanced PRI Maintenance
NTXQ74AA	NSS Customer Group Transport for PRI
NTXR49AA	Dialable Wideband Service PRI
NTXV06AA	International ISDN PRI-Base
NTXV07AA	ETSI PRI (T)

Note: Check the appropriate software management system report for availability and to confirm required supporting packages.

NTX757AA (TR444 ISUP Interworking)

This feature package provides compliance to Bellcore TR444, which allows ISDN to extend beyond a single node for network-wide service by mapping ISDN Q.931 loop signaling onto ISUP signaling.

NTX790AC (ISDN Primary Rate Access Base)

This feature package provides the base services for ISDN PRI. It provides interconnectivity for advanced networking capability. Features include functional signaling, integrated services access, maintenance interaction, and number delivery enhancements. Calling Line Identification Display (CLID), an enhancement, provides the capability to suppress or override the presentation of the calling party number on a call-type basis.

NTX791AA (ISDN PRI: Network Ring Again)

This package provides the network ring again feature between the SL-1, SL-100, and PBX, and the DMS-100 Family switches.

NTX792AA (ISDN PRI: Network Name Display)

This package provides the network name display feature between the SL-1, SL-100, and PBX, and the DMS-100 Family switches.

NTX793AA (PRI Integrated Services Access)

This feature package provides dynamic allocation of a trunk type.

NTX794AA (PRI CCS7 Interworking)

This feature package provides interworking capabilities between PRI and Common Channel Signaling 7 (CCS7). The package allows the two-way transfer of messages and signaling information.

NTX795AA (Info+ Enhanced Number Delivery-Primary Rate Interface)

This feature package converts the feature group D and CAMA automatic number identification to ISDN Q.931 signaling for inter-LATA delivery over the PRI.

NTX797AA (PRI Message Waiting Indication)

This feature package allows standardized message activation and deactivation of the message waiting indicator, which is passed over PRI links. The package uses CCS7 to provide a message waiting indication against a station served by another switch using CCS7 and PRI signaling. A message service can use a central location to cover multiple business locations over an entire city or a local access and transport area (LATA).

NTXE64AA (#4ESS AT&T Interworking)

This feature package provides basic call and service connectivity to support AT&T interworking through the #4ESS primary rate interface.

NTXJ43AA (#5ESS AT&T Interworking)

This feature package modifies Sigman to support AT&T interworking through the #5ESS primary rate interface.

NTXJ55AA (ISDNAP)

This feature package, named ISDNAP (ISDN Application Process) provides call processing, static data support, and table control for XMS-based peripheral modules (XPM). It also provides central control for the switch-computer applications interface (SCAI). The initial SCAI application communicates with a host over a PRI D-channel interface. The feature also provides coordinated voice and data capability to the switch to host computer communications that are necessary for operator services.

NTXK55AA (Emergency Services over ISDN)

This feature package creates a new terminating line and customer group options which override the CLID presentation restrictions at the terminating end of the call.

NTXN14AA (Trunks as SCAI ACD Agents)

This feature package provides support and table control to develop foreign exchange station loop start (FXSLS) trunks as switch-to-computer application interface (SCAI) automatic call distribution (ACD) agents.

NTXN34AA (ISUP/PRI to SMDI Interface)

This feature package provides the capability to terminate ISUP and PRI trunks on a simplified message desk interface (SMDI).

NTXN53AA (Enhanced PRI Maintenance)

This feature package provides the ability for the backup D-channel to take over if the primary D-channel fails.

NTXQ74AA (NSS Customer Group Transport for PRI)

This feature package, a network subscriber service (NSS), transports the customer group information as part of the called party number in the Q.931 SETUP message.

NTXR49AA (Dialable Wideband Service PRI)

This feature package provides the capability for dialable wideband service using PRI.

NTXV06AA (International ISDN PRI-Base)

This feature package provides basic CLIP/CLIR functions for international PRI.

NTXV07AA (ETSI PRI [T])

This feature package provides the capability for ETSI (European Telecommunications Standards Institute) interworking with PRI.

Software dependencies

Table 3-4 lists the common software packages required to support the base capabilities of ISDN.

Table 3-4xxx
ISDN software dependencies

Feature package number	Feature package title
NTEX143	Extended Superframe
NTX000AA	Bilge
NTX001AA	Common Basic
NTX100AA	Integrated Business Networks-Basic (IBN)
NTX106AA	IBN-Proprietary Business Set
NTX108AA	IBN-Display Features
NTX142AA	DS-1 64 Kbps Clear
NTX244AB	Enhanced Sequential Trunk Hunting
NTX270AA	New Peripheral Maintenance Package
NTX901AA	Local Features I

Note: The package NTX750AB is required when the XPM configuration consists of an MP, an SP, and associated memory cards. The package NTX750AC is required when the XPM PLUS configuration consists of a UP.

NTX000AA (Bilge)

Bilge is the basic startup software that is required by a DMS-100 Family switch.

NTX001AA (Common Basic)

Common Basic is the basic operating software required by a DMS-100 Family switch.

NTX100AA (Integrated Business Networks-Basic [IBN])

This feature package implements a variety of business network features including Call Waiting, Call Forwarding, and Call Pickup.

NTX106AA (IBN-Proprietary Business Set)

This feature package provides enhanced business set features and functions for integrated business networks (IBN).

NTX108AA (IBN-Display Features)

This feature package provides display features for integrated business networks.

NTX142AA (DS-1 64 Kbps Clear)

This feature package provides support for clear 64-kbit/s signaling on DS-1 carriers.

NTX244AB (Enhanced Sequential Trunk Hunting)

This feature package provides guard timing for trunks that use the sequential trunk selection and circular trunk selection methods. Trunk guard timing prevents two-way or outgoing trunk members from being prematurely seized after they are disconnected.

NTX270AA (New Peripheral Maintenance Package)

This feature package provides enhanced software capabilities for peripheral module maintenance functions.

NTX901AA (Local Feature I)

This feature package provides disconnect timing for residential enhanced services (RES) lines that do not have flash features. It also provides an option to force ringing voltage to the RING side of the line only, increase the number of line concentrating devices in SuperNode offices, and minimize line card code resource problems with superset loads.

DMS packet handler software

DMS packet handler requires the common software packages listed in table 3-4 and the ISDN Basic Access feature package (NTX750) described in table 3-1 to operate. Table 3-5 lists the software packages required to support DMS PH.

Table 3-5xxx
DMS packet handler software

Feature package number	Feature package title
NTXD44AA/AB	LPP on DMS SuperNode SSP
NTXD87AA	LIS Support Over SR512 Interface
NTXF93AA	ISDN Provisioning
NTXH77AA	Channelized Access on LPP/LIS
NTXP47AA/AB	DMS Packet Handler Base
NTXP75AA	DMS Packet Handler SERVORD

-continued-

Table 3-5xxx
DMS packet handler software (continued)

Feature package number	Feature package title
NTX042AA	Local Automatic Message Accounting (LAMA) Format
NTX159AA	Bellcore LAMA Format
NTX941AA	CM Common
NTX942AB	DMS SuperNode System Load Module (SLM)

End

NTXD44AA/AB (LPP on DMS SuperNode SSP)

This feature package provides the platform for LPP-base applications, including DMS PH. This master package contains the following packages:

- NTXF71AB-SuperNode Enhanced Messaging
- NTXF20AA-Local Message Switch on LPP
- NTXN18AA-F-Bus Link Interface Unit Base

NTXD87AA (LIS Support Over SR512 Interface)

This feature package provides the support for a single-shelf LPP configuration on a DMS SuperNode switch. This master package contains the following packages:

- NTXF71AB-SuperNode Enhanced Messaging
- NTXN18AA-F-Bus Link Interface Unit Base
- NTXN83AA-LIS Common-LMS Functionality on MS
- NTXQ51AA-Support for LIS Resident LIS Controller
- NTX945AA-MS Base Link Maintenance

NTXF93AA (ISDN Provisioning)

This feature package provides integrated service provisioning for ISDN circuit- and packet-switched devices. Additions, deletions, and changes can be performed through SERVORD for B- and D-channel packet devices and for B-channel circuit-switched voice and data terminals.

NTXH77AA (Channelized Access on LPP/LIS)

This feature package provides the maintenance system for the network interface unit (NIU) in a SuperNode peripheral module (PM) and diagnostics to isolate hardware faults.

NTXP47AA/AB (DMS Packet Handler Base)

This feature package provides the DMS packet handler (DMS PH) application on the link peripheral processor (LPP).

NTXP75AA (DMS Packet Handler SERVORD)

This feature package allows service provisioning for ISDN packet terminals for the DMS packet handler (DMS PH) through the use of service order system (SERVORD) commands.

NTX042AA (Local Automatic Message Accounting [LAMA] Format)

This feature package provides billing capabilities for local automatic message accounting.

NTX159AA (Bellcore LAMA Format)

This feature package formats automatic message accounting data to the Bellcore local automatic message accounting (LAMA) format.

NTX941AA (CM Common)

Computing Module Common provides the basic operating software required by the DMS SuperNode CM.

NTX942AB (DMS SuperNode System Load Module [SLM])

System Load Module software package provides the operating software required by the SLM.

Additional software

Table 3-6 lists the software packages available to support additional ISDN capabilities.

Table 3-6xxx
Additional ISDN software

Feature package number	Feature package title
SL100:	
NTXP83AA	ISUP Wideband Services
NTXP84AA	No. 64 Wideband (flexible bandwidth)
NTXP85AA	ISUP Broadcast Fan Out
NTXQ60AA	SL-100 ISDN Cabinet Circuit Locator

-continued-

Table 3-6xxx
Additional ISDN software (continued)

Feature package number	Feature package title
ECM:	
NTXJ59AB	CompuCALL Base Utilities
NTXJ60AB	ISI Coordinated Voice and Data
NTXJ62AA	Third Party Call Control
NTXJ63AA	Voice Processing Integration for DMS ISI
NTXJ65AA	CompuCALL X.25 Transport
ISDN CLASS:	
NTX761AA	CLASS on ISDN

End

SL-100

NTXP83AA (ISUP Wideband Services)

This feature package provides trunk selection schemes to allow rapid setup of wideband calls.

NTXP84AA (No. 64 Wideband [flexible bandwidth])

This feature package provides the option to select a group of features that implements wideband (WB) calls on the SL-100.

NTXP85AA (ISUP Broadcast Fan Out)

This feature package allows remote outgoing trunk circuits to progressively fan out to multiple remote destinations served by the ISUP.

NTXQ60AA (SL-100 ISDN Cabinet Circuit Locator)

This feature package provides the capability to expand the data store memory.

ECM

NTXJ59AB (CompuCALL Base Utilities)

This feature package provides a common data structure and datafill for all SCAI applications.

NTXJ60AB (ISI Coordinated Voice and Data)

This feature package creates intelligent services interface (ISI) links. An ISI link is a data link between a DMS switch and a host computer that is established over an ISDN BRI D-channel.

NTXJ62AA (Third Party Call Control)

This feature package uses the ISI to allow external host computers to set up outbound automatic call distribution (ACD) calls for specific agent positions in extended call management.

NTXJ63AA (Voice Processing Integration for DMS ISI)

This feature package uses the SCAI to allow external host computers to request and receive ACD resource information for a specific ACD group.

NTXJ65AA (CompuCALL X.25 Transport)

This feature package allows a DMS-100 central office switch with SCAI-based applications to communicate and interact with a subscriber's computer over an X.25 multiprotocol controller card SCAI link.

ISDN CLASS

NTX761AA (CLASS on ISDN)

This feature package allows the COT and SLE features SCA, SCF, and SCRJ to be valid options for ISDN line class codes. It provides these CLASS features to users on ISDN as the features exist and operate on RES, IBN, and MBS sets, and also provides these features to subscribers on an EKTS.

Custom Local Area Signaling Services (CLASS) features

Custom Local Area Signaling Services (CLASS)-also known as Call Management Services (CMS)-are driven by verbal announcements rather than the beeps and tones associated with business features. The announcements prompt users through procedures. Each feature is packaged separately to allow each operating company to customize the package that is offered to subscribers.

Table 3-7 lists the CLASS group of features available on ISDN.

Table 3-7xxx
ISDN CLASS group of features

Feature package number	Feature package title
NTXA02AA	CLASS Customer-Originated Trace
NTXA45AA	CLASS Selective Call Acceptance
NTXA95AA	CLASS Selective Call Forwarding
NTXA96AA	CLASS Selective Call Rejection
NTXE56AA	CLASS Screen List Editing

NTXA02AA (CLASS Customer-Originated Trace)

This feature package allows a subscriber to trace the last incoming call. When the feature is activated, the identity of the caller and other information is recorded at the operating company or a law-enforcement agency. The subscriber receives a notification of the success or failure of the trace and is instructed how to contact the agency that has the trace information.

NTXA45AA (CLASS Selective Call Acceptance)

This feature package enables a subscriber to choose the calls received by defining a list of directory numbers allowed to access the subscriber's line.

NTXA95AA (CLASS Selective Call Forwarding)

This feature package enables a subscriber to establish a list of directory numbers to be forwarded to a specific number. When a call-the number of which appears on the selective call forwarding screening list-attempts to terminate on the subscriber's set, it is forwarded to this special number. If the incoming number is not on the screening list, the call is handled as usual.

NTXA96AA (CLASS Selective Call Rejection)

This feature package allows a subscriber to program a list of directory numbers that the subscriber wants rejected as incoming calls. In this way, if a call arrives from a number that the subscriber has chosen to reject, the calling party receives a recorded rejection announcement and the subscriber's set does not ring.

NTXE56AA (CLASS Screen List Editing)

This feature package allows the SLE group of features to function properly and must be present to receive any one of the following features:

- Selective Call Acceptance (NTXA45AA)
- Selective Call Rejection (NTXA96AA)
- Selective Call Forwarding (NTXA95AA)

For additional information on DMS feature packages, see the *DMS-100 Feature Description Manual*, 297-1001-801.

ISDN call routing

This chapter describes the elements and concepts of ISDN signaling protocols.

Signaling protocols on page 4-2 describes the ISDN signaling protocols.

Call routing for basic rate interface on page 4-3 describes how calls are routed for basic rate interface (BRI) through the enhanced ISDN line concentrating module (LCME) and the ISDN line group controller (LGC) or ISDN line trunk controller (LTC).

Call routing for DMS packet handler on page 4-9 describes how calls are routed through the DMS packet handler (PH) using Bb and Bd channels.

Call routing for primary rate interface on page 4-12 describes how calls are routed for primary rate interface (PRI) through the ISDN digital trunk controller (DTCI).

Signaling protocols

ISDN supports two types of signaling protocols: basic rate interface (BRI) and primary rate interface (PRI).

Figure 4-1 shows ISDN basic and primary rate interfaces using the ISDN line group controller (LGC) and line trunk controller (LTC) configuration.

Figure 4-1xxx
ISDN basic and primary rate interface configurations

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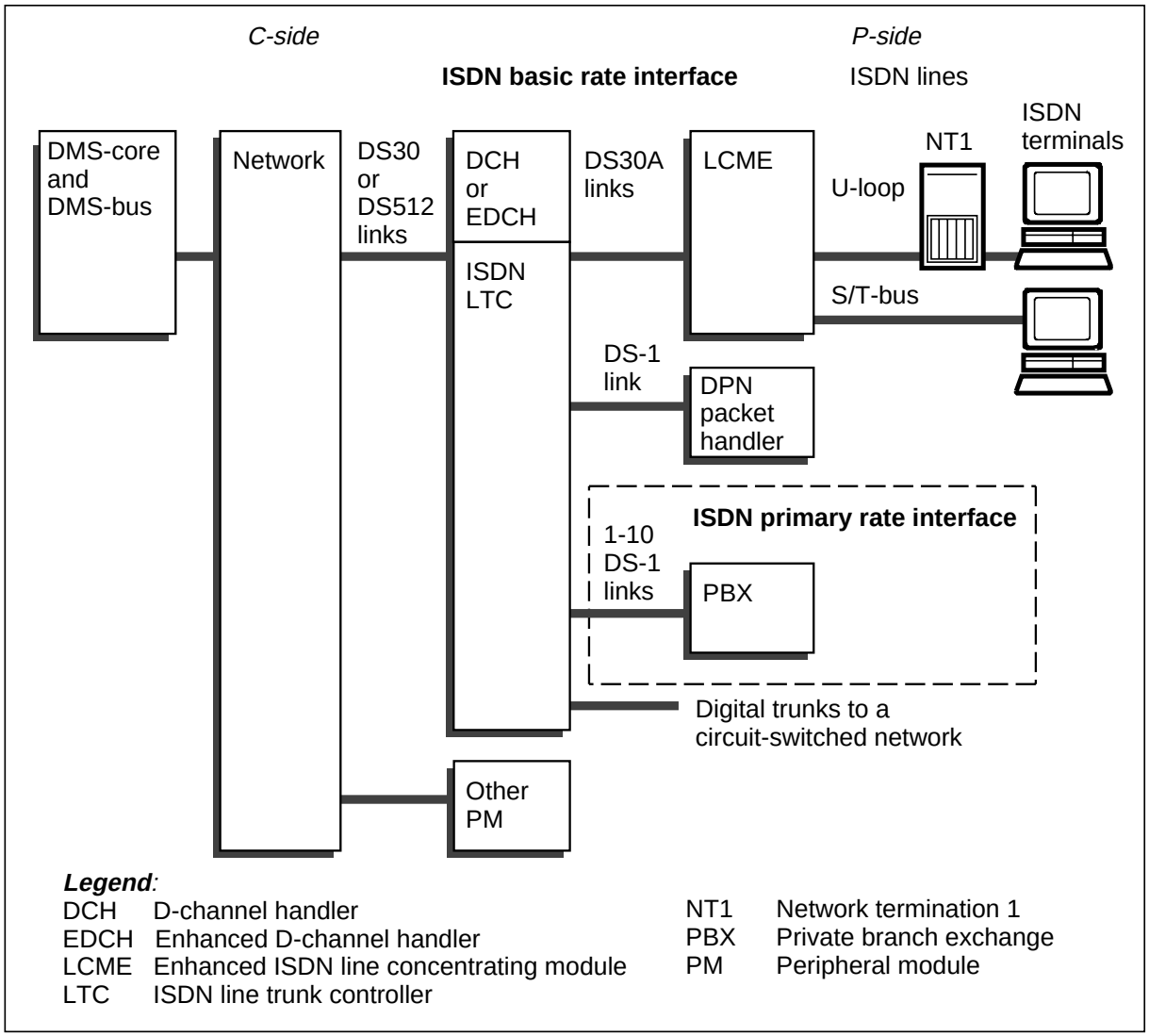


Call routing for basic rate interface

Table 4-1 is a summary of BRI call routing for different types of calls.

Table 4-1xxx
BRI call routing summary

Call type	Originating terminal	Originating network	Destination terminal	Destination network
Circuit-switched voice	B-channel voice terminal	ISDN	B-channel voice terminal	ISDN
Circuit-switched voice	B-channel voice terminal	ISDN	Non-ISDN voice terminal	POTS
Circuit-switched voice	Non-ISDN voice terminal	POTS	B-channel voice terminal	ISDN
Circuit-switched data	B-channel data terminal	ISDN	B-channel data terminal	ISDN
Circuit-switched data	B-channel data terminal	ISDN	Non-ISDN data terminal	PSDS (public switched data service)
Circuit-switched data	Non-ISDN data terminal	PSDS	B-channel data terminal	ISDN
Packet-switched data	B- or D-channel packet-switching terminal	ISDN	B- or D-channel packet-switching terminal	ISDN
Packet-switched data	B- or D-channel packet-switching terminal	ISDN	Non-ISDN packet-switching terminal	PPSN (public packet-switched network)
Packet-switched data	Non-ISDN packet-switching terminal	PPSN	B- or D-channel packet-switching terminal	ISDN

Call routing through the enhanced ISDN line concentrating module

The enhanced ISDN line concentrating module (LCME) routes B-, D-, C- and M-channel data.

The LCME connects the B-channel on each customer line to a channel on the DS30A link, which, in turn, connects to the ISDN LGC or LTC. Connections for circuit-switched voice and data on the B-channel are set up and taken down dynamically for each call. Connections for high-speed B-packet data are dedicated connections, which are datafilled at subscription time.

The LCME maintains dedicated connections between the D-channel on each customer line, and a channel on the DS30A link to the LGC or LTC. These connections carry call control messaging for ISDN calls and low-speed packet data.

The C-channel carries maintenance and diagnostic data that allows the LCMI to check the status of the customer line and the NT1. The M-channel carries maintenance and diagnostic data that allows the LCME to check the status of the customer line and the NT1.

Call routing through line group and line trunk controllers

Call routing is identical for both the LGC and the LTC. This section refers to both the ISDN LGC and ISDN LTC as the LGC. Figure 4-2, with an XPM PLUS configuration, shows the BRI data flow through an ISDN LGC equipped with the enhanced ISDN signaling preprocessor (EISP) and unified processor (UP). Figure 4-3, with an XPM configuration, shows the BRI data flow through an ISDN LGC equipped with the ISDN signaling preprocessor (ISP), master processor (MP), and signaling processor (SP) cards.

The LGC provides paths for the following:

- B-channel circuit-switched voice and data
- dedicated B-channel packet data
- D-channel packet data
- D-channel call control messages
- LCME-to-NT1 control messages

B-channel circuit-switched voice and data is carried on DS30A links from the LCME. The links terminate on the DS30A interface cards in the LGC. The voice and data is then carried on DS30 or DS512 channels to the network module, which connects to the far-end subscriber.

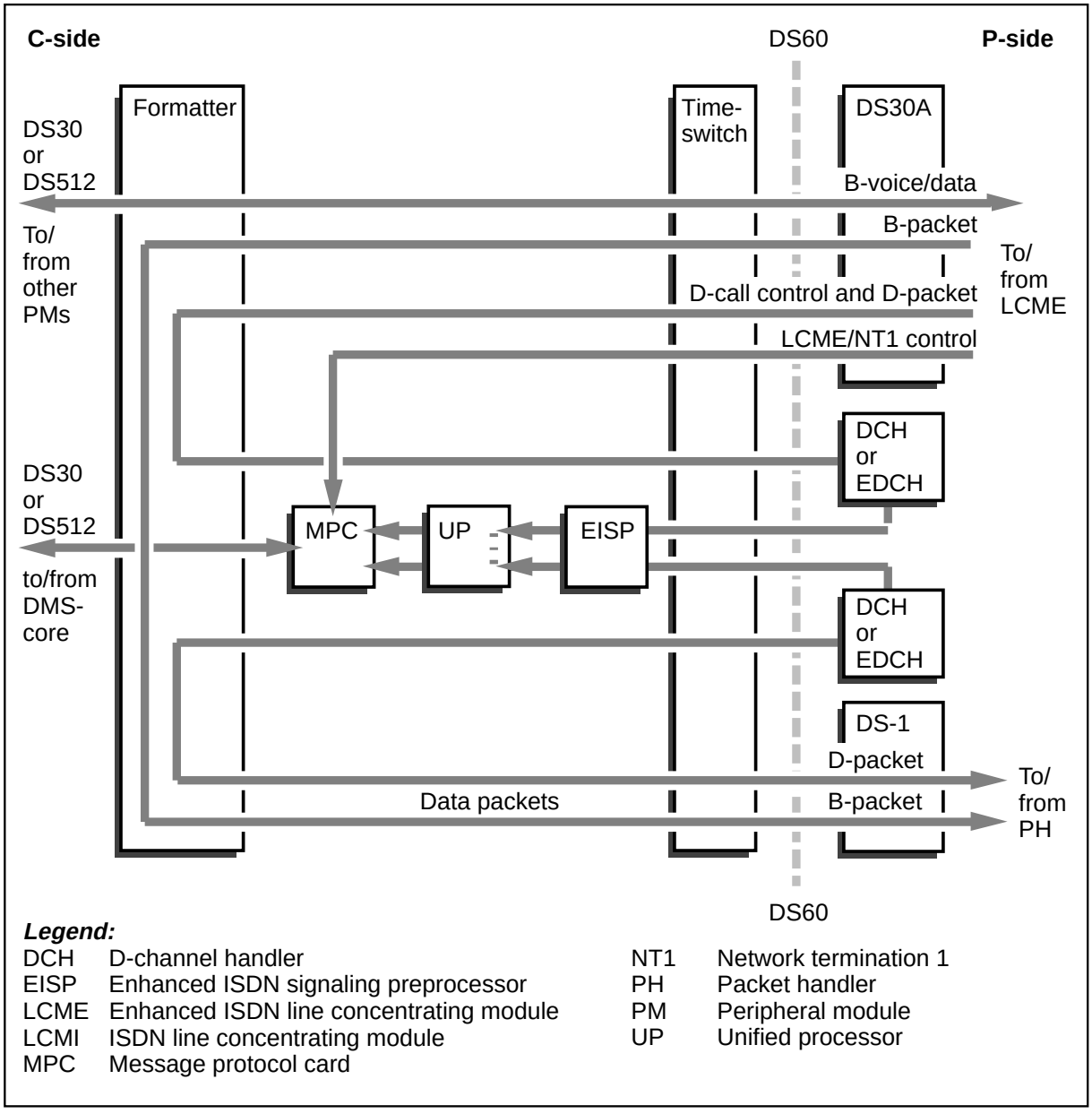
B-channel packet data is carried on dedicated channels and permanent connections through the LCME and LGC. B-channels destined for the packet handler are carried on a dedicated DS30A channel from the LCME. They are then transported through the time switch, which loops back through DS60 links to the DS-1 interface to the DPN packet handler, and the DS30 or DS512 interface to the DMS packet handler.

D-channel packet data is time division multiplexed (TDM) at the ratio of 4:1, and is carried through the LCM or LCME onto the DS30A links. These links terminate on the DS30A interface cards in the LGC, and are carried to the time switch through the DS60 links. The D-channels are then looped back at the formatter card, then to the time switch, and on to other DS60 links, and the D-channel handlers (DCH and EDCH) that occupy the DS-1 card slots on the LGC.

LCME-to-NT1 control messages are sent by the DMS-core to the LGC on DS30 or DS512 links, and through connections in the LGC to the LCME on DS30A links.

Figure 4-2xxx
Basic rate interface data flow through the ISDN LGC with an XPM PLUS configuration

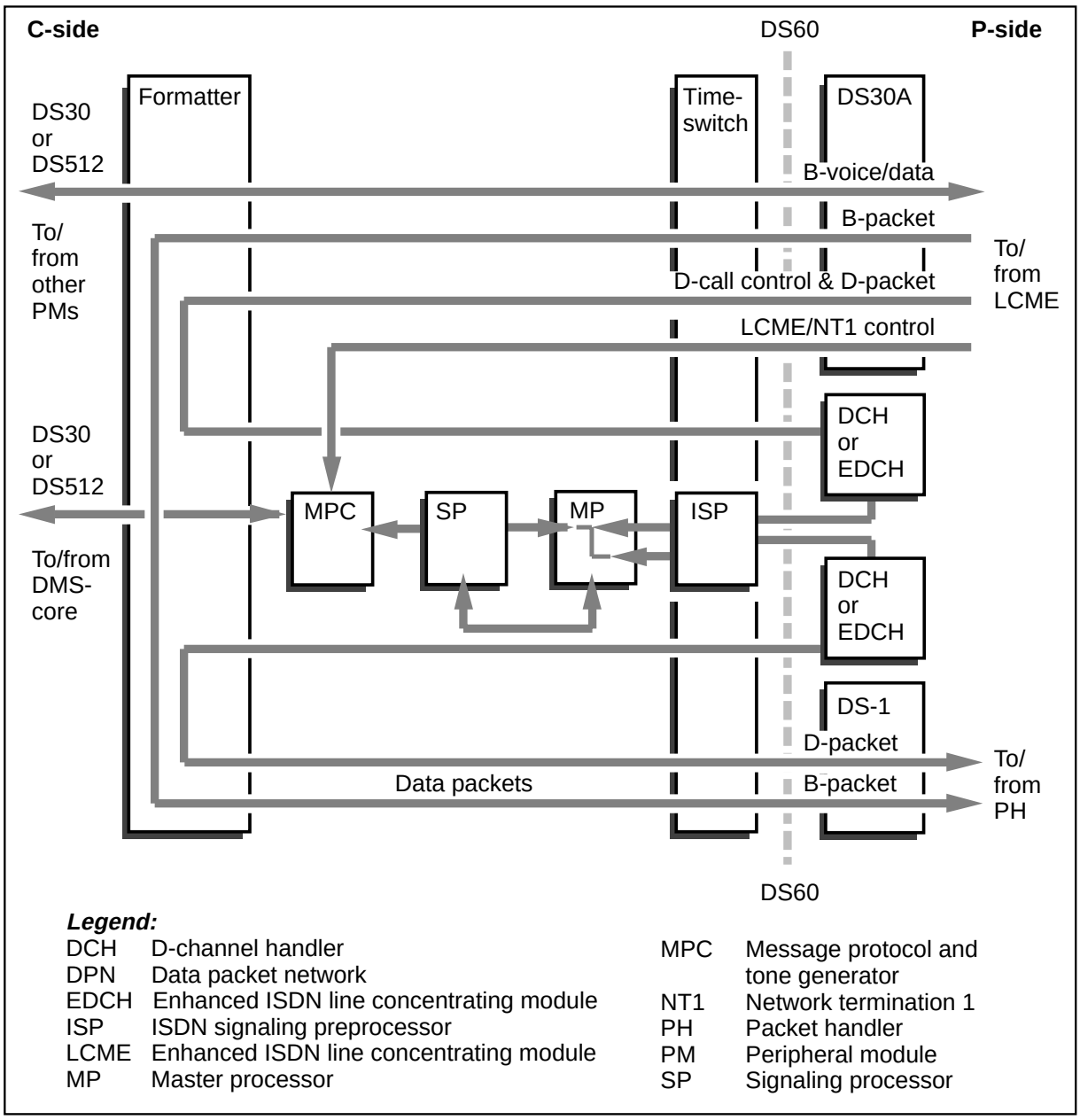
FW-30334



Legend:

DCH	D-channel handler	NT1	Network termination 1
EISP	Enhanced ISDN signaling preprocessor	PH	Packet handler
LCME	Enhanced ISDN line concentrating module	PM	Peripheral module
LCMI	ISDN line concentrating module	UP	Unified processor
MPC	Message protocol card		

Figure 4-3
Basic rate interface data flow through the ISDN LGC with an XPM configuration



Establishing physical and logical links

The LGC establishes and maintains physical and logical links for call routing, and for maintenance routines that support call routing.

The DCH or EDCH provides Q.921 (LAPD) datalink level processing, sorting out the frame types according to the following service access point identifier (SAPI) values:

- For SAPI 0 (call control) and SAPI 63 (TEI management), the DCH or EDCH acts as the termination point for the logical links.
- SAPI 16 (packet-switching) frames are statistically multiplexed (64:1 maximum) and routed to the DPN packet handler through a dedicated DS-1 card, and to the DMS packet handler through the DS30 or DS512 channels.
- SAPI 17 (user-to-user signaling) frames are handled within the DCH or EDCH itself, which sends the frames back to the originating ISDN loop.

Physical links

The LGC provides connections between a BRI DS30A P-side channel and DS30 or DS512 C-side channel, and between a DS30A P-side channel and DS-1 P-side channel. The P-side interfaces are required to send data to, and receive data from

- an LCME (DS30A links)
- a DPN packet handler (DS-1 links)
- DCHs or EDCHs (DS30A links)

Under the supervision of the DMS-core, the LGC software performs connection management, including internal channel allocation and deallocation, call connection timing, and connection integrity supervision.

Logical links

Transmitting D-call control, D-packet, and B-packet data requires the creation of logical datalinks. These logical datalinks are set up between service access points within the ISDN using SAPI, and between logical terminals using terminal endpoint identifiers (TEI).

The DCH or EDCH checks the frame sequencing and digits built into each call control frame, and requests the ISDN terminal to resend missing or invalid frames. The DCH or EDCH builds frames for the D-call control messages it transmits to an ISDN terminal, and responds to any requests to resend invalid frames. The DCH and EDCH action for D-packet frames is limited to validity checking. If a frame fails the validity check, the frame is discarded.

Special connections

Special connections are permanent 64-kbit/s information paths which are created, modified, and deleted in the peripheral modules, based on commands from the DMS-core. Special connections carry voice and signaling information through a bidirectional C-side-to-P-side link, or a loop-around on the P-side. These connections can also carry four 16-kbit/s TDM D-channels. Special connections can be reserved (both C-side and P-side endpoints identified) or nailed-up (both C-side and P-side endpoints identified and connected). These connections exist for trunks, remotes, messaging, and ISDN applications.

Exchanging and managing Q.931 call control messages

LGC call control software communicates with the functional signaling terminals on the D-channel using call control messages. The structure of a call control message is defined in CCITT recommendation Q.931. D-channel call control messages, which are exchanged between the LGC and the ISDN terminals (through the LCME), conform to the CCITT standard.

The LGC master processor (MP) or unified processor (UP) converts Q.931 call control messages into the format used by the DMS-core, and forwards them to the DMS-core. The MP or UP performs the same function for messages sent from the DMS-core to the terminals. In addition, LGC software

- constructs the frames in which call control messages are sent to the functional signaling terminals
- tracks call states and communicates them to the terminals
- controls the sequence for transmitting messages
- determines when to resend messages

Routing data-packet messages

Using an address based on the DCH or EDCH number, the LGC MP or UP routes data packets from the packet handler to the ISDN terminal, and to the TEI associated with each logical terminal.

Using an address based on the TEI, the LGC MP or UP routes data packets from the ISDN terminal to the packet handler, and to the logical DS30-to-DMS or DS512-to-DMS packet handler link associated with the terminal or to the logical DS-1-to-DPN packet handler link associated with the terminal.

The tables containing address information are downloaded from the DMS-core. The LGC uses them to generate an address for onward routing.

Routing internal control messages

In addition to routing call control messages to and from the DMS-core, the LGC

- sends and receives DMS-core hardware control and diagnostic messages
- sends DMS-core messages to the LCME, and sends LCME messages to the DMS-core
- receives software loads for the LGC and its associated DCHs and EDCHs
- receives and routes software loads for the LCME

Maintenance functions

The LGC performs maintenance on its links and cards.

Link maintenance

The LGC carries out periodic loop-around tests on the DS30A links connected to the LCME. The TDM D-channels from the LCME are assigned to specific channels on a DS30A link. Therefore, if the LGC detects a link failure, all the lines involved go out of service.

The LGC monitors and carries out maintenance tests on the DS-1 links connected to the DPN packet handler. In addition, each DCH or EDCH monitors the integrity of the channel over which it sends and receives data from the packet handler.

LGC card maintenance

The LGC maintains the D-channel handlers and individual cards in the LGC processing complex.

Performance monitoring

The LGC supports 2B1Q layer 1 performance monitoring in the 2B1Q line card by:

- maintaining a performance error count for each line card
- providing alarms when error thresholds are exceeded for each line card
- providing a counter reset for each line card

Call routing for DMS packet handler

Access from customer premises equipment to the DMS packet handler involves both Bb and Bd channels. Figure 4-4 illustrates the path followed from the NT1 to the XLIU when a Bb channel is used. The data is routed through the line card and LCME to the peripheral module, and then through the network to the NIU and XLIU. This path is datafilled in table SPECCONN, which maps each ISDN B-channel from a LEN to an X.25 service group (XSG) channel in the XLIU.

Note: An XSG is similar to an ISDN service group (ISG), in that it enables provisioning and maintenance based on services rather than on hardware. Each XLIU is associated with an XSG, which contains a number of XSG channels. When an ISDN B channel is "nailed-up," or mapped, to an XSG channel, it is designated as SPAPH (semi-permanent access to packet handler).

Figure 4-4xxx
Bb channel data path

FW-30579

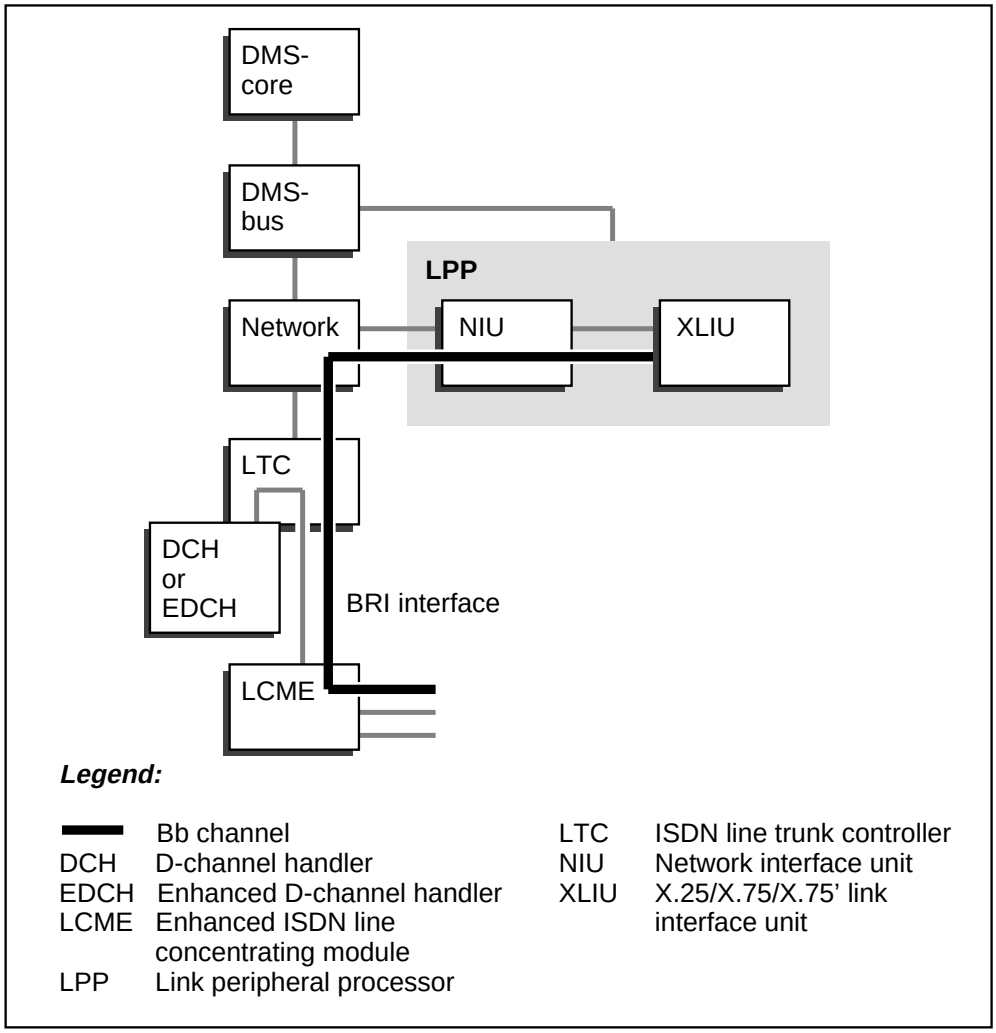
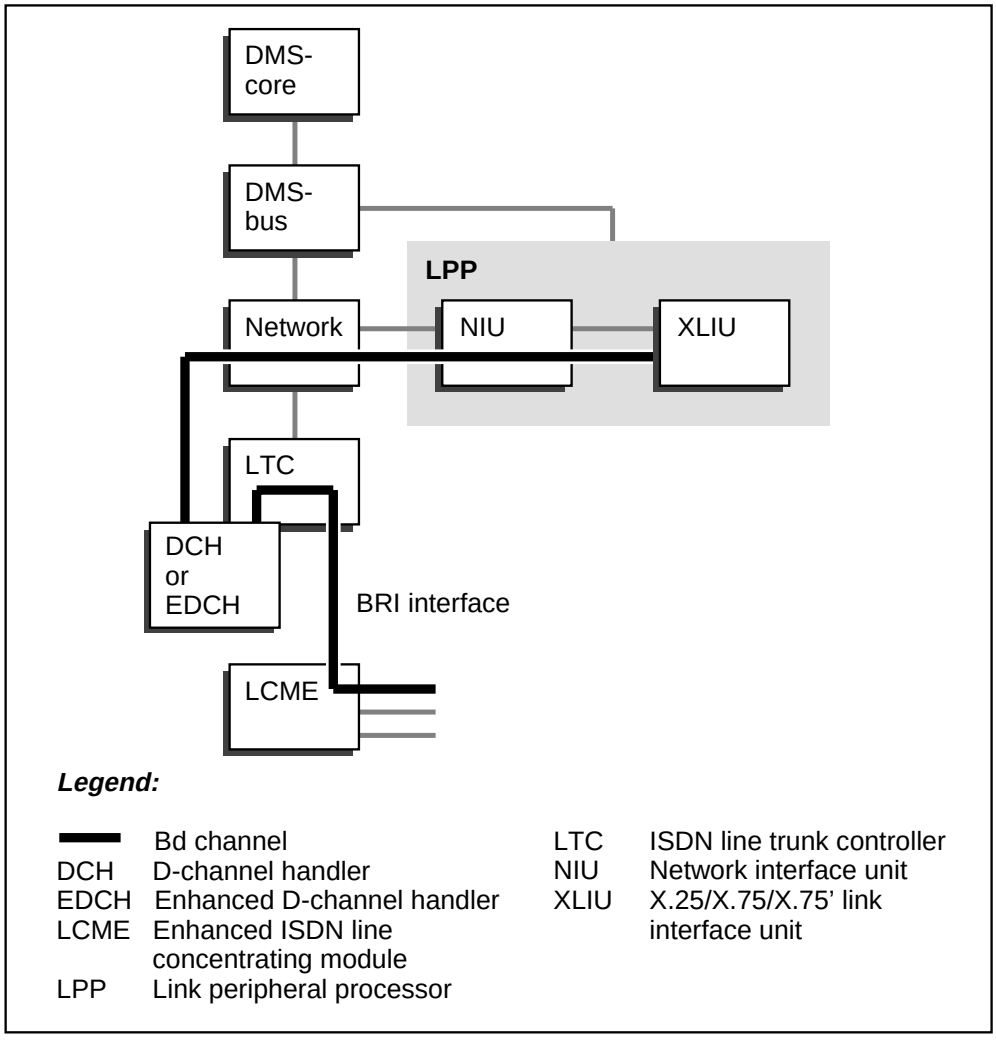


Figure 4-5 illustrates the path followed from the NT1 to the XLIU when a Bd channel is used. Low-speed packet data on the D-channel of the ISDN line is routed to the DCH or EDCH in the peripheral module. From the DCH or EDCH, the data is sent through the network to the NIU and XLIU, using a Bd channel. For Bd data, the path from the terminal equipment to the XLIU is mapped in two stages. The ISDN line D-channel is automatically mapped to a DCH or EDCH channel when the D-channel LTID is mapped to the LEN in table LTMAP. The Bd channel is datafilled in SPECCONN by mapping an ISG Bd channel in the DCH or EDCH to an XSG channel in the XLIU.

Figure 4-5xxx
Bd channel data path

FW-30580



Call routing for primary rate interface

PRI calls are routed through the digital trunk controller (DTCI) or LTC. The DS-1 link is the PRI between the private branch exchange (PBX) and the DTCI or LTC. Figure 4-6 shows the PRI data flow through a DTCI with an XPM PLUS configuration (UP and EISP). Figure 4-7 shows the PRI data flow through a DTCI with an XPM configuration (MP/SP and ISP).

The DTCI and the LTC provide data paths for B-channel circuit-switched voice and data, and D-channel call control messages.

B-channel circuit-switched voice and data is carried on the DS-1 links to the DTCI or LTC. The voice and data is then carried on DS30 or DS512 channels to the network module which connects to the far-end subscriber.

Figure 4-6xxx
Primary rate interface data flow through a DTCI or LTC with an XPM PLUS configuration

FW-30949

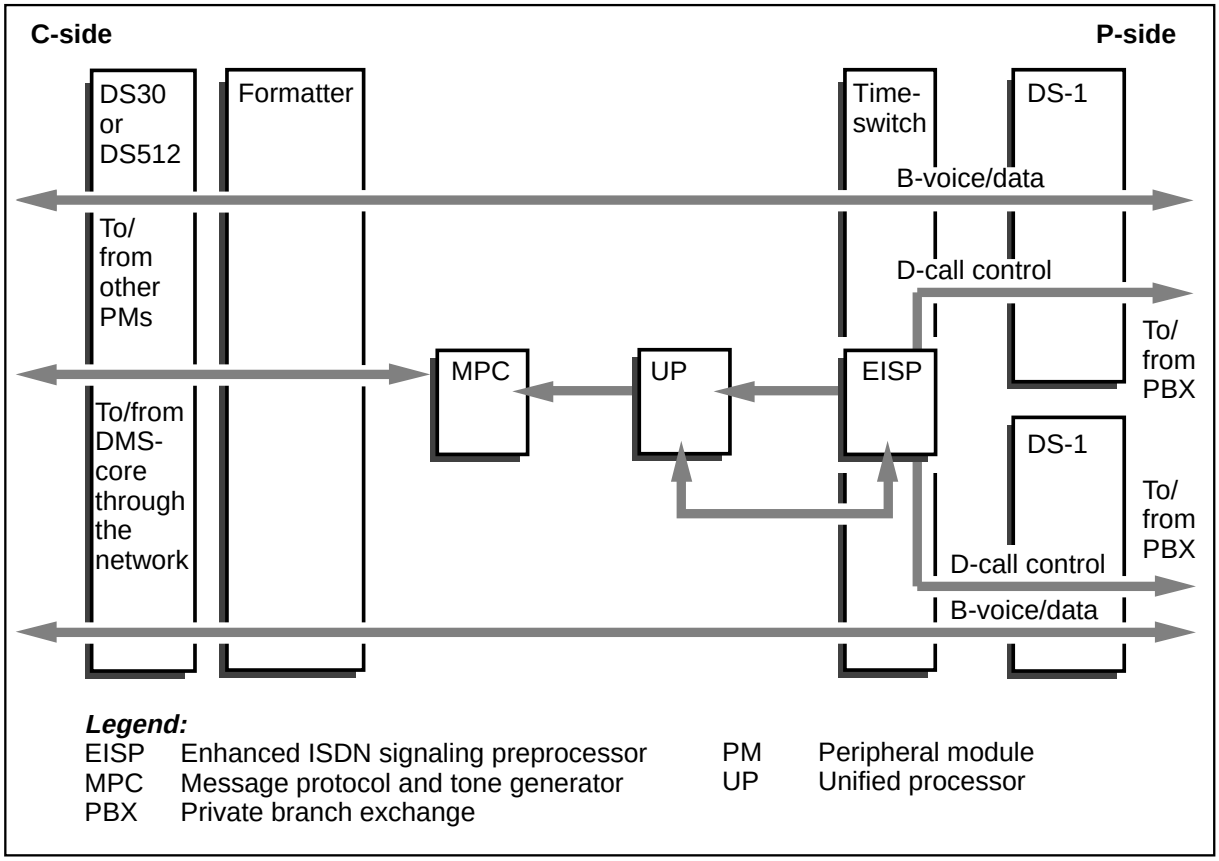
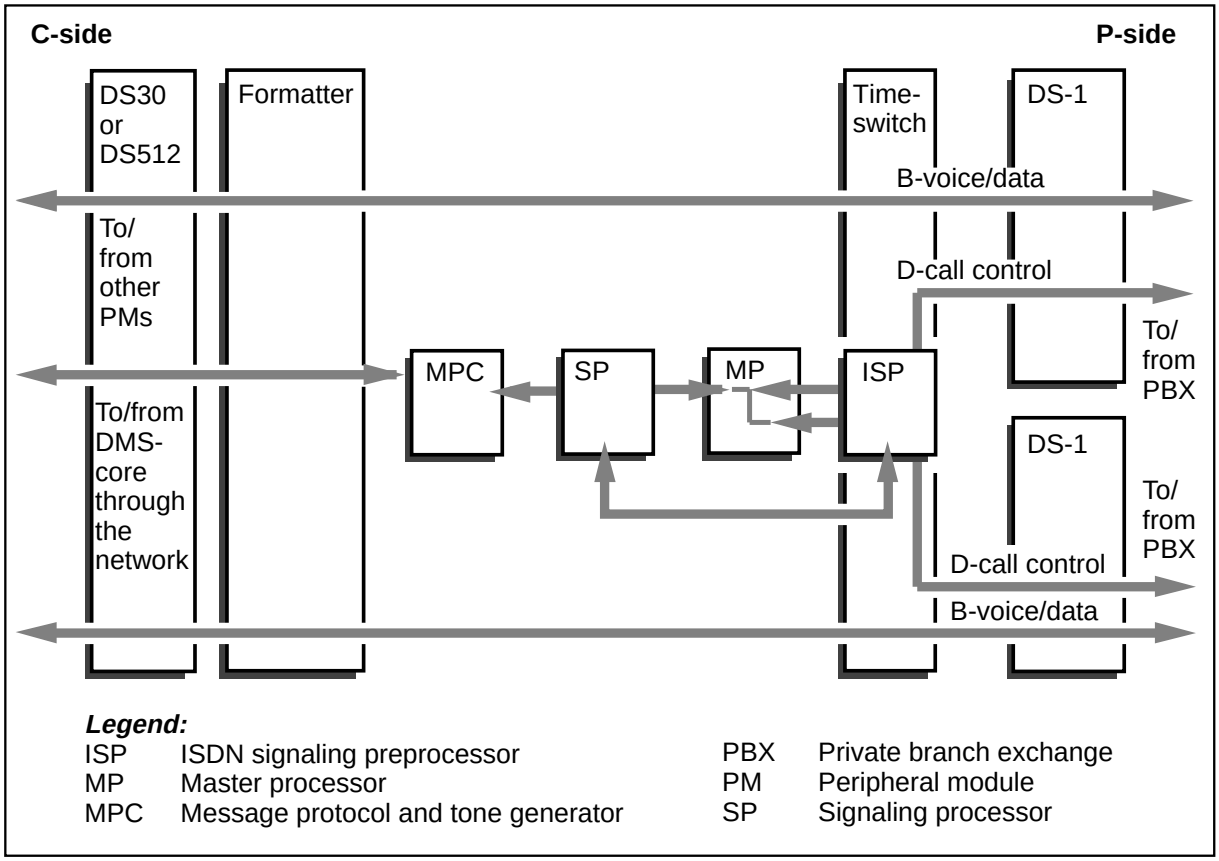


Figure 4-7
Primary rate interface data flow through a DTCI or LTC with an XPM configuration

FW-30961



Establishing physical and logical links

The DTCI or LTC establishes and maintains physical and logical links for call routing, and for maintenance routines that support call routing.

The ISP provides Q.921 (LAPD) datalink level processing. The ISP or EISP receives and processes layer 3 data and routes it to the MP, communicating with the MP through shared memory. Only SAPI 0 (call control) messages are sent over PRI D-channels. The destination for SAPI 0 messages is the ISP or EISP, which eliminates the need to reroute the D-channel data.

Physical links

As figure 4-7 illustrates, the DTCI or LTC provides connections between a DS30 or DS512 C-side channel and DS-1 P-side channel. The P-side interfaces are required to send data to, and receive data from, a digital PBX. The C-side interface is required to send and receive data over the DS30 or DS512 links to and from the network modules. Under the supervision of the DMS-core, the DTCI or LTC software performs connection management, including internal channel allocation and deallocation, call connection timing, and connection integrity supervision.

Logical links

Transmitting D-channel call control data requires the creation of logical datalinks which are set up between service access points within the ISDN using SAPI. SAPI 0 messages are routed through the ISP or EISP.

The D-channel checks the frame sequencing and the check digits built into each call control frame, and requests the PBX to resend missing or invalid frames. The D-channel builds frames for the D-call control messages it transmits to a PBX, and responds to any requests to resend invalid frames.

Exchanging and managing Q.931 call control messages

The DTCI or LTC call control software communicates with PBXs on the D-channel using call control messages. These messages, exchanged between the DTCI or LTC and the PBX, conform to the CCITT standard.

The DTCI or LTC MP or UP converts Q.931 call control messages into the DMS-core format and forwards them to the DMS-core. The MP or UP performs the same function for messages sent from the DMS-core to the PBXs. In addition, the DTCI or LTC software

- constructs frames in which call control messages are sent to the PBXs
- tracks call states and communicates them to the PBXs
- controls the sequence for transmitting messages
- determines when to resend messages

Routing internal control messages

In addition to routing control messages to and from the DMS-core, the DTCI or LTC

- sends and receives hardware control and diagnostic messages to and from the DMS-core
- receives software loads for the DTCI or LTC and its associated ISPs or EISPs and D-channels

The DTCI or LTC accomplishes these functions using a dedicated control channel through the network modules to the DMS-core.

Maintenance functions

The DTCI or LTC carries out maintenance functions on its links and cards.

Link maintenance

The DTCI or LTC monitors and carries out maintenance tests on the DS-1 links to the PBX. In addition, the ISP or EISP monitors the integrity of the channels over which it sends data to, and receives data from, the PBX.

DTCI or LTC card maintenance

The DTCI or LTC maintains the D-channels and individual cards in the DTCI processing complex.

Flow and overload control

A flow and overload control system is provided for ISDN PRI on both the DTCI or LTC. This system ensures that the impact on service from incoming Q.931 messages is regulated and predictable.

The PRI flow and overload control system applies only to Q.931 messages going from the PRI D-channel to the DTCI or LTC. The flow and overload control does not apply to messages generated by the DMS-core or by the internal operation of the ISP or EISP card.

The PRI overload control system provides a 99.9% completion rate at the rated capacity and reduces the overload impact on the peripheral module.

A DTCI or LTC is overloaded when:

- the DTCI or LTC is flooded with call processing messages from the DMS-core
- the call rate has exceeded capacity
- the DTCI or LTC is flooded with call originations or messages from the far-end office
- a network plane is lost due to a failure recovery

Overload control system description

The overload control system prevents a shortage of resources and degradation in service. The PRI overload control system in the DTCI or LTC consists of overload protection and overload indicators.

Overload protection

Overload protection controls the flow of messages for call processing in the DTCI or LTC. This function prioritizes the messages for call processing.

The call priorities for the DTCI or LTC, in descending order of importance, are

1 calls in progress and trunk terminations

2 line terminations

3 ELN terminals

4 trunk and line originations

Overload indicators

Three mechanisms that indicate overload conditions are

- peripheral module state change on the MAP
- logs
- operational measurements (OM)

Finding ISDN information

This chapter lists the documents that contain information related to DMS-100 ISDN. Abstracts for all documents are provided in the sections "Documentation key" and "Documentation index."

DMS-100 ISDN equipment

Table 5-1 lists the documents that make up the DMS-100 ISDN documentation package.

Table 5-1xxx
DMS-100 ISDN equipment

Document	Title
297-2401-010	*Integrated Services Digital Network Product Guide*
297-2401-155	*Integrated Services Digital Network Basic Rate Interface Planning and Engineering Guide*
297-2401-165	*Integrated Services Digital Network Primary Rate Interface Planning and Engineering Guide*
297-2401-310	*Integrated Services Digital Network Service Orders for ISDN Terminals Reference Manual*
297-2401-320	*Integrated Services Digital Network Administration Guide*
297-2401-350	*Integrated Services Digital Network Basic Rate Interface Translations Guide*
297-2401-351	*National ISDN-1 Feature Provisioning Guide*
297-2401-360	*Integrated Services Digital Network Primary Rate Interface Translations Guide*
297-2401-501	*Integrated Services Digital Network Basic Rate Interface Maintenance Guide*
297-2401-502	*Integrated Services Digital Network Primary Rate Interface Maintenance Guide*
297-2401-544	*Integrated Services Digital Network Basic Rate Interface Trouble Locating and Clearing Procedures*
297-2401-554	*Integrated Services Digital Network Primary Rate Interface Trouble Locating and Clearing Procedures*
297-2711-010	*Remote Switching Center Product Guide*
297-2711-155	*Remote Switching Center Planning and Engineering Guide*
297-2711-320	*Remote Switching Center Administration Guide*
297-2711-350	*Remote Switching Center Translations Guide*
297-2711-520	*Remote Switching Center Maintenance Guide*
ISBX40	*Installation Drawing*

DMS-100 Family equipment (ISDN-related)

Table 5-2 lists the documents that contain information about DMS-100 Family equipment used in DMS-100 ISDN.

Table 5-2xxx
DMS-100 Family equipment

Document	Title
297-1001-001	*DMS-100 Family Guide to Northern Telecom Publications*
297-1001-330	*Switch Performance Monitoring System Application Guide*
297-1001-451	*Customer Data Schema*
297-1001-454	*Customer Data Schema Input Forms*
297-1001-455	*Office Parameters Reference Manual*
297-1001-456	*Software Package to Data Cross-Reference*
297-1001-582	*Lines, Trunks, and Peripherals Peripheral Modules Alarm and Performance Monitoring Procedures*
297-1001-584	*Lines, Trunks, and Peripherals Lines Alarm and Performance Monitoring Procedures*
297-1001-586	*Lines, Trunks, and Peripherals Trouble Locating and Clearing Procedures*
297-1001-589	*Lines, Trunks, and Peripherals Card Replacement Procedures*
297-1001-592	*Peripheral Modules Maintenance Guide*
297-1001-595	*Trunks Maintenance Manual*
297-1001-801	*Feature Description Manual*
297-1001-805	*Hardware Description Manual Reference Manual*
297-1001-814	*Operational Measurements Reference Manual*
297-1001-820	*Nonmenu Commands Reference Manual*
297-1001-821	*Menu Commands Reference Manual*
297-1001-840	*Log Report Reference Manual*
297-2001-351	*Meridian Digital Centrex (MDC) Translations Guide*
297-5001-010	*DMS SuperNode Product Guide*
297-5301-010	*DMS SuperNode SE Product Guide*
GS0X28	*Frame Supervisory Panel*

-continued-

Table 5-2xxx
DMS-100 Family equipment (continued)

Document	Title
GS2X70	*Power Converter*
GS6X50	*DS-1 Interface Card*
GSBX25	*U-Interface ISDN Line Card*
GSBX62	*Integrated Services Digital Network Line Drawer*
TAM002	*Translation Routing and Verification (TRAVER) User Guide*
Not numbered	*SCANLOG User Manual*

End

Dialable wideband service

Table 5-4 lists the dialable wideband service (DWS) documents that contain information relating to DMS-100 ISDN.

Table 5-3xxx
Dialable wideband service

Document	Title
297-2461-010	*Dialable Wideband Service Product Guide*
297-2461-021	*Dialable Wideband Service Services Guide*

DPN Family equipment

Table 5-4 lists the documents that contain information on the data packet network (DPN) equipment used in DMS-100 ISDN. Refer to *NTP Index for Documentation*, 241-0001-003, for the latest revision codes for these documents.

Table 5-4xxx
DPN Family equipment

Document	Title
241-0001-001	*Documentation Guide*
241-0001-002	*Glossary*
241-0001-003	*Northern Telecom Publication Reference Guide*

-continued-

Table 5-4xxx
DPN Family equipment (continued)

Document	Title
241-0001-005	*Table of Contents for NTP Set*
241-1001-100	*Network Description*
241-1001-109	*AM and RM Provisioning User Guide*
241-1001-120	*Frame Relay Service User Guide and Specification*
241-1001-125	*SNA Services Provisioning User Guide*
241-1001-150	*Equipment Identification and Ordering Information*
241-1001-153	*DPN System Engineering Guidelines*
241-1001-156	*Access/Resource Module Engineering*
241-1001-170	*Q.931 and Demand-Established B-Channel User Guide*
241-1001-180	*Facility Requirements*
241-1001-181	*DPN-100 X.75 Service Specification*
241-1001-183	*Addressing Plan*
241-1001-184	*LAPB/X.25 Specification*
241-1001-194	*LAPD/X.25 Specification*
241-1001-205	*DPN-100 Installation and Initial Tests*
241-1001-207	*X.32 Specification*
241-1001-300	*DPN Switch Operating Procedures*
241-1001-303	*Access and Resource Module Operator Commands and Responses*
241-1001-314	*X.32 Service User Guide*
241-1001-501	*DPN Trace User Guide*
241-1001-506	*Alarm Console Indications*
241-2001-311	*NM NAS Data Entry Reference Guide*
241-2001-320	*Introduction to AM and RM NAS Service Provisioning Operating Procedures*
241-2001-321	*AM and RM NAS Data Entry Reference Guide*
241-2001-324	*AM and RM NAS Component Reporting Reference Guide*
241-2001-350	*NCS Operations and Maintenance*

End

Meridian 1 (SL-1 architecture) PBX equipment

Table 5-5 lists the Meridian 1 (SL-1) private branch exchange documents that contain information on DMS-100 ISDN.

Table 5-5xxx
Meridian 1 (SL-1 architecture) equipment

Document	Title
553-2201-151 Appendix 1	*X11 Memory Calculations*
553-2201-153	*ST, RT, NT, XT Equipment Identification and Ordering*
553-2201-181	*ST, RT, NT, XT Spares Planning*
553-2811-100	*Digital Trunk Interface/Computer-to-PBX Interface Description*
553-2901-100	*Integrated Services Digital Network Primary Rate Interface Description*
553-2901-200	*Integrated Services Digital Network Primary Rate Interface PRI and DCHI Installation*
553-2901-300	*Integrated Services Digital Network Primary Rate Interface Administration*
553-2901-500	*Integrated Services Digital Network Primary Rate Interface PRI and DCHI Maintenance*
553-3001-000	*Master Index of Publications*
553-3001-400	*X11 Input/Output Guide*

Meridian 1 (SL-100 architecture) PBX equipment

Table 5-6 lists the Meridian 1 (SL-100) private branch exchange documents that contain information on DMS-100 ISDN.

Table 5-6xxx
Meridian 1 (SL-100 architecture) equipment

Document	Title
555-4001-001	*Meridian SL-100 Master Index of Publications*
555-4001-105	*Meridian SL-100 Features and Services Description*
555-4001-106	*Meridian SL-100 ISDN Primary Rate Interface Reference Manual*
555-4011-105	*Meridian SL-100 Defense Switched Network Features and Services Description*

MCDN services

Table 5-7 lists the Meridian customer-defined network (MCDN) services documents that contain information relating to DMS-100 ISDN.

Table 5-7xxx
MCDN services

Document	Title
555-8001-101	*Meridian SL-100 MCDN Basic Call Service Network Guide*
555-8001-102	*Meridian SL-100 MCDN Integrated Services Access Network Guide*
555-8001-103	*Meridian SL-100 MCDN Network Ring Again Network Guide*

Customer premises equipment

Table 5-8 lists the customer premises equipment (CPE) documents that contain information relating to DMS-100 ISDN.

Table 5-8xxx
Customer premises equipment

Document	Title
297-2451-106	*Integrated Services Digital Network AMI Network Termination 1 (NT1) Description*
297-2451-107	*Meridian Digital Centrex Network Termination 1 (NT1) Description*
297-2451-181	*Integrated Services Digital Network AMI S/T Bus and U-Loop Engineering Guide*
297-2451-182	*Meridian Digital Centrex ISDN U-Loop and S/T Bus Engineering Guide*
297-2451-201	*M5317T Digital Telephone Installation, Verification, Operation, and Trouble Locating*
297-2451-206	*AMI Network Termination 1 (NT1) and S/T Bus Installation Guidelines*
297-2451-207	*Meridian Digital Centrex Network Termination 1 (NT1) and S/T Bus Installation Guidelines*
297-2451-951	*Meridian T2317 Telephone Set User Guide*
P0696891	*Installation of the NT1*
P0700421	*Integrated Services Digital Network Meridian Business Set M5317T-User Guide*

-continued-

Table 5-8xxx
Customer premises equipment (continued)

Document	Title
P0700423	*Integrated Services Digital Network Meridian Business Set M5317T-Data Option User Guide*
P0704392	*Centrex ISDN Display Set M5209T Voice Quick Reference Card (S)*
P0704393	*Centrex ISDN Display Set M5209T Data Features Quick Reference Card*
P0710678	*M5000TD-1 Terminal Adapter-User Guide*
P0711710	*M5209T Quick Reference Card (Functional)*
P0713103	*Integrated Services Digital Network Meridian Business Set M5317TD Functional Signaling User Guide*
P0713853	*MDC Stand-alone NT1 NTBX80 Installation Guide*
P0713854	*MDC Stand-alone NT1 Power Supply NTBX81 Installation Guide*
P0713855	*MDC NT1 Rack-Mount Shelf NTBX82 Installation Guide*
P0713856	*MDC NT1 Unit Module NTBX83 Installation Guide*
P0713857	*MDC NT1 Basic Unit NTBX84 Installation Guide*
P0713858	*MDC NT1 Star Unit NTBX84 Installation Guide*
P0713859	*MDC NT1 Power Module NTBX86 Installation Guide*
P0713860	*MDC NT1 Battery Module NTBX86 Installation Guide*
P0714378	*Centrex ISDN Display Set M5209T User Guide*
P0714380	*Centrex ISDN Display Set M5209T Installation Guide*
P0714382	*Centrex ISDN Display Set M5209T Data User Guide*
P0714383	*M5209T PAD Reference Manual*
P0726956	*M5209T Quick Reference Card (MFT)*
P0726957	*M5209T Quick Reference Card (MFT/Functional)*
P0726958	*M5209T Voice User Guide (MFT/Functional)*
P0726959	*M5209T Data User Guide (MFT/Functional)*
P0726960	*M5209T Installation Guide*

End

Documentation key

Table 5-9 lists the ISDN-related Northern Telecom Publications in numerical order.

Table 5-9xxx
Documentation key

Document	Title	Abstract
241-0001-001	Documentation Guide	Defines and discusses the four classes of DPN documentation. These include the Northern Telecom Practices, DPN marketing information, DPN release information, and network-specific documentation. Procedures for updating and ordering documentation are also outlined.
241-0001-002	Glossary	Provides descriptions and definitions of acronyms commonly used in DPN documentation. It also lists the titles of CCITT recommendations quoted throughout the DPN NTP documentation.
241-0001-003	Northern Telecom Publication Reference Guide	Provides an index for documentation supporting the DPN Data Networking System.
241-0001-005	Table of Contents for NTP Set	Identifies the NTPs that make up the complete DPN NTP set.
241-0001-008	Table of Contents for NAS NTP Set	Identifies all NTPs that make up the complete NAS NTP set.
241-1001-100	Network Description	Provides a description of the DPN product line and equipment features, and an introduction to fundamental network engineering and installation requirements.
241-1001-109	AM and RM Provisioning User Guide	Provides reference information and procedures for provisioning service data to add a new module within an existing DPN-100 data communications network. Provides reference information and procedures for provisioning components in a module.
241-1001-120	Frame Relay Service User Guide and Specification	Provides a detailed description and specification of the Frame Relay service with information on engineering, installing, provisioning, and operation.
241-1001-125	SNA Services Provisioning User Guide	Provides information and procedures to provision SNA services.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
241-1001-150	Equipment Identification and Ordering Information	Provides ordering information for the DPN product line.
241-1001-153	DPN System Engineering Guidelines	Provides information for provisioning SNA services.
241-1001-156	Access/Resource Module Engineering	Provides information for engineering DPN Access/Resource Module with subscriber data communications traffic.
241-1001-170	Q.931 and Demand-Established B-Channel User Guide	Provides information for the DPN Q.931 and demand-established B-channel (DEB) service.
241-1001-180	Facility Requirements	Provides information on the facilities required at a DPN site including power and grounding, environmental, and equipment room limitations.
241-1001-181	DPN-100 X.75 Service Specification	Provides information on the DPN-100 X.75 Service on the DPN-100.
241-1001-183	Addressing Plan	Provides information on the DPN implementation of the provisions of the CCITT recommendation X.121 for an international numbering plan, and describes the national addressing techniques used within a DPN network.
241-1001-184	LAPB/X.25 Specification	Provides the functions of the LAPB/X.25 access service.
241-1001-194	LAPD/X.25 Specification	Provides the functions of the LAPD/X.25 access service.
241-1001-205	DPN-100 Installation and Initial Tests	Provides details of the installation and initial test procedures specific to DPN-100.
241-1001-207	X.32 Specification	Provides information on the DPN X.32 Service and its compliance to CCITT recommendation X.32.
241-1001-300	DPN Switch Operating Procedures	Provides comprehensive procedures for operating a DPN switch.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
241-1001-303	Access and Resource Module Operator Commands and Responses	Lists input formats and system responses for the NM operator commands at switch sites.
241-1001-314	X.32 Service User Guide	Provides information on DPN X.32 service, routing impacts, function and service data requirements.
241-1001-501	DPN Trace User Guide	Provides information on DPN Trace. Provides software installation procedures, operating procedures, recommended troubleshooting, possible alarms, and engineering data.
241-1001-506	Alarm Console Indications	Provides interpretation of the alarm conditions associated with various types of system alarms.
241-2001-304	DPN NAS Edition Management User Guide	Provides a description of DPN NAS capabilities for creating and managing multiple views of the data in the database. Specific functions of both AM and network module (NM) are discussed.
241-2001-311	NM NAS Data Entry Reference Guide	Defines the data entry component of the NM NAS and provides a comprehensive user-oriented guide for data entry functions for NM NAS. Describes the NM NAS screens presented to the user through the NAS user interface management system (UIMS), and provides detailed descriptions of all NM NAS parameters.
241-2001-320	Introduction to AM and RM NAS Service Provisioning Operating Procedures	Defines the AM NAS for the DPN network. Provides a benchmark for the host operational stall, detailing the day-to-day AM NAS service provisioning operating procedures.
241-2001-321	AM and RM NAS Data Entry Reference Guide	Contains a command menu which lists all the commands supported by the Data Entry function, and appears after being selected from the AM/RM NAS FUNCTION menu and <PROMPT> hard function key.
241-2001-324	AM and RM NAS Component Reporting Reference Guide	Defines the software catalog component of NAS for DPN.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
241-2001-350	NCS Operations and Maintenance	Provides information on specific NCS applications, and details on the commands and command syntax supported by each application.
297-1001-001	DMS-100 Family Guide to Northern Telecom Publications	Contains an index to the Northern Telecom Publications (NTP) for the DMS-100 Family of products. Publications are listed under four functional areas: planning, installation, administration, and operations and maintenance.
297-1001-330	Switch Performance Monitoring System Application Guide	Describes the BCSMON commands for obtaining a printout of the selected log reports, operational measurements, and indications of system activity used in evaluating overall system performance.
297-1001-451	Customer Data Schema	Gives a general description and use for software tables including syntax and semantics of fields, valid inputs, and examples of data tables.
297-1001-454	Customer Data Schema Input Forms	Contains input forms for customer data schema. The forms are completed by the operating company to structure the data store lookup tables.
297-1001-455	Office Parameters Reference Manual	Describes the office parameter data for all DMS switching units.
297-1001-456	Software Package to Data Cross-Reference	Describes the relationship between software packages and data structures in the DMS.
297-1001-582	Peripheral Modules Alarm and Performance Monitoring Procedures	Contains information for analyzing peripheral module alarms and performance.
297-1001-584	Lines, Trunks, and Peripherals Lines Alarm and Performance Monitoring Procedures	Contains lines alarm clearing procedures. Used by maintenance personnel to clear alarms as they appear at the MAP display.
297-1001-586	Lines, Trunks, and Peripherals Trouble Locating and Clearing Procedures	Contains procedures for correcting trouble related to lines, trunks, PMs, input/output devices, external subsystems, and network devices.
297-1001-589	Lines, Trunks, and Peripherals Card Replacement Procedures	Contains procedures for replacing cards.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
297-1001-592	Peripheral Modules Maintenance Guide	Contains maintenance information about PMs that are located in the host office. Contains sections on single-shelf PMs, dual-shelf PMs, and the LCM. Should be used by experienced maintenance personnel.
297-1001-595	Trunks Maintenance Manual	Describes the operation and functions of the trunks subsystem. Includes commands and displays for the manual and automatic maintenance level commands. To be used by maintenance personnel who have a basic knowledge of the DMS and the trunks subsystem.
297-1001-801	Feature Description Manual	Provides feature information for the DMS-100 switch. Feature information is intended to help operating company personnel to prepare for insertion of a new BCS load, or to understand elements of the software. Operating company personnel involved in planning and engineering or in maintenance activities will find this document useful.
297-1001-805	Hardware Description Manual Reference Manual	Provides descriptions of DMS-100 circuit cards. It contains cards that can be ordered by the customer, as provisionable items (with quantities based on the size of the office, traffic capacity requirements, and feature requirements), or as spare or replacement items. Included are ISDN line cards, and cards required in the peripheral modules which support ISDN.
297-1001-814	Operational Measurements Reference Manual	Includes a description of additions and changes made to the operational measurements system for ISDN, as well as those made to the DMS-100 switch.
297-1001-820	Nonmenu Commands Reference Manual	Describes all nonmenu commands used at a MAP in a Northern Telecom DMS-100 switch.
297-1001-821	Menu Commands Reference Manual	Describes all menu commands used at a MAP in a Northern Telecom DMS-100 switch.
297-1001-840	Log Report Reference Manual	Contains descriptions of log reports for DMS-100 Family equipment including those specific to ISDN.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
297-2001-350	Meridian Digital Centrex (MDC) Translations Guide	Describes the features used in the Meridian Digital Centrex (MDC) environment. This document describes the MDC features, including station, business set, attendant console, system, and ISDN PRI.
297-2401-010	Integrated Services Digital Network Product Guide	Contains an overview of the ISDN equipment and software developed by Northern Telecom. This document describes the Northern Telecom implementation of ISDN, and refers to other documents that contain more information about the topics described.
297-2401-155	Integrated Services Digital Network Basic Rate Interface Planning and Engineering Guide	Contains a description of the ISDN BRI operation, hardware and software requirements, site requirements, and guidelines for provisioning and sparing. It is written for personnel responsible for provisioning, long-range planning, and setting up ISDN BRI.
297-2401-165	Integrated Services Digital Network Primary Rate Interface Planning and Engineering Guide	Contains a description of the ISDN PRI operation, hardware and software requirements, site requirements, and guidelines for provisioning and sparing. It is written for personnel responsible for provisioning, long-range planning, and setting up ISDN PRI.
297-2401-310	Integrated Services Digital Network Service Orders for ISDN Terminals Reference Manual	Describes how to use service orders for creating, modifying, or removing service to ISDN terminals in DMS-100 Family switches, and describes the query commands used to determine the current assignments of software and hardware.
297-2401-350	Integrated Services Digital Network Basic Rate Interface Translations Guide	Describes the translations and datafill used to set up the DMS-100 ISDN BRI capabilities.
297-2401-351	National ISDN-1 Feature Provisioning Guide	Provides tables mapping the Bellcore TR199/TA199 names for NI-1 features to those names used by Northern Telecom.
297-2401-360	Integrated Services Digital Network Primary Rate Interface Translations Guide	Describes datafill for all DMS-100 PRI capabilities.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
297-2401-501	Integrated Services Digital Network Basic Rate Interface Maintenance Guide	Contains the following for ISDN BRI: maintenance overview, preventive maintenance strategies, logs, operational measurements, tree diagram of commands, card requirements, trouble isolation and correction methods, advanced troubleshooting procedures. The procedures are designed for experienced maintenance personnel.
297-2401-502	Integrated Services Digital Network Primary Rate Interface Maintenance Guide	Contains the following for ISDN PRI: maintenance overview, preventive maintenance strategies, logs, operational measurements, tree diagram of commands, card requirements, trouble isolation and correction methods, advanced troubleshooting procedures. The procedures are designed for experienced maintenance personnel.
297-2401-544	Integrated Services Digital Network Basic Rate Interface Trouble Locating and Clearing Procedures	Contains trouble locating and clearing maintenance procedures for BRI services to ISDN. The procedures covered are designed for maintenance personnel in an operating company.
297-2401-554	Integrated Services Digital Network Primary Rate Interface Trouble Locating and Clearing Procedures	This document identifies the trouble locating and clearing maintenance procedures unique to the DMS-100 ISDN PRI.
297-2451-106	Integrated Services Digital Network AMI Network Termination 1 (NT1) Description	Provides an overview of the AMI NT1 and its communication characteristics, electrical specifications for the U-loop, and the S/T bus specifications.
297-2451-107	Meridian Digital Centrex Network Termination 1 (NT1) Description	Provides an overview of the 2B1Q NT1 and its communication characteristics, electrical specifications for the U-loop, and the S/T bus specifications.
297-2451-181	Integrated Services Digital Network AMI S/T Bus and U-Loop Engineering Guide	Contains guidelines for engineering the AMI U-loop and S/T bus.
297-2451-182	Meridian Digital Centrex ISDN U-Loop and S/T Bus Engineering Guide	Contains guidelines for engineering the 2B1Q U-loop and S/T bus.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
297-2451-201	M5317T Digital Telephone Installation, Operation, Verification, and Trouble Locating	Describes the M5317T Meridian ISDN digital telephone. It explains how to install the telephone and perform test and trouble-locating routines on it.
297-2451-206	AMI Network Termination 1 (NT1) and S/T Bus Installation Guidelines	Describes the installation and verification of the AMI NT1.
297-2451-207	Meridian Digital Centrex Network Termination 1 (NT1) and S/T Bus Installation Guidelines	Describes the installation and verification of the 2B1Q NT1, including the stand-alone and modular versions.
297-2451-951	Meridian T2317 Telephone Set User Guide	Describes how to use the T2317 Meridian ISDN telephone set.
297-2461-010	Dialable Wideband Service Product Guide	Provides an overview of DWS. It includes a general description, applications, functional architecture, hardware, and software.
297-2461-021	Dialable Wideband Service Services Guide	Describes planning and engineering, administration, translations, and maintenance for DWS.
297-2711-010	Remote Switching Center Product Guide	Provides an overview of the remote switching center (RSC), a configuration providing switching services at a remote site from the host office. Includes the architecture, components, and applications for both the ISDN RSC and non-ISDN RSC.
297-2711-155	Remote Switching Center Planning and Engineering Guide	Provides planning and engineering information for the ISDN RSC and non-ISDN RSC, including dual-RSC configurations. It contains details on provisioning these configurations, and covers hardware, trunk assignments, DS-1 and DS30 link and port assignments, traffic considerations, and site requirements.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
297-2711-320	Remote Switching Center Administration Guide	Describes the administration tools and procedures for the ISDN RSC and non-ISDN RSC. Included are assessment routines for traffic and hardware use, feature use, level of service, level of billing, and system faults. Operational measurements and log reports applicable to the RSC are also described.
297-2711-350	Remote Switching Center Translations Guide	Describes the tables and procedures to datafill the various ISDN and non-ISDN RSC configurations and features. Support tools and datafill procedures for lines, trunks, and peripheral modules are provided, in addition to those used for ISDN service and bearer capabilities.
297-2711-520	Remote Switching Center Maintenance Guide	Describes the tools and procedures to maintain the RSC and dual-RSC configurations for both ISDN and non-ISDN applications. The document includes information on querying and monitoring the RSC, testing lines, setting up and using maintenance and monitoring tools, controlling the RSC, and troubleshooting.
297-5001-010	DMS SuperNode Product Guide	Provides an overview of DMS SuperNode. Describes the hardware, software, and signaling methods developed for DMS SuperNode. It also refers to other documents that contain information about DMS SuperNode.
297-5301-010	DMS SuperNode SE Product Guide	Provides an overview of the DMS SuperNode SE switch. It describes the functional architecture, hardware and software of the switch. It also refers to documents that contain more information about the DMS SuperNode SE switch.
553-2201-151 Appendix 1	X11 Memory Calculations	Helps the user to calculate core memory requirements.
553-2201-153	ST, RT, NT, XT Equipment Identification and Ordering	Provides information that enables the user to identify and order MSL-1 T-systems equipment.
553-2201-181	ST, RT, NT, XT Spares Planning	Provides information for the user to plan spares requirements for the MSL-1 T-systems.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
553-2811-100	Digital Trunk Interface/Computer-to-PBX Interface Description	Describes the digital trunk and the computer-to-PBX interfaces.
553-2901-100	Integrated Services Digital Network Primary Rate Interface Description	Provides a brief overview of ISDN and PRI. It lists MSL-1 connectivity per release, describes available features, and gives engineering and configuration guidelines.
553-2901-200	Integrated Services Digital Network Primary Rate Interface PRI and DCHI Installation	Provides essential information for installing and removing the PRI and DCHI circuit packs.
553-2901-300	Integrated Services Digital Network Primary Rate Interface Administration	Provides the guidelines for administering far-end connectivity. It gives complete service change and software administration procedures for PRI capability.
553-2901-500	Integrated Services Digital Network Primary Rate Interface PRI and DCHI Maintenance	Provides a PRI operations guide and fault-clearing procedures. It also contains detailed procedures for PRI card, D-channel, and clock controller maintenance.
553-3001-000	Master Index of Publications	Provides a list of Meridian 1 SL-1 PBX documentation, with a synopsis for each document.
553-3001-400	X11 Input/Output Guide	Provides administration and maintenance overlay programs, referred to as loads (LD), prompts and responses (I/O), and messages.
555-4001-001	Meridian SL-100 Master Index of Publications	Lists all documents for the Meridian SL-100 PBX.
555-4001-105	Meridian SL-100 Features and Services Description	Catalogs and describes features and services available on the Meridian SL-100.
555-4001-106	Meridian SL-100 ISDN Primary Rate Interface Reference Manual	Describes the applications provided and engineered for ISDN PRI, including end-to-end service for the user, engineering information for PRI between MSL-100s, provisioning information for DS-1 options on the PRI, and performance analysis of PRI.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
555-4011-105	Meridian SL-100 Defense Switched Network Features and Services Description	Catalogs and describes defense switched network features and services available on the Meridian SL-100.
555-8001-101	Meridian SL-100 MCDN Basic Call Service Network Guide	Provides an overview of the basic call as an ISDN network service, including information and procedures for the configuration, administration, and maintenance of the network links. The network links may include MSL-1 PBX, MSL-100 PBX, DMS-100 switch, and DMS-250 switch.
555-8001-102	Meridian SL-100 MCDN Integrated Services Access Network Guide	Provides information about the ISA feature on PRI, allowing calls of different types to be combined on a single trunk group. It provides the details to provision ISA on the MSL-1 PBX, MSL-100 PBX, DMS-100 switch, and DMS-250 switch.
555-8001-103	Meridian SL-100 MCDN Network Ring Again Network Guide	Provides information about the NRAG feature on PRI. It provides details to provision NRAG on the MSL-1 PBX, MSL-100 PBX, DMS-100 switch, and DMS-250 switch.
GS0X28	Frame Supervisory Panel	Describes the NT0X28 series of frame supervisory panels, including the NT0X28EA version used in ISDN equipment frames.
GS2X70	Power Converter	Describes the NT2X70 series of power converters, including the NT2X70EA version used in ISDN frames. Refer also to 297-1001-805.
GS6X50	DS-1 Interface Card	Describes the NT6X50 series of DS-1 interface cards, including the NT6X50AB version used in the ISDN access controller and ISDN line group controller. Refer also to 297-1001-805.
GSBX25	U-Interface ISDN Line Card	Describes the two-slot U-line card used in the LCMI. Refer also to 297-1001-805.
GSBX62	Integrated Services Digital Network Line Drawer	Describes the line drawer that holds the NTBX25 two-slot line card.
ISBX40	Installation drawing	

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
P0696891	Installation of the NT1	Provides instructions to install the AMI network termination 1 (NT1) on the S/T-bus.
P0700421	Integrated Services Digital Network Meridian Business Set M5317T-User Guide	Describes how to use the M5317T Meridian business set.
P0700423	Integrated Services Digital Network Meridian Business Set M5317T-Data Option User Guide	Describes how to use the M5317T Meridian business set equipped with the data option. This option converts the set from a voice-only telephone to one suitable for voice and data transmission.
P0704392	Centrex ISDN Display Set M5209T Voice Quick Reference Card (S)	Describes the features of the M5209T display set for voice applications using stimulus signaling.
P0704393	Centrex ISDN Display Set M5209T Data Features Quick Reference Card	Describes the features of the M5209T display set equipped for data applications.
P0710678	M5000TD-1 Terminal Adapter-User Guide	Provides instructions on how to use the terminal adapter (TA) to connect a variety of data terminal equipment to an ISDN switch through the S/T-bus.
P0711710	M5209T Quick Reference Card (Functional)	Describes the features of the M5209T display set for voice applications using functional signaling.
P0713103	Integrated Services Digital Network Meridian Business Set M5317TD Functional Signaling User Guide	Provides instructions to use the M5317TD business set.
P0713853	MDC Stand-alone NT1 NTBX80 Installation Guide	Provides instructions to install the stand-alone NT1, with connections to the U-loop, S/T-bus, and power source.
P0713854	MDC Stand-alone NT1 Power Supply NTBX81 Installation Guide	Provides instructions to install the NT1 power supply, with connections to the U-loop, NT1, and ac power source.
P0713855	MDC NT1 Rack-Mount Shelf NTBX82 Installation Guide	Provides installation instructions for the NT1 rack-mount shelf.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
P0713856	MDC NT1 Unit Module NTBX83 Installation Guide	Provides instructions to install the NT1 unit module, with connections to the U-loop and NT1 power module. It also provides instructions for installing the NT1 units (cards) in the module.
P0713857	MDC NT1 Basic Unit NTBX84 Installation Guide	Provides instructions for installing the NT1 basic unit (card) in the NT1 unit module, and setting the configuration jumpers on the card.
P0713858	MDC NT1 Star Unit NTBX84 Installation Guide	Provides instructions for installing the NT1 star unit (card) in the NT1 unit module, and setting the configuration jumpers on the card.
P0713859	MDC NT1 Power Module NTBX86 Installation Guide	Provides instructions for installing the NT1 power module, with connections to the NT1 module, NT1 battery module, and to ac power.
P0713860	MDC NT1 Battery Module NTBX86 Installation Guide	Provides instructions for installing the NT1 power module, with connections to the NT1 power module. It also provides charging and test routines.
P0714378	Centrex ISDN Display Set M5209T User Guide	Describes how to activate and use the features of the M5209T display set.
P0714380	Centrex ISDN Display Set M5209T Installation Guide	Provides installation instructions for the M5209T display set.
P0714382	Centrex ISDN Display Set M5209T Data User Guide	Describes how to activate and use the data features of the M5209T display set.
P0714383	M5209T PAD Reference Manual	Contains information on packet assembler/disassembler (PAD) parameters and profiles, PAD commands, and PAD control procedures for the M5209TDp and M5209TDcp data sets.
P0726956	M5209T Quick Reference Card (MFT)	Describes the voice features of the M5209T set.
P0726957	M5209T Quick Reference Card (MFT/Functional)	Describes the voice and data features of the M5209T set.

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Table 5-9xxx
Documentation key(continued)

Document	Title	Abstract
P0726958	M5209T Voice User Guide (MFT/Functional)	Provides instructions to use the voice features of the M5209T set.
P0726959	M5209T Data User Guide (MFT/Functional)	Provides instructions for operating the data features of the M5209TDp and the M5209TDcp sets.
P0726960	M5209T Installation Guide	Provides instructions for installing, upgrading and programming the M5209T set. Also provides basic troubleshooting during installation.
TAM002	Translation Routing and Verification (TRAVER) User Guide	Describes the TRAVER software used to step through a call slowly and examine the contents of the system data tables as they are accessed at each stage in the call. This procedure verifies translation and routing information stored in the switch.
Not numbered	SCANLOG User Manual	Describes the commands to obtain graphs showing the frequency of selected log reports.

End

Documentation Index

Table 5-10 lists the NTPs relating to ISDN in alphabetical order.

Table 5-10xxx
Documentation index

Title	Document	Abstract
Access and Resource Module Operator Commands and Responses	241-1001-303	Lists input formats and system responses for the NM operator commands at switch sites.
Access/Resource Module Engineering	241-1001-156	Provides information for engineering DPN Access/Resource Module with subscriber data communications traffic.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
Addressing Plan	241-1001-183	Provides information on the DPN implementation of the provisions of the CCITT recommendation X.121 for an international numbering plan, and describes the national addressing techniques used within a DPN network.
Alarm Console Indications	241-1001-506	Provides interpretation of the alarm conditions associated with various types of system alarms.
AM and RM NAS Component Reporting Reference Guide	241-2001-324	Defines the software cataloguer component of NAS for DPN.
AM and RM NAS Data Entry Reference Guide	241-2001-321	Contains a command menu which lists all the commands supported by the Data Entry function. The menu appears after being selected from the AM/RM NAS FUNCTION menu and <PROMPT> hard function key.
AM and RM Provisioning User Guide	241-1001-109	Provides reference information and procedures for provisioning service data to add a new module within an existing DPN-100 data communications network. Provides reference information and procedures for provisioning components in a module.
AMI Network Termination 1 (NT1) and S/T Bus Installation Guidelines	297-2451-206	Describes the installation and verification of the AMI NT1.
Centrex ISDN Display Set M5209T Data Features Quick Reference Card	P0704393	Describes the features of the M5209T display set equipped for data applications.
Centrex ISDN Display Set M5209T Data User Guide	P0714382	Describes how to activate and use the data features of the M5209T display set.
Centrex ISDN Display Set M5209T Installation Guide	P0714380	Provides installation instructions for the M5209T display set.
Centrex ISDN Display Set M5209T User Guide	P0714378	Describes how to activate and use the features of the M5209T display set.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
Centrex ISDN Display Set M5209T Voice Quick Reference Card (S)	P0704392	Describes the features of the M5209T display set for voice applications using stimulus signaling.
Customer Data Schema	297-1001-451	Gives a general description and use for software tables including syntax and the semantics of its fields, and valid inputs. It also provides examples of data tables.
Customer Data Schema Input Forms	297-1001-454	Contains input forms for customer data schema. The forms are completed by the operating company to structure the data store lookup tables.
Dialable Wideband Service Product Guide	297-2461-010	Provides an overview of DWS. It includes a general description, applications, functional architecture, hardware, and software.
Dialable Wideband Service Services Guide	297-2461-021	Describes planning and engineering, administration, translations, and maintenance for DWS.
Digital Trunk Interface/Computer-to-PBX Interface Description	553-2811-100	Describes the digital trunk and the computer-to-PBX interfaces.
DMS SuperNode Product Guide	297-5001-010	Provides an overview of DMS SuperNode. Describes the hardware, software, and signaling methods developed for DMS SuperNode. It also refers to other documents that contain information about DMS SuperNode.
DMS SuperNode SE Product Guide	297-5301-010	Provides an overview of the DMS SuperNode SE switch. It describes the functional architecture, hardware and software of the switch. A list of related documents is also provided.
DMS-100 Family Guide to Northern Telecom Publications	297-1001-001	Contains an index to the Northern Telecom Publications (NTP) for the DMS-100 Family of products. Publications are listed under four functional areas: planning, installation, administration, and operations and maintenance.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
Documentation Guide	241-0001-001	Defines and discusses the four classes of DPN documentation. These include Northern Telecom Practices, DPN marketing information, DPN release information, and network-specific documentation. Procedures for updating and ordering documentation are also outlined.
DPN Switch Operating Procedures	241-1001-300	Provides comprehensive procedures for operating a DPN switch.
DPN System Engineering Guidelines	241-1001-153	Provides information for provisioning SNA services.
DPN Trace User Guide	241-1001-501	Provides information on DPN Trace. Provides software installation procedures, operating procedures, recommended troubleshooting, possible alarms, and engineering data.
DPN-100 Installation and Initial Tests	241-1001-205	Provides details on the installation and initial test procedures specific to DPN-100.
DPN-100 X.75 Service Specification	241-1001-181	Provides information on the DPN-100 X.75 Service on the DPN-100.
DS-1 Interface Card	GS6X50	Describes the NT6X50 series of DS-1 interface cards, including the NT6X50AB version used in the ISDN access controller and ISDN line group controller. Refer also to 297-1001-805.
Equipment Identification and Ordering Information	241-1001-150	Provides ordering information for the DPN product line.
Facility Requirements	241-1001-180	Provides information on the facilities required at a DPN site including power and grounding, environmental, and equipment room limitations.
Feature Description Manual	297-1001-801	Provides feature information for the DMS-100 switch. Feature information is intended to help operating company personnel to prepare for insertion of a new BCS load, or to understand elements of the software. Operating company personnel involved in planning and engineering or in maintenance activities find this document useful.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
Frame Relay Service User Guide and Specification	241-1001-120	Provides a detailed description and specification of the Frame Relay service with information on engineering, installing, provisioning, and operation.
Frame Supervisory Panel	GS0X28	Describes the NT0X28 series of frame supervisory panels, including the NT0X28EA version used in ISDN equipment frames.
Glossary	241-0001-002	Provides descriptions, and definitions of acronyms commonly used in DPN documentation. It also lists the titles of CCITT recommendations quoted throughout the DPN NTP documentation.
Hardware Description Manual Reference Manual	297-1001-805	Provides descriptions of DMS-100 circuit cards. It contains cards that can be ordered by the customer, as provisionable items (with quantities based on the size of the office, traffic capacity requirements, and feature requirements), or as spare or replacement items. Included are ISDN line cards, and cards required in the peripheral modules which support ISDN.
Installation Drawing	ISBX40	
Installation of the NT1	P0696891	Provides instructions on how to install the AMI network termination 1 (NT1) on the S/T-bus.
Integrated Services Digital Network Administration Guide	297-2401-320	Provides ISDN BRI and PRI administration procedures for monitoring and evaluating ISDN performance factors and fault conditions.
Integrated Services Digital Network AMI Network Termination 1 (NT1) Description	297-2451-106	Provides an overview of the AMI NT1 and its communication characteristics, electrical specifications for the U-loop, and the S/T bus specifications.
Integrated Services Digital Network AMI S/T Bus and U-Loop Engineering Guide	297-2451-181	Contains guidelines for engineering the AMI U-loop and S/T bus.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
Integrated Services Digital Network Basic Rate Interface Maintenance Guide	297-2401-501	Contains the following for ISDN BRI: maintenance overview, preventive maintenance strategies, logs, operational measurements, tree diagram of commands, card requirements, trouble isolation and correction methods, and advanced troubleshooting procedures. The procedures are designed for experienced maintenance personnel.
Integrated Services Digital Network Basic Rate Interface Planning and Engineering Guide	297-2401-155	Contains a description of the ISDN BRI operation, hardware and software requirements, site requirements, and guidelines for provisioning and sparing. It is written for personnel responsible for provisioning, long-range planning, and setting up ISDN BRI.
Integrated Services Digital Network Basic Rate Interface Translations Guide	297-2401-350	Describes the translations and datafill used to set up the DMS-100 ISDN BRI capabilities.
Integrated Services Digital Network Basic Rate Interface Trouble Locating and Clearing Procedures	297-2401-544	Contains trouble locating and clearing maintenance procedures for BRI services to ISDN. The procedures covered are designed for maintenance personnel in an operating company.
Integrated Services Digital Network Line Drawer	GSBX62	Describes the line drawer that holds the NTBX25 two-slot line card.
Integrated Services Digital Network Meridian Business Set M5317T-Data Option User Guide	P0700423	Describes how to use the M5317T Meridian business set equipped with the data option. This option converts the set from a voice-only telephone to one suitable for voice and data transmission.
Integrated Services Digital Network Meridian Business Set M5317TD Functional Signaling User Guide	P0713103	Provides instructions on how to use the M5317TD business set.
Integrated Services Digital Network Meridian Business Set M5317T-User Guide	P0700421	Describes how to use the M5317T Meridian business set.
Integrated Services Digital Network Primary Rate Interface Administration	553-2901-300	Provides guidelines for administering far-end connectivity. It gives complete service change and software administration procedures for PRI capability.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
Integrated Services Digital Network Primary Rate Interface Description	553-2901-100	Provides a brief overview of ISDN and PRI. It lists MSL-1 connectivity per release, describes available features, and gives engineering and configuration guidelines.
Integrated Services Digital Network Primary Rate Interface Maintenance Guide	297-2401-502	Contains the following for ISDN PRI: maintenance overview, preventive maintenance strategies, logs, operational measurements, tree diagram of commands, card requirements, trouble isolation and correction methods, and advanced troubleshooting procedures. The procedures are designed for experienced maintenance personnel.
Integrated Services Digital Network Primary Rate Interface Planning and Engineering Guide	297-2401-165	Contains a description of the ISDN PRI operation, hardware and software requirements, site requirements, and guidelines for provisioning and sparing. It is written for personnel responsible for provisioning, long-range planning, and setting up ISDN PRI.
Integrated Services Digital Network Primary Rate Interface PRI and DCHI Installation	553-2901-200	Gives essential information for installing and removing PRI and DCHI circuit packs.
Integrated Services Digital Network Primary Rate Interface PRI and DCHI Maintenance	553-2901-500	Provides a PRI operations guide and fault-clearing procedures. It also contains detailed procedures for PRI card, D-channel, and clock controller maintenance.
Integrated Services Digital Network Primary Rate Interface Translations Guide	297-2401-360	Describes datafill for all DMS-100 PRI capabilities.
Integrated Services Digital Network Primary Rate Interface Trouble Locating and Clearing Procedures	297-2401-554	This document identifies the trouble locating and clearing maintenance procedures unique to the DMS-100 ISDN PRI.
Integrated Services Digital Network Product Guide	297-2401-010	Contains an overview of ISDN equipment and software developed by Northern Telecom. This document describes the Northern Telecom implementation of ISDN, and refers to other documents that contain information about the topics described.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
Integrated Services Digital Network Service Orders for ISDN Terminals Reference Manual	297-2401-310	Describes how to use service orders for creating, modifying, or removing service to ISDN terminals in DMS-100 Family switches, and the query commands for finding out the current assignments of software and hardware.
Introduction to AM and RM NAS Service Provisioning Operating Procedures	241-2001-320	Defines the AM NAS for the DPN network. Provides a benchmark for the host operational stall, detailing the day-to-day AM NAS service provisioning operating procedures.
LAPB/X.25 Specification	241-1001-184	Provides the functions of the LAPB/X.25 access service.
LAPD/X.25 Specification	241-1001-194	Provides the functions of the LAPD/X.25 access service.
Line Maintenance Procedures	297-2101-503	For maintenance personnel responsible for maintaining lines from the LTP level of the DMS-100 MAP, describes how to diagnose and correct line faults reported by system diagnostics and by subscriber complaints for POTS, EBS, Datapath, and ISDN lines. Also contains a procedure for replacing line cards in a line concentrating device.
Lines, Trunks, and Peripherals Card Replacement Procedures	297-1001-589	Contains procedures for replacing cards.
Lines, Trunks, and Peripherals Lines Alarm and Performance Monitoring Procedures	297-1001-584	Contains lines alarm clearing procedures. Used by maintenance personnel to clear alarms as they appear at the MAP display.
Lines, Trunks, and Peripherals Trouble Locating and Clearing Procedures	297-1001-586	Contains procedures for correcting trouble related to lines, trunks, PMs, input/output devices, external subsystems, and network devices.
Log Report Reference Manual	297-1001-840	Contains descriptions of log reports for DMS-100 Family equipment including those specific to ISDN.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
M5000TD-1 Terminal Adapter-User Guide	P0710678	Provides instructions on how to use the TA to connect a variety of data terminal equipment to an ISDN switch through the S/T-bus.
M5209T Data User Guide (MFT/Functional)	P0726959	Provides instruction for operating the data features of both the M5209TDp and the M5209TDcp sets.
M5209T Installation Guide	P0726960	Provides instructions for installing, upgrading, and programming the M5209T set. Also provides information on basic troubleshooting during installation.
M5209T PAD Reference Manual	P0714383	Contains information on PAD parameters and profiles, PAD commands and PAD control procedures for the M5209TDp and M5209TD cp data sets.
M5209T Quick Reference Card (Functional)	P0711710	Describes the features of the M5209T display set for voice applications using functional signaling.
M5209T Quick Reference Card (MFT)	P0726956	Describes the voice features of the M5209T set.
M5209T Quick Reference Card (MFT/Functional)	P0726957	Describes the voice and data features of the M5209T set.
M5209T Voice User Guide (MFT/Functional)	P0726958	Provides instructions on how to use the voice features of the M5209T set.
M5317T Digital Telephone Installation, Verification, Operation, and Trouble Locating	297-2451-201	Describes the M5317T Meridian ISDN digital telephone. It explains how to install the telephone and perform test and trouble-locating routines.
Master Index of Publications	553-3001-000	Provides a list of Meridian 1 SL-1 PBX documentation with a synopsis for each document.
MDC Stand-alone NT1 NTBX80 Installation Guide	P0713853	Provides instructions on installing the stand-alone NT1, with connections to the U-loop, S/T-bus, and power source.
MDC Stand-alone NT1 Power Supply NTBX81 Installation Guide	P0713854	Provides instructions on installing the NT1 power supply, with connections to the U-loop, NT1, and ac power source.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
MDC NT1 Basic Unit NTBX84 Installation Guide	P0713857	Provides instructions on installing the NT1 basic unit (card) in the NT1 unit module, and setting the configuration jumpers on the card.
MDC NT1 Battery Module NTBX86 Installation Guide	P0713860	Provides instructions on installing the NT1 power module, with connections to the NT1 power module. It also provides charging and test routines.
MDC NT1 Power Module NTBX86 Installation Guide	P0713859	Provides instructions on installing the NT1 power module, with connections to the NT1 module, NT1 battery module, and ac power.
MDC NT1 Rack-Mount Shelf NTBX82 Installation Guide	P0713855	Provides installation instructions for the NT1 rack-mount shelf.
MDC NT1 Star Unit NTBX84 Installation Guide	P0713858	Provides instructions on installing the NT1 star unit (card) in the NT1 unit module, and setting the configuration jumpers on the card.
MDC NT1 Unit Module NTBX83 Installation Guide	P0713856	Provides instructions on installing the NT1 unit module, with connections to the U-loop and NT1 power module. It also provides instructions on installation of the NT1 units (cards) in the module.
Menu Commands Reference Manual	297-1001-821	Describes all menu commands used at a MAP in a Northern Telecom DMS-100 switch.
Meridian Digital Centrex ISDN U-Loop and S/T Bus Engineering Guide	297-2451-182	Contains guidelines for engineering the 2B1Q U-loop and the S/T bus.
Meridian Digital Centrex (MDC) Translations Guide	297-2001-350	Describes the features used in the Meridian Digital Centrex (MDC) environment. This document describes the MDC features, including station, business set, attendant console, system, and ISDN PRI.
Meridian Digital Centrex Network Termination 1 (NT1) and S/T Bus Installation Guidelines	297-2451-207	Describes the installation and verification of the 2B1Q NT1, including the stand-alone and modular versions.

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Documentation index (continued)

Title	Document	Abstract
Meridian Digital Centrex Network Termination 1 (NT1) Description	297-2451-107	Provides an overview of the 2B1Q NT1 and its communications characteristics, electrical specifications for the U-loop, and the S/T bus specifications.
Meridian SL-100 Defense Switched Network Features and Services Description	555-4011-105	Catalogs and describes defense switched network features and services available on the Meridian SL-100.
Meridian SL-100 Features and Services Description	555-4001-105	Catalogs and describes features and services available on the Meridian SL-100.
Meridian SL-100 ISDN Primary Rate Interface Reference Manual	555-4001-106	Describes the applications provided and engineered for ISDN PRI, including end-to-end service for the user, engineering information for PRI between MSL-100s, provisioning information for DS-1 options on the PRI, and performance analysis of PRI.
Meridian SL-100 Master Index of Publications	555-4001-001	Lists all documents for the Meridian SL-100 PBX.
Meridian SL-100 MCDN Basic Call Service Network Guide	555-8001-101	Provides an overview of the basic call as an ISDN network service, including information and procedures for the configuration, administration, and maintenance of the network links. The network links may include MSL-1 PBX, MSL-100 PBX, DMS-100 switch, and DMS-250 switch.
Meridian SL-100 MCDN Integrated Services Access Network Guide	555-8001-102	Provides information about the ISA feature on PRI, allowing calls of different types to be combined on a single trunk group. It provides the details to provision ISA on the MSL-1 PBX, MSL-100 PBX, DMS-100 switch, and DMS-250 switch.
Meridian SL-100 MCDN Network Ring Again Network Guide	555-8001-103	Provides information about the NRAG feature on PRI. It provides details to provision NRAG on the MSL-1 PBX, MSL-100 PBX, DMS-100 switch, and DMS-250 switch.
Meridian T2317 Telephone Set User Guide	297-2451-951	Provides installation instructions for the T2317 display set. It includes firmware version or model upgrading, programming the set, verifying operation of the set, and troubleshooting.

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Documentation index (continued)

Title	Document	Abstract
National ISDN-1 Feature Provisioning Guide	297-2401-351	Provides tables mapping the Bellcore TR199/TA199 names for NI-1 features to those names used by Northern Telecom.
NCS Operations and Maintenance	241-2001-350	Provides details on specific NCS applications, and detailed information on the commands and command syntax supported by each application.
Network Description	241-1001-100	Provides a description of the DPN product line and equipment features, and an introduction to fundamental network engineering and installation requirements.
NM NAS Data Entry Reference Guide	241-2001-311	Defines the data entry component of the NM NAS and provides a comprehensive user-oriented guide for data entry functions for NM NAS. Describes the NM NAS screens presented to the user through the NAS user interface management system (UIMS), and provides detailed descriptions of all NM NAS parameters.
Nonmenu Commands Reference Manual	297-1001-820	Describes all nonmenu commands used at a MAP in a Northern Telecom DMS-100 switch.
Northern Telecom Publication Reference Guide	241-0001-003	Provides an index of the documentation supporting the DPN data networking system.
Office Parameters Reference Manual	297-1001-455	Describes the office parameter data for all DMS switching units.
Operational Measurements Reference Manual	297-1001-814	Includes a description of additions and changes made to the operational measurements system for ISDN, as well as those made to the DMS-100 switch.
Peripheral Modules Alarm and Performance Monitoring Procedures	297-1001-582	Contains information for analyzing peripheral module alarms and performance.
Peripheral Modules Maintenance Guide	297-1001-592	Contains maintenance information about PMs that are located in the host office. Contains sections on single-shelf PMs, dual-shelf PMs, and the LCM. Should be used by experienced maintenance personnel.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
Power Converter	GS2X70	Describes the NT2X70 series of power converters, including the NT2X70EA version used in ISDN frames. Refer also to 297-1001-805.
Q.931 and Demand-Established B-Channel User Guide	241-1001-170	Provides information for the DPN Q.931 and demand-established B-channel (DEB) service.
Remote Switching Center Administration Guide	297-2711-320	Describes administration tools and procedures for the ISDN RSC and non-ISDN RSC. Included are assessment routines for traffic and hardware use, feature use, level of service, level of billing, and system faults. Operational measurements and log reports applicable to the RSC are also described.
Remote Switching Center Maintenance Guide	297-2711-520	Describes the tools and procedures to maintain the RSC and dual-RSC configurations for both ISDN and non-ISDN applications. The document includes information on querying and monitoring the RSC, testing lines, setting up and using maintenance and monitoring tools, controlling the RSC, and troubleshooting.
Remote Switching Center Planning and Engineering Guide	297-2711-155	Provides the planning and engineering information for the ISDN RSC and the non-ISDN RSC, including dual-RSC configurations. It contains details on provisioning these configurations, and covers hardware, trunk assignments, DS-1 and DS30 link and port assignments, traffic considerations, and site requirements.
Remote Switching Center Product Guide	297-2711-010	Provides an overview of the RSC, a configuration providing switching services at a remote site from the host office. The document includes the architecture, components, and applications for both the ISDN RSC and non-ISDN RSC.
Remote Switching Center Translations Guide	297-2711-350	Describes the tables and procedures to datafill ISDN and non-ISDN RSC configurations and features. Support tools and datafill procedures for lines, trunks, and peripheral modules are provided, in addition to those used for ISDN service and bearer capabilities.

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Table 5-10xxx
Documentation index (continued)

Title	Document	Abstract
SCANLOG User Manual	Not numbered	Describes the commands to obtain graphs showing the frequency of selected log reports.
SNA Services Provisioning User Guide	241-1001-125	Provides information and procedures to provision SNA services.
Software Package to Data Cross-Reference	297-1001-456	Describes the relationship between software packages and data structures in the DMS.
ST, RT, NT, XT Equipment Identification and Ordering	553-2201-153	Provides information that enables the user to identify and order MSL-1 T-systems equipment.
ST, RT, NT, XT Spares Planning	553-2201-181	Provides information that helps the user plan spares requirements for the MSL-1 T-systems.
Switch Performance Monitoring System Application Guide	297-1001-330	Describes the BCSMON commands to obtain a printout of selected log reports, operational measurements, and indications of system activity used to evaluate overall system performance.
Table of Contents for NTP Set	241-0001-005	Identifies all the NTPs that make up the complete DPN NTP set.
Translation Routing and Verification (TRAVER) User Guide	TAM002	Describes TRAVER software used to step through a call and examine the contents of the system data tables as they are accessed at each stage in the call. This procedure verifies translation and routing information stored in the switch.
Trunks Maintenance Manual	297-1001-595	Describes the operation and functions of the trunks subsystem. Includes commands and displays for the manual and automatic maintenance level commands. To be used by maintenance personnel who have a basic knowledge of the DMS and the trunks subsystem.
U-Interface ISDN Line Card	GSBX25	Describes the two-slot U-line card used in the LCMI. Refer also to 297-1001-805.
X.32 Service User Guide	241-1001-314	Provides information on DPN X.32 service, routing impacts, function and service data requirements.
X.32 Specification	241-1001-207	Provides information on the DPN X.32 Service and its compliance to CCITT recommendation X.32.

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Documentation index (continued)

Title	Document	Abstract
X11 Input/Output Guide	553-3001-400	Provides administration and maintenance overlay programs, referred to as loads (LD), prompts and responses (I/O), and messages.
X11 Memory Calculations	553-2201-151 Appendix 1	Helps the user calculate core memory requirements.

End

List of terms

2B1Q

Two binary one quaternary. The interface standard for ISDN basic rate interface (BRI) transmission between the network and the network termination 1 (NT1) as defined by the American National Standards Institute (ANSI).

abstract terminal

The standard software representation of the physical terminal at the network level. The abstract terminal specifies how the network and the physical terminal interact at the network level.

access module (AM)

The unit that provides access to the network modules of a digital packet network switching system from a local subscriber packet data line or the digital interworking unit.

access termination (AT)

The functional term to describe the part of the exchange termination which terminates the access interfaces (BRI and PRI). It defines the access privileges of the terminals on an interface, and provides the terminals on an interface with access to ISDN circuit- and packet-switching services.

ACCS

Automatic Calling Card Service

additional functional calls (AFC)

A service that is assigned to a directory number (DN) on a functional terminal, permitting multiple calls to the DN.

AFC

See additional functional calls (AFC).

agent

See telephony agent.

AM

See access module (AM).

AMA

See automatic message accounting (AMA).

AT

See access termination (AT).

authorized call type

Characteristic that is associated with a logical terminal (service profile) in functional signaling. It offers a pool of bearer capabilities to a logical terminal. Also called bearer services.

automatic message accounting (AMA)

An automatic recording system that documents all the necessary billing data of subscriber-dialed long distance calls.

B8ZS

Bipolar with 8 zeros substitution. Transmission coding technique that substitutes a specific bipolar violation pattern in place of eight consecutive zeros so that a link does not go down.

B-channel

A 64-kbit/s digital bidirectional channel used by ISDN for carrying either circuit-switched voice or data, or packet-switched data.

B-packet

Packet data that is transmitted over a B-channel.

B-voice

A pulse code modulated voice signal carried on a B-channel.

basic rate access (BRA)

See basic rate interface (BRI).

basic rate interface (BRI)

A type of access to ISDN service provided by a set of time-division multiplexed digital channels of information, including two B-channels, one D-channel, and one or more maintenance channels, often described as 2B (channels) + D (channel). A BRI is typically used on lines between customer premises and a central office switch. Formerly known as basic rate interface (BRA).

batch change supplement (BCS)

A DMS-100 Family software release.

Bb channel

A B sub b channel. A 64-kbit/s channel carrying multiplexed B-channel data packets to the packet handler. Bb is pronounced "B sub-b." *See also* B-channel.

BC

See bearer capability (BC).

BCS

See batch change supplement (BCS).

Bd channel

A B sub-d channel. A DS-0 channel that carries low-speed, packet-switched data statistically multiplexed from up to 32 different sources. Bd is one of 24 channels on a DS-1 facility between the exchange termination (ET) and the packet handler (PH). Bd is pronounced "B sub-d."

bearer capability (BC)

A characteristic associated with a directory number (DN) to indicate the type of call (voice or data) and the rate of transmission that is allowed. Bearer capability is also an information element that is carried in the setup message for functional signaling to indicate the type of call (voice or data) and the rate of transmission required (for ISDN). *See also* authorized call type, bearer services.

bearer services

Characteristic that is associated with a logical terminal (service profile) in functional signaling. It offers a pool of bearer capabilities to a logical terminal. Also called authorized call type.

Bell Communications Research (Bellcore)

A group responsible for coordinating Bell operating company projects and setting guidelines for a switching system.

Bellcore

See Bell Communications Research (Bellcore).

BIC

See bus interface card (BIC).

BRA

See basic rate access (BRA). Preferred term is basic rate interface (BRI).

BRI

See basic rate interface (BRI).

bus interface card (BIC)

A card located in the drawer of the line concentrating module that connects two 32-channel digroups to a maximum of 64 line cards.

C-side

See central side (C-side).

call appearance

When a directory number has been assigned the additional functional calls parameter, the directory number can support up to five calls at one time. Each call using this directory number is called a call appearance of the directory number. *See also* additional functional calls.

call capacity

Call capacity is expressed as calls per hour and depends upon the available occupancy and average per-call timing.

call processing

The software that handles the processes involved in setting up connections through the DMS-100 Family network between calling and called parties.

call reference

This identifies the call on the local ISDN interface to which the message applies. Stimulus call control messages have dummy call references because the network controls the call. Functional call control messages are used by the ISDN terminal to distinguish between call appearances of the same directory number, and to selectively control a number of simultaneous calls (for example, an active call, calls on hold, calls waiting).

call type

See authorized call type *and* bearer services.

CAMA

See centralized automatic message accounting (CAMA).

CC

See central control (CC).

CCC

See central control complex (CCC).

CCITT

See Consultative Committee on International Telephony and Telegraphy (CCITT).

CCS

See common channel signaling (CCS) or hundred call seconds (CCS).

CCS7

See Common Channel Signaling 7 (CCS7).

CDTE

ISDN cabinetized digital trunk equipment

central control (CC)

Comprises the data processing functions of the DMS-100 Family with associated data store and program store.

central control complex (CCC)

Comprises all the central control functions of the DMS-100 Family system. It consists of the central message controller, central processing unit, program store, and data store.

central office (CO)

A switching office arranged for terminating subscriber lines and provided with switching equipment and trunks for establishing connections to and from other switching offices. Synonymous with class 5 office; end office; local office.

central side (C-side)

The side of a node facing away from the peripheral modules (PM) and toward the central control (CC). Also known as control side. *See also* peripheral side (P-side).

centralized automatic message accounting (CAMA)

A system that produces itemized billing details for subscriber-dialed long distance calls. Details are recorded at a central facility serving a number of exchanges. In exchanges not equipped for automatic number identification (ANI), calls are routed to a CAMA operator who obtains the calling number and enters it into the computer for billing. *See also* local automatic message accounting (LAMA).

channel supervision message (CSM)

A message received and transmitted continuously on each connected voice channel of a peripheral module. The CSM contains a connection data byte, which includes the channel supervision bit, and an integrity byte, which issues call path integrity.

circuit-switched network

Synonym for the telephone network.

CLGE

ISDN cabinetized line group equipment

CLLI

See common language location identifier (CLLI).

CLMI

ISDN cabinetized line module

closed user group (CUG)

A supplementary service that allows the originator to access certain network addresses if a correct interlock code is supplied. Screening of a CUG is performed at call set-up only.

CO

See central office (CO).

common channel signaling (CCS)

A signaling method in which information relating to many labeled messages is transmitted over a single channel using time-division multiplex (TDM) digital techniques.

Common Channel Signaling 7 (CCS7)

A digital, message-based network signaling standard defined by the CCITT that separates call signaling information from voice channels so that interoffice signaling is exchanged over a separate signaling link.

common language location identifier (CLLI)

A standard identification method for trunk groups in the following form:

aaaa bb xx yyyy

where:

aaaa is the city code
bb is the province or state code
xx is the trunk group identifier
yyyy is the trunk number

Consultative Committee on International Telephony and Telegraphy (CCITT)

The CCITT is one of the four permanent groups within the International Telecommunication Union (ITU). The CCITT is responsible for studying technical, operating, and tariff questions. This organization also prepares recommendations relating to telephony and telegraphy, including data and program services.

CPE

See customer premises equipment (CPE).

CRC

See cyclic redundancy check (CRC).

CS-data

Circuit-switched data carried on B-channel

CSM

See channel supervision message (CSM).

CUG

See closed user group.

customer premises equipment (CPE)

Equipment, such as ISDN terminals, that is located on the customer's premises.

cyclic redundancy check (CRC)

A method of detecting errors. Typically, a 16-bit check character is added to each data block based on a repeated examination of each information bit.

D-call control

Call control information that is carried on the D-channel and used to establish, maintain, or clear a voice or circuit-switched data call on a B-channel of an ISDN.

D-channel

For BRI, the D-channel is a 16 kbit/s, bi-directional channel. A D-channel carries call control messages between a terminal on an ISDN interface and the exchange termination. These call control messages are used to set up, maintain, or clear a circuit-switched call on a B-channel. The D-channel also carries low-speed packet data between a terminal on an ISDN interface and a terminal in the packet data network. For PRI, the D-channel is a 64 kbit/s, bi-directional channel. *See also* Bd channel, BRI, PRI.

D-channel handler (DCH)

A card in an ISDN line group controller (LGCI) or in an ISDN line trunk controller (LTCI) that provides the primary interface to all D-channels. The DCH also performs Q.921 LAPD layer 2 processing. The DCH is assigned to an ISDN loop and receives or sends messages on the signaling/packet data channel.

D-channel handler interface (DCHI)

Connects the MSL-1 with the D-channel in ISDN primary rate access. The DCHI performs link access procedures on the D-channel for primary rate access.

D-packet

Packet data carried on the D-channel between the packet handler and an ISDN terminal.

data link layer

Layer 2 in the open systems interconnection (OSI) model that is used to create logical links between ISDN terminals and the services they access. The datalink layer provides error-free, sequenced messaging over a channel.

data network address (DNA)

A number that accesses a terminal on the packet-switched network.

data network identification code (DNIC)

For ISDN, a code that is used in packet switching to identify the network being addressed.

data packet network (DPN)

A packet-switched networking system that is manufactured by Northern Telecom.

DCC

See digroup control card (DCC).

DCH

See D-channel handler (DCH).

DCHI

See D-channel handler interface (DCHI).

destination address

Directory number or code representing the party that is reached when a voice or circuit-switched data call is made through the circuit-switched network. *See also* destination code.

destination code

The complete ten-digit number (three-digit numbering plan area [NPA] code + three-digit central office code + four-digit station number) that pinpoints the location of a telephone in North America. Also known as national number; telephone address; destination address.

digital interworking unit (DIU)

The unit in a digital packet network switch that converts B-channel and D-channel data packets received in a DS-1 format from the ISDN access controller to a VR-35 format that is suitable for the access module. For packets being sent in the opposite direction, the DIU performs the reverse conversion.

Digital Multiplex System (DMS)

A central office (CO) switching system in which all external signals are converted to digital data and stored in assigned time slots. Switching is performed by reassigning the original time slots. DMS is a trademark of Northern Telecom.

digroup control card (DCC)

A circuit comprising part of the LCM unit control complex. DCC provides eight DS30A ports for connection to the network in the host LCM.

direct memory access (DMA)

A device for transferring blocks of continuous data to and from memory at a high rate.

directory number (DN)

The full complement of digits required to designate a subscriber's station within one numbering plan area (NPA)-usually a three-digit central office code followed by a four-digit station number.

DIU

See digital interworking unit (DIU).

DMA

See direct memory access (DMA).

DMS

See Digital Multiplex System (DMS).

DMS-bus

The messaging control component of DMS SuperNode. It consists of a pair of message switches.

DMS-core

The call management and system control portion of DMS SuperNode. It consists of a computing module and a system load module.

DMS-link

The networking software of DMS SuperNode. DMS-link consists of open and standard protocols that enable DMS SuperNode to function in a multi-vendor environment.

DMS PH

DMS packet handler

DMS SuperNode

A central control complex for the DMS-100. The two major components of DMS SuperNode are the computing module and the message switch. Both are compatible with the current network module, the input/output controller, and XMS-based peripheral modules.

DN

See directory number (DN).

DNA

See data network address (DNA).

DNIC

See data network identification code (DNIC).

DPN

See data packet network (DPN).

DS-0

A protocol for data transmission that is used to represent one channel in a 24-channel DS-1 trunk.

DS-1

A closely specified bipolar pulse stream with a bit rate of 1.544 Mbit/s. It is the standard signal used to interconnect Northern Telecom digital systems. The DS-1 signal carries 24 DS-0 information channels of 64 kbit/s each.

DS-1 link

The 8-bit, 24-channel, 1.544 Mbit/s digital signaling format as used in the DMS-100 Family. DS-1 is the North American standard for digital trunks. It is a closely specified bipolar pulse stream with a bit rate of 1.544 Mbit/s. The DS-1 signal is the standard signal used to interconnect Northern Telecom digital systems. The DS-1 signal carries 24 information channels of 64 kbit/s each (DS-0s).

DS30 link

1. A 10-bit, 32-channel, 2.048-Mbit/s speech-signaling and message-signaling link as used in the DMS-100 Family. 2. The protocol by which DS30 links communicate.

DS30A link

A 32-channel transmission link between the line concentrating module and controllers in the DMS-100 Family. DS30A is similar to DS30, though intended for use over shorter distances.

DS512 fiber link

The fiber optic transmission link implemented in the DMS SuperNode processor. The DS512 is used for connecting the computing module (CM) to the message switch. One DS512 fiber link is the equivalent of 16 DS30 links.

DTCI

See ISDN digital trunk controller (DTCI).

DTEI

See ISDN digital trunk equipment frame (DTEI).

E.164

The public network numbering plan in accordance with CCITT Recommendation E.164. It is defined as being the same as the North American public switched telephone network (PSTN) numbering plan until 1995.

EAEO

See equal access end office (EAEO).

EDCH

See enhanced D-channel handler (EDCH).

EISP

See enhanced ISDN signaling preprocessor (EISP).

EKTS

See electronic key telephone service (EKTS).

electronic key telephone service (EKTS)

A set of services for ISDN voice terminals on a basic rate interface. EKTS provides shared directory numbers (DN), multiple DNs for each service profile, and conference and intercom calling.

end office (EO)

A switching office (SO) arranged for terminating subscriber lines and provided with trunks for establishing connections to and from other SOs. *See also* central office (CO), office classification.

enhanced D-channel handler (EDCH)

A card in an ISDN line group controller (LGC) or in an ISDN line trunk controller (LTCI) that provides the primary interface to all D-channels. The EDCH also performs Q.921 LAPD layer 2 processing. It is connected permanently to an ISDN loop, and receives or send messages on the signaling and packet data channel. Similar to the DCH, the EDCH has a

memory upgrade from 1 MB to 4 MB, a clock speed upgrade from 16 MHz to 20 MHz, and data bus upgrade from a 16-bit width to 32 bits. *See also* D-channel handler (DCH).

enhanced ISDN signaling preprocessor (EISP)

Provides call control messaging and D-channel handler maintenance functions, similar to the ISP, but with memory upgrade from 1 Mbyte to 4 Mbyte, clock speed upgrade from 16 MHz to 20 MHz, and data bus upgrade from a 16 bit width to 32 bits

enhanced ISDN line concentrating module (LCME)

A dual-unit peripheral module that terminates ISDN 2B1Q U-type lines, ISDN S/T-type lines, plain ordinary telephone service (POTS), electronic business sets (EBS), and Datapath lines. LCME also provides access to the ISDN B-, D-, and M-channels. The LCME supports 480 POTS, EBS, or ISDN U-type lines, or 240 Datapath or S/T-type lines.

enhanced service provider (ESP)

A third-party vendor that supplies value-added services to the subscriber.

enhanced services test unit (ESTU)

A stand-alone test unit that performs metallic and digital line tests at remote or host sites for ISDN services.

EO

See end office (EO).

equal access (EA)

An operating company tariff offering for local access and transport area (LATA) access equal in type, quality, and price for all connecting inter-LATA and international carriers (INC).

equal access end office (EAEO)

A central office that provides access to several long distance carriers.

ESP

See enhanced service provider (ESP).

ESTU

See enhanced services test unit (ESTU).

ET

See exchange termination (ET).

exchange termination (ET)

The functional name for the component of the ISDN which serves as the access termination for BRI and PRI interfaces, and provides circuit-switched services to the ISDN switch.

F-bus

See frame transport bus (F-bus).

FA

See feature activator (FA).

FC

See flexible calling (FC).

FCM

See functional call management (FCM).

feature activator (FA)

The key on a circuit-switched service ISDN stimulus terminal used to activate a supplementary service such as Ring Again.

feature indicator (FI)

A device that indicates the state or condition of a call when using a supplementary service on an ISDN stimulus terminal with circuit-switched service.

feature key management (FKM)

The concept of using FAs and FIs to access supplementary services. This way of accessing features is unique to stimulus terminals. 2. A facility available on ISDN voice terminals that provides access to supplementary services such as ring again.

FFM

See functional feature management (FFM).

FI

See feature indicator (FI).

FKM

See feature key management (FKM).

flexible calling (FC)

A supplementary service which allows functional signaling subscribers with electronic key telephone service (EKTS) to merge two concurrent calls into a single conference call.

foreign exchange (FX)

A service that allows a telephone or a PBX to be served by a distant central office (CO), rather than by the CO in the immediate geographical area.

frame transport bus (F-bus)

An eight-bit bus that provides data communications between a local message switch (LMS) and the link interface units that are provisioned in a link peripheral processor (LPP). To ensure readability, two load-sharing F-buses are provided in an LPP. Each F-bus is dedicated to one of the two LMSs. *See also* link interface module.

frame supervisory panel (FSP)

Accepts the frame battery feed and ground return from the power distribution center. The FSP distributes the battery feed, by means of subsidiary fuses and feeds, to the shelves of the frame or bay in which it is mounted. The FSP also contains alarm circuits.

FSP

See frame supervisory panel (FSP).

functional call management (FCM)

Describes the portion of functional signaling that affects basic call processing and the supplementary services that are considered to be optional parts of basic call processing.

functional feature management (FFM)

Describes the portion of functional signaling that affects the supplementary services operating on calls that are in progress.

functional signaling

An intelligent terminal in which call control functions are shared between the switch and the terminal.

FX

See foreign exchange (FX).

HDLC

See high-level data link control (HDLC).

HFP

high-level data link control (HDLC) frame processor

high-level data link control (HDLC)

The channel by which high-level control messages from the central control are carried between the digital carrier module and remote line modules.

hundred call seconds (CCS)

The unit of telephone traffic in the United States. The rest of the world uses the erlang, which is one circuit continuously occupied for one hour. One erlang is equal to 36 CCS. Formerly known as centum call seconds.

IBERT

See integrated bit error rate test (IBERT).

IEC

See interexchange carrier (IEC).

integrated bit error rate test (IBERT)

A test that a MAP operator uses with an IBERT card to test the transmission quality of a selected data line. The card resides in the line drawer of a line concentrating module and generates the bit stream for an IBERT.

integrated services access (ISA)

Uses call setup messages and dialed digits to permit access to public and private network services through one bidirectional common access facility. ISA provides the capability to support multiple call types (such as PUBLIC, PRIVATE, OUTWATS, INWATS, FX, and TIE) on a single trunk.

integrated services digital network (ISDN)

A set of standards proposed by the CCITT to establish compatibility between the telephone network and various data terminals and devices. ISDN is a communications network that provides access to voice, data, and imaging services from a single type of connector.

inter-LATA

Telecommunications services between a point inside a local access and transport area (LATA) and a point either outside that LATA or inside another LATA.

interexchange carrier (IEC)

Any carrier authorized to carry customer transmissions between local access and transport areas (LATA) interstate or intrastate.

International Standards Organization (ISO)

The organization responsible for creating a seven-layer protocol model for a data communications network.

intra-LATA

Telecommunications services between a point inside a local access and transport area (LATA) and another point inside the same LATA.

inward wide area telecommunications service (INWATS)

A telephony service that allows a subscriber to receive long distance telephone calls originating within specified service areas without a charge to the originating party. A 1-800 number is assigned to a certain PBX to allow for free calls. *See also* outward wide area telephone service.

INWATS

See inward wide area telecommunications service (INWATS).

ISA

See integrated services access (ISA).

ISDN

See integrated services digital network (ISDN).

ISDN access controller

A frame used to support ISDN access between a DMS and voice and packet services.

ISDN digital trunk controller (DTCI)

A dual-unit peripheral module that provides access for ISDN primary rate interface to a digital private branch exchange (PBX). The DTCI provides call control for PRI functional signaling, and performs functions similar to the LGC, including D-channel handling and processing, and maintenance and diagnostics.

ISDN digital trunk equipment (DTEI) frame

A frame containing up to two dual-shelf ISDN digital trunk controllers.

ISDN line

The physical part of a basic rate interface (BRI) that connects the terminals to the network termination (NT1).

ISDN line concentrating array (LCA)

A shelf in the ISDN line concentrating module (LCME). It contains four physical line drawers. The LCME consists of two line concentrating arrays, which operate in a load sharing mode with mutual takeover capability.

ISDN line concentrating equipment (LCE)

A single-bay equipment frame containing two LCMEs.

ISDN line concentrating module (LCM)

A dual-unit peripheral module that terminates ISDN lines. LCMI B-channel connections are dynamic and can be used on a per-call basis. A peripheral module which interfaces the ISDN line trunk controller or ISDN line group controller and up to 640 subscriber lines, using two to six DS30A links.

ISDN line group controller (LGC)

A peripheral module that connects DS30 links from the network.

ISDN line trunk controller (LTC)

A peripheral module that is a combination of the line group controller and the digital trunk controller, and provides all of the services offered by both.

ISDN service group (ISG)

Defines the services that a D-channel handler (DCH) provides and their allocation to the channels within the DCH. ISG allows hardware-independent access to service-related functions at the MAP. The ISG MAP level provides a view of the services and the DCH MAP level provides a view of the hardware.

ISDN signaling preprocessor (ISP)

Provides call control messaging and D-channel handler maintenance functions.

ISDN switch

A DMS switch configured to provide ISDN services. Its main functional components are the exchange termination and the packet handler.

ISDN terminal

A digital telephone or personal computer that is connected to a customer premises loop which forms part of a BRI.

ISDN U-line card (U-ISLC)

An ISDN line card which terminates the U-loop in the enhanced line concentration module (LCME). When a U-ISLC is used, the network termination 1 (NT1) situated on customer premises acts as the network termination. Synonymous with ISLC and U-line card.

ISDN user part (ISUP)

A CCS7 message-based signaling protocol which acts as a transport carrier for ISDN services. The ISUP provides the functionality within a CCS7 network for voice and data services.

ISG

See ISDN service group (ISG).

ISLC

See ISDN U-line card (ISLC).

ISO

See International Standards Organization (ISO).

ISP

See ISDN signaling preprocessor (ISP).

ISUP

See ISDN user part (ISUP).

kbit/s

See kilobits per second (kbit/s).

kilobits per second (kbit/s)

A bit rate expressed in thousands of bits per second.

LAPB

See link access procedure balanced (LAPB).

LAPD

See link access procedure on the D-channel (LAPD).

LATA

See local access and transport area (LATA).

Layer 1

Physical level of the OSI model. This level defines the electrical, functional, and mechanical interface. For ISDN, this level defines the electrical and physical characteristics of the S/T and U interfaces.

Layer 2

Data link level of the OSI model. This level defines the operation of the link access procedures on the D-channel.

Layer 3

The network level of the OSI model. This level defines the procedures for establishing, maintaining, and clearing calls and accessing supplementary services.

L-bus

A bi-directional link that acts as the interface between the bus interface card and the line card in an enhanced line concentrating module (LCME).

LCA

See ISDN line concentrating array (LCA).

LCE

See ISDN line concentrating equipment (LCE).

LCM

See ISDN line concentrating module (LCM).

LCME

See enhanced ISDN line concentrating module (LCME).

LD

See line drawer (LD).

LEN

See line equipment number (LEN).

LGC

See ISDN line group controller (LGCI).

LIM

See link interface module.

line drawer (LD)

A hardware entity located in the LCME that contains line circuit cards.

line equipment number (LEN)

A seven-digit function-reference used to identify line circuits.

link access procedure balanced (LAPB)

ISDN access protocol that is used with links established on a B-channel. LAPB supports a single data link that operates with a fixed, single-byte address convention between the ISDN terminal and the network.

link access procedure on the D-channel (LAPD)

ISDN access protocol that is used with links established on a D-channel.

link interface module (LIM)

A peripheral module that controls messaging between link interface units (LIU) in a link peripheral processor (LPP). The LIM also controls messages between the LPP and the DMS-bus. An LIM consists of two local message switches (LMS) and two frame transport buses (F-bus). One LMS normally operates in a load sharing mode with the other LMS. This ensures LIM reliability in the event of an LMS failure because each LMS has adequate capacity to carry the full message load of an LPP. Each LMS uses a dedicated F-bus to communicate with the LIUs in the LPP.

link interface unit (LIU)

A peripheral module that processes messages entering and leaving a link peripheral processor through an individual signaling data link. *See also* CCS7 link interface unit 7.

link peripheral processor (LPP)

The DMS SuperNode equipment frame for DMS-STP that contains two types of peripheral modules: an LIM and an LIU. For DMS-STP applications, CCS7 link interface units 7 (LIU7) are used in the LPP. *See also* link interface module.

LIU

See link interface unit (LIU).

local access and transport area (LATA)

A geographic area within which an operating company may offer telecommunications-related services. *See also* inter-LATA and intra-LATA.

logical terminal (LT)

The datafilled instance of an abstract terminal that is provided with a subset of the features and services (service profile) datafilled in the access termination for the abstract terminal.

logical terminal identifier (LTID)

The unique identifier that is assigned to a logical terminal when it is datafilled in the ISDN access termination.

LPP

See link peripheral processor (LPP).

LT

See logical terminal.

LTC

See ISDN line trunk controller (LTC).

LTID

See logical terminal identifier (LTID).

M5209T

A Meridian M5209T ISDN telephone that can be a stand-alone. In conjunction with the ISDN terminal adapter and software, the M5209T unifies call handling and PC functions in a functionally integrated voice/data work station. Meridian M5209T is a trademark of Northern Telecom.

M5317T

A Meridian M5317T ISDN telephone that uses functional signaling to access voice and data. The M5317T can be a stand-alone ISDN voice telephone or a voice/data set with integrated RS232. Meridian M5317T is a trademark of Northern Telecom.

M5317TX/TDX

A 5317TX/TDX ISDN Meridian business set that uses functional signaling to access circuit-switched voice and data and packet-switched data. The M5317TX/TDX can be a stand-alone ISDN voice telephone or a voice/data set with integrated RS-232C interface.

maintenance and administration position (MAP)

See MAP.

MAP

The maintenance and administration position. MAP is a group of components that provides a user interface between operating company personnel and the DMS-100 Family systems. A MAP consists of a visual display unit and keyboard, a voice communications module, test facilities, and MAP furniture. MAP is a trademark of Northern Telecom.

master processor (MP)

In a DMS switch, the processor containing the instruction set that implements the tasks assigned by the central control software. The MP performs all high-level tasks.

master processor memory (MPM) card

A circuit pack that contains memory for the master processor card.

Mbit/s

See megabits per second (Mbit/s).

M-channel

A 16-kbit/s, bi-directional, U-loop channel used to transfer maintenance information between the NT1 and the exchange termination.

MDC

See Meridian Digital Centrex (MDC).

megabits per second (Mbit/s)

Expresses the rate of transmission of serial data bits in a time-division multiplexed frame format.

Meridian Digital Centrex (MDC)

A special DMS business services package that uses the data handling capabilities of DMS-100 Family offices. MDC provides a centralized telephone exchange service and was known formerly as Integrated Business Network (IBN). Meridian Digital Central is a trademark of Northern Telecom.

message protocol and tone generator card (MPC)

The MPC interprets and transfers signaling and control messages exchanged between the network and various peripheral modules (PM). It converts parallel data received from the network to serial data for transmission to the PM, and converts serial data sent from the PM to parallel data for transmission to the network. Also known as the common peripheral processor (CPP) message protocol and tone card.

MP

See master processor (MP)

MPC

See message protocol and tone generator card (MPC).

MPM

See master processor memory (MPM) card.

NAS

Network administration system

National ISDN 1 (NI-1)

An ISDN standard agreed to by the major switch vendors, regional Bell operating companies (RBOC), interexchange carriers, customer premises equipment (CPE) vendors, and Bellcore.

NCS

Network control system

network administration system (NAS)

A stand-alone computer that is involved in operation, administration, and maintenance for integrated services digital network (ISDN) services. The NAS uses data on service and system operation to generate files that contain information on alarms, accounting, billing, and network operation.

network interface unit (NIU)

A DMS SuperNode application specific unit (ASU) that provides channelized access for F-bus resident link interface units (LIU) using a channel bus (C-bus). The NIU resides in a link peripheral processor (LPP) frame.

network layer

Layer 3 in the OSI model. In ISDN, the network layer is used to send call control messages.

network termination 1 (NT1)

Access point for basic rate interface to ISDN. This component is situated on customer premises and is typically located between the terminals and the exchange termination. An NT1 is required when ISDN lines are terminated by U-line cards.

NI-1

See National ISDN 1 (NI-1).

NIU

See network interface unit (NIU).

Northern Telecom Publication (NTP)

A document that contains descriptive information about DMS-100 Family hardware and software modules and performance-oriented practices for testing and maintaining the system. These documents are supplied as part of the standard documentation package provided to an operating company.

NT1

See network termination 1 (NT1).

NTP

See Northern Telecom Publication (NTP).

OAM

See operation, administration, and maintenance (OAM).

open system interconnection (OSI)

A 7-layer protocol model for communications networks developed by the International Standards Organization and adopted by the Consultative Committee on International Telephony and Telegraphy (CCITT) for an Integrated Services Digital Network (ISDN).

operation, administration, and maintenance (OAM)

All of the tasks necessary for providing, maintaining, or modifying the services provided by a switching system. These tasks include provisioning of hardware, creation of service, verification of new service, and trouble recognition and clearance.

OSI

See open system interconnection (OSI).

outward wide area telephone service (OUTWATS)

A telephony service provided over one or more dedicated access lines to the serving central office. OUTWATS permits subscribers to make calls to specified service areas on a direct dialing basis for a flat monthly charge or

for a charge based on accumulated use. OUTWATS lines have special directory numbers. *See also* inward wide area telephone service.

OUTWATS

See outward wide area telephone service (OUTWATS).

P-side

See peripheral side (P-side).

PABX

See private automatic branch exchange (PABX).

packet assembler/disassembler (PAD)

A device that enables data terminal equipment (DTE) not equipped for packet switching to access a packet-switched network. Functions of a PAD include assembling characters into packets, forwarding data packets, handling virtual call setup and clearing, and disassembling user data in packets for delivery to start-stop DTE.

packet handler (PH)

The Consultative Committee on International Telephony and Telegraphy (CCITT) term for the component of an integrated services digital network (ISDN) switch that provides packet switching services.

packet handler interface (PHI)

The functional name of the device in an exchange termination used for multiplexing low-speed packet data on the D-channel into a DS-1 format for transmission on links joining the exchange termination to the packet handler. The PHI also performs the reverse operation.

PAD

See packet assembler/disassembler (PAD).

PBX

See private branch exchange (PBX).

PC

Personal computer

PCM

See pulse code modulation (PCM).

PEC

See product engineering code (PEC).

peripheral module (PM)

A generic term referring to all hardware modules of DMS-100 Family systems that provide interfaces with external line, trunk, or service facilities. A PM contains peripheral processors, which perform local routines, thus relieving the load on the central processing unit.

peripheral side (P-side)

The side of a node facing away from the central control and towards the peripheral modules. *See also* central side (C-side).

permanent virtual circuit (PVC)

A continuously available virtual path between remote applications and DMS applications. The PVC eliminates the need to establish a circuit on an each call basis.

per trunk signaling (PTS)

Conventional telephony method, which multiplexes a call's control signals with voice or data over the same trunk.

PH

See packet handler (PH).

PHI

See packet handler interface (PHI).

physical layer

Layer 1 of the OSI model that provides raw information channels to layer 2, which is the datalink layer. The protocols used depend on whether the interface is the basic rate interface (BRI) or primary rate interface (PRI).

plain ordinary telephone service (POTS)

Basic conventional telephone service. In the context of service screening, POTS is a pseudo-service that is derived from the combination of a bearer service of speech with no supplementary services.

PM

See peripheral module (PM).

point-of-use power supply (PUPS)

The type of power supply used for an enhanced line concentrating module (LCME). It provides 5V power supply for ISDN line cards. There is one PUPs for each line drawer.

POTS

See plain ordinary telephone service (POTS).

PPSN

See public packet-switched network (PPSN).

PRA

See primary rate access (PRA). Preferred term is primary rate interface (PRI).

PRI

See primary rate interface (PRI).

primary rate access (PRA)

See primary rate interface (PRI).

primary rate interface (PRI)

Carries nB+D channels over a digital DS-1 facility (typically 23B+D in North America and 30B+D in Europe). PRI is used to link private networking facilities, such as PBXs, LANs, and host computers with a standardized architecture acting as the bridge between private switching equipment and the public network.

private (PVT) (call type)

Incoming and outgoing calls that connect the PBX to its virtual private network. The private network overflow to the public network may also be provisioned. The dialed digits may not conform to E.164 standards. *See also* public.

private automatic branch exchange (PABX)

Local automatic telephone office serving extensions in an organization and providing access to the public network.

private branch exchange (PBX)

A private telephone exchange, either automatic or attendant-operated, serving extensions in an organization and providing access to the public network.

product engineering code (PEC)

An 8-character code that provides a unique identification for each marketable product manufactured by Northern Telecom.

PSDS

See public switched data service (PSDS).

PTS

See per trunk signaling (PTS).

PUB

See public (PUB).

public (PUB)

Public calls connect the PBX to the central office in the case of direct outward dialing (DOD). For direct inward dialing (DID), public calls connect the central office to the PBX. The digits dialed conform to E.164 standards. *See also* private.

public packet switched network (PPSN)

Any common carrier network designed to carry data in the form of packets between public users.

public switched data service (PSDS)

Any common carrier network designed to switch data, not necessarily in packet form, between public users.

pulse code modulation (PCM)

Representation of an analog waveform by coding and quantizing periodic samples of the signal, so that each element of information consists of a binary number representing the value of the sample.

PUPS

See point-of-use power supply (PUPS).

PVC

See permanent virtual circuit.

PVT

See private (PVT).

Q.921

The CCITT recommendation that defines protocols at the datalink layer.

Q.931

The CCITT recommendation that defines protocols for circuit-switched call control at the network layer.

Q-channel

An 800-bit/s maintenance channel that runs on the S/T-bus from the network termination to the terminals.

Q/S-channels

The collective name for the Q-, R-, and S-channels.

resource module (RM)

A software module that performs packet switching operations on data packets sent from the access module or from digital trunks in the packet switched network.

RM

See resource module (RM).

S-channel

An 800-bit/s maintenance channel that runs on the S/T bus from terminals to the network termination. *See also* S/T bus.

S/T bus

An eight-wire bus (of which only four wires are used to transmit and receive messages) that connects terminals to the NT1 for access to the ISDN. Also known as an S/T-interface and an S/T-loop. Formerly known as a T-bus.

S/T-interface

CCITT name for the S/T-bus.

S/T-line card

An ISDN line card that terminates the S/T-bus in the LCME. When S/T-line cards are used, the U-interface and the NT1 are not required. The exchange termination acts as a network termination. *See also* U-line card.

SAPI

See service access point identifier (SAPI).

serial interface module (SIM)

A component of the digital interworking unit (DIU). The SIM provides the multiplexing or demultiplexing of the DS-1 links from the exchange termination (ET). One SIM demultiplexes eight channels from the DS-1 into eight individual circuits; therefore, three SIMs are required for each DS-1.

service access point identifier (SAPI)

Identifier that is used by datalink layer (layer 2) protocol to define the type of service allowed to an ISDN terminal.

service order

A facility consisting of commands used to change subscriber line service tables.

service order system

A user interface used to change, add, or delete a subscriber line. Standard telephone industry command format is used.

service profile

Set of services or feature parameters subscribed to by a logical terminal, and associated with the terminal through the service profile identifier (SPID). Synonym for the logical terminal.

service profile identifier (SPID)

A layer 3 identifier programmed into the logical terminal by the user during configuration, which uniquely identifies a logical terminal and its service profile to the switch. A SPID may be up to 20 alphanumeric (IA5) characters long and is typically generated using the primary directory number of the terminal and an optional short suffix. A SPID is unique on a switch and has significance only on the local interface.

SERVORD

See service order system (SERVORD).

signaling processor (SP)

The interface between a master processor and the control circuits in the line-side of a line module. Through the SP, the line circuits, ringing multiplexers, programmable ringing generators, and the activity circuit are controlled, and their status reported.

signaling processor memory (SPM) card

A circuit pack that contains memory for the signaling processor card.

SIM

See serial interface module (SIM).

SMDR

See Station Message Detailed Recording (SMDR).

SP

See signaling processor (SP).

SPID

See service profile identifier (SPID).

SPM

See signaling processor memory (SPM) card.

Station Message Detail Recording (SMDR) system

In Meridian Digital Centrex (MDC), a system that provides recording facilities for the details of billable and nonbillable calls for each MDC customer group.

stimulus signaling

For ISDN call control, stimulus signaling mode messages for call control are sent by the terminal to the network as a direct result of actions by the terminal user. Terminals that use stimulus signaling have little local intelligence and are driven by the network. These terminals do not keep records of call states. *See also* functional signaling.

supplementary services

Services that are not network-wide, but are provided to an ISDN terminal entirely by the exchange termination to which it is connected. These services include circuit-switched services that are based on MDC services and packet-switched services that are provided by the ISDN packet handler and packet switching network. Supplementary services also request optional facilities and require transport of additional information during a CCS7 call.

SWACT

See switch of activity (SWACT).

switch of activity (SWACT)

In a DMS fault tolerant system, a switch that changes the states of two identical devices devoted to the same function. A SWACT makes an active device inactive and an inactive device active.

TA

See terminal adapter (TA).

TCAP

See transaction capability application part (TCAP).

TEI

See terminal endpoint identifier (TEI).

telephony agent

Any kind of line, trunk, or special service circuit that performs a telephony function.

terminal adapter (TA)

A device with associated software that allows a personal computer to connect to a Northern Telecom ISDN.

terminal endpoint identifier (TEI)

The identity number used to identify each terminal on an ISDN interface.

TIE

See TIE (call type).

TIE (call type)

A type of call that occurs on private incoming and outgoing lines that are between private branch exchanges (PBX).

TL-1

See transaction language one (TL-1).

TR

Bellcore technical requirements

transaction capability application part (TCAP)

A proprietary Northern Telecom layer of the protocol developed for CCS7. TCAP provides the ability for the service switching point (SSP) to communicate with a service control point (SCP). TCAP is used by the ISDN network layer facility message to transport service information for transaction signaling, not associated with an active call, over PRI links.

transaction language one (TL-1)

The command interface between the ITS OS and the DMS which allows 2B1Q lines to be maintained. Phase 1 of TL1 supports protocol commands, information requests, action requests, and test requests. Phase 2 supports a more extensive command set and requires the installation of an ESTU.

U-interface

The CCITT term for a U-loop. *See also* U-loop.

U-ISLC

See ISDN U-line card (U-ISLC).

U-line card

ISDN line card which terminates the U-loop in the LCME. When U-line cards are used, the NT1, situated on customer premises, acts as the network termination.

U-loop

The portion of a BRI that connects an NT1 to an ISDN line concentrating module or an enhanced line concentrating module (LCME). *See also* U-interface.

unified processor (UP)

A processor that replaces the master processor (MP), signaling processor (SP), and the memory cards associated with these processors.

universal terminal adapter (UTA)

A device with associated software that allows non-ISDN devices such as personal computers to connect to a Northern Telecom ISDN line.

universal tone receiver (UTR)

An optional card in the peripheral module (PM). If the UTR is not included in a specific PM, the central control (CC) can establish a network connection between that PM and one that has a UTR. The UTR is a 32-channel tone receiver. Thirty channels detect a variety of tones, including dual-tone multifrequency (DTMF) for lines and multifrequency (MF) for trunks. Tone samples are switched onto the parallel speech bus by the time switch and are collected by the UTR at the appropriate time slots. The UTR analyzes the samples and identifies the tones. The results are then sent to the signaling processor (SP).

UP

See unified processor (UP).

UTA

See universal terminal adapter (UTA).

UTR

See universal tone receiver (UTR).

VC

See virtual circuit (VC).

virtual circuit (VC)

In packet switching, a network facility used for transferring data between those data stations emulating physically-connected stations.

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.31

CCITT recommendation for support of terminal equipment by ISDN

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.

X.75'

X.75 prime. The Bellcore ISDN packet protocol extension to X.75 for connections between ISDN nodes and supporting PPSNs.

X.121

CCITT standard for data network address

XLIU

X.25/X.75 link interface unit

XMS

A workstation-based microcomputer with networking capabilities. XMS is based on a Motorola 68000 microprocessor with system software written in BNR Pascal.

XMS-based peripheral module (XPM)

The generic name for XMS peripheral modules (PM) that use the Motorola 68000 microprocessor. An XPM has two processors in a hot standby configuration: a master processor (MP) and a signaling processor (SP).

XMS-based peripheral module product life upgrade strategy (XPM-PLUS)

The integration of a new processor complex into the existing XPM architecture.

XPM

See XMS-based peripheral module (XPM).

XPM PLUS

See XMS-based peripheral module product life upgrade strategy (XPM PLUS).

XSG

X.25 service group

ZCS

See zero code suppression (ZCS).

zero code suppression

In telephone digital transmission, the insertion of pulses to break up a string of 0 bits, when the string is long enough to disrupt clock synchronization.

DMS-100 Family

Integrated Services Digital Network

Product Guide

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