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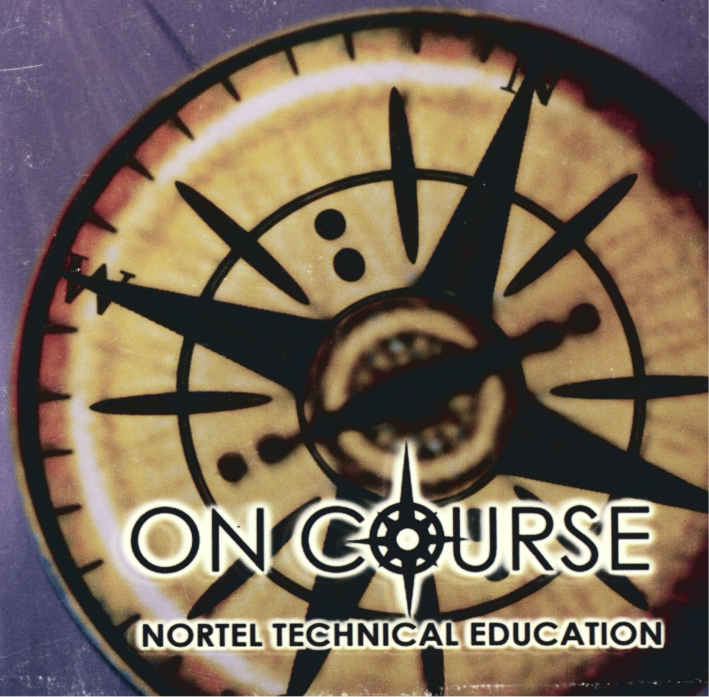

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NORTEL
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DMS SUPERNODE SYSTEM PRIMARY RATE INTERFACE (PRI) TRANSLATIONS

COURSE 7002

STUDENT GUIDE 298-7002-001.05.01

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Course Introduction

The purpose of this course is to provide you with the skills to datafill the tables required for the Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) on an ISDN node.

This course addresses ISDN PRI-related issues for both the DMS SuperNode and DMS-250 Switches. In general, the basic functions, features, and datafill of the tables required for PRI are the same for the DMS SuperNode and DMS-250 switches. However, there are several differences between the two switches in the areas of Integrated Services Access, Bearer Capability Routing, and PRI network features. The differences are clearly marked in your student guide. Your instructor will ensure these specific differences are noted and explained during the course.

Course Objectives

After completing this course, you will be able to:

- Identify basic functions and features of the Primary Rate Interface (PRI).
- Identify and datafill the tables required for PRI.
- Identify the function of the Integrated Services Access feature and use the Translation Verification (TRAVER) utility.
- Identify functions and features of Bearer Capability Routing and datafill required tables.
- Identify PRI network features and datafill required tables.

Prerequisites

You should have a basic understanding of lines, trunks, and routing translations as used in the DMS SuperNode or the DMS-250. Additionally, you will need a general knowledge of the principles of ISDN technology and architecture, packet switching architecture, and customer applications.

This knowledge can be acquired by completing the following Nortel courses:

- Course 0170, *Introduction to Integrated Services Digital Network (ISDN) Computer-Based Training*
- Course 0314, *DMS SuperNode Meridian Digital Centrex (MDC) Translations*
- Course 3400, *Introduction to DMS SuperNode Translations*
- Course 3401, *Creating DMS SuperNode Translations*
- Course 3402, *Troubleshooting DMS SuperNode Translations*
- One of the following courses:
  - — Course 3710, *DMS-250 Translations (SPRINT)*
  - — Course 3711, *DMS-250 Translations (MCI)*
  - — Course 3712, *DMS-250 Translations (UCS/IXC)*

Course Agenda

Day 1

Component	Title
Lesson 1	Primary Rate Interface (PRI) Overview
Lesson 2	PRI Table Datafill

Day 2

Component	Title
Lesson 2	PRI Table Datafill (continued)
Lesson 3	Integrated Services Access (ISA)
Lesson 4	Q.931 Signaling

Day 3

Component	Title
Lesson 5	Bearer Capability Routing
Lesson 6	PRI Network Features

Documentation Used in This Course

The following Northern Telecom Publications (NTPs) and specifications were used in the development of this courseware and should be used as reference material following completion of the course. The NTPs are regularly updated. They are the most current source of information.

Title	Number
DMS SuperNode ISDN Primary Rate Interface Translations Guide	297-2401-360
ISDN PRI Maintenance Guide	297-2401-502
DMS SuperNode Dialable Wideband Service	297-2461-021
ISDN ETSI Primary Rate Interface Trouble Locating-Clearing Procedures	297-2471-554
North American DMS SuperNode Translations Guide	297-8001-350
ISDN Primary Rate User-Network Interface Specification	NIS A211-1
DMS-250 Data Schema Reference Manual	297-2621-851 Volumes 1 to 4
UCS DMS-250 Integrated Services Digital Network (ISDN) Reference Manual	297-2621-106

Lesson 1

Primary Rate Interface (PRI) Overview

The purpose of this lesson is to provide you with an overview of capabilities and configuration of the Primary Rate Interface (PRI) in the DMS SuperNode environment.

Lesson Objectives

After completing this lesson, you will be able to:

- Define the basic function of the Primary Rate Interface (PRI).
- Define the term 23 B+D and its significance to the PRI.
- Define PRI trunking features.
- Define network calling features.
- Describe the function of the Integrated Services Digital Network (ISDN) Digital Trunk Controller (DTCI) and selected cards.
- Identify the quantity of PRI B-channels and DS1 circuits that can interface the DTCI when the opposite end of the link is an SL1, DMS SuperNode, or SL-100 node.

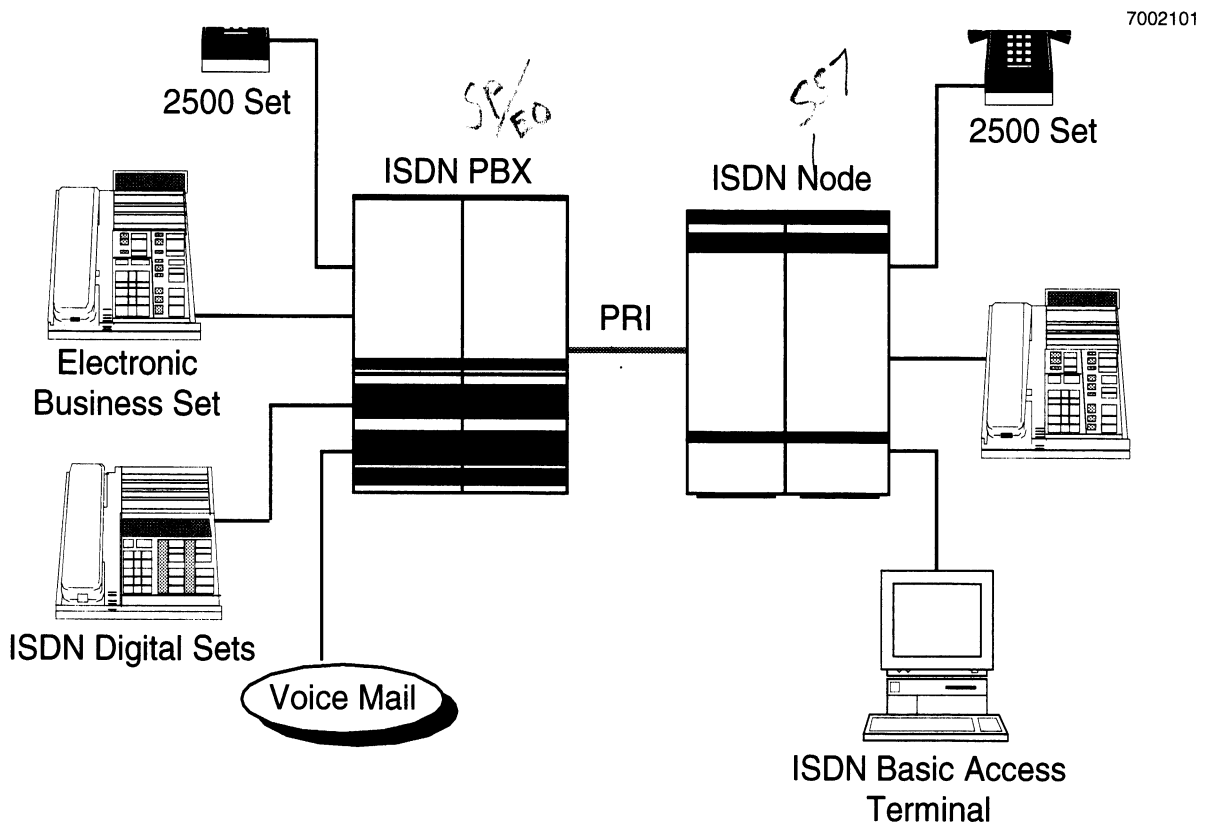
Introduction

Primary Rate Interface (PRI) is the ISDN trunking technology which enables the networking of multiple locations. PRI also allows access to a hybrid network of both public and private facilities.

A single PRI trunk group can carry various types of traffic. This capability provides a more efficient use of trunk facilities than allocating one trunk group for each call type.

PRI improves service by providing Network Name Display, Network Ring Again, and other custom features to subscribers on different switches. As shown in Figure 1, the PRI link between the Private Branch Exchange (PBX) and the DMS SuperNode office allows one of the PBX subscribers to activate the Network Ring Again feature against a subscriber on the Digital Multiplex System (DMS) and then receive notification when that line becomes available.

Figure 1 Primary Rate Interface (PRI)



PRI Channels

PRI utilizes one or more DS1 access facilities, which contain twenty-four 64-kbps digital channels. The typical PRI configuration allocates one DS1 facility as a PRI trunk group. Calls are connected over the 23 B-channels of the facility. Signaling information for these calls is transmitted on one D-channel, hence, 23 B+D.

PRI D-Channel Signaling

PRI D-channel signaling is similar to Basic Rate Interface (BRI) 2 B+D with these exceptions:

- The PRI D-channel is 64 kbps; in BRI, the D-channel is 16 kbps.
- PRI D-channels transmit the call control signaling for voice and circuit switched data, but no packet information. These messages are transmitted using Q.931 protocol. (BRI D-channels send call-control signaling for voice and circuit-switched data and transmit low-speed packet data.)

Figure 2 represents a 23 B+D configuration.

Figure 2 PRI 23 B+D-Channels

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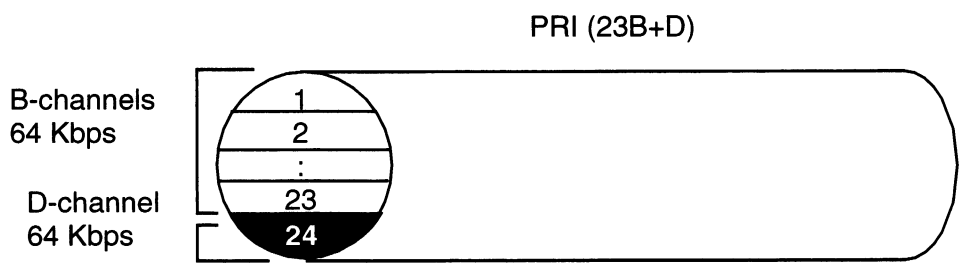

PRI Trunk

Each PRI trunk group requires one D-channel and can support multiple DS1s, up to a maximum of 479 B-channels distributed over 20 DS1 links. The Meridian SL1 supports 16 DS1 links to the DMS SuperNode and 64 D-channels. The number of B-channels that may be controlled by a single D-channel is 254 when interfacing Meridian SL1 PBX. This is the maximum trunk group size in the SL1. Figure 3 shows DMS-to-PBX configuration with a five-span PRI trunk group between them.

Figure 3 B- and D-Channels

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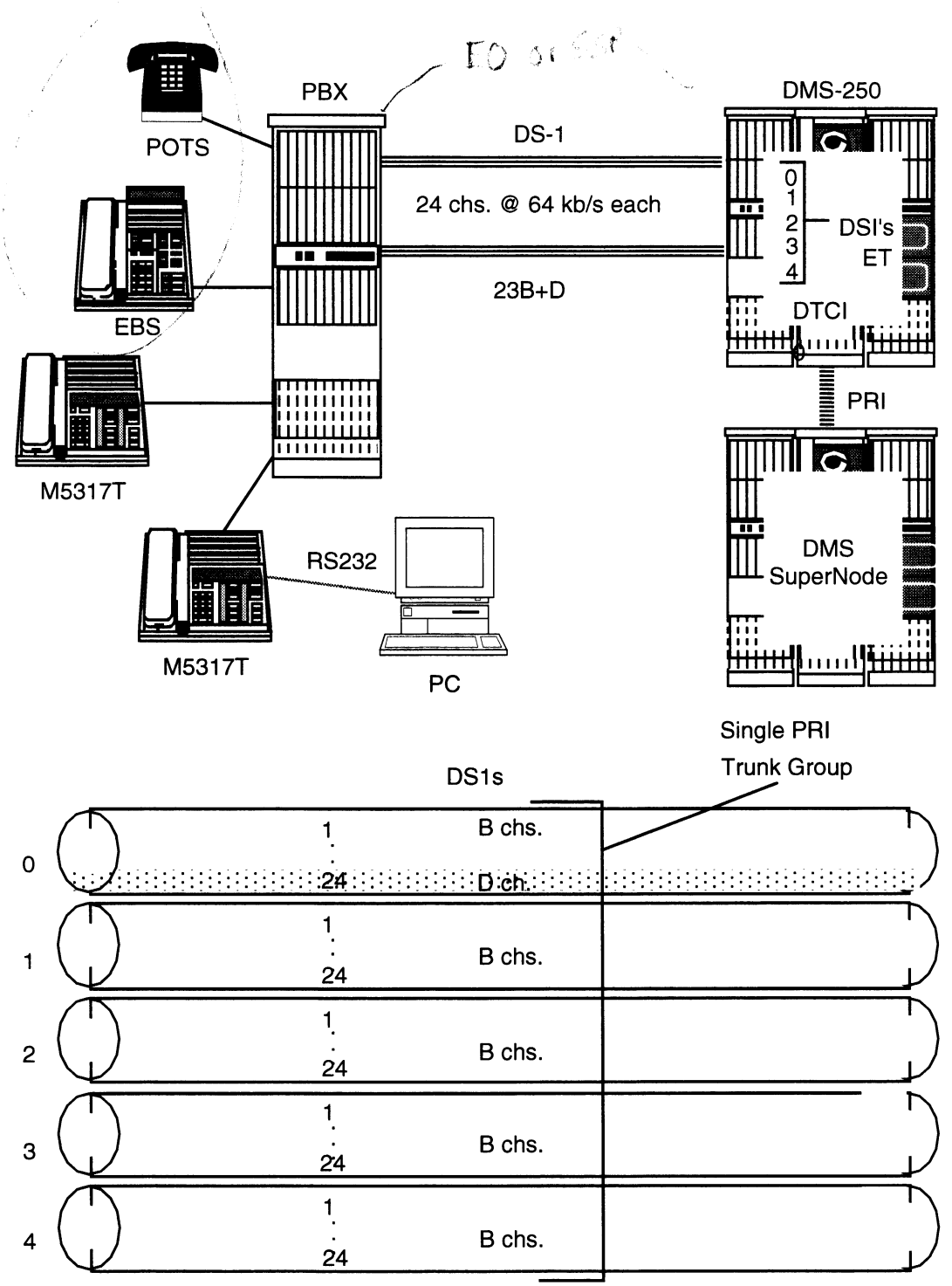

Trunking Features

The following trunking features are offered by PRI:

- Integrated Services Access (ISA)
- Backup D-channel
- Bearer capability trunking
- Enhanced equal access
- Dialable Wideband Service (DWS)
- Call-by-Call Hotel/Motel and Selective Class of Call Screening Service Selection

Integrated Services Access (ISA)

Traditionally, each unique trunk group type carried a specific type of traffic, making it necessary to provision multiple trunk groups between a PBX and its serving central office. PRI enables one PRI trunk group to replace many trunk groups, providing a much more efficient use of trunk circuits. Refer to Figure 4.

The following call types are supported by the ISA feature:

- Inbound Wide Area Telephone Service (INWATS)
- Outbound Wide Area Telephone Service (OUTWATS)
- Foreign Exchange (FX)
- Public (PUB)
- Private (PVT)
- TIE

Routes for outgoing ISA calls are built using the ISA route selector. This selector inputs information into protocol messages which are sent to the far node via Q.931 call control signaling. This selector allows more specific information to be passed than is possible using conventional signaling.

Incoming PRI calls are translated using this call control information by accessing tables that list unique data for each call type. However, if the only call types to be used are PUB and PVT, ISA is not used.

Figure 4 Call Types

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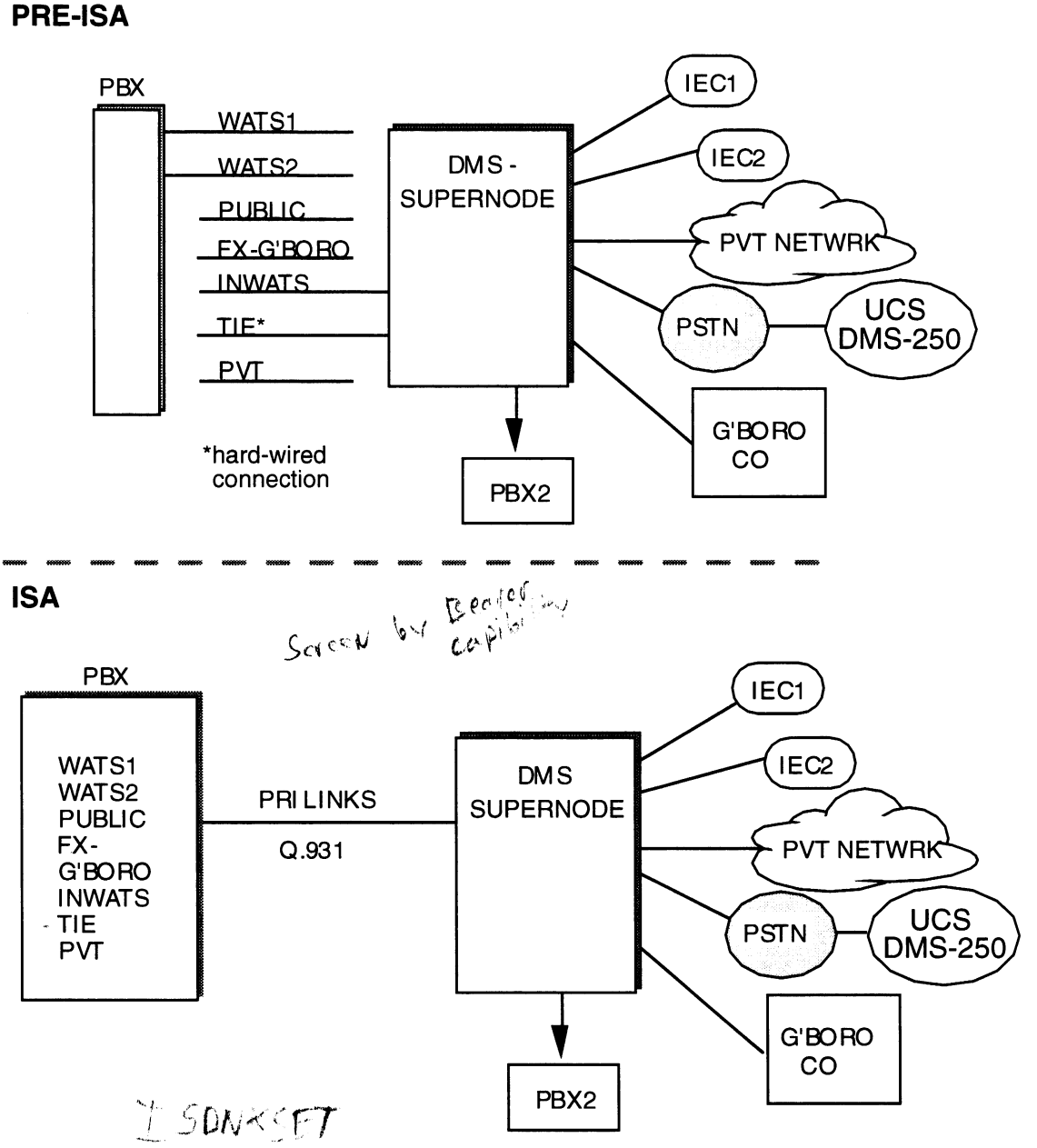


Backup D-Channel

One D-channel may be configured to interface up to 479 B-channels on a maximum of 20 DS1s, provided the DS1s are in the same peripheral module (PM). This configuration is called **nBN+d**.

When more than one DS1 span is used to interface a PRI trunk, a backup D-channel is recommended for reliability. This backup channel will become active if the primary D-channel fails. The backup D-channel should be on a different span and a different DS1 interface card than the primary D-channel in case an entire span or interface card becomes inoperable.

Bearer Capability (BC) Trunking

Bearer capability (BC) trunking assures that the originator of an ISDN call such as a terminal device or a Primary Rate Access (PRA) trunk can communicate with the terminator. Traditionally, called number information was the only factor for determining the destination of a call. The ISDN translation and routing system enables the call's destination to be determined by the called number, the call type, and the bearer capability of the originator.

The eight default bearer capabilities are

- Speech (voice and voice band data)
- 64 kbps unrestricted circuit-switched digital data
- 64 kbps restricted circuit-switched digital data
- 56 kbps circuit-switched digital data
- 1 kHz audio
- 384 kbps unrestricted circuit-switched digital data
- 1536 kbps unrestricted circuit-switched digital data
- Multirate (*n* by 64) Dialable Wideband Service (DWS)

Interoffice Private Trunking

The initial application of PRI allowed PBX-to-central office (CO) networking. PRI trunks may now be provisioned between COs, providing feature networking to multiple Centrex locations and extending these to PBXs as well.

Enhanced Equal Access

Equal access carrier selection for outgoing PRI calls has been enhanced by the creation of the *transit network selection information element,* which is part of the Setup message. A choice of carriers can also be made by prefixing the called party number with the "10XXX" digits of the selected carrier.

L PIC

Dialable Wideband Service (DWS)

DWS is a DMS SuperNode data service available with PRI. This public-switched service offers variable bandwidth on demand with single number dialing. DWS allows the subscriber to request *n by 64* kbps channels (128 kbps through 1.536 Mbps) on a per-call basis.

DWS provides the following capabilities:

- Multirate
- ISDN-switched flexible service
- Dialable on-demand wideband service
- Selectable bandwidth rate for each call
- Video transmission and video conferencing
- High-speed applications

With DWS, a subscriber can transmit digital information through the network without having the expense and maintenance of physically hardwired and dedicated resources. The subscriber dials a directory number to establish the wideband connection. Table 1 provides the throughput values supported for all valid N values (2 to 24).

Table 1 NX64 Data Throughput

N Value	Data Throughput	N Value	Data Throughput	N Value	Data Throughput
2	128 kbps	10	640 kbps	18	1.152 Mbps
3	192 kbps	11	704 kbps	19	1.216 Mbps
4	256 kbps	12	768 kbps	20	1.280 Mbps
5	320 kbps	13	832 kbps	21	1.344 Mbps
6	384 kbps	14	896 kbps	22	1.408 Mbps
7	448 kbps	15	960 kbps	23	1.472 Mbps
8	512 kbps	16	1.024 Mbps	24	1.536 Mbps
9	576 kbps	17	1.088 Mbps		

Call-by-Call Hotel/Motel (HM) and Selective Class of Call Screening (SCOCS) Service Selection

NI PRI Hotel/Motel SCOCS Services enable the operator services system to send a station's service class of call screening (SCOCS) code over multifrequency (MF) trunks to a PBX operator so that station-restricted telephones can provide accurate billing to the operator system. Station-restricted telephones include those found in:

- Hotels and motels
- Dormitories
- Prisons
- Business campuses
- Hospitals

The NI PRI routes the digits received from the PBX to the automatic number identification (ANI) stream going to the operator services system via the DMS-100 switch.

Network Calling Features

PRI extends the application of certain MDC features to include the entire hybrid network.

Calling Line ID

The Calling Number Delivery service provides the directory number of the calling party to the terminating PRI. The terminating node may then deliver this number to the called device, normally as a display to the called party.

Network Redirection and Reason

The Network Redirection and Reason service informs the calling and called parties about any redirections that may occur during the life of a call.

The following redirection services are supported:

- Call Forwarding Universal (CFU)
- Call Forwarding Busy (CFB)
- Call Forwarding No Reply (CFNR)
- Call Transfer
- Call Pickup

Table 2 shows the three main features of the Network Redirection and Reason service.

Table 2 Network Redirection and Reason Service

Feature	Description
Notification of redirection before answer	The calling party will be informed of the reason for redirection and the directory number of the new destination.
Notification of redirection after answer	The connected parties will be informed of the reason for redirection and the directory number of the new connected party.
Notification of redirected call	The new destination of a redirected call will be informed of the original destination and the reason for redirection.

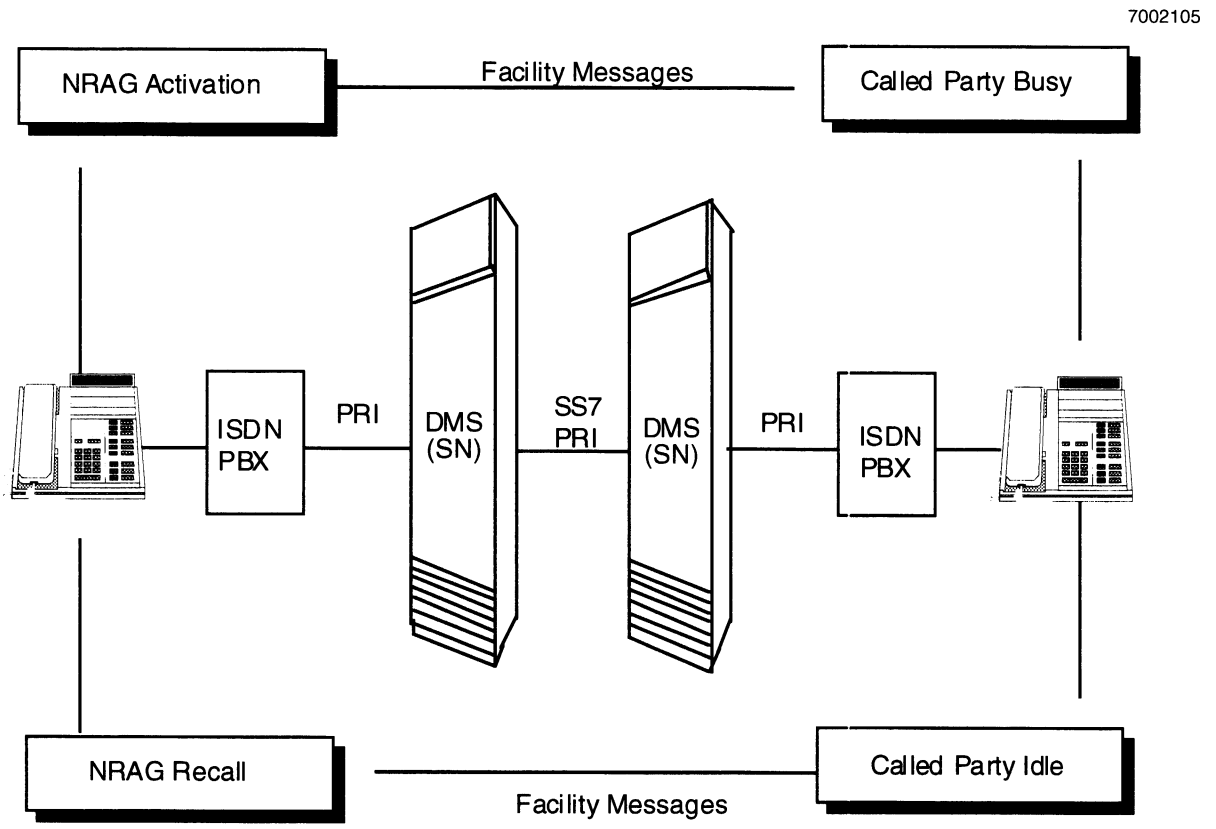
Network Ring Again (NRAG) on PRI

The NRAG feature allows a subscriber who calls a busy station to queue against that station and be recalled when it becomes idle. If the subscriber accepts the recall, the original call will automatically be set up again.

NRAG on PRI connects the calling and called parties on different switches connected by PRI trunks, as shown in Figure 5. Thus, a subscriber located in any of the switching nodes in the PRI network can apply NRAG against a busy station located in any of the nodes in the same network.

Note: Both stations must belong to the same network customer group.

Figure 5 Network Ring Again (NRAG)



Information and Number Delivery

The DMS SuperNode acts as a service node for all intraLATA (Local Access and Transport Area) and interLATA calls. The DMS SuperNode provides basic incoming and outgoing call setup with terminating Automatic Message Accounting (AMA) billing records, calling number, called number, and Automatic Number Identification (ANI) information.

The INFO+ service enables the service provider to offer its customers LATA-wide calling line ID by converting a calling number from a Multifrequency (MF) ANI format into the ISDN Q.931 format. The calling number is made available to customers over PRI.

As illustrated in Figure 6, the INFO+ service can deliver the information to an Automatic Call Distribution (ACD) station on a PBX.

Figure 6 Information and Service for Enhanced Service Providers

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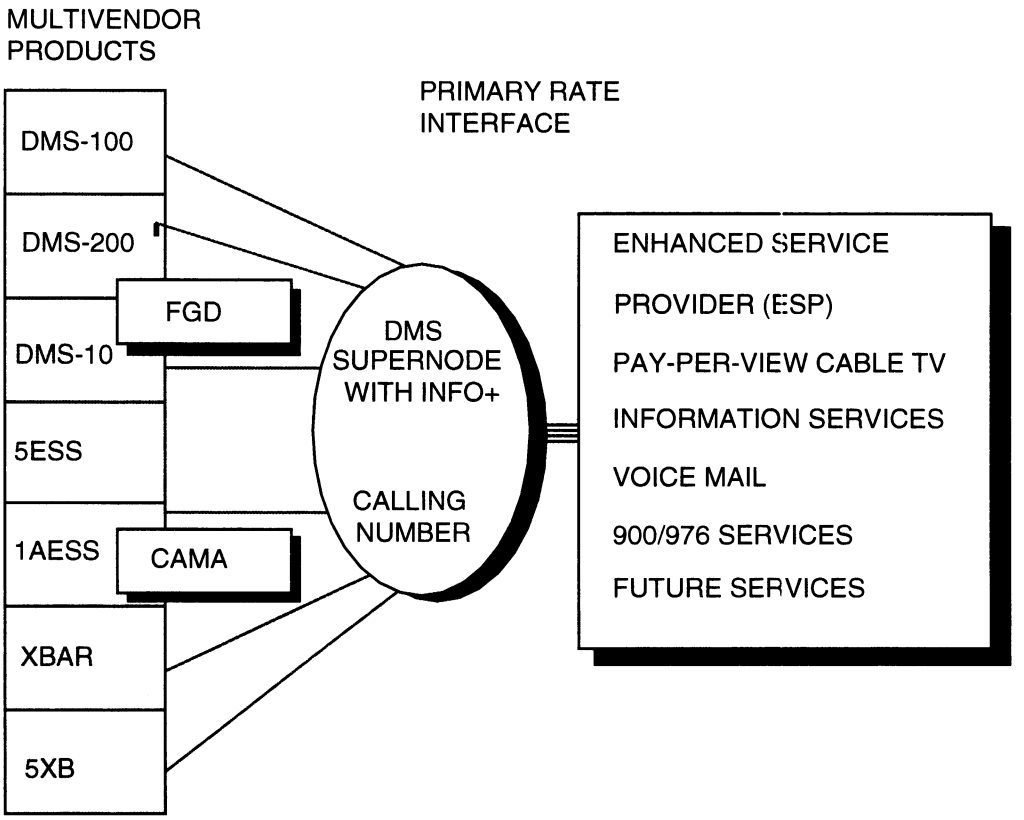


PRI Peripheral Modules

Two ways in which an ISDN common peripheral module can be equipped are

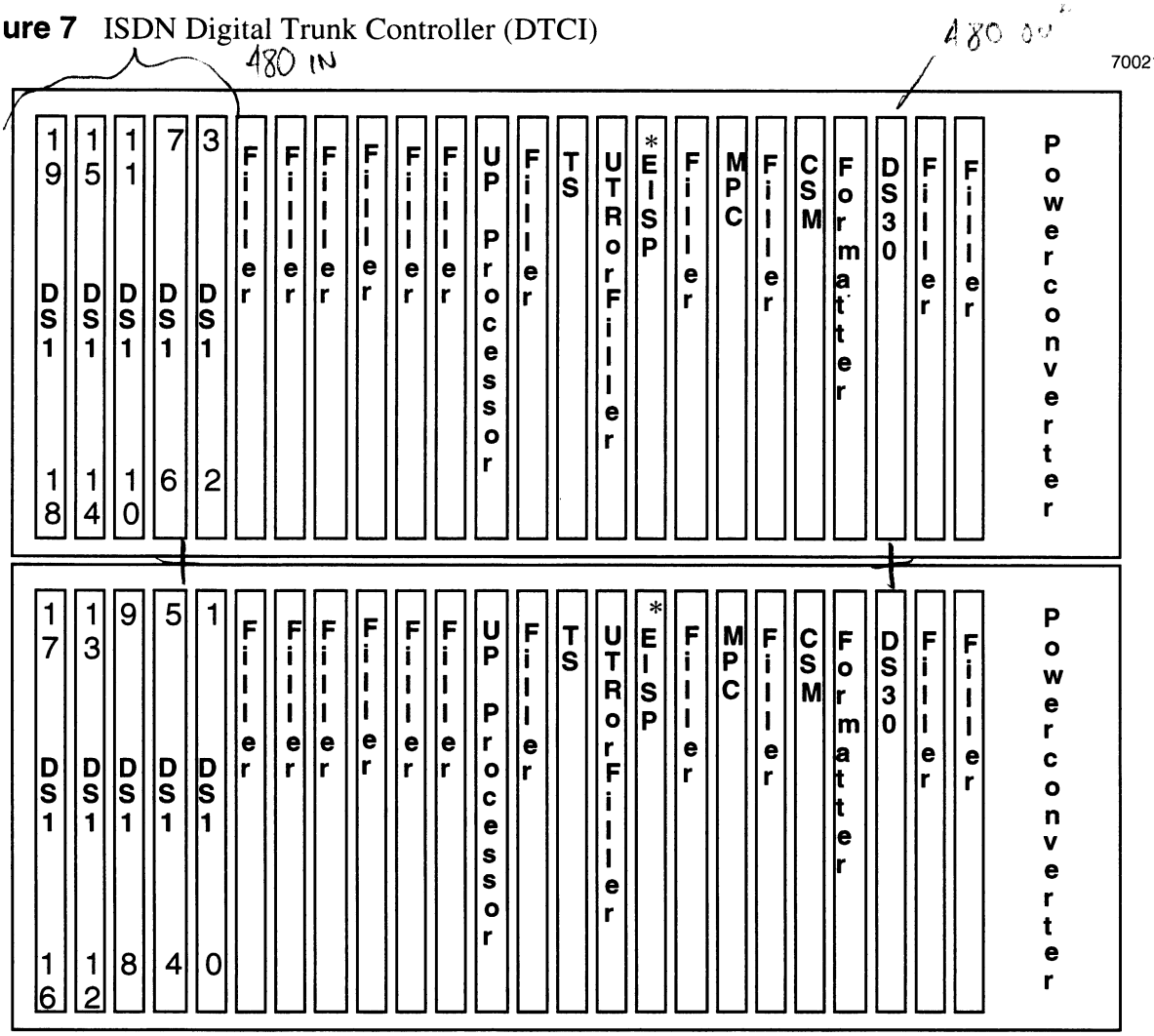
- A combination of BRI and PRI
- PRI only

If the ISDN common peripheral module to be used is only equipped for PRI, it will be called an ISDN Digital Trunk Controller (DTCI). D-Channel Handler (DCH) circuit packs are not required on the DTCI. If the module is equipped for both BRI and PRI, it will be called an ISDN Line Trunk Controller (LTC). This chapter will focus on the PRI-specific ISDN common peripheral module, the DTCI. It will require an EISP card BX02BA.

ISDN Digital Trunk Controller (DTCI)

The DTCI supports a maximum of 32 D-channels and up to 20 DS1 links on 10 DS1 cards. See Figure 7. The DS1s may be any combination of PRI trunks or other interoffice trunking facilities. The DTCI also provides the capability of provisioning PRI and non-PRI trunks on a single DS1. Since the DTCI interfaces strictly with DS1s, BRI D-channel handlers are not used. Instead, the ISDN Signaling Preprocessor (ISP) within the DTCI interfaces all D-channels on PRI trunks.

Figure 7 ISDN Digital Trunk Controller (DTCI)



Slot

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Note: Slot 16 of the 6X02 is the location of the EISP card BX01BA.

DTEI Frame

An ISDN Digital Trunk Equipment (DTEI) frame contains the DTCIs, the cooling unit, and the Frame Supervisory Panel (FSP), as shown in Figure 8. For PRI, the required equipment frame is the NT6X01AB ISDN common peripheral controller equipment frame.

NT6X02NA Packfill

One NT6X02NA ISDN common circuit pack (CP) fill for each module to be equipped must be provided for the CPCI peripheral controller.

Figure 8 ISDN Digital Trunk Equipment Frame

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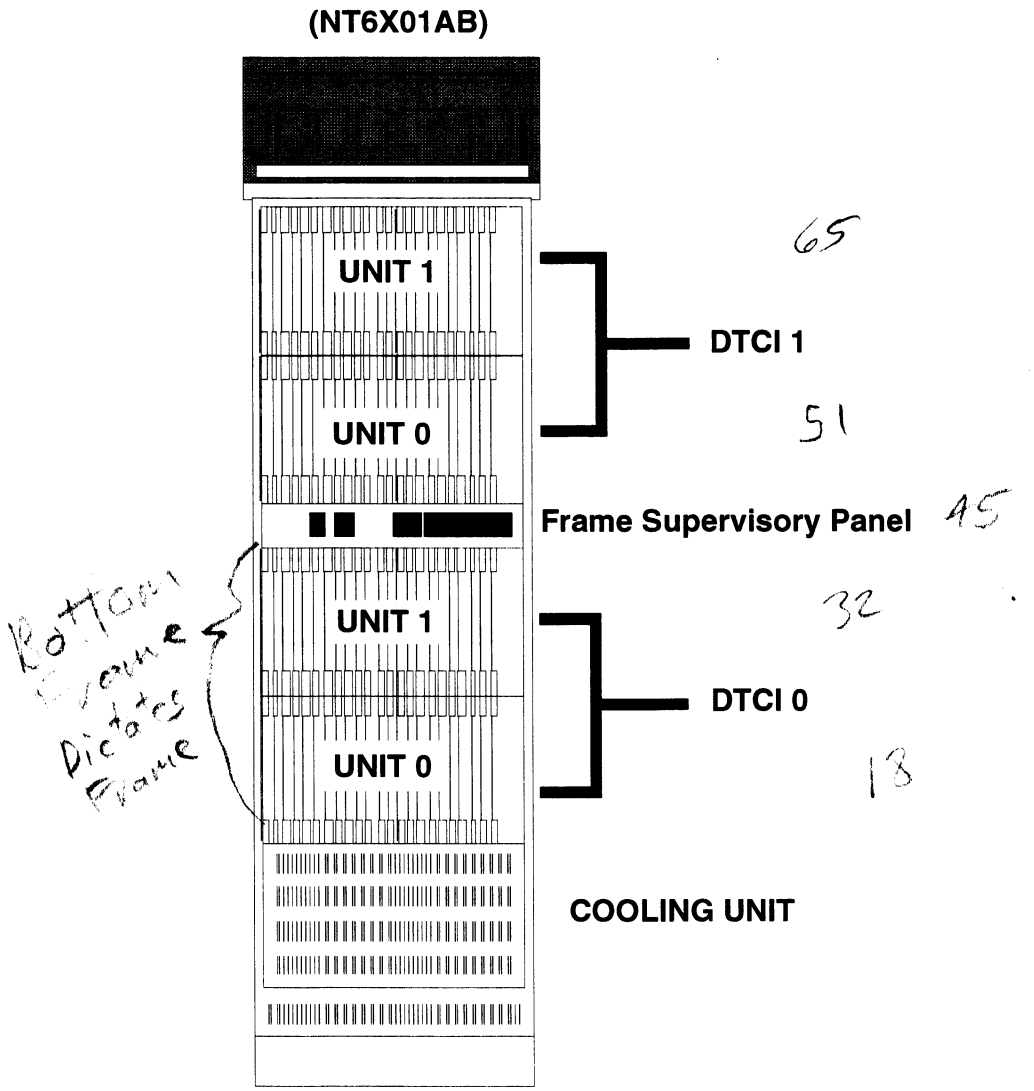


DTCI Cards

The DTCI shelf components are similar to those of a Digital Trunk Controller (DTC), with the exception of the signaling preprocessor card BX01BA and the type of load residing on the memory cards. Figure 9 shows the shelf components for the DTCI.

Figure 9 DTCI Shelf Packfill

7002109

DTCI

Slot		
1	17 DS-1 (6X50AB) 16	19 DS-1 (6X50AB) 18
2	13 DS-1 (6X50AB) 12	15 DS-1 (6X50AB) 14
3	9 DS-1 (6X50AB) 8	11 DS-1 (6X50AB) 10
4	5 DS-1 (6X50AB) 4	7 DS-1 (6X50AB) 6
5	1 DS-1 (6X50AB) 0	3 DS-1 (6X50AB) 2
6	Filler (0X50)	Filler (0X50)
7	Filler (0X50)	Filler (0X50)
8	Filler (0X50)	Filler (0X50)
9	Filler (0X50)	Filler (0X50)
10	Filler (0X50)	Filler (0X50)
11	Filler (0X50)	Filler (0X50)
12	Universal Processor (MX77AA)	Universal Processor (MX77AA)
13	Filler (0X50)	Filler (0X50)
14	Time switch (6X44) (AX78)	Time switch (6X44) (AX78)
15	Universal tone recv (6X92)	Universal tone recv (6X92)
16	*ISDN signaling preproc (BX01●) BA*	*ISDN signaling preproc (BX01●) BA*
17	Filler (0X50)	Filler (0X50)
18	MSG and tone (6X69)	MSG and tone (6X69)
19	Filler (0X50)	Filler (0X50)
20	Channel supv msg (6X42)	Channel supv msg (6X42)
21	Formatter (6X41)	Formatter (6X41)
22	DS-30 (6X40)	DS-30 (6X40)
23	Filler (0X50)	Filler (0X50)
24	Filler (0X50)	Filler (0X50)
25	Power converter (2X70)	Power converter (2X70)

XPM PLUS

ISDN Signaling Preprocessor (ISP)

The DTCI interfaces with DS1s. The signaling information contained in the D-channel is processed in the DMS-100 and DMS-250 by an ISDN Signaling Preprocessor (ISP) card (BX01BA) in the DTCI. The ISP within the DTCI interfaces all D-channels on PRI trunks. The ISP card can handle a maximum of 32 D-channels, and it resides in Slot 16 of the DTCI.

DS1 Interface

The DS1 interface card (NT6X50AB) allows the DTCI to interface DS1 links. The NT6X50AB card is located in Card Slots 1 to 5 on the DTCI. One card is required to accommodate two DS1s; therefore, ten DS1s are supported per DTCI unit (two units per DTCI 0 and 1).

Universal Tone Receiver (UTR)

The UTR card (NT6X92BB) identifies and processes Pulse Code Modulation (PCM) tones from 30 voice channels on the DTCI's parallel speech bus. The UTR is required for A/B-bit signaling and is used if standard per-trunk signaling is supported by the DTCI.

Enhanced Time Switch (ETS)

The Enhanced Time Switch (ETS) card (NTAX78BA) is required for the DTCI and the DTC7 to provide Dialable Wideband Service (DWS) capability. This card provides the constant property that DWS requires to maintain the sequenced order of data received (multiple bytes per frame) across the entire switch.

In addition, this card will expand the traffic/line capacity of existing LTC/LGC ISDN peripherals. The AX78 doubles the P-side capacity of the XPM from 20 to 40 ports.

Shelf Configuration Notes

Table 3 contains shelf configuration notes.

Table 3 Shelf Configuration

Slot	Card	NT PEC	Remarks
01-05	DS1	6X50AB	DS1 interface. Up to 5 DS1 cards on each unit are supported.
06-07	---	0X50AA	Filler panel
08	---	0X50AA	Filler panel
09	---	0X50AA	Filler panel
10	---	0X50AA	Filler panel
11	---	0X50AA	Filler panel
12	UP	MX77AA	Universal Processor
13	---	0X50AA	Filler panel
14	TS	6X44/AX78	Time switch
15	UTR	6X92BB	UTR
16	ISP	BX01BA	ISDN Enhanced signaling preprocessor
17	---	0X50AA	Filler panel
18	MI	6X69AB	Message interface
19	---	0X50AA	Filler panel
20	CSM	6X42AA	Channel supervision message
21	FM	6X41AA	Formatter
22	DS30	6X40FA	DS30 interface (16-port fiber interface)
23	---	0X50AA	Filler panel
25	PCONV	2X70AD	Power converter

Check Your Learning

1. The ISDN digital trunk controller (DTCI) peripheral may be used to interface both Basic Rate Interface (BRI) and Primary Rate Interface (PRI) in a DMS SuperNode ISDN node.

   True or False

2. The Universal Tone Receiver card supports standard per-trunk signaling on the DTCI.

   True or False

3. For the DTCI peripheral:

   a. List the maximum number of D-channels it can support.

   32

   b. List the maximum number of DS1 links it can connect to.

   20

4. For the MSL-1 PBX:

   a. List the maximum number of D-channels it can support.

   64

   b. List the maximum number of DS1 links it can connect to.

   16

5. Name the DTCI card and the card code (PEC) that processes signaling information on the D-channel.

ISP

BX01BI

6. List the number of DS1 links that each DS1 Interface card can connect to. Ten DS1 cards are required to support the maximum quantity of 20 DS1 links on a DTCI.

2

7. Primary rate interface is a packet-switched technology commonly called "23 B+D."

True or False

8. The term 23 B+D represents a DS1 span containing twenty-three 64 kbps B-channels and one 16-kbps D-channel.

True or False

9. PRI transmits call control signaling information over the D-channel, but no packet data.

True or False

10. A backup D-channel must be on the same DS1 facility as the primary D-channel.

True or False

11. Name the feature that combines calls of various call types on the same trunk facility. List four of the available call types.

ISA Integrated Services Access

a. Public

b. Private

c. FX

d. TIE

12. Name the process that ensures that the originator of an ISDN call can communicate with the terminator.

Bearer Capability

13. Name the information element in the Setup message that may be used to send carrier information to the far-end PRI node.

Transit Network Selection Information Element

Equal Access (TNS)

Lesson 2

PRI Table Datafill

The purpose of this lesson is to provide you with the skills to set up the Integrated Services Digital Network (ISDN) Digital Trunk Controller (DTCI) and the DS1 links for Primary Rate Interface (PRI) service, using proper DMS SuperNode tables and datafill procedures.

Lesson Objectives

After completing this lesson, you will be able to:

- Describe Primary Rate Interface (PRI) datafill dependencies.
- Demonstrate proper datafill procedures for these tables:
  - — Carrier Maintenance (CARRMTC)
  - — Peripheral Module Loads (PMLOADS)
  - — Line Trunk Controller Inventory (LTCINV)
  - — Line Trunk Controller P-Side Inventory (LTCPSINV)
  - — Common Language Location Identifier (CLLI)
  - — Pad Data (PADDATA)
  - — Trunk Group (TRKGRP)
  - — Trunk Group 1 (TRKGRP1)
  - — ISDN Parameters (ISDNPARM)
  - — Trunk Subgroup (TRKSGRP)
  - — Trunk Member (TRKMEM)
  - — Logical Terminal Group (LTGRP)
  - — PRI Profile (PRIPROF)
  - — Logical Terminal Definition (LTDEF)
  - — Logical Terminal Mapping (LTMAP)
  - — Trunk Routing Characteristics Selector (TRKRCSEL)

Introduction

The procedures for datafilling PRI tables are organized into four categories:

1. Configuration tables define the PRI hardware requirements for the DTCI.

2. Facility-related tables define the PRI trunk facilities associated with the DTCI.

3. Service-related tables set up the call routing services associated with PRI applications.

4. Associating tables associate the information in the configuration and facility-related tables with the information in the service-related tables.

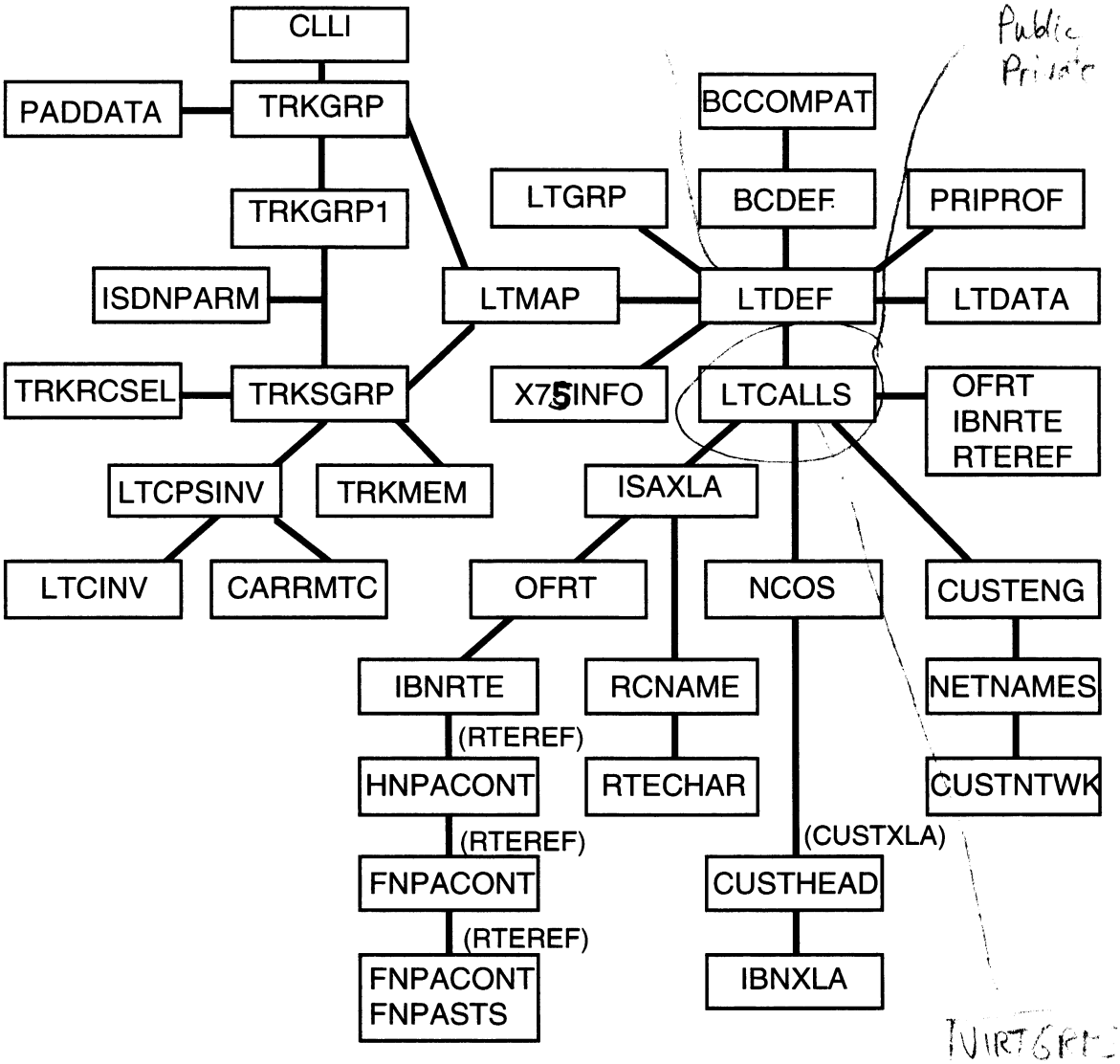
The tables within each category are discussed in the order in which they should be datafilled. Only those fields which are specific to PRI will be discussed in depth. For a complete description of other table fields, please refer to the appropriate Northern Telecom Publications (NTPs).

The order in which the PRI tables are datafilled is an important part of successful datafill procedures. Many PRI tables rely on other tables for information.

Some tables must be datafilled first while other tables may be datafilled in parallel. Using this student guide, you will complete each category before moving on to the next one.

Figure 10 shows an ISDN PRI flow chart of associated tables. These tables are used with the DMS SuperNode system and Centrex translations. Not all associated tables will be discussed.

Figure 10 ISDN PRI Associated Tables



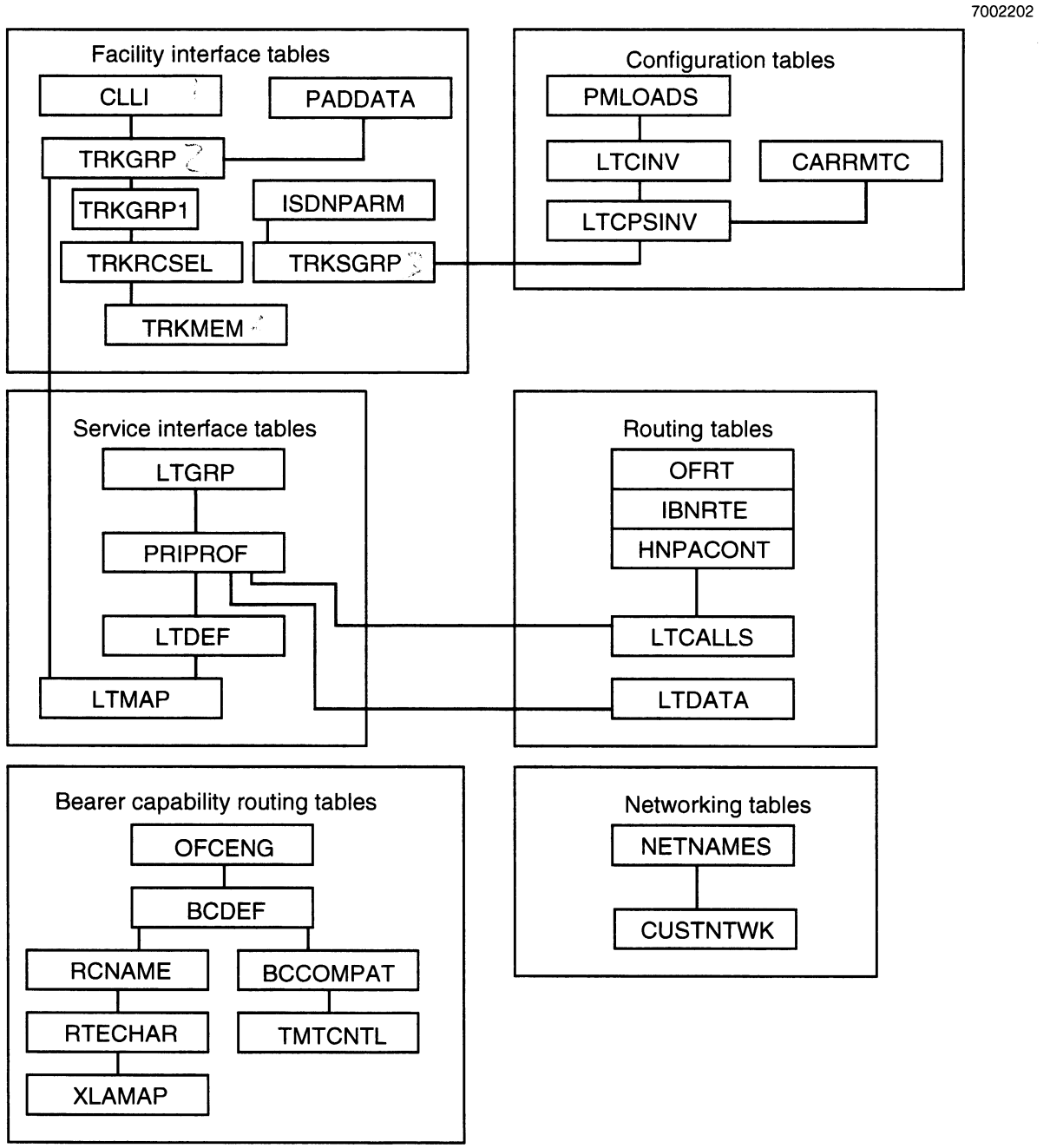
CLLI Use ADNUM greater than (50)
PADDATA
TRKGRP
LTCINV
CARRMTC
LTCPSINV
TRKSGRP
TRKMEM
LTGRP
PRIPROF - max 255 Profiles, max variants 15
LTDEF
LTMAP
TRKGRP1
TRKRCSEL

LTCALLS
NCOS
CUSTHEAD
IBNXLA
HNPACONT
OFRT
BCCOMPAT
BCDEF
ISDNPARM
RCNAME
RTECHAR
X75INFO

Figure 11 shows the deployment and organization of the DMS SuperNode ISDN PRI translation tables.

Note: Reference documents for PRA data tables: NTP 297-8001-350, *North American DMS SuperNode Translations Guide.*

Figure 11 Relationship of Datafill Tables

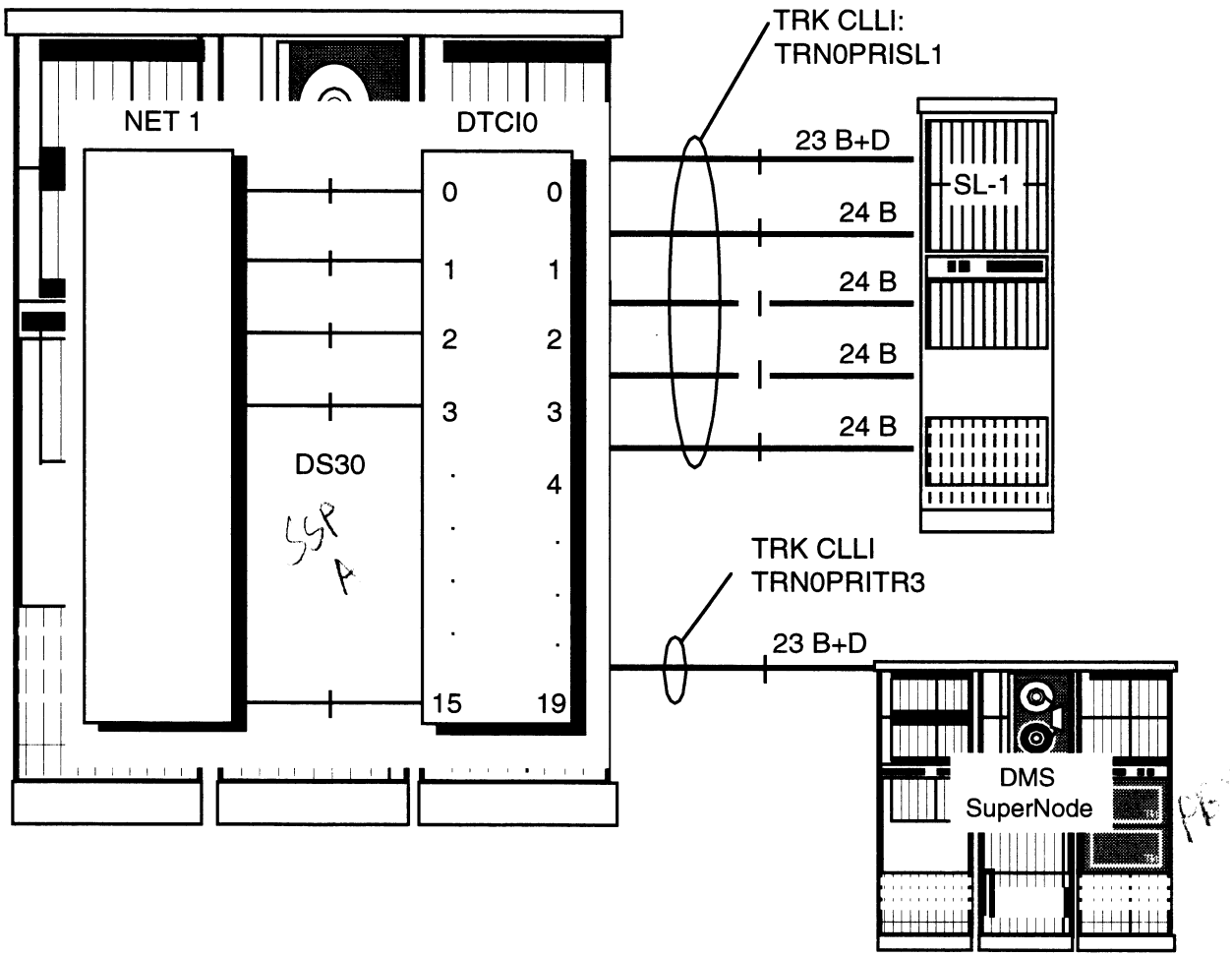


PRI Training Network

Each PRI table we discuss references the PRI training network in order to emphasize the table requirements. Figure 12 shows one DTCI in the DMS SuperNode with two PRI trunk groups. One trunk group, *CLLI TRN0PRISL1*, comprises five DS1 circuits and interfaces an SL1 Private Branch Exchange (PBX). The second trunk group, *CLLI TRN0PRITR3*, uses one DS1 and connects to a DMS SuperNode.

Trunk Group *CLLI TRN0PRISL1* contains 119 B-channels. These B-channels are supported by one D-channel located on Port 0 of DTCI 0.

Figure 12 PRI Training Network



Configuration Tables

The configuration tables define the PRI hardware requirements within the DMS SuperNode office:

- Table CARRMTC (Carrier Maintenance)
- Table PMLOADS (Peripheral Module Loads)
- Table LTCINV (Line Trunk Controller Inventory)
- Table LTCPSINV (Line Trunk Controller Peripheral Side Inventory)

Figure 13 shows that Tables LTCINV and CARRMTC can be datafilled in parallel; however, you should datafill the configuration tables in the order presented above. In addition, when an entry is defined within Table LTCINV, an entry is automatically written in Table LTCPSINV with an index into Table CARRMTC.

If the ISDN Digital Trunk Controller (DTCI) default index within Table CARRMTC does not exist, you cannot add the DTCI tuple within Table LTCINV. Verify the DTCI default tuple in Table CARRMTC before proceeding to Table LTCINV.

Figure 13 Configuration Tables

7002204

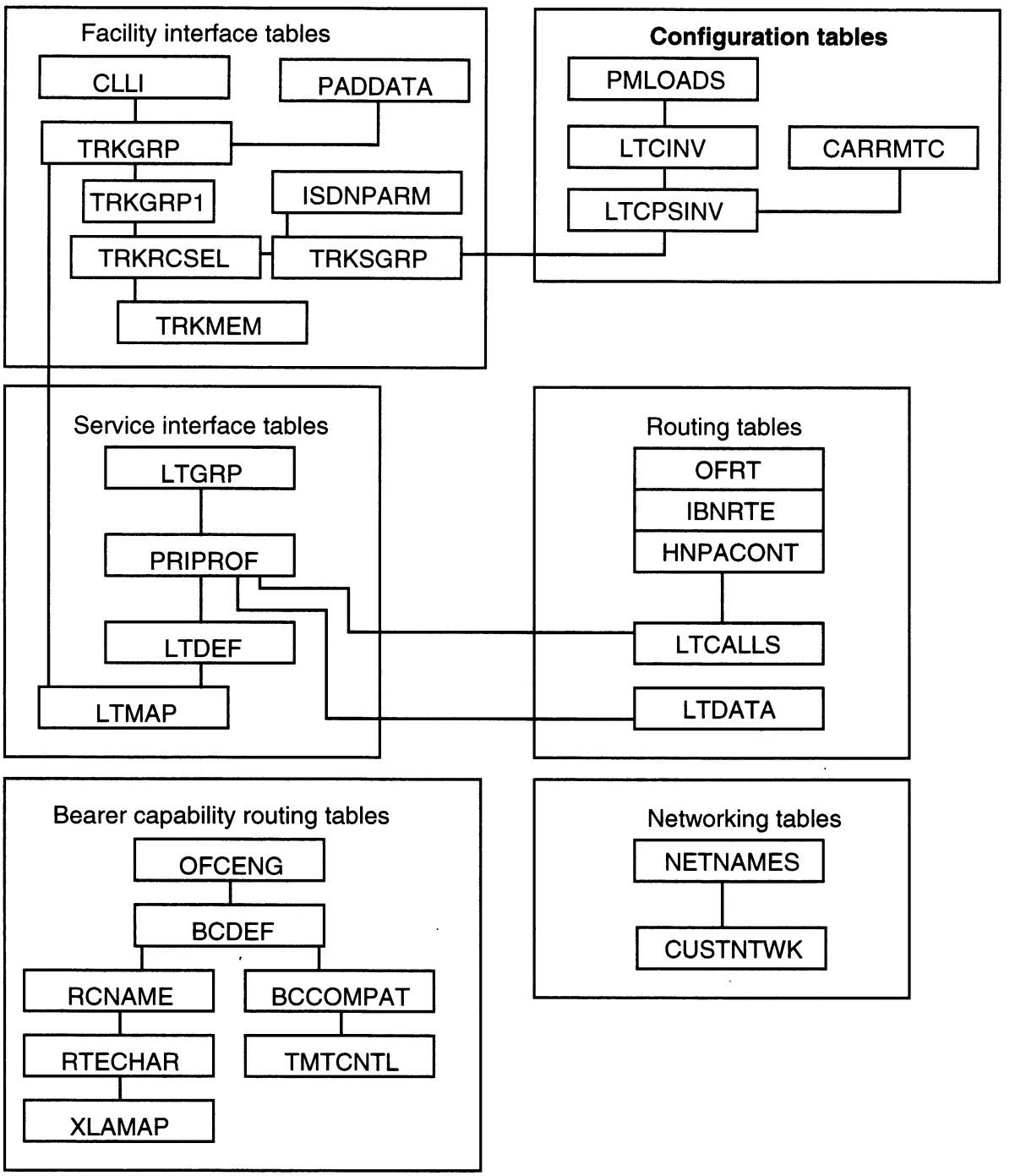


Table CARRMTC

Table CARRMTC (Carrier Maintenance) stores information regarding the attributes of the individual PRI trunks associated with the DTCI. This table defines the link coding and frame formats for the PRI trunk and provides maintenance control information for the links. The DTCI default tuple for the Local Carrier Group Alarm Clear (LCGACL) threshold is set to 1,000. For the DMS SuperNode, the DMS-250, and the SL1, the LCGACL should be set to 2,500.

PRI Fields

Table 4 lists the fields and describes the changes to Table CARRMTC as it applies to PRI.

Table 4 Table CARRMTC Fields

Field	Description	Values	Default
CSPMTYPE	C-side node PM type.	DTCI	DTCI
TMPLTNM	Template name of PM.	64KCLEAR or DWS	Default
RTSML	Return to service maintenance limit.	0 to 255	255
RTSOL	Return to service out of service limit. To RTS, manual intervention will be required.	0 to 255	255
Selector	Identifies value entered for PM type.	DS1	DS1
Card	DTCI cards added.	NT6X50AB	NT6X50AB
VOICELAW	Voice law used in the carrier.	MU_LAW or A_LAW	MU_LAW
FF	Frame format SF Standard superframe (12 frames) or ESF Extended superframe (24 frames). For DWS, use ESF.	SF or ESF	SF
ZLG	Zero Logic for zero code suppression or for Bipolar 8-Bits Zero Substitution (B8ZS). For DWS application, all T1 carriers must have B8ZS coding.	ZCS or B8ZS	B8ZS
BERB	Bit error rate base BPV checks for bipolar violations, CRC declares cyclic redundancy checking.	BPV or CRC	BPV

Table 4 Table CARRMTC Fields (continued)

LCGACL	Local carrier group alarm clear threshold in 10 ms increments; should be set to 2500 for PRI.	1 to 9,999	1,000 (2,500)
AISST	Alarm indication signal set threshold.	0 to 9,999	50
AISCL	Alarm indication signal clear threshold in 10 ms increments.	0 to 9,999	1,000
BEROL	Bit error rate out of service limit **n** expressed as the exponent 10^n. The default is 10^3, or one bit error per thousand bits.	3 to 6	3
BERML	Bit error rate maintenance limit	4 to 7	6
ES	Erred Seconds threshold; defines the span of time between bit errors within which an error second is declared.	0 to 9,999	864
SES	Severe erred seconds threshold; defines the span of time between bit errors within which a severe error second is declared.	0 to 9,999	100
FRAMEML	Frame bit error maintenance limit.	0 to 9,999	17
FRAMEOL	Frame bit error out of service limit.	0 to 9,999	511
SLIPML	Slip maintenance limit.	0 to 9,999	4
SLIPOL	Slip out-of-service limit.	0 to 9,999	255

Table CARRMTC contains peripheral module maintenance data, out-of-service limits for alarms, and system return-to-service information. Carrier alarms are characterized by steady state and hit state properties:

- An alarm is said to reach its "steady" state if the switch records a continuous occurrence of signals that do not meet the appropriate specification (LCGA, RCGA).
- An alarm is said to reach its "hit" state if the switch records isolated or intermittent occurrence of signals (for example, frame loss or frame slip alarms) do not meet the appropriate specification.

When frame loss reaches its "steady state," it becomes a Local Carrier Group Alarm (LCGA). The maintenance and out-of-service limits for frame loss and slip are datafilled in Table CARRMTC, Fields FRAMEML, FRAMEOL, SLIPML, and SLIPOL.

A carrier link may be

- Put out of service by the system when an alarm is raised
- Returned to service when the alarm is dropped

However, if the alarms occur frequently, the carrier state may bounce between system-busy and in-service.

In a Return-to-Service (RTS) system, a counter controls the number of system returns. The counter keeps track of the number of times the carrier is returned to service within the audit interval. The counter is incremented when the carrier is returned to service by the system and is reset in the next audit.

Should the counter value exceed the maintenance limit (RTSML) in Table CARRMTC, a warning is raised in the maintenance and administration position. Should the counter value exceed the out-of-service limit (RTSOL), a criterion for putting the carrier permanently out of service, it remains in this state until it is successfully returned to service by manual action.

The DS1 card type should be an NTX6X50AB. The NTX6X50AB card supports:

- Two types of frame codes
  - — Superframe (SF)
  - — Extended Superframe (ESF)
- Two types of transmission codes
  - — Bipolar Eight Zero Substitution (B8ZS)
    - B8ZS provides the capability of 64 kbps clear transmission rate. If using B8ZS, you need the NTX142 software package. If using ESF, you need the NTX143 software package.
  - — Zero Code Substitution (ZCS)
    - ZCS, capable of 56 kbps, is used if the repeaters between the DMS SuperNode or DMS-250 and ISDN PBX cannot handle the Bipolar Violations (BPVs) inherent in the B8ZS line encoding scheme.

The listing in Table 5 shows the different combinations of frame formats and line coding associated with its possible Bit Error Rate Base (BERB—a type of error checking—and maximum data rate.

Table 5 Frame Formats and Line Coding

Frame Line Coding	BERB	Maximum Data Rate
SF/ZCS	BPV	56 KBPS
SF/B8ZS	BPV	64 KBPS
ESF/ZCS	CRC or BPV	56 KBPS
ESF/B8ZS	CRC or BPV	64 KBPS

Wideband Calls

The DS1 links carrying wideband calls on the DTCI must be as B8ZS and ESF.

Figure 14 shows the datafill requirements that Nortel recommends for the PRI fields within Table CARRMTC. Among the entries shown are the DTCI default tuple, the DTCI tuple specific to 64KCLEAR, and the tuple for DTCI Dialable Wideband Service (DWS) PRI.

Figure 14 Table CARRMTC

7002205

```
CSPMTYPE  TMPLTNM RTSML RTSOL                                          ATTR
-------------------------------------------------------------------------

DTCI  DEFAULT  255  255 DS1 NT6X50AB MU_LAW SF B8ZS BPV NILDL
                           N 250 1000 1 500 250 1000 3 6 864 100
                           17 511 4 255

DTCI  64KCLEAR  255  255  DS1 NT6X50AB MU_LAW ESF B8ZS BPV NILDL
                             N 250 2500 50 50 150 1000 3 6 864 100
                             17 511 4 255

DTCI  56KBPS  255  255  DS1 NT6X50AB MU_LAW SF ZCS BPV NILDL N
                           250 2500 50 50 150 1000 3 6 864 100 17
                           511 4 255

DTCI  ESFB8ZS  255  255 DS1 NT6X50AB MU_LAW ESF B8ZS CRC NILDL
                           N 250 1000 1 500 250 1000 3 6 864 100
                           17 511 4 255

DTCI  DWS  255  255  DS1 NT6X50AB MU_LAW ESF B8ZS BPV NILDL N
                         250 2500 50 50 150 1000 3 6 864 100 17
                         511 4 255
```

Table LTCINV

Table LTCINV (Line Trunk Controller Inventory) contains a list of ISDN Digital Trunk Controller (DTCI) peripheral modules and identifies the

- Location of the DTCI hardware
- Load and executive programs that are required
- C-side DS30 link connections to the switched network modules

PRI Fields

Table 6 and Figure 15 describe the PRI fields in Table LTCINV.

Table 6 Table LTCINV Fields

Field	Description
LTCNAME	Defines the line trunk controller name
FRTYPE	Defines the frame type
EQPEC	Defines equipment product engineering code (PEC)
LOAD	Defines load name required for XPM
TRMTYPE	Defines the terminal type used
EXEC	Defines executive programs used
OPTCARD	Defines optional cards
PEC6X40	Defines 6X40 equipment PEC

Figure 15 Table LTCINV

7002206

```
TABLE: LTCINV
       LTCNAME
          ADNUM   FRTYPE FRNO SHPOS  FLOOR  ROW FRPOS  EQPEC     LOAD
                                 EXECTAB CSLNKTAB OPTCARD
     TONESET          PECS6X45
                                 E2LOAD
                                                              OPTATTR
    PEC6X40                                        EXTINFO
--------------------------------------------------------------------
    DTCI   0
           6     DTEI     0     51        1     B      1 6X02NA  ELI10BI
                                 ABTRK   DTCEX)  (       PRAB  DTCEX)$
 (0 10 3 0) (0 10 3 1) (0 10 3 2) (0 10 3 3) (0 10 3 4) (0 10 3 5)
 (0 10 3 6) (0 10 3 7) (0 10 3 8) (0 10 3 9) (0 10 3 10) (0 10 3 11)
 (0 10 3 12) (0 10 3 13) (0 10 3 14) (0 10 3 15) $
                              ( TONE6X79 ) (   MSG6X69 ) (   ISP  16 )$
     NORTHAM     MX77AA MX77AA
                               UPFWNM04
                                                                    $
     6X40FA                                             N
     LTC    3
         1006    LTE     2    51        1     E     40 6X02NA  ELI09AZ
 (POTS POTSEX)  (KEYSET KSETEX)  (ABTRK DTCEX)  (PRAB DTCEX) $
 (0 19) (0 51) (1 19) (1 51) (2 19) (2 51) (3 19) (3 51) (0 23) (0 55)
 (1 23) (1 55) (2 23) (2 55) (3 23) (3 55)$
          (UTR15) (MSG6X69)                     (ISP 16)   (NTAX78BA)$
   NORTHAM               MX77AA MX77AA
                         NILLOAD
                                                                     $
   6X40AC                                              N
```

Integrated Trunk Access (ITA)

Integrated Trunk Access (ITA) allows both ISDN PRI trunks and regular voice trunks to function on the same DS1 facility. To configure ITA, datafill the following executables:

- For PRI trunks only:
  - — Terminal type (TERMTYPE): PRAB
  - — EXEC: DTCEX
- For PRI and voice trunks:
  - — TERMTYPE: PRAB
  - — EXEC: DTCEX
  - — TERMTYPE: ABTRK
  - — EXEC: DTCEX
- For voice trunks only:
  - — TERMTYPE: ABTRK
  - — EXEC: DTCEX
- For DWS trunks only:
  - — EXEC: PRAB DTCEX
  - — OPTCARD: DCTAX78

Note 1: The minimal datafill requirements for the DTCI are the ISP16 and MSG6X69 cards.

Note 2: For each DTCI used by wideband dedicated trunk groups, the datafill entry is DCTAX78.

Note 3: Additional option cards may be datafilled if needed, that is, ISP16, MSG6X69, UTR15, and DCTAX78.

Table LTCPSINV

Table LTCPSINV (Line Trunk Controller Peripheral Side Inventory) stores information about the peripheral-side link (or port) assignments. When the DTCI is datafilled in Table LTCINV, an entry is automatically added to Table LTCPSINV. However, Table LTCPSINV must be edited to specify

- Up to 20 (0 to 19) DS1 link assignments
- The signaling terminal controller modules
- The signaling terminal load

PRI Fields

Table 7 describes the PRI fields in Table LTCPSINV.

Table 7 Table LTCPSINV Fields

Field	Description	Values	Default
XPM type	Define the peripheral module type	DTCI	DTCI
XPM number	Peripheral module number	0 to 127	0 to 127
EXP_PSIDE	Expansion P-side	Y or N	N
PS link	P-side port number	0 to 19 or 0 to 15	0 to 19 or 0 to 15
PS data	P-side data: for DWS trunks, enter DS1PRA	DS30A DS1 D30 Nil type DS1PRA DCH DS0 TTC M20 P30PRA M20PRA TTCPRA	DS1PRA
CARRIDX	Defines the valid template name from Table CARRMTC	Alpha-numeric	Default
Action	Defines the out-of-service limit action	N, Y	N
IID	Interface Identifier. The following restrictions apply when interfacing a Meridian SL1: IID 0 is assigned to the DS1 on which the primary D-channel resides. When interfacing an SL1, IID 1 is used on the channel which contains the backup D-channel and cannot be used if no backup D-channel is provisioned.	0 to 31	0 to 31
LINE_EQ	Line equipment. This is the length from the DS1 circuit to the first DS1 office repeater.	110, 220, 330, 440, 550, 660, or NIL	NIL

Datafill

Figure 16 shows example datafill for the PRI fields in Table LTCPSINV.

Figure 16 Table LTCPSINV

7002207

```
TABLE NAME: LTCPSINV
LTCNAME                                                    PSLNKTAB
-----------------------------------------------------------------

DTCI   0
   N(0 DS1PRA 64KCLEAR N 0 NIL) (1 DS1PRA 64KCLEAR N 0 NIL)
    (2 DS1PRA 64KCLEAR N 0 NIL) (3 DS1PRA 64KCLEAR N 0 NIL)
    (4 DS1PRA 64KCLEAR N 0 NIL) (5 DS1PRA 64KCLEAR N 0 NIL)
    (6 DS1PRA 64KCLEAR N 0 NIL) (7 DS1PRA 64KCLEAR N 0 NIL)
    (8 NILTYPE                ) (9 NILTYPE                )
    (10 NILTYPE               ) (11 NILTYPE               )
    (12 NILTYPE               ) (13 NILTYPE               )
    (14 NILTYPE               ) (15 NILTYPE               )
    (16 NILTYPE               ) (17 NILTYPE               )
    (18 NILTYPE               ) (19 NILTYPE               ) $


DTCI   1
    N (0 DS1PRA ESFB8ZS N 0 NIL) (1 DS1PRA ESFB8ZS N 1 NIL)
    (2 DS1PRA ESFB8ZS N 0 NIL) (3 DS1PRA ESFB8ZS N 0 NIL)
    (4 DS1PRA ESFB8ZS N 0 NIL) (5 DS1PRA ESFB8ZS N 0 NIL)
    (6 DS1PRA ESFB8ZS N 0 NIL) (7 DS1PRA ESFB8ZS N 0 NIL)
    (8 DS1PRA ESFB8ZS N 0 NIL) (9 DS1PRA ESFB8ZS N 0 NIL)
    (10 DS1PRA DEFAULT N 0 NIL) (11 DS1PRA ESFB8ZS N 0 NIL)
    (12 DS1PRA ESFB8ZS N 0 NIL) (13 DS1PRA ESFB8ZS N 0 NIL)
    (14 DS1PRA ESFB8ZS N 0 NIL) (15 DS1PRA ESFB8ZS N 0 NIL)
    (16 DS1PRA ESFB8ZS N 0 NIL) (17 DS1PRA ESFB8ZS N 0 NIL)
    (18 DS1PRA ESFB8ZS N 0 NIL) (19 DS1PRA ESFB8ZS N 0 NIL)

LTC  3
   Y(0 DS1DEFAULT N) (1 DS1 DEFAULT N) (2 DS1 DEFAULT N)
    (3 DS1DEFAULT N) (4 DS1 DEFAULT N) (5 DS1 DEFAULT N)
    (6DS30A)         (7 DCH)           (8 NILTYPE)
    (9 NILTYPE)      (10 DS30A)        (11 DS30A)
    (12 NILTYPE)     (13 DCH)          (14 NILTYPE)
    (15 NILTYPE)     (16 NILTYPE)      (17 NILTYPE)
    (18 NILTYPE)     (19 NILTYPE)      (20 DS30A)
    (21 DS30A)       (22 DS30A)        (23 DS30A)
    (24 DS30A)       (25 DS30A)        (26 NILTYPE)
    (27 DS30A)       (28 DS30A)        (29 DCH)
    (30 NILTYPE)     (31 DCH)          (32 NILTYPE)
    (33 NILTYPE)     (34 NILTYPE)      (35 DCH)
    (36 NILTYPE)     (37 NILTYPE)      (38 NILTYPE)
    (39 NILTYPE)$
```

Facility-Related Tables

Facility-related tables are used to define the PRI trunks on each DS1 span, including the B- and D-channels:

- Table CLLI (Common Language Location Identifier)
- Table PADDATA (Pad Data)
- Table TRKGRP (Trunk Group)
- ~~Table TRKGRP1 (Trunk Group 1) (See note.)~~
- Table ISDNPARM (ISDN PRI Parameters)
- Table TRKSGRP (Trunk Subgroup)
- Table TRKMEM (Trunk Member)
- Table TRKRCSEL (Trunk Routing Characteristics RC Filter)

Because deployment of PRI is based upon providing ISDN capabilities on a trunk facility, the trunk facility tables associated with the DMS SuperNode must be used. All the tables listed in Figure 17, the facility-related block, should be familiar.

Note: Within the facility-related tables, the DMS-250 uses one table *that is not utilized* by the DMS SuperNode. That table is Table TRKGRP1, and it is noted in Figure 17.

Figure 17 Facility-Related Tables

7002208

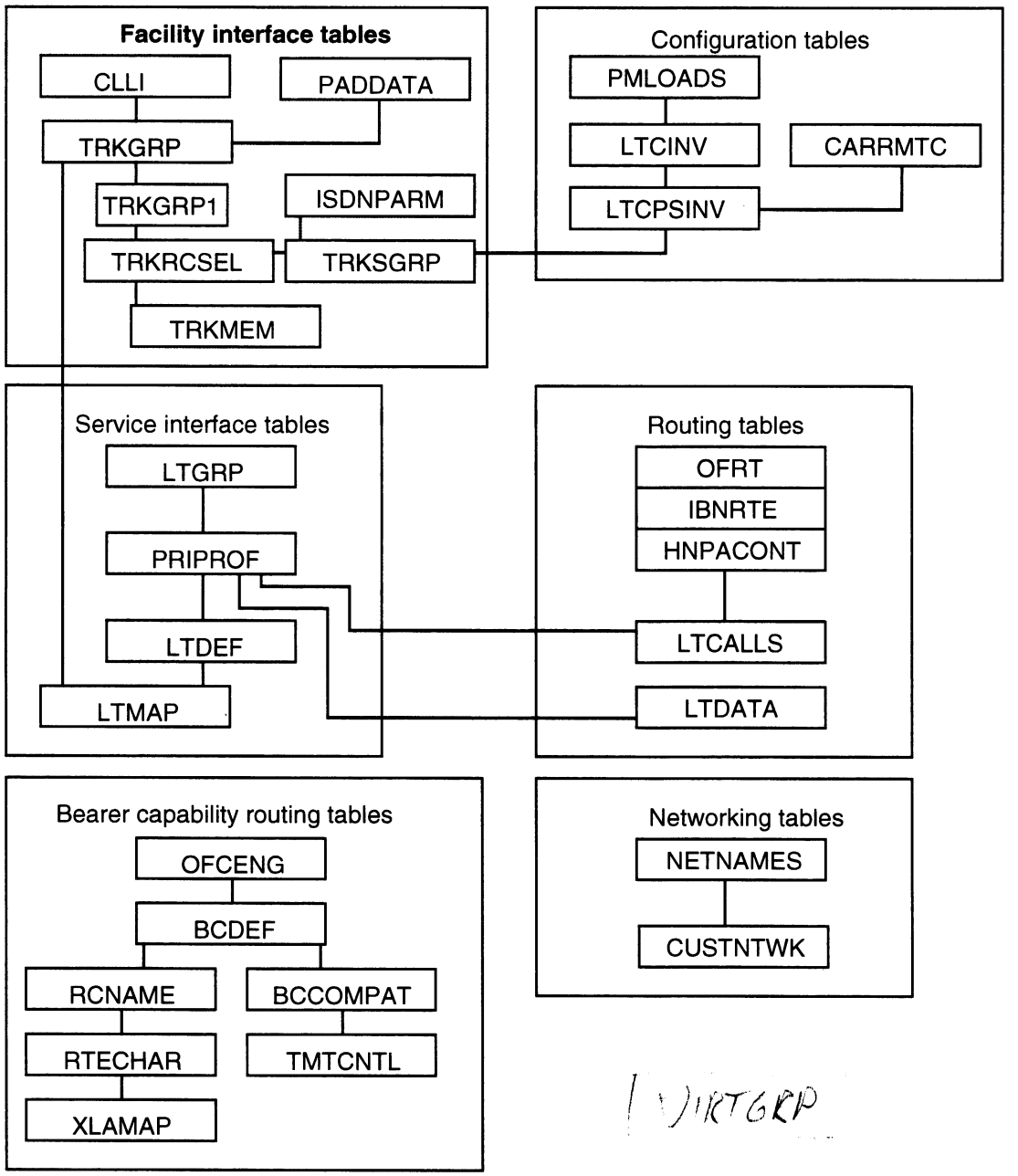


Table CLLI

Table CLLI (Common Language Location Identifier) defines a name for each PRI trunk group in the same way as for regular trunk facilities.

PRI Fields

The following fields are relevant to PRI:

- CLLI—datafills the name of the PRI trunk group.
  - — Alphanumeric
- TRKGRSIZ—assigns the trunk group size.
  - — 24

  This field allocates the memory available for each PRI trunk group.

Datafill

Figure 18 is an example of Table CLLI datafill for PRI.

Figure 18 Table CLLI

7002209

TABLE: CLLI

CLLI	ADNUM	TRKGRSIZ	ADMININF
TRN0PRISL1	283	64	PRI_TO_SL1
TRN0PRITR3	284	64	PRI_TO_TRAINER_3
PRICLASTRK1	170	32	TRAINING_EXER_TRK_1
PRICLASTRK2	171	32	TRAINING_EXER_TRK_2
PRICLASTRK3	172	32	TRAINING_EXER_TRK_3
PRICLASTRK4	173	32	TRAINING_EXER_TRK_4
PRICLASTRK5	175	32	TRAINING_EXER_TRK_5
PRICLASTRK6	176	32	TRAINING_EXER_TRK_6
PRICLASTRK7	177	32	TRAINING_EXER_TRK_7

Table PADDATA

Table PADDATA (Pad Data) defines the loss and level plan for ISDN PRI. The DMS SuperNode-to-ISDN-PBX loss-and-level plan must be implemented to ensure acceptable voice quality for calls over ISDN PRI. This plan is incorporated in a lookup table that resides in DMS memory.

Figure 19 shows that PRAC is the PAD group associated with the PRI on the DMS SuperNode central office side. If the loss-and-level plan for ISDN PRI is used, then this table must be datafilled before Table TRKGRP (Trunk Group). Once the PRAC PAD group is defined, Table TRKGRP will use those entries in Table PADDATA as the loss-and-level plan for ISDN PRI.

Figure 19 is an example of Nortel's recommendation for various loss-and-level states.

Figure 19 Table PADDATA

7002210

```
Table: PADDATA
PADKEY  PAD1TO2  PAD2TO1
----------------------
PRAC    UNBAN 2L 0
PRAC    STDLN 3L 0
PRAC    LRLM  3L 0
PRAC    PPHON 0  0
PRAC    IAO   3L 0
PRAC    LCO   3L 0
PRAC    ELO   0  0
PRAC    ETLS  0  0
PRAC    ETLL  0  0
PRAC    TLA   0  0
PRAC    TLD   0  0
PRAC    CONF  0  0
PRAC    CPOS  0  0
PRAC    TPOS  0  0
PRAC    ATT   3L 0
PRAC    DTT   0  0
PRAC    PRAC  0  0
```

Note: Remember that digital trunks may not require any loss or gain.

Table TRKGRP

Table TRKGRP (Trunk Group) contains the data associated with each PRI trunk group. The trunk group type is Primary Rate Access (PRA).

PRI Fields

The PRI fields are as follows:

- GRPTYP—group type used for call processing. For PRI, the entry is called PRA. See note.
  - — PRA

    Note: For the DMS-250, the entry is **PRA250**.

- TRAFSNO is the traffic separation number for the trunk group. If no number is used, enter 0.
  - — 0
- PADGRP—name of the associated PAD group entry from Table PADDATA.
  - — PRAC
- SELSEQ—the recommended choices ASEQ (Ascending Selection Sequence) or DSEQ (Descending Selection Sequence). To prevent B-channel glare, each end of the PRI trunk must be an opposite value. Typically, the DMS SuperNode office is set to ASEQ while the ISDN PBX is set to DSEQ.
  - — ASEQ
- When the selection sequence field is set to WIDEBAND, the following subfields are displayed:
  - — WBSELSEQ specifies DS0 channels as ascending or descending.
  - — WBGRPING specifies trunk selection method (FIXED, FLOATING, and FLEXIBLE).
  - — WBSEARCH specifies the search method (FIRSTFIT and BESTFIT). The FIRSTFIT selection method should be used to minimize glare on 384 kbps and 1,536 kbps DWS calls.

- BILLDN—Directory number to which calls should be billed, regardless of the calling party's number. If a value of (N) is entered, the calling party's number is used for billing.

  — N

- LTID—the DMS SuperNode and DMS-250 treat the ISDN PBX as one Logical Terminal Identifier (LTID). This is a read-only field. The DMS SuperNode and DMS-250 assign an LTID value to this field once Table LTMAP has been datafilled. Before an entry is made in Table LTMAP, a dollar sign ($) is entered in this field.

  — $

- GrpInfo—New option PRA_OPTION. Option is MRLT, release line trunk to be activated on that trunk group.

  — MRLT

Datafill

Figure 20 is an example of Table TRKGRP datafill for PRI.

Figure 20 Table TRKGRP

7002211

```
TABLE: TRKGRP

  TRN0PRITR3
      PRA 0 PRAC NCRT ASEQ N (ISDN 900) $ $

  TRN0PRISL1
      PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $

   WITSPRI1
      PRA 0 PRAC NCRT WIDEBAND DSEQ FLEXIBLE FIRSTFIT N (ISDN 600) $ $
```

Note: In Table TRKGRP, only the value NETWORK can be datafilled in Field IFCLASS for the NI PRI variant.

Table TRKGRP1

Table TRKGRP1 (Trunk Group 1) provides flexible dialing plan characteristics. This table is an extension of Table TRKGRP (Trunk Group).

PRI Fields

The PRI fields are as follows:

- LCDUR—the LCD duration. For PRI, the entry is 0 to 60.
- SPARE1— Spare1. For future development. The default value is Y.
- SPARE2—Spare2. Set to **Y** to allow a five- to seven-digit authorization code to be followed by an optional account code, then by the address digits. Set to **N** to cause the trunk group to use the standard dial plan appropriate to its group type.

Datafill

Figure 21 is an example of Table TRKGRP1 datafill for PRI.

Figure 21 Table TRKGRP1

7002212

```
CLLI GRPTYP DATA
_____________
PRI920DTN0 PRA250 0 Y Y 0 0
DAL225OGDTGS DAL NPRT NOLOOK N 0 Y Y 0 NIL 0 0
ONLNX3ICDTG0 ONAL N NPRT NOLOOK N 0 Y Y 0 NIL 0 0
ONT525OGMFWK ONAT N NPRT NOLOOK N 0 Y Y 0 NIL 0 3
EAN6220GMFWK EANT N Y 7 C Y 0 NONE NOLOOK N NOAUTHS Y 0 NIL Y 0 0
IMT304OGMFDD INT 0 N N Y Y 0 0
```

Table ISDNPARM

Table ISDNPARM (ISDN Parameters) allows the operating company to specify the optional information element handling routine for each PRI for the SETUP, NOTIFY, and ALERT message types.

- There is no requirement to datafill other tables prior to Table ISDNPARM.
- Maximum number of unique names allowed is 64.
- Table ISDNPARM is used to state how and when name delivery will be communicated. DNATTRS and DNGRPS defines how it will appear.
- Table ISDNPARM is used while the DMS is transporting information elements between PRI and CCS7 systems.

PRI Fields

The table fields are as follows:

- NAME—the ISDNPARM name used by Table TRKSGRP.
- MSGTYPE—three message types: SETUP, NOTIFY, and ALERT.
- MSGDIR—three different message directions: IN, OUT, or BOTH.
- DFLTACT—the default action taken with unspecified information elements: MAP or BLK.
- PARMACT—the individual information element parameters that can be mapped or blocked:
  - — RNN—Redirection Number Information Element identifies the number to which call redirection was invoked.
  - — RGN—Redirecting Number Information Element identifies the number from which the redirection was invoked.
  - — CN—Connected Number Information Element identifies the responding party to the call.
  - — OCN—Original Called Number Information Element identifies original called party when redirection occurs.

NETWORK

— IRQ—Information Request Information Element provides capability for requesting additional information and to signal completion of the information request.

— FAC—Facility Information Element indicates invocation and operation of supplementary services (for example, NRAG).

— DIE—Display Information Element provides capability to display the calling, connected, or original called party name.

Datafill

Figure 22 shows two parameter names datafilled in Table ISDNPARM. Parameter PRI1 shows the default mapping of all information elements for the three message types. PRI2 shows the individual information elements which can be datafilled with each message type.

Figure 22 Table ISDNPARM

7002213a

```
TABLE: ISDNPARM
    NAME MSGTYPE MSGDIR    DFLTACT                                    PARMACT
-------------------------------------------------------------------------------
    PRI1   SETUP   BOTH   MAP                                              $
    PRI1  NOTIFY   BOTH   MAP                                              $
    PRI1   ALERT   BOTH   MAP                                              $
    PRI2   SETUP   BOTH   MAP          (DIE MAP) (FAC MAP) (OCN MAP)$
    PRI2  NOTIFY   BOTH   MAP (CN MAP) (RNN MAP) (RGN MAP) (DIE MAP)
                          (IRQ MAP) $

    PRI2   ALERT   BOTH   MAP                              (FAC MAP)$
```

Table TRKRCSEL

Table TRKRCSEL (Trunk Routing Characteristics Selector) allows end users to optionally turn on and off particular types of ISDN information elements (IEs). The IEs can be turned on or off on an individual trunk group basis, although only PRI trunks are supported.

To maintain network integrity, PRI trunks that are partially compliant to the ISDN numbering protocol are allowed to selectively turn off any IEs that are not compliant to the protocol. If an IE is turned off in Table TRKRCSEL, the information associated with that particular IE is treated as key pad information rather than intelligent information. (For example, the call type associated with that IE is treated as unknown before the call is sent to translation.)

If this table is not datafilled for a particular trunk, only Bearer Capability (BC) defaults to ON. Other IEs (for example, [redacted], TNS, and OSA) are not used for determining the routing characteristics even if they exist in the Setup message.

Figure 23 shows an example of Table TRKRCSEL.

Figure 23 Table TRKRCSEL

7002213b

```
TABLE: TRKRCSEL
    KEY             DATA                                                OPTDATA
    (CLLI)          (Routing Characteristics - RCFILTER)
-------------------------------------------------------------------------
    PRITRK          (BC  ON)  (CDN  ON)  (TNS  ON)  (OSA  ON)  (SR OFF)  (PI
OFF)                                                 OFF
ON
```

Table TRKSGRP

Table TRKSGRP (Trunk Subgroup) defines supplementary data associated with the subgroup of a trunk group, such as signaling and timing parameters specific to that trunk. Table TRKSGRP assigns the D-channel(s) to each PRI trunk group Common Language Location Identifier (CLLI).

PRI Fields

The table fields are as follows:

- SGRP—only subgroup 0 is valid for ISDN signaling.

  — 0

- CARDCODE—the card code for ISDN PRI is DS1SIG.

  — DS1SIG

- SIGDATA—signal protocol used for call processing.

  — ISDN

- VERSION—protocol version. For wideband services this field must be set to UNISPEC20, an extension of standard Q.931 ISDN signaling.

  — 87Q931 **or**

  — UNISPEC20

- CRLENGTH—the call reference length in bytes

  — 1 **or**

  — 2

- BCHNEG—enter Y if B-channel negotiation is allowed; if not, enter N.

  — N to disable B-channel negotiation

- BCHGLARE—used to prevent B-channel glare between the DMS SuperNode and ISDN PBX. Typically, the DMS SuperNode Central Office is datafilled with STAND, and the ISDN PBX is datafilled with YIELD.

  — STAND

- IFCLASS—indicates if this end of the PRI trunk is to be considered the network end or the user end of the protocol. The DMS SuperNode is the NETWORK end, while the ISDN PBX is considered the USER end.

  — NETWORK

- CONFIG—enter PT_PT for point-to-point configuration.

  — PT_PT

- LOCATION—location to be used for the creation of cause information elements; can be LOCALEO, PVTNET, or USER.

  — USER

- SAT—indicates if trunk subgroup is handled by satellite facilities.

  — N

- ECSTAT—indicates type of echo cancellation used.

  — UNEQ

- TRKGRDTM—trunk guard time in 10 ms intervals the system waits after an on-hook signal before placing the trunk back in the idle queue.

  — 75

- L1FLAGS—indicates if the DTCI will send the Q.921 flags:

  — N if PRA connection is DMS to DMS

  — Y if end node is SL1 or other vendor equipment

- PARMNAME—name of Table ISDNPARM profile name to be used for PRI to CCS7 message handling.
  - — DEFAULT—to allow standard PRI/CCS7 message handling
  - — ISDNPARM—profile name to specify special handling
- DCHNL—Info fields tell the DMS SuperNode the location of the D-channel. The first set of DTCI fields indicates the primary D-channel and the second indicates the backup D-channel.
  - — PMTYPE—DTCI
  - — DTCINO—number of the DTCI
  - — DTCICKTNO—DS1 Circuit (DS1 Span) (0 to 19)
  - — DTCICKTTS—DS0 channel of the DS1 containing the D-channel
  - — DCHRATE—56K or 64K
  - — HDLCTYPE—HDLC or INVHDLC

Datafill

Figure 24 is a datafill example for Table TRKSGRP.

Figure 24 Table TRKSGRP

7002214

```
TABLE: TRKSGRP
SGRPKEY  CARDCODE
                SGRPVAR
-----------------------------------------------------
TRN0PRISL1 0    DS1SIG
ISDN 20 20 87Q931 2 N STAND NETWORK PT_PT USER N UNEQ
75  Y DEFAULT DTCI 0 2 24 64K HDLC DTCI 0 3 24 64K HDLC

TRN0PRITR3 0    DS1SIG
ISDN 20 20 87Q931 2 N STAND NETWORK PT_PT USER N UNEQ
75  Y DEFAULT DTCI 0 0 24 64K HDLC DTCI 0 1 24 64K HDLC

WITSPRI1 0    DS1SIG
ISDN 20 20 UNISPEC20 2 N YIELD NETWORK PT_PT USER N
UNEQ 160  Y DEFAULT DTCI 0 19 1 64K HDLC $
```

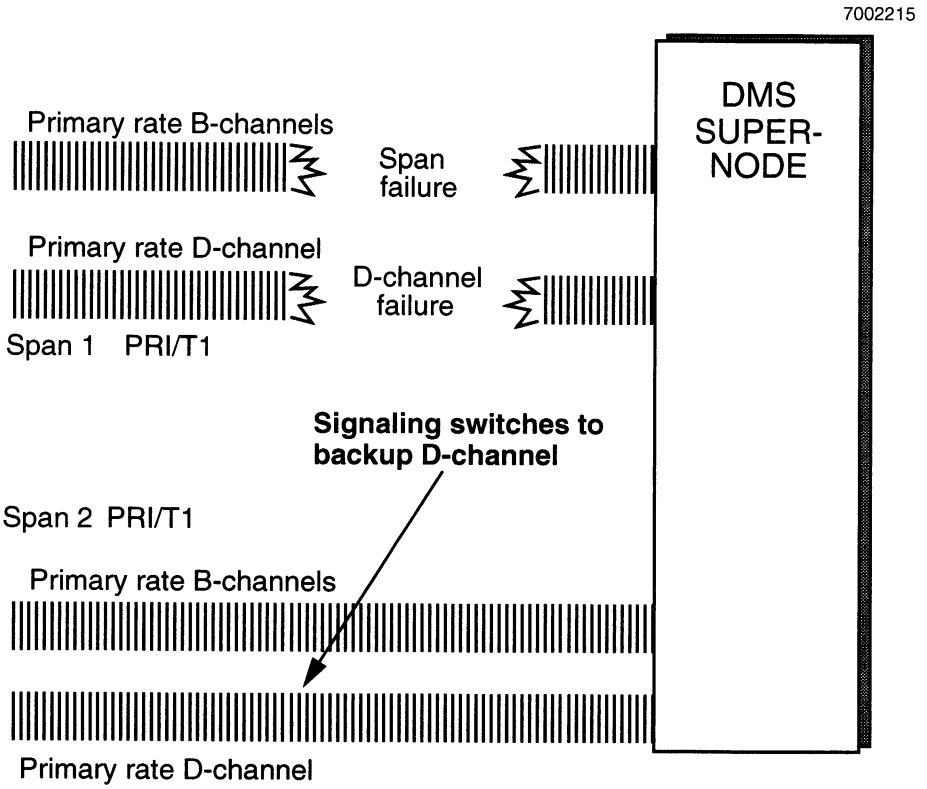
PRI Backup D-Channel

This optional feature provides the capability to provision a second D-channel link in Table TRKSGRP for the CLLI of the PRI trunk group. This secondary or backup D-channel will carry all D-channel messages if the primary link fails. When this feature is available in the DMS, two links may be provisioned in Table TRKSGRP, the first link of the tuple being the primary link.

The need for a backup D-channel is crucial when a PRI trunk group has more than one DS1 span, as shown in Figure 25. Nortel recommends that D-channels be provisioned on different DS1 circuits in case an entire span becomes inoperable. Obviously, if an entire span goes down, the calls that are on B-channels residing on the same span as the primary D-channel cannot be salvaged. Calls on other DS1s will be maintained.

The primary D-channel is the first D-channel datafilled in Table TRKSGRP and must be on a numerically lower span than the backup D-channel. The D-channels should terminate on spans that reside on different DS1 cards.

Figure 25 PRI Backup D-Channel



Offlining the PRI Trunks

Changes cannot be made to Table TRKSGRP until the trunk group is offlined. Use the following commands to busy the B- and D-links in a non-prompt mode.

Commands to post the trunk group's B-channels:

```
>MAPCI;MTC;TRKS;TTP;POST G CLLI
```

Commands to post the trunk group's D-channels:

```
>MAPCI;MTC;TRKS;TTP;PRADCH;POST GD CLLI
```

Figure 26 shows the MAP screen display after the commands to post the D-channel have been executed.

Commands to offline the posted link(s):

```
>BSY;BSY INB
```

Figure 26 shows posted PRI D-channels at the maintenance and administration position (MAP).

Figure 26 Posted PRI D-Channel at the MAP

7002216

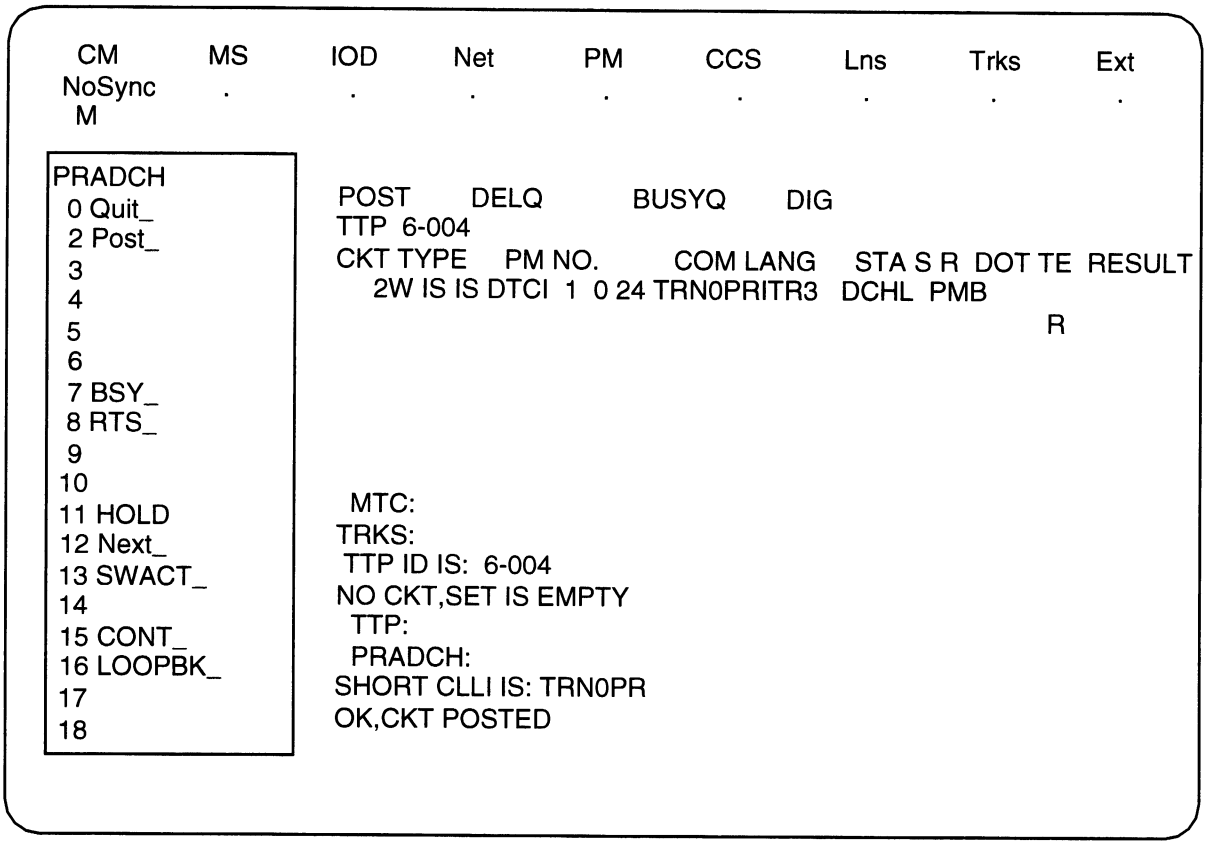


Table TRKMEM

Table TRKMEM (Trunk Member) is used to define each trunk associated with its time slot on the DS1 circuit. Each B-channel associated with the trunk group CLLI is assigned to a time slot on the DS1 facility. For example, if there are 23 B-channels, then there are 23 entries with Table TRKMEM, one for each B-channel.

PRI Fields

The table fields are as follows:

- EXTRKNUM—the trunk number associated within the trunk group CLLI.
- PMTYPE—the peripheral that supports the ISDN PRI trunk facilities.

  — DTCI

Datafill

Figure 27 represents PRI datafill in Table TRKMEM.

Figure 27 Table TRKMEM

7002217

TABLE: TRKMEM

CLLI	EXTRKNM	SGRP		MEMVAR		
TRN0PRISL1	0	0	DTCI	0	0	1
TRN0PRISL1	1	0	DTCI	0	0	2
TRN0PRISL1	2	0	DTCI	0	0	3
TRN0PRISL1	3	0	DTCI	0	0	4
TRN0PRISL1	4	0	DTCI	0	0	5
TRN0PRISL1	5	0	DTCI	0	0	6
TRN0PRISL1	6	0	DTCI	0	0	7
TRN0PRISL1	7	0	DTCI	0	0	8
•						
•						
•						
TRN0PRISL1	115	0	DTCI	0	4	21
TRN0PRISL1	116	0	DTCI	0	4	22
TRN0PRISL1	117	0	DTCI	0	4	23
TRN0PRISL1	118	0	DTCI	0	4	24
TRN0PRITR3	0	0	DTCI	1	0	1
TRN0PRITR3	1	0	DTCI	1	0	2
TRN0PRITR3	2	0	DTCI	1	0	3
TRN0PRITR3	3	0	DTCI	1	0	4
TRN0PRITR3	4	0	DTCI	1	0	5
TRN0PRITR3	5	0	DTCI	1	0	6

Service-Related Tables

Four tables associate the ISDN PRI trunk(s) to the ISDN tables for PRI service deployment:

1. Table LTGRP (Logical Terminal Group)
2. Table PRIPROF (PRI Profile)
3. Table LTDEF (Logical Terminal Definition)
4. Table LTMAP (Logical Terminal Mapping)

Figure 28 shows the table relationship between the PRI service deployment for ISDN PRI trunks and the types of PRI services.

Figure 28 Service-Related Tables

7002218

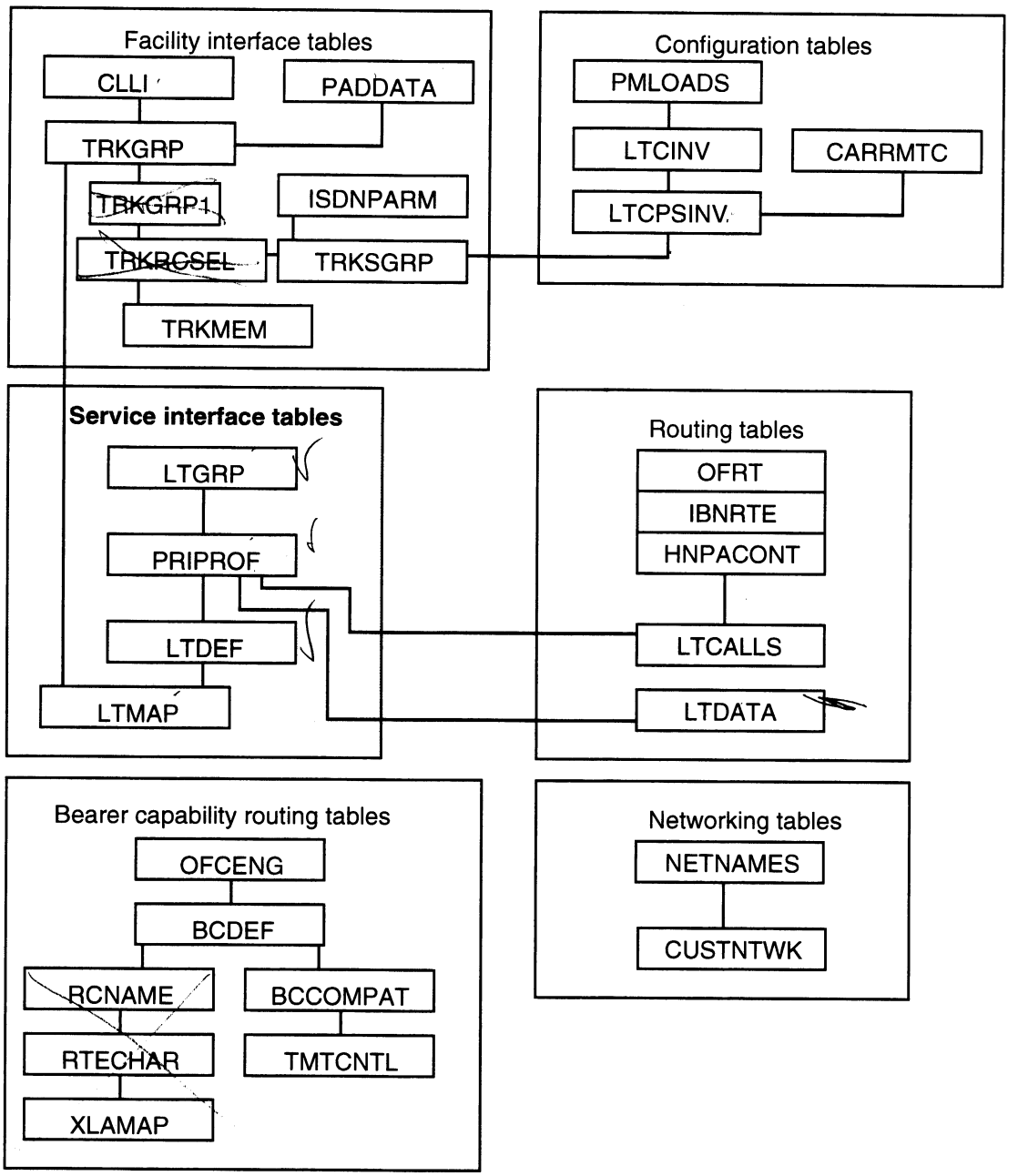


Table LTGRP

The DMS SuperNode ISDN software looks at ISDN terminals as "logical terminals." The ISDN logical terminals range from a single ISDN business set to the definition of multiple trunk groups connecting to ISDN PBX switches. Table LTGRP (Logical Terminal Group) defines the number of logical terminals within that particular group. Each logical terminal group contains a maximum of 1,022 logical terminals.

PRI Fields

The table fields are as follows:

- LTGRP—the name of the logical group as defined by the operating company.
  - — Alphanumeric
- GROUPNO—assigned to each of the possible 32 logical terminal groups.
  - — 0 to 31
- OPTIONS—presently the only valid option is SAPI16. A logical terminal group used solely for PRI does not require this option.
  - — SAPI16 **or** $

Note 1: The default name and group number GROUP **ISDN** and GROUPNO **0** cannot be changed or removed.

Note 2: Groups 0 to 15 may have SAPI16 (low-speed packet).

Note 3: Groups 16 to 31 cannot have SAPI16.

Datafill

Figure 29 is an example of PRI datafill in Table LTGRP.

Figure 29 Table LTGRP

7002219

```
TABLE: LTGRP
TOP
  GROUP GROUPNO  OPTIONS
-------------------------------------------
  ISDN      0        $
```

Table PRIPROF

Table PRIPROF (PRI Profile) is the protocol variant control table. In certain cases, a DMS and a PBX cannot communicate due to protocol implementation differences. Table PRIPROF provides a pointer from Table LTDEF (Logical Terminal Definition) to allow the declaration of a special PRI PROFNAME containing special function switches.

PRI Fields

The table fields are as follows:

- PROFNAME—user-defined key of up to eight alphanumeric characters. A maximum of 255 profiles can be datafilled on any one switch.
- VARINFO—consists of subfield VARIANT and ISSUE.
  - — VARIANT specifies the PRI protocol associated with the PROFNAME:
    - Use NTNAPRI when connecting to nodes manufactured by Nortel
    - Use U449PRI when connecting to an AT&T 4ESS
    - Use U459PRI when connecting to an AT&T 5ESS
  - — NIPRI is an NI 2 selection.
  - — ISSUE defines the specific issue of the PRI variant in use. Current issues supported are V1 and NI2V1.

- SWITCH—function switch name of up to eight alphanumeric characters for each software function that must be associated with the switch. Currently only the NTNAPRI variant may use these functions.
  - — NOPIALRT—No Progress Alert message
  - — XPLCTIID—Explicit Circuit Identification
  - — CIDXBIT0—Set Extension Bit to Zero
  - — CSE27T47—Charge cause code 27
  - — RMBCSE82—Remote Manual Busy cause code 82
  - — NOSTATEQ—No Status Inquiry (currently not used)
  - — NONUNKNW—Unknown (currently not used)
  - — TONUKNW
  - — DIALTONE
  - — UNTONNPI
  - — MCHYBIT0

Datafill

Figure 30 is an example of PRI datafill in Table PRIPROF.

Figure 30 Table PRIPROF

7002220

```
PROFNAME VARINFO
            SWITCH
----------------------
SL1PROFL NTNAPRI V1
          (NOPIALRT) (XPLCTIID) (CIDXBIT0) (CSE27T47) (RMBCSE82) $
```

Table LTDEF

Table LTDEF (Logical Terminal Definition) defines logical terminals and each terminal's access privilege. Access privilege is the type of ISDN service that the DMS SuperNode and DMS-250 provides. With PRI, the logical terminal is the trunk group. The only access privilege allowed in PRI is circuit switching.

PRI Fields

The table fields are as follows:

- LTAP—the logical terminal access privilege for ISDN PRI—is B.

  — B

- LTCLASS—tells the DMS SuperNode and DMS-250 what type of logical terminal is defined.

  — PRA

- NUMBCHNL—the number of B-channels associated with the trunk group.

  — 1 to 479

- NUMCALLS—the number of B-channels that can be active on the trunk group.

  — 1 to 479

- INCALLS—the number of incoming calls allowed on this trunk group.

- OUTCALLS—the number of outgoing calls allowed over this trunk. The summation of INCALLS and OUTCALLS cannot exceed the total number of B-channels.

- VARISSUE—variant issue consists of subfields VARIANT, ISSUE, and PROFNAME.
  - — VARIANT specifies the PRI protocol in use for the LTID:
    - Use NTNAPRI when connecting to nodes manufactured by Nortel
    - Use U449PRI when connecting to an AT&T 4ESS
    - Use U459PRI when connecting to an AT&T 5ESS
  - — NIPRI—NI 2 selection.
  - — ISSUE—the specific issue of the PRI variant in use. Current issues supported are V1 and NI2V1.
  - — PROFNAME—links a profile name up to eight characters found in Table PRIPROF. NIL disables all available function switches and assumes the normal default method of PRI messaging per the VARIANT issue.

Datafill

Figure 31 represents the datafill requirements for Table LTDEF.

Figure 31 Table LTDEF

7002221

```
 LTKEY LTAP
                                        CLASSREF
-------------------------------------------------------------------------
ISDN 700  B
PRA 23 23 12 11 NTNAPRI V1 NIL (NOPMD ) $

ISDN 900  B
PRA 119 119 60 59 NTNAPRI V1 SL1PROFL (NOPMD ) $
```

Table LTMAP

Table LTMAP (Logical Terminal Mapping) is used to assign the trunk group CLLI to the ISDN Logical Terminal ID (LTID). All PRI trunk groups must have an entry in this table. Once an entry is accepted, the DMS SuperNode updates Table TRKGRP.

PRI Fields

The table fields are as follows:

- MAPTYPE—used by the DMS SuperNode to determine if the services of the LTID are going to be assigned to an ISDN line (a LEN) or a trunk group (a trunk CLLI).

  — CLLI

- CLLI—the name of the trunk CLLI in order to associate that particular LTID to a PRI trunk facility.

  — Alphanumeric

- OPTIONS—the valid option for ISDN PRI. This is the Terminal End Point Identifier (TEI) 0.

  — TEI 0

Datafill

Figure 32 shows example datafill for Table LTMAP.

Figure 32 Table LTMAP

7002222

```
TABLE: LTMAP

LTKEY MAPPING OPTION
-------------------------------------------------------
ISDN  700 CLLI TRN0PRITR3 (    TEI  0)$
ISDN  900 CLLI TRN0PRISL1 (    TEI  0)$
```

Check Your Learning

Match the following tables with their functions:

J	CARRMTC	a. Each PRI trunk "B" channel is assigned its channel location here.
E	LTCINV	b. Records the pre-defined loss values to be applied to the connection in order to reduce echo.
H	LTCPSINV	c. Associates an LTID with a unique PRI trunk group.
B	PADDATA	d. Defines logical terminals and their access privileges.
F	PRIPROF	e. Datafills links to the network modules in this table along with the load and executive programs that are required
I	TRKSGRP	f. Assigns protocol variant information.
A	TRKMEM	g. Associates a logical terminal group name with the terminal types that can be datafilled in that group.
G	LTGRP	h. Defines the P-side DS1 links which will interface PBXs and other nodes.
D	LTDEF	i. Stores signaling and timing values here for each trunk group and assigns D-channels here per trunk group.
C	LTMAP	j. Stores the attributes of the DS1 links and associates them with a template name which is referred to in Table LTCPSINV.

Lesson 3

Integrated Services Access (ISA)

The purpose of this lesson is to provide you with the skills to use the Integrated Services Access (ISA) feature and to interpret translations performed by the DMS SuperNode for incoming Primary Rate Interface (PRI) calls.

Lesson Objectives

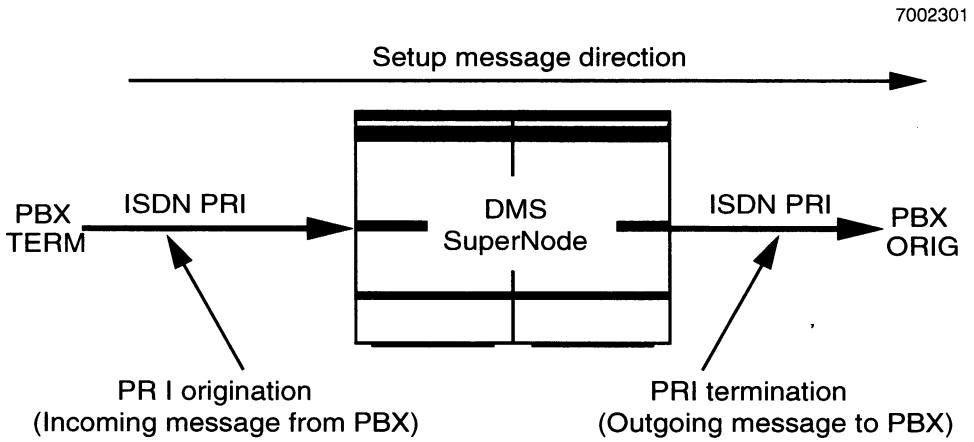
After completing this lesson, you will be able to:

- Identify how the Numbering Plan Indicator (NPI) and Network Specific Facilities (NSF) in the Call Setup message point to Table LTCALLS, and their effect upon the translations of the call.
- Define the six call types that can be datafilled in Table LTCALLS.
- Datafill Table LTCALLS for various call types and routing options.
- Use the Translation Verification (TRAVER) utility to analyze PRI calls with different call type and NPI values.

PRI Call Setup Direction

PRI origination and termination are the terms that define the switch's perspective, where the switch could be a Private Branch Exchange (PBX), a DMS SuperNode, or some other PRI node. To demonstrate the direction of the flow of messages for origination and termination, refer to Figure 33.

Figure 33 PRI Origination and Termination



Q.931 Setup Message

PRI call processing supports Q.931 messages. For ISA, the Setup message is the only significant one. This message is sent by either the user or the network to initiate call establishment.

The Setup message contains certain information elements (IEs):

- Bearer Capability
- Channel ID
- Network Specific Facilities
- Progress Indicator
- Calling Party Number
- Called Party Number

Two IEs are of special interest for ISA:

- Numbering Plan Indicator (NPI), which is part of the Called Directory Number (CDN) information element
- Network Specific Facilities (NSFs)

For more information on the NSF and the NPI, refer to the section on call control signaling.

ISA for PRI

The Integrated Services Access (ISA) feature provides access to public and private network services through one two-way common trunk group. Enhancements to the PRI basic call permit access to the dedicated facilities within the public network. As a result, translation of the call has been enhanced to share one common access facility.

With ISA, different call types can share the same trunk group. The call type is now defined once for each route. (In BCS 34, TIE, FX, INWATS, and WATS call types may be translated in the DMS using the "service identifier" part of the NSF.) From the incoming trunk call's Setup message, additional information is extracted and used along with the dialed digits to route a call.

The key characteristic of ISA is that all B-channels over the PRI can be shared. It allows different types of calls (for example, public and private) to be routed over the PRI by selecting any available B-channel. As we have seen, the call type information is conveyed to the other switch by the Setup message.

PRI Calls

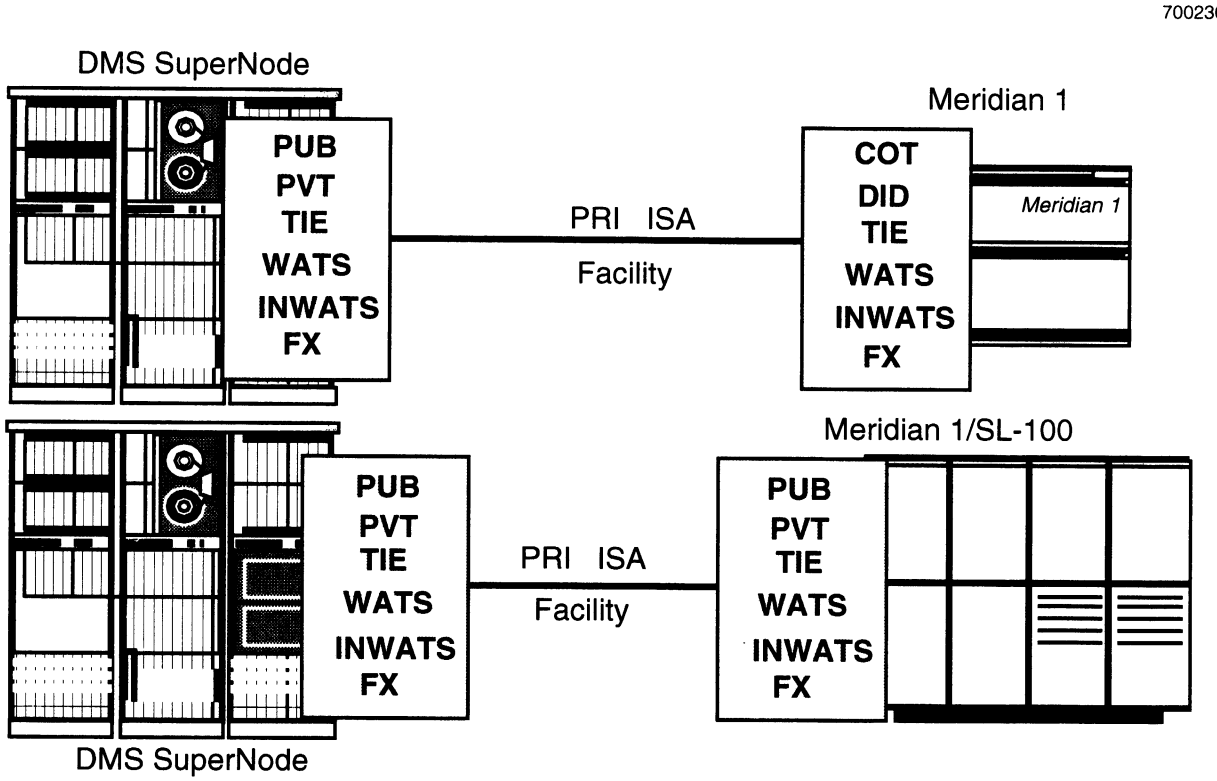
For a PRI call, route selection is based on the datafill for that call type. The specified call type has significance only for the originating and terminating ends of a PRI link. Subsequent legs of the same call may have different call types.

Non-PRI Calls

For non-PRI calls, the dialed digits control which trunk is accessed. The treatment of calls and the trunk signaling plan depend on datafill at each end of the trunk. This information maps into the standard dialing plan depending on the local context.

Figure 34 shows the ISA call type relationships between the DMS SuperNode, the Meridian 1, and the SL-100 PBX switches.

Figure 34 ISA Call Types



Call Type Definition

ISA supports the following call types on a single trunk group.

Public (PUB)

These are calls that pass through the Public Switched Telephone Network (PSTN) and conform to the North American Dialing Plan (E.164). These calls must be translated by screening the called number digits, specifically the NPA and NXX digits, to determine the destination of the call. InterLATA and international calls may also use this call type by utilizing the Equal Access (EA) option.

Private (PVT)

Companies can create their own networks with the Private call type to establish a unique dialing plan for reaching other locations within the company. These calls are routed over privately owned or leased facilities. Private calls utilize Centrex screening and routing, and they may or may not conform to the E.164 dialing format. Normally, the called number must be screened in order to route the call and it is translated in Table IBNXLA.

Note: E.164 refers to the public network numbering plan in accordance with CCITT recommendation E.164.

Outbound Wide Area Telephone Service (OUTWATS)

Standard OUTWATS services are dedicated trunks that provide access to certain toll areas or zones. Each dedicated trunk (or line) is assigned a specific zone, and it is typical for businesses to own multiple Wide Area Telephone Service (WATS) circuits with different zone assignments.

With ISA, a PRI trunk from a PBX (or other node) provides OUTWATS service to the customer as required. The access to specific zones is based on datafill. Instead of dedicating specific trunks to OUTWATS, PRI allows us to use one trunk for access to more than one zone in addition to the other call types. There is also an auto-banding option, which allows all bands and sets the zone for the call by screening the called number through Table OWATZONE.

Inbound Wide Area Telephone Service (INWATS)

This call type allows "800" service to terminate to a PRI node. PRI replaces the traditional hunt group of dedicated lines at the terminating node. The INWATS selector normally will not be used to send an 800 number from the originating station to the network. The Public call type will sufficiently route those calls.

Foreign Exchange (FX)

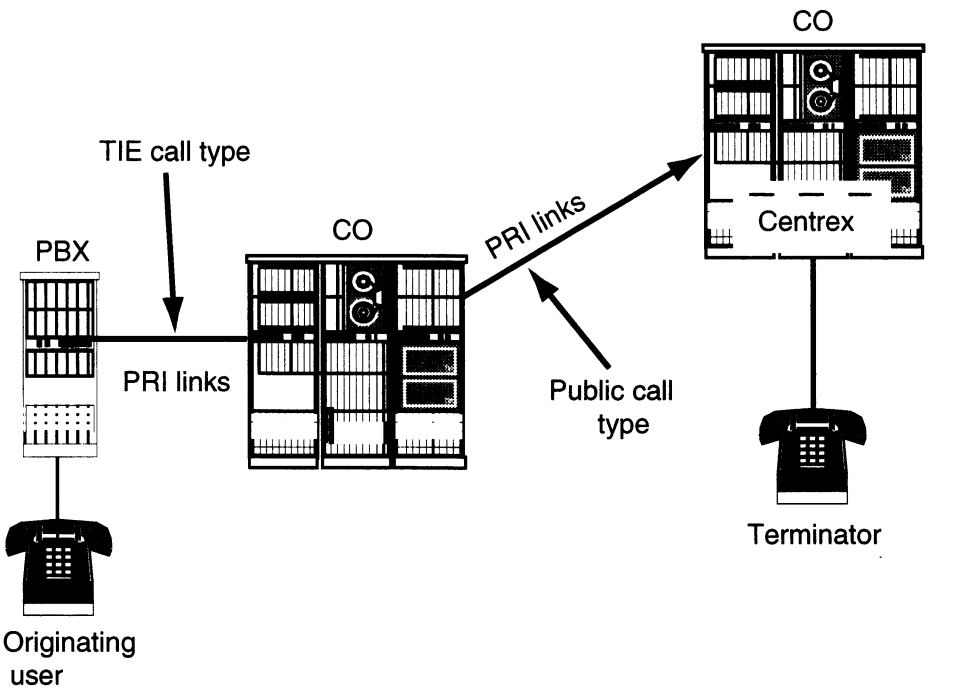
A Foreign Exchange (FX) is a physical trunk between a PBX's central office (CO) and a different CO. With ISA, the PRI trunk to the home CO is used to route FX traffic, which is then routed to the foreign exchange in one of two ways. A dedicated FX trunk may be provisioned between the home and foreign COs, in which case the call is not routed based on called number digits. The call can also be routed through the PSTN. This service provides the equivalent of local service at the distant exchange.

TIE

A TIE call is a private call on a direct route between PBXs. After dialing the initial TIE access code digits, the originating subscriber begins dialing as if originating from within the distant PBX. The PRI node does not usually need these digits to connect to the destination PBX.

As shown in Figure 35, a TIE call is passed over a PRI trunk to a CO, which sends the call to the destination CO as a Public call. (In order to accomplish this, the called number digits would have to be altered to represent a standard directory number (DN)). One practical alternative to completing this call over two PRI trunks would be to complete the public portion of the call as a non-ISDN call over the public network.

Figure 35 PRI Call Type Change



Remember, the call type of an incoming PRI call (received in the Setup message) is only valid for determining the translations for that one leg of the call. Once the screening process has been completed and the termination of the call is found to be PRI, the call type (the Network Specific Facilities or NSF) must be datafilled based on the next leg of the call. If the termination is not PRI, then no PRI call type (NSF) needs to be determined and standard routing procedures are used.

ISA Translations and the Setup Message

Two components of the Setup message, the Numbering Plan Indicator (NPI) and the Network Specific Facilities (NSF), are required to calculate the call type and translate the ISA call.

Numbering Plan Indicator (NPI)

For ISA, the NPI is used for translations. The NPI is contained in the Called Party Number information element (CDN) of the Setup message. The NPI indicates whether the numbering plan used for called number identification is Private or Public (for example, E.164).

Public (PUB)

Public calls conform to the plain ordinary telephone service (POTS) dialing plan and are therefore screened via tables designed for that purpose, such as, Table STDPRTCT or Table HNPACONT. The datafill for PRI originations reflects these characteristics. By default, when the called party number has an NPI of E.164, public network (PSTN) facilities will be used to route the call and support the connection.

Private (PVT)

When the NPI is Private, the dial plan is determined by the datafill in existing tables for translations. This datafill includes the use of ESN information signal digits. The reserved private facilities (for example, PVT or TIE) are selected.

If the call is placed within the business network, then Meridian Digital Centrex (MDC) translations are needed to analyze the dialing according to the dialing plan of the customer group. There is no requirement for these calls to conform to the POTS dialing plan.

Network Specific Facilities (NSF)

Incoming calls specify the type of service they wish to access using the NSF information element in the Setup message. This information element contains a service selector (call type, or in protocol, a binary code facility coding value) which specifies the type of service requested.

The selector, such as FX, TIE, INWATS, OUTWATS, or PVT, and an optional Service ID (SID) specifies the actual facility:

- If an NSF exists, then the call type is the value of the NSF.
- If no NSF exists, then the call type is the value of the NPI.

Translations for Originations

A PRI origination is defined as a call originating from the ISDN PBX switch to the DMS SuperNode and the DMS-250 over PRI trunk facilities. Figure 36 shows the translations from the perspective of the DMS SuperNode and the DMS-250. There are some slight differences between the two switches.

An incoming PRI call is translated through the following procedure:

1. The DMS receives the Setup message. The NSF and NPI are mapped to a call type.

2. Tables TRKMEM, TRKSGRP, and TRKGRP are accessed to determine the characteristics of the originating trunk group. Table TRKGRP contains the Logical Terminal Identifier (LTID) assigned to the trunk.

3. Table LTDEF is accessed using the LTID from Table TRKGRP. Table LTDEF determines the access privilege assigned to the LTID.

4. Table LTCALLS is accessed using the LTID from Table TRKGRP and the call type. In Table LTCALLS, the field XLARTE determines the next step for translations. From this point on, digit translation takes place using the called number digits.

Note: The UCS DMS-250 switch does not support values RTEREF, XLAISA, or XLAMBG.

Figure 36 Originating PRI Call for the DMS SuperNode and DMS-250

7002304a

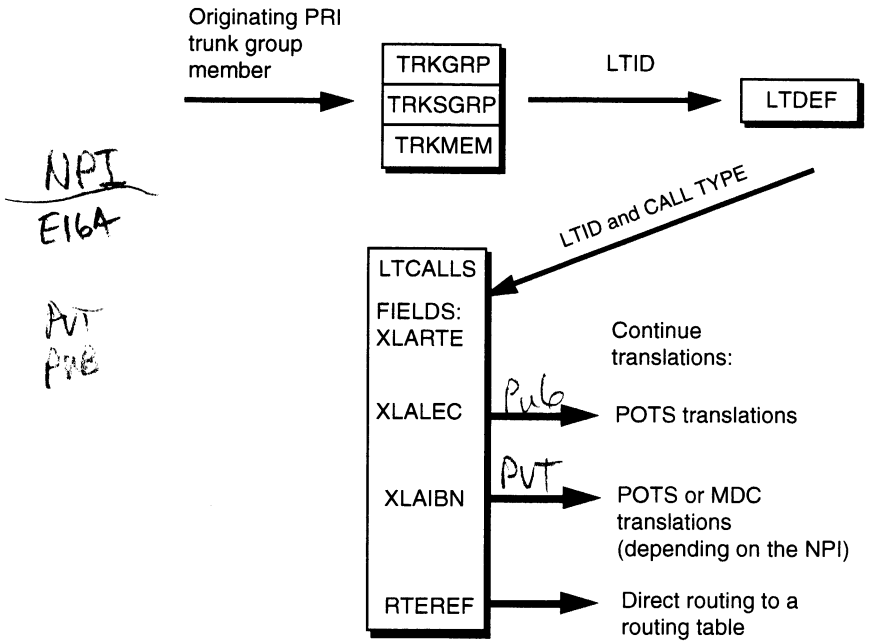
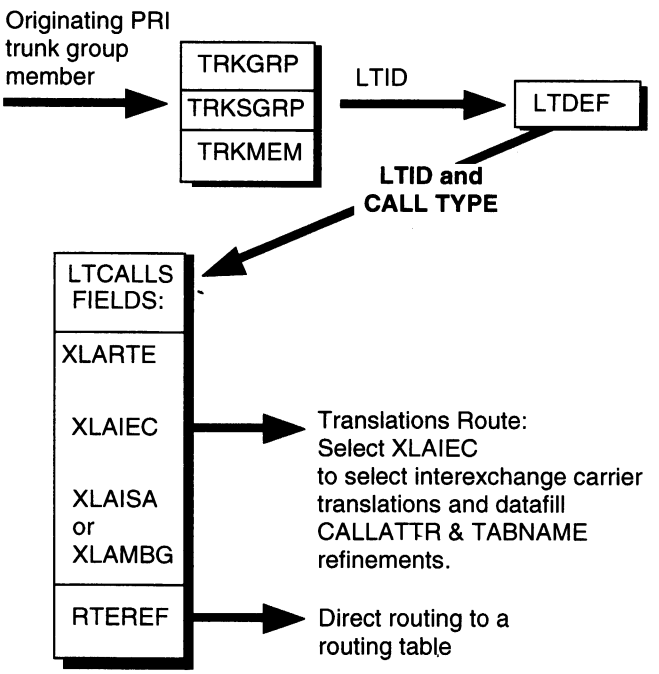


Figure 37 Originating PRI Call for the DMS SuperNode and DMS-250

7002304b



Call Routing Tables

Figure 38 shows the tables required to complete the PRI call.

- Logical terminal tables (Tables LTCALLS and LTDATA)
- Routing tables (Tables HNPACONT and OFRT)

Figure 38 Routing Tables

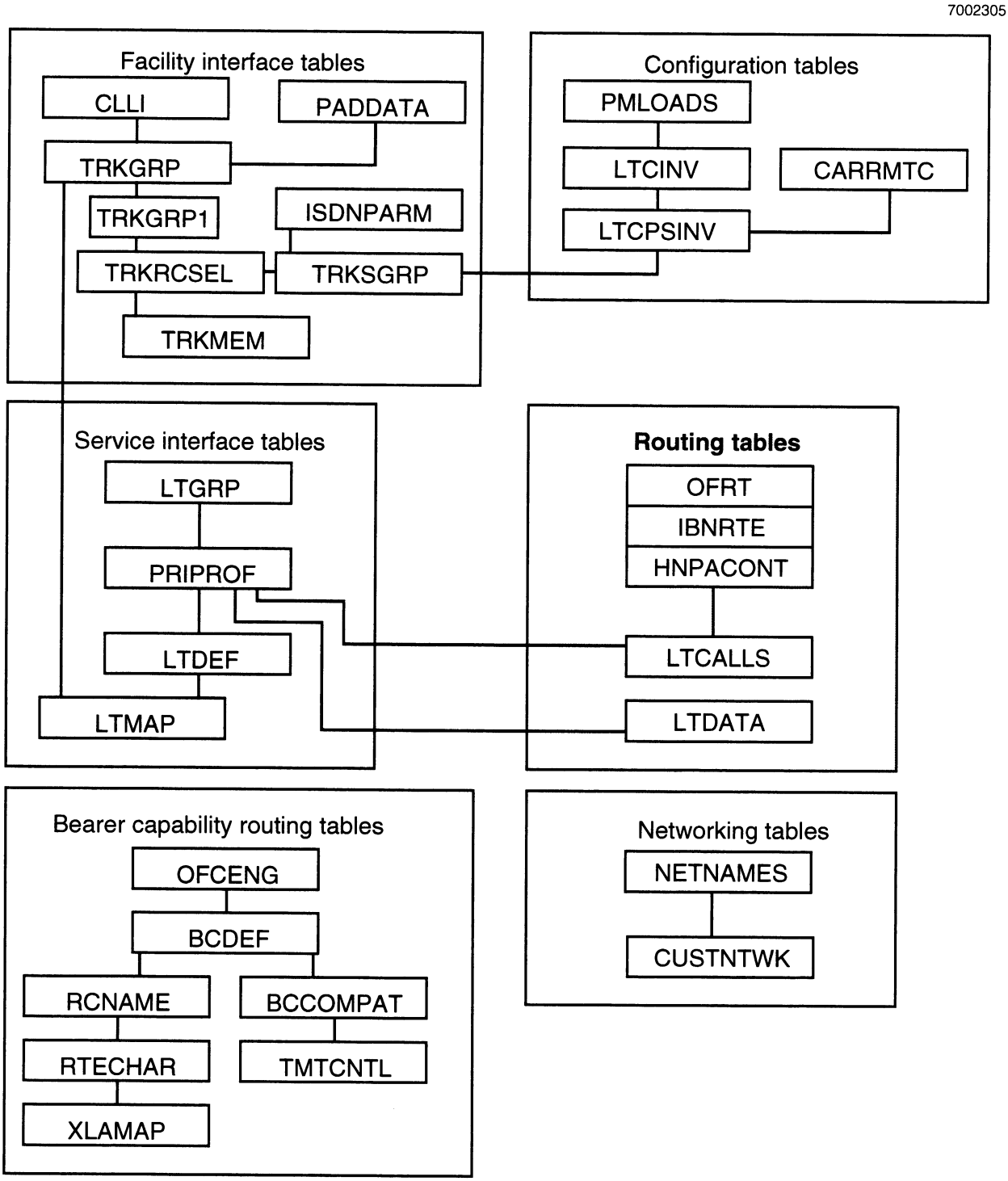


Table LTCALLS

In Table LTCALLS, digit translations are provided in the XLARTE field. There are three different XLARTE fields for the DMS SuperNode.

- The XLALEC (Local Exchange Carrier Translations) field provides POTS translations service. When the NPI is set to PUB, this selector points to a tuple in Table LINEATTR. An NPI of PVT is not valid with this selector.
- The XLAIBN field is used in PBX or Centrex type offices only. It provides either POTS or MDC translations service depending on the NPI of the call.
  - — When the NPI is set to PUB, this selector indexes into Table LINEATTR, providing standard POTS translations.
  - — When the NPI is set to PVT, the LINEATTR index is ignored and an index is instead provided into MDC translations, specifically a customer group name, along with the subgroup and NCOS numbers. Translations will proceed into Table IBNXLA.
- The RTEREF field provides an index into a routing table such as OFRT or IBNRTE. This routing does not depend on the NPI, nor does it depend on the digits of the called number. With this selector however, digits may be added or subtracted from the called party number based on the route specified.

By allowing a unique tuple per call type, ISA enables each call type to select a unique Network Class of Service (NCOS) LINEATTR tuple, routing table index, or even a distinct customer group.

There are different XLARTE fields for the DMS SuperNode and the DMS-250 switches.

- DMS-250
  - — Translations Route

    Select XLAIEC to select interexchange carrier translations. You will need to datafill CLLATTR and the TABNAME refinements.

— RTERREF

Direct routing to a routing table.

Figure 39 shows example datafill for Table LTCALLS.

— LPIC

IntraLATA option now in Table LTCALLS. Figure 40 shows an example.

Note: This option will impact TRKRCSEL (LPIC).

Figure 39 Table LTCALLS

7002306a

```
TABLE LTCALLS
        LTID                XLARTSEL
                                          OPTIONS
-------------------------------------------------------------
ISDN  700     PUB           XLALEC    0  (EA USS333  Y)$
ISDN  700     PVT           XLAIBN   30  ISDNGRP 0 100  $
ISDN  700     INWATS        XLAIBN   30  ISDNGRP 0 100  $
ISDN  700     WATS          XLAIBN   30  ISDNGRP 0 100  $
ISDN  700     FX            RTEREF   OFRT   80 $
ISDN  700     TIE           XLAIBN   30  ISDNGRP 0   97  $
ISDN  900     PUB           XLALEC    0  (EA MCI222  Y)$
ISDN  900     PVT           XLAIBN   30  ISDNGRP 0   100  $
ISDN  900     TIE           XLAIBN   30  ISDNGRP 0   100  $
```

Figure 40 IntraLATA Option

7002306b

```
KEY                  DATA                           OPTDATA
-----------------------------------------------------------------------
PRAIC  18  PUB    XLALEC  42                      (EA  CAR1 Y) (LPIC CAR1 Y)
PRAIC  11  PUB    XLAIBN  49   RESGRP  0  0       (EA  CAR1 Y) (LPIC CAR2 Y)
```

Table 8 shows which XLARTE selectors are allowed for each call type in Table LTCALLS while utilizing the Translation Verification (TRAVER) utility.

Note: The primary XLARTE selector utilized by the DMS-250 is XLAIEC.

Within the DMS-250 environment, Table LTCALLS also includes the XLARTE selector XLAISA. The XLAISA selector, along with its eight-character router name, directs ISDN to use the ISAXLA table. Table ISAXLA is addressed when the station identification is employed in the translation and routing for the call from a PRI trunk.

Table 8 XLARTE Selectors

Call Type in XLARTE Selectors	Valid XLARTE Selectors	Call Type While Using TRAVER
PUB	XLALEC XLAIBN RTEREF	PUB
PVT	XLAIBN RTEREF	PRVT
OUTWATS	XLALEC XLAIBN RTEREF	OWT
INWATS	XLAIBN RTEREF	IWT
TIE	XLAIBN RTEREF	TIE
FX	XLALEC XLAIBN RTEREF	FX

Equal Access (EA) and PRI

In the previous lesson, we have considered the capabilities of ISA. In BCS 33, an enhancement to the ISA feature added an Equal Access (EA) option to the Public call type fields of Table LTCALLS. This option, as shown in Figure 41 and Figure 42, provides the functionality of the Equal Access End Office (EAEO) to the PRI. It is only available for the Public call type.

The dialing capabilities are identical to those of the EAEO package (NTX186AA).

Figure 41 Table LTCALLS Datafill of EA Option

7002307

```
TABLE
LTCALLS:

>ADD
LTID:
>ISDN 700
PUB
XLARTE:
>XLALEC
LINEATTR:
>0
LTCOPT:
>EA
CARRIER:
>USS333
CHOICE:
>Y
```

Enhanced Equal Access on the DMS-250

Equal access carrier selection for outgoing PRI calls has been enhanced by the creation of the Transit Network Selection (TNS) information element which is a part of the Setup message. A choice of carriers could also be made by prefixing the called party number with the 10xxx digits of the selected carrier. Prior to this capability, dedicated trunk groups from the PBX to each carrier were often used to allow access to a choice of carriers.

Figure 42 Table LTCALLS

7002308

```
Table LTCALLS
                LTID                          XLARTSEL
                                                        OPTIONS
-------------------------------------------------------------------
ISDN  700    PUB     XLALEC    0                 (EA USS333 Y)$
```

The carrier assigned in LTCALLS is similar to a PIC assigned in the SERVORD utility. The calls accessing LTCALLS are likewise screened as though dialed by a line subscriber in a DMS SuperNode end office. For PRI, a manual entry must be made into Table LTCALLS.

If the Carrier Access Code (CAC) is not explicitly dialed, then the switch takes the following steps:

1. The called number accesses the STDPRTCT subtable specified in Table LINEATTR and standard translations procedure is performed just as with any domestic called number.

2. If the call is not local, LATA screening is done on the called number using the LATA name specified in Table LINEATTR.

3. Carrier information is attained for the carrier listed in Table LTCALLS from Table OCCINFO.

4. The CAC is added to the called number and the initial pretranslator is accessed again, searching for the CAC as the leading digits.

5. The tuple in the pretranslator points to a second pretranslator, and the final route for the call is determined from this second (or recursive) pretranslator.

Universal access is not supported in PRI on the UCS DMS-250 switch. Requests for this service result in a FNAL treatment.

The UCS DMS-250 switch executes the following steps when performing interexchange carrier translations on an originating PRI call:

1. Using the call type received in the incoming Setup message and the LTID associated with the trunk group, the UCS DMS-250 switch accesses the LTCALLS information relevant to the call. If the call type is not datafilled or supported, the UCS DMS-250 switch applies FNAL treatment to the call.

2. Using the Call Attribute Index (CALLATTR), which is datafilled against the LTCALLS tuple, access the call attribute parameters related to the call in Table CALLATTR. If the CALLATTR index datafilled in Table LTCALLS leads to a CALLATTR tuple that is not datafilled, the UCS DMS-250 switch applies Vacant Code (VACT) treatment to the call. Also, the UCS DMS-250 switch outputs a Database Access Trouble log, indicating that the call attribute could not be found.

3. The UCS DMS-250 switch validates the authorization code datafilled in Table CALLATTR if AUTH billing is selected. This provides access to information such as TPART and COS.

4. Using the pretranslator name datafilled in Table CALLATTR, the UCS DMS-250 switch pretranslates the address digits received in the Setup message (which were supplied by the authorization code hotline). As specified by pretranslations, the UCS DMS-250 switch performs any necessary digit processing, route selection, or call type assignment.

5. If the address digits correspond to a public speed number, the UCS DMS-250 switch searches for the speed digits in the corresponding database. If the digits are not found or if speeds are denied, the UCS DMS-250 switch sets appropriate treatment. If the digits are found, the UCS DMS-250 switch replaces the dialed digits with the DDD or private network number stored against the speed digits. The UCS DMS-250 switch returns to the previous step to begin processing on the new address digits.

6. The UCS DMS-250 switch performs translations on the address digits using the Serving Translations Scheme (STS) that is determined by the OPART and TPART associated with the authorization code or CLID used to screen the call. The STS provides a unique HNPA control table used to perform translations of up to ten digits.

7. After an outgoing route has been selected, route selection proceeds to locate an available terminating agency to complete the call.

Translations Verification (TRAVER)

The Translations Verification (TRAVER) utility is a useful tool for gaining an understanding of the translations that are accessed for each combination of NPI and NSF. We have created an example office configuration with examples of each call type to better give you an idea of the ISA process.

Scenario

Silicon America Products Inc. (SAP), a growing national business, has requested PRI to connect three locations in the area. The customer service location is served by an SL1 PBX, bridged by a PRI link to the Morrisville DMS SuperNode. Two other locations each interface a different DMS SuperNode:

1. The Morrisville CO
2. The Raleigh office

There is a PRI link between them.

- All locations have access to the public network, and to save on toll costs, they all access OUTWATS services at the Morrisville DMS.
- The SAP private network allows for 7-digit dialing to locations all over the country.
- Each CO serving a SAP location assigns an ESN code for that location.
- Some private network calls will exchange the dialed private number for the equivalent public DN and complete using public facilities.
- Three-digit station dialing is allowed among the three locations.
- SAP has other branch offices across the US.

- The Arizona branch office has a PBX connected to a DMS-250.

  Note: For the DMS-250, TRAVER reflects the additional translations tables accessed by PRA 250 and ISA trunk types. However, TRAVER support in the DMS-250 switching system is only valid when the STS is set on a per TRAVER basis.
  Command: UTVSTS <sts#>

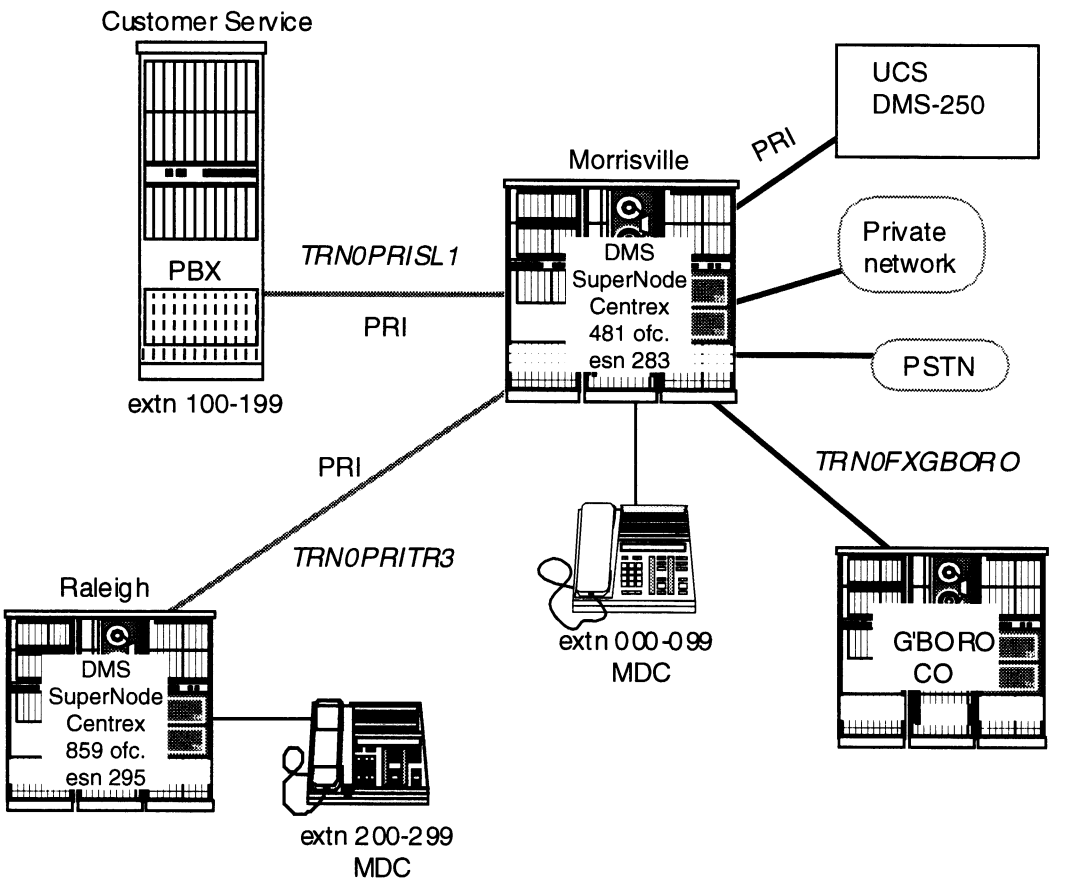
  Example: UTVSTS 001—Setting the STS is a switch-based set.

  Once set, every TRAVER will use the same STS for call flow information regardless of login. Also, TRAVER does not support the ANI/AUTHCODE/ACCOUNT CODE and PIN digit screening tables.

- Our table datafill will be that of the Morrisville DMS SuperNode switching office, shown in Figure 43.

Figure 43 Example PRI Office Configuration

7002309a



PRI Originations

Public Call

A Public call is the assumed default of the TRAVER utility. You do not have to specify the NPI nor the call type when a TRAVER is of type Public.

The following sample TRAVER input shows how calls of different attributes flow through the translations process.

>TRAVER TR TRN0PRITR3 N CDN E164 19192385555 B

Where:	Trunk	=	TR
	CLLI	=	TRN0PRITR3
	N	=	NUMBER TAG
			CDN CALLED DIRECTORY NUMBER
			E164 NPI = E164
	Digits	=	19192385555
	Call type	=	PUB (default)
	Trace	=	B

See Figure 44 and Figure 45 for examples of this TRAVER.

Figure 44 Public Call—Screen 1

```
>TRAVER TR TRN0PRITR3 N CDN E164 19192385555 B
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 PUB XLALEC 0 (EA USS333 Y) $
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 N OPER N 0 NIL NILSFC LATA1 0 NIL NIL 00 N
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1)
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 191 199 N DD 1 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
```

Figure 45 Public Call—Screen 2

7002309c

```
TABLE HNPACONT
919 64 1 (7) (1) (0) (0)
. SUBTABLE HNPACODE
 . 919 919 HNPA 0
.  23 274 HRTE 4
 . SUBTABLE RTEREF
 .    4 N D LATATANDEM2W 0 N N
 . EXIT TABLE RTEREF
EXIT TABLE HNPACONT
TABLE LCASCRCN
919 LCA1 ( 9) MAND Y
 . SUBTABLE LCASCR
 . 919 919
TABLE LCASCRCN
919 LCA1 ( 9) MAND Y
 . SUBTABLE LCASCR
 . TUPLE NOT FOUND.  DEFAULT IS NON-LOCAL
TABLE PFXTREAT
MAND DD N DD UNDT
TABLE LATAXLA
TUPLE NOT FOUND
ASSUMED TO BE DEFAULT INTRALATA, INTRASTATE, STD
TABLE EASAC
TUPLE NOT FOUND
+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 LATATANDEM2W          9192385555         ST
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Public Call with Equal Access Translation

Translating Incoming Equal Access (EA) Calls

There are two ways to translate incoming EA calls:

1. Public calls may be screened as any EAEO call would be, using the PIC assigned in Table LTCALLS or a dialed Carrier Access Code (CAC) which would be part of the called number.

2. The second way is unique to ISDN. It utilizes the ISDN translations and routing system. This requires that the transit network selector information element be used to send the CAC to the office for screening.

>TRAVER TR TRN0PRITR3 12125554444 B

Where:
Trunk	=	TR
CLLI	=	TRN0PRITR3
Digits	=	12125554444
NPI	=	E164 (default)
Calltype	=	PUB (default)
Trace	=	B

See Figure 46, Figure 47, and Figure 48 for examples of this TRAVER.

Figure 46 Public Call with Equal Access Translation—Screen 1

7002309d

```
>TRAVER TR TRN0PRITR3 12125554444 B
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 PUB XLALEC 0 (EA USS333 Y) $
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 N OPER N 0 NIL NILSFC LATA1 0 NIL NIL 00 N
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1)
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 12 17 N DD 1 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
```

Figure 47 Public Call with Equal Access Translation—Screen 2

7002309e

```
TABLE HNPACONT
919 64 1 ( 7) ( 1) ( 0) ( 0)
 . SUBTABLE HNPACODE
 . 212 219 FRTD 1
 . SUBTABLE RTEREF
 .    1 N D OCCFGC288DD 0 N N
 .      S D EAPEG
 .      S D NCAANNC
 . EXIT TABLE RTEREF
EXIT TABLE HNPACONT
TABLE LCASCRCN
919 LCA1 ( 9) MAND Y
 . SUBTABLE LCASCR
 . TUPLE NOT FOUND.  DEFAULT IS NON-LOCAL
TABLE PFXTREAT
MAND DD N DD UNDT
TABLE LATAXLA
LATA1 2 INTER INTER STD
TABLE OCCINFO
USS333 333 EAP Y Y N Y Y Y Y Y Y Y LONG 0 NONE Y N Y N N N Y N Y N N N
TABLE EASAC
TUPLE NOT FOUND
TABLE STDPRTCT
POTS ( 1) ( 1)
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 10333 10333 EA DD 5 P R333 USS333 Y OFRT 37 6 20 Y
 .  .  . TABLE STDPRTCT
 . R333 ( 1) ( 0)
 .  . SUBTABLE STDPRT
```

Figure 48 Public Call with Equal Access Translation—Screen 3

7002309f

```
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
TABLE OFRT
 .  .   37 N D OCCFGD3330A 0 N N
 .  .      S D EAPEG
 .  .      N D LATATANDEM2W 15 D080 N
 .  .      S D NCAANNC
 .  . EXIT TABLE OFRT
 .  . 12 19 EA DD 1 T NA USS333 Y OFRT 33 1 1 Y
 .  .  . TABLE OFRT
 .  .  .   33 N D OCCFGD333DD 0 N N
 .  .  .      S D EAPEG
 .  .  .      N D LATATANDEM2W 15 D081 N
 .  .  .      S D NCAANNC
 .  .  . EXIT TABLE OFRT
DIGIT TRANSLATION ROUTES
1 OCCFGD333DD           2125554444         ST
2 EAPEG
3 LATATANDEM2W          D081               ST
4 NCAANNC
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

EA-Dialed Carrier Access Code (CAC)

The EA option CHOICE subfield determines whether a CAC may be received in front of the called number. If the field is set to Y, the order of screening steps changes to reflect the carrier choice determined by the digits received, as shown by the list below and the TRAVER that immediately follows. (See Figure 49 and Figure 50.)

1. The CAC and called number access the STDPRTCT subtable specified in Table LINEATTR. The EA tuple specified by the CAC digits points to the second pretranslator table built for that carrier.

2. The tuple in the second pretranslator points to what should be the final route for the call if all screening of the called number is successful.

3. The called number is screened through standard translations tables. If the call is not local, LATA screening is done on the called number using the LATA name specified in Table LINEATTR.

4. Carrier information is attained for the carrier specified by the dialed CAC. The switch checks Table OCCINFO to determine if calls with a dialed CAC are allowed to complete via this carrier. Table LTCALLS would already have been checked to determine if a dialed CAC is permissible.

5. If all screening verification approves the call, then the call completes to the last EA route encountered in the translations process.

>TRAVER TR TRN0PRITR3 1022212124446565 B

Where:
Trunk	=	TR
CLLI	=	TRN0PRITR3
Digits	=	1022212124446565
NPI	=	E164 (default)
Calltype	=	PUB (default)
Trace	=	B

Figure 49 EA-Dialed Carrier Access Code (CAC)—Screen 1

7002309h

```
>TRAVER TR TRN0PRITR3 10222212124446565 B
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 PUB XLALEC 0 (EA USS333 Y) $
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 N OPER N 0 NIL NILSFC LATA1 0 NIL NIL 00 N
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1)
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 10222 10222 EA DD 5 P R222 MCI222 N
 . TABLE STDPRTCT
 . R222 ( 1) ( 0)
 .  . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 .  . 12 19 EA DD 1 T NA MCI222 Y OFRT 23 6 20 N
 .  .  . TABLE OFRT
 .  .  .   23 N D LATATANDEM2W 15 D081 N
 .  .  .      S D NCAANNC
 .  .  . EXIT TABLE OFRT
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
```

Figure 50 EA-Dialed Carrier Access Code (CAC)—Screen 2

7002309i

```
TABLE HNPACONT
919 64 1 ( 5) ( 1) ( 0) ( 0)
 . SUBTABLE HNPACODE
 . 212 219 FRTD 1
 . SUBTABLE RTEREF
 .    1 N D OCCFGC288DD 0 N N
 .      S D EAPEG
 .      S D NCAANNC
 . EXIT TABLE RTEREF
EXIT TABLE HNPACONT
TABLE LCASCRCN
919 LCA1 ( 9) MAND Y
 . SUBTABLE LCASCR
 . TUPLE NOT FOUND.  DEFAULT IS NON-LOCAL
TABLE PFXTREAT
MAND DD N DD UNDT
TABLE LATAXLA
LATA1 2 INTER INTER STD
TABLE OCCINFO
MCI222 222 EAP Y Y N Y N Y N N Y Y LONG 0 NONE Y N Y N N N N N Y N N N
TABLE EASAC
TUPLE NOT FOUND
Using Equal Access (EA) route    OFRT   23 from Pretranslation
TABLE OFRT
  23 N D LATATANDEM2W 15 D081 N
     S D NCAANNC
EXIT TABLE OFRT
+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 LATATANDEM2W          D081               ST
2 NCAANNC
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Private Call ESN Dialing (E.164)

A Private call uses the company private network. Note the translations tables accessed to complete this call. Although the call type is PRIVATE in this TRAVER, the NPI is E.164, which is the default and can be omitted.

>TRAVER TR TRN0PRITR3 2831199 PRVT B

Where:	Trunk	=	TR
	CLLI	=	TRN0PRITR3
	N	=	NUMBER TAG
			CDN CALLED DIRECTORY NUMBER
			E164 NPI = E164
	Digits	=	2831199
	Calltype	=	PRVT
	Trace	=	B

See Figure 51 and Figure 52 for examples of this TRAVER.

The NPI is E.164, the call type is Private. The XLAIBN selector in Table LTCALLS is unique in that it points to both a LINEATTR index and a customer group Network Class of Service (NCOS) combination. The NPI determines whether the LINEATTR index or the Meridian Digital Centrex (MDC) tables indexed will be accessed when the XLAIBN selector is used.

Note 1: Do not confuse the private NPI and the Private call type! Remember, the call type points to a tuple in Table LTCALLS, but the NPI determines which of the translation systems will be accessed.

Note 2: Follow this rule of thumb: choose the NPI based on the first digits in the called number stream. If the first digits are access code digits that are specific to a customer group or NCOS, then the private NPI may be your best choice because it will provide you with more options. Even if you choose the private NPI, MDC translations in Table IBNXLA will give you more opportunities to point to a LINEATTR index.

Figure 51 Private Call ESN Dialing (E.164)—Screen 1

7002309j

```
>TRAVER TR TRNOPRITR3 N CDN E164 2831199 PRVT B
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 PVT XLAIBN 77 ISDNGRP 0 100 $
TABLE LINEATTR
77 1FR NONE NT NSCR 13 002 POTS NLCA N OPER N 0 NIL NILSFC LATA1 0 NIL NIL 00 N
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1)
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 2 610 N NP 0 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
TABLE HNPACONT
002 66 1 ( 3) ( 1) ( 0) ( 0)
 . SUBTABLE HNPACODE
 . 28311 28311 HRTE 66
 . SUBTABLE RTEREF
 .   66 T IBNRTE 769
 .  . TABLE IBNRTE
 .  .  769 ISA N N N TRN0PRISL1 PVT 0 E164 0
 .  .  . TABLE TRKGRP
 .  .  . TRN0PRISL1 PRA 0 NPDGP NCRT ASEQ $ (ISDN 900) $
```

Figure 52 Private Call ESN Dialing (E.164)—Screen 2

7002309k

```
 .  .  . TABLE LTCALLS
 .  .  . ISDN 900 PVT XLAIBN 77 ISDNGRP 0 100 $
 .  . EXIT TABLE IBNRTE
 . EXIT TABLE RTEREF
EXIT TABLE HNPACONT
+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 TRN0PRISL1                  N CDN  E164  L  2831199 PRVT 0 BC SPEECH
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Station-to-Station Dialing, Private NPI TIE Call

Private NPI calls require some additional entries into TRAVER for a successful call trace. The following TRAVER input shows how calls of different attributes flow through the translations process.

>TRAVER TR TRN0PRITR3 N CDN PVT TIE B

Where:	Trunk	=	TR
	CLLI	=	TRN0PRITR3
	N	=	NUMBER TAG
			CDN CALLED DIRECTORY NUMBER
			PVT NPI = PVT
	Digits	=	095
	Call type	=	TIE
	Trace	=	B

See Figure 53, Figure 54, and Figure 55 for examples of this TRAVER.

Figure 53 Station-to-Station Dialing—Private NPI, TIE Call, PRI Origination (Example 1)

7002309I

```
>TRAVER TR TRN0PRITR3 N CDN PVT 095 TIE B
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 30 ISDNGRP 0 97 $
TABLE NCOS
ISDNGRP 97 0 0 0 ( XLAS PRIXLA NXLA NDGT)$
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
ISDNGRP NXLA ISDNC01 NXLA 1 ISDNDC
TABLE DIGCOL
ISDNDC 0 RPT
TABLE IBNXLA: XLANAME PRIXLA
PRIXLA 0 EXTN N N Y 919 481 3 1
TABLE TOFCNAME
919 481
TABLE DNINV
919 481 1095 L ISDN 106
+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 LINE                  9194811095          ST
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Figure 54 Station-to-Station Dialing—Private NPI, TIE Call, PRI Origination (Example 2)

7002309m

```
>TRAVER TR TRN0PRISL1 N CDN PVT 237 TIE B
TABLE TRKGRP TRN0PRISL1 PRA 0 NPDGP NCRT ASEQ $ (ISDN 900) $ TABLE LTCALLS
ISDN 900 TIE XLAIBN 30 ISDNGRP 0 97 $
TABLE NCOS
ISDNGRP 97 0 0 0 ( XLAS PRIXLA NXLA NDGT)$
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
ISDNGRP NXLA ISDNC01 NXLA 1 ISDNDC
TABLE DIGCOL
ISDNDC 2 COL L 3
TABLE IBNXLA: XLANAME PRIXLA
PRIXLA 2 ROUTE N N N 0 N 3 3 NDGT Y T OFRT 79
TABLE DIGCOL
NDGT specified: digits collected individually
TABLE OFRT
  79 ISA N N N TRN0PRITR3 PUB NONE N N 10
 . TABLE TRKGRP
 . TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
 . TABLE LTCALLS
 . ISDN 700 PUB XLALEC 0 (EA USS333 Y) $
 . TABLE DIGMAN
 .    10 (INC 8598)
 . EXIT TABLE DIGMAN EXIT TABLE OFRT

+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES 1 TRN0PRITR3                N CDN  E164  L  8598237
NIL_NSF   BC SPEECH
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
>?
```

Figure 55 Station-to-Station Dialing—Private NPI, TIE Call, PRI Origination (Example 3)

7002309n

```
>TRAVER TR TRN0PRITR3 N CDN PVT 137 TIE B
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 30 ISDNGRP 0 97 $
TABLE NCOS
ISDNGRP 97 0 0 0 ( XLAS PRIXLA NXLA NDGT)$
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
ISDNGRP NXLA ISDNC01 NXLA 1 ISDNDC
TABLE DIGCOL
ISDNDC 1 COL L 3
TABLE IBNXLA: XLANAME PRIXLA
PRIXLA 1 ROUTE N N N 0 N 3 3 NDGT Y T OFRT 78
TABLE DIGCOL
NDGT specified: digits collected individually
TABLE OFRT
  78 ISA N N N TRN0PRISL1 TIE 0 PVT 0
 . TABLE TRKGRP
 . TRN0PRISL1 PRA 0 NPDGP NCRT ASEQ $ (ISDN 900) $
 . TABLE LTCALLS
 . ISDN 900 TIE XLAIBN 30 ISDNGRP 0 97 $
EXIT TABLE OFRT

+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 TRN0PRISL1                  N CDN  PVT  L  137 TIE 0 BC SPEECH
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Although the call terminated to a public DN, MDC translations tables were necessary because the called digits did not meet public numbering plan standards. (The PSTN requires seven- or ten-digit numbers.)

If call translations does not depend on the called number, then the RTEREF selector can pass the call to its destination with no screening at all.

Foreign Exchange (FX) Call

This FX call has been built to pass through the DMS SuperNode without the digits being modified or screened. The Greensboro end office switch will perform the necessary screening for this call, including LCA screening. See Figure 56 for an example of the TRAVER.

>TRAVER TR TRN0PRITR3 3767777 FX B

Where:
- Trunk = TR
- CLLI = TRN0PRITR3
- Digits = 3767777
- NPI = E164 (default)
- Call type = FX
- Trace = B

Figure 56 FX Call PRI Origination

7002309o

```
>TRAVER TR TRN0PRITR3 3767777 FX B
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 FX RTEREF OFRT 80 $
TABLE OFRT
  80 N D TRN0FXGBORO 0 N N
EXIT TABLE OFRT
+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 TRN0FXGBORO           3767777            ST
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

WATS Call (OUTWATS)

The WATS call type presents many opportunities to use optional or diverse ways of screening, including Equal Access (EA) and Virtual Facility Groups (VFGs), but for now we will show you a straightforward intraLATA example. The OUTWATS call type allows for the band number to be transmitted in the service identifier (SID) field of the NSF information element.

>TRAVER TR TRN0PRITR3 19192384444 OWT '0' B

Where:	Trunk	=	TR
	CLLI	=	TRN0PRITR3
	Digits	=	19192384444
	NPI	=	E164 (default)
	Call type	=	OWT
	Band	=	0
	Trace	=	B

See Figure 57 and Figure 58 for an example of this TRAVER.

Figure 57 WATS Call (OUTWATS), PRI Origination—Screen 1

7002309p

```
>TRAVER TR TRN0PRITR3 19192384444 OWT '0' B
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 WATS XLAIBN 30 ISDNGRP 0 100 $
TABLE LINEATTR
30 1FR NONE NT NSCR 13 919 POTS LCA1 N OPER N 0 NIL NILSFC LATA1 0 NIL NIL 00 N
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1)
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 191 199 N DD 1 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
TABLE HNPACONT
```

Figure 58 WATS Call (OUTWATS), PRI Origination—Screen 2

7002309q

```
919 64 1 ( 7) ( 1) ( 0) ( 0)
 . SUBTABLE HNPACODE
 . 919 919 HNPA 0
 . 23 274 HRTE 4
 . SUBTABLE RTEREF
 .    4 N D LATATANDEM2W 0 N N
 . EXIT TABLE RTEREF
EXIT TABLE HNPACONT
TABLE LCASCRCN
919 LCA1 ( 9) MAND Y
 . SUBTABLE LCASCR
 . TUPLE NOT FOUND.  DEFAULT IS NON-LOCAL
TABLE PFXTREAT
MAND DD N DD UNDT
TABLE OWATZONE
919 9192384444 0
TABLE ZONEORDR
919 ( 0) ( 123456) ( 7) ( 8) ( 9) ( A) ( B) ( C)$
VALID ZONE 0 OUTWATS CALL
+++ TRAVER: SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 LATATANDEM2W          9192384444         ST
TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

SIDXLA Option in Table LTCALLS

This option has four subfields:

- RTRNAME is an 8-character router name index into Table ISAXLA (Integrated Service Access Translations).
- TREAT_NO_SID defines what action will be taken when there is no SID in the Setup message. If Y is selected, the call will go to treatment. If N is selected, the translation will continue using information from the NPI, NSF, XLARTE, and called digits. Auto-zoning of WATS calls when no SID is present is not supported unless this field is set to N.
- NO_CALL_SCREEN allows bypass of call screening on the LINEATTR. If Y is selected, validation will be done on the DN. If N is selected, call screening will be done using the LINEATTR defined in Table LTCALLS.
- ROUTE_ON_XLARTE defines whether to route a call through public or private translations based on the XLARTE (CALL TYPE) rather than on the NPI in the Setup message. If Y, the CALL TYPE overrides the NPI. If N, the NPI determines the type of translation. This field only affects calls where either a valid entry for the SID exists in the ISAXLA table but no routing table is assigned, or no SID is sent in the Setup message and the TREAT_NO_SID option was not selected. For example, during the call setup if the call type is declared with no SID, the call will route through CUSTGRP translations regardless of the NPI.

SIDXLA is only valid for LTCALLS entries with XLARTE type of XLALEC or XLAIBN. Calls with an XLARTE of XLALEC and an NPI of private will be blocked. Also, call types INWATS, TIE, and PVT are not allowed with an XLARTE of XLALEC.

Note: For the DMS-250, the SIDXLA option in Table LTCALLS does not exist within the DMS-250 environment.

Figure 59 shows the datafill for Table LTCALLS using option SIDXLA.

Figure 59 Table LTCALLS with Option SIDXLA

7002310a

```
TABLE: LTCALLS
                LTID                           XLARTSEL
                                                             OPTIONS
-------------------------------------------------------------------
   ISDN     700    TIE XLAIBN    30         ISDNDEMO 100
                                              (SIDXLA PRIXLA N Y N)$
```

Figure 60 shows the SIDXLA display.

Figure 60 SIDXLA Display

7002310b

```
PRIXLA     N     Y     N
           •Treat No Sid = N....do NOT treat if no SID if provided.
                 •No Call Screen = Y do NOT screen per lineattr, use DN
                       •Route on XlARTE = N....DO NOT override the
                 NPI...the NPI will determine the type of
           translation
```

Table ISAXLA

Table ISAXLA (Integrated Service Access Translations) defines the services-related data associated with ISA calls. It uses a SID to determine translations and routing for calls datafilled in Table LTCALLS.

PRI Fields

The PRI fields are:

- IRTRNAME is the eight-character alphanumeric router name that was specified in table LTCALLS. Multiple tuples with the same router name are allowed.
- SIDFROM and SIDTO (SID lower- and upper-range fields) specify a range of SID values that use the rest of the tuple information to continue translations and routing. The valid range entry is from 0 to 1023. The SIDFROM value cannot be greater than the SIDTO value. For example, SIDFROM 75, SIDTO 40 is not allowed. If the SID value is not within the range defined in this field, the call will be sent to treatment.
- RTEID, route ID, is used to specify a route reference, such as OFRT, followed by an index into Table ISAXLA. Translation will continue to the specified route reference. If an entry exists in Table ISAXLA but no routing table is defined, the call will translate using the NPI, NSF, and the called digits.

Table ISAXLA for the DMS-250

Table ISAXLA is accessed by an eight-character router name and SID to form the key. The key drives the translation and routing further on to Table CALLATTR, then possibly to a table of route references, such as Table OFRT.

Table ISAXLA defines the service-related data associated with ISA that use the SID to determine translations and routing for calls datafilled in Table LTCALLS. Table LTCALLS does not need to be datafilled prior to datafilling this table. Once the LTID is determined from the trunk Common Language Location Identifier (CLLI) and the call type is determined from the NSF, Table LTCALLS is accessed. If the selector is XLAISA, the SID from the NSF is employed along with the router name to access Table ISAXLA.

Datafill

Figure 61 shows an example of the datafill for Table ISAXLA.

Figure 61 Table ISAXLA

7002311

```
TABLE ISAXLA

IRTRNAME        SIDFROM         SIDTO           RTEID
-------------------------------------------------------

PRIXLA          1               1023           (OFRT 125)$
```

SIDXLA Routing Console Sessions

Console Session A: PRIXLA N Y N

As shown in Figure 62, the TIE call type is datafilled with the SIDXLA option.

Figure 62 Table LTCALLS with SIDXLA N Y N Option Selection

7002312a

```
TABLE: LTCALLS
                LTID                              XLARTSEL
                                                              OPTIONS
-------------------------------------------------------------------------
   ISDN     700    TIE XLAIBN    0         ISDNDEMO 0   0
                                              (SIDXLA PRIXLA N Y N)$
```

Sample Datafill Trace for the DMS-250

The following sample call trace should provide an idea of how a call is processed within the DMS-250.

The first three tables are TRKGRP, LTCALLS, and CALLATTR.

- Table TRKGRP provides the LTID (in this case, ISDN 45) that TRAVER uses to perform further translation of a routed call.
- Table LTCALLS, which is indexed by ISDN 45 and the call type from the command line, provides the appropriate CALLATTR index or RTEREF.
- Table CALLATTR, which has been indexed by the CALLATTR index or RTEREF. LTCALLS (in this case, 4), provides information needed to translate the call.

Figure 63 Sample TRAVER Call Trace

7002312b

```
>  TRAVER  TR  L2DPR64CL  2339910000  PRISM  T
STS USED FOR TRAVER IS:  815
TABLE TRKGRP
L2DPR64CL PRA250 0  NPDGP  NCIT  N  0  ASEQ  N  NIL  0  N  814
     0  (ISDN 45)
TABLE LTCALLS
ISDN 45 PRISM XLAIEC  4  $  $
TABLE CALLATTR
4  444   MCIP  0  NSCR  ZEROM  814  Y  10  8140000  NIL
TABLE STDPRTCT
MCIP   (1)  (0)
   - SUBTABLE STDPRT
   - 23 29 CT OFFNET 10 10 0
   - SUBTABLE AMAPRT
   - KEY NOT FOUND
   - DEFAULT VALUE IS:  NONE N
TABLE HNPACONT
815  20  0  (8)  (1)  (0)
- SUBTABLE HNPACODE
- 233  234  FRTE  3
-       3  S  D  D2AIMTISUP
- EXIT TABLE RTEREF
EXIT TABLE HNPACONT

+++ SUCCESSFUL CALL TRACE
```

Figure 64 SIDXLA Display

7002312c

```
PRIXLA      N      Y      N
            •Treat No Sid = N....do NOT treat if no SID if provided.
                  •No Call Screen = Y do NOT screen per lineattr, use DN
                        •Route on XlARTE = N....DO NOT override the
                  NPI...the NPI will determine the type of
            translation
```

Call 1: NPI = E164, TIE Call Type, No SID Provided

The NPI E164 will direct the call through LINEATTR 0. See Figure 65.

Figure 65 Call 1—NPI = E164, TIE Call Type, No SID Provided

7002312d

```
traver tr priteach n cdn e164 8282001 tie b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA N Y N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 OPER 0 NIL NILSFC LATA1 0 NIL NIL 00 N
$
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1) 0
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 8 910 N NP 0 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
TABLE HNPACONT
919 67 1 ( 26) ( 1) ( 0) ( 0) 0
 . SUBTABLE HNPACODE
 . 828 828 DN 919 828
AIN Info Collected TDP: no subscribed trigger.
AIN Info Analyzed TDP: no subscribed trigger.
TABLE TOFCNAME
919 828
TABLE DNINV
919 828 2001 L ISDN 1
AIN Term Attempt TDP: no subscribed trigger.
TABLE DNATTRS
TUPLE NOT FOUND
TABLE DNGRPS
TUPLE NOT FOUND
TABLE LCASCRCN
919 LCA1 ( 10) MAND Y
 . SUBTABLE LCASCR
 . 828 828
TABLE PFXTREAT
MAND NP Y NP UNDT
+++ TRAVER: SUCCESSFUL CALL TRACE +++
  DIGIT TRANSLATION ROUTES
1 LINE                  9198282001N        ST
```

Call 2: NPI = E164, TIE Call Type, SID Index 1 Provided

The SID index will route the call directly to OFRT 125. See Figure 66.

Figure 66 Call 2—NPI = E164, TIE Call Type, SID Index 1 Provided

7002312e

```
traver tr priteach n cdn e164 8282001 tie 1 b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA N Y N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE ISAXLA
PRIXLA 1 1023 (OFRT 125) $
TABLE OFRT
 125 ISA N N N PRITEAM6 TIE 0 E164 0
 . TABLE TRKGRP
 . PRITEAM6 PRA 0 NPDGP NCRT ASEQ N (ISDN 501) $ $
 . TABLE LTCALLS
 . ISDN 501 TIE XLAIBN 0 ISDNDEMO 0 0 $
EXIT TABLE OFRT

+++ TRAVER: SUCCESSFUL CALL TRACE +++


DIGIT TRANSLATION ROUTES

1 PRITEAM6                    N CDN  E164  L  8282001 TIE 0 BC SPEECH

TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120

+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Call 3: NPI = PVT, TIE Call Type, SID Index Not Provided

Call is routed through customer group translations, completing the call. See Figure 67.

Figure 67 Call 3—NPI = PVT, TIE Call Type, SID Index Not Provided

7002312f

```
traver tr priteach n cdn pvt 2001 tie b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA N Y N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE NCOS
ISDNDEMO 0 0 0 UNRES ( XLAS NXLA NXLA NDGT)$
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
ISDNDEMO NXLA ISDNCT NXLA 0 ISDNDC
TABLE DIGCOL
ISDNDC 2 COL L 3
NCOS PRELIM XLA name is NIL. Go to next XLA name.
CUST PRELIM XLA name is NIL. Go to next XLA name.
TABLE IBNXLA: XLANAME ISDNCT
ISDNCT 2 EXTN N N Y 919 828 4 $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
AIN Info Collected TDP: no subscribed trigger.
AIN Info Analyzed TDP: no subscribed trigger.
TABLE TOFCNAME
919 828
TABLE DNINV
919 828 2001 L ISDN 1
AIN Term Attempt TDP: no subscribed trigger.
TABLE DNATTRS
TUPLE NOT FOUND
TABLE DNGRPS
TUPLE NOT FOUND
 +++ TRAVER: SUCCESSFUL CALL TRACE +++

 DIGIT TRANSLATION ROUTES

1 LINE                  9198282001N        ST

TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120
 +++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Call 4: NPI = PVT, TIE Call Type, SID Index 1 Provided

The SID index will route the call directly to OFRT 125. See Figure 68.

Figure 68 Call 4—NPI = PVT, TIE Call Type, SID Index 1 Provided

7002312g

```
traver tr priteach n cdn pvt 2001 tie 1 b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA N Y N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE ISAXLA
PRIXLA 1 1023 (OFRT 125) $
TABLE OFRT
 125 ISA N N N PRITEAM6 TIE 0 E164 0
 . TABLE TRKGRP
 . PRITEAM6 PRA 0 NPDGP NCRT ASEQ N (ISDN 501) $ $
 . TABLE LTCALLS
 . ISDN 501 TIE XLAIBN 0 ISDNDEMO 0 0 $
EXIT TABLE OFRT

+++ TRAVER: SUCCESSFUL CALL TRACE +++


DIGIT TRANSLATION ROUTES

1 PRITEAM6                    N CDN  E164  L  2001 TIE 0 BC SPEECH

TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120

+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Console Session B: PRIXLA N N N

As shown in Figure 69, the TIE call type is datafilled with the SIDXLA option.

Figure 69 Table LTCALLS with SIDXLA N N N Option Selection

7002313a

```
TABLE: LTCALLS
                LTID                              XLARTSEL
                                                              OPTIONS
-------------------------------------------------------------------------
   ISDN     700    TIE XLAIBN    0         ISDNDEMO 0    0
                                              (SIDXLA PRIXLA N N N)$
```

Figure 70 shows the SIDXLA display.

Figure 70 SIDXLA Display

7002313b

```
PRIXLA      N      N      N
           •Treat No Sid = N....do NOT treat if no SID if provided.
                 •No Call Screen = N...screen the call per table lineattr
                       •Route on XlARTE = N....DO NOT override the
                       NPI...the NPI will determine the type of
                       translation
```

Call 1: NPI = E164, TIE call type, SID Index Not Provided

The NPI E164 will direct the call through LINEATTR 0. See Figure 71.

Figure 71 Call 1—NPI = E164, TIE call type, SID Index Not Provided

7002313c

```
traver tr priteach n cdn e164 8282001 tie b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA N N N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 OPER 0 NIL NILSFC LATA1 0 NIL NIL 00 N
$
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1) 0
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 8 910 N NP 0 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
TABLE HNPACONT
919 67 1 ( 26) ( 1) ( 0) ( 0) 0
 . SUBTABLE HNPACODE
 . 828 828 DN 919 828
AIN Info Collected TDP: no subscribed trigger.
AIN Info Analyzed TDP: no subscribed trigger.
TABLE TOFCNAME
919 828
TABLE DNINV
919 828 2001 L ISDN 1
AIN Term Attempt TDP: no subscribed trigger.
TABLE DNATTRS
TUPLE NOT FOUND
TABLE DNGRPS
TUPLE NOT FOUND
TABLE LCASCRCN
919 LCA1 ( 10) MAND Y
 . SUBTABLE LCASCR
 . 828 828
TABLE PFXTREAT
MAND NP Y NP UNDT
+++ TRAVER: SUCCESSFUL CALL TRACE +++
 DIGIT TRANSLATION ROUTES
1 LINE                  9198282001N        ST
```

Call 2: NPI = E164, TIE Call Type, SID Index 1 Provided

The SID index will route the call with screening by LINEATTR 0. See Figure 72 and Figure 73.

Figure 72 Call 2—NPI = E164, TIE Call Type, SID Index 1 Provided—Screen 1

7002313d

```
traver tr priteach n cdn e164 8282001 tie 1 b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA N N N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE ISAXLA
PRIXLA 1 1023 (OFRT 125) $
ROUTE FROM ISAXLA WILL BE USED IF CALL SCREENING IS SUCCESSFUL
TABLE OFRT
 125 ISA N N N PRITEAM6 TIE 0 E164 0
 . TABLE TRKGRP
 . PRITEAM6 PRA 0 NPDGP NCRT ASEQ N (ISDN 501) $ $
 . TABLE LTCALLS
 . ISDN 501 TIE XLAIBN 0 ISDNDEMO 0 0 $
EXIT TABLE OFRT
SCREEN CALL USING LINEATTR FROM LTCALLS
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 OPER 0 NIL NILSFC LATA1 0 NIL NIL 00 N
$
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1) 0
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 8 910 N NP 0 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
TABLE HNPACONT
919 67 1 ( 26) ( 1) ( 0) ( 0) 0
 . SUBTABLE HNPACODE
 . 828 828 DN 919 828
AIN Info Collected TDP: no subscribed trigger.
AIN Info Analyzed TDP: no subscribed trigger.
```

Figure 73 Call 2—NPI = E164, TIE Call Type, SID Index 1 Provided—Screen 2

7002313e

```
TABLE TOFCNAME
919 828
TABLE DNINV
919 828 2001 L ISDN 1
AIN Term Attempt TDP: no subscribed trigger.
TABLE DNATTRS
TUPLE NOT FOUND
TABLE DNGRPS
TUPLE NOT FOUND
TABLE LCASCRCN
919 LCA1 ( 10) MAND Y
 . SUBTABLE LCASCR
 . 828 828
TABLE PFXTREAT
MAND NP Y NP UNDT

+++ TRAVER: SUCCESSFUL CALL TRACE +++


DIGIT TRANSLATION ROUTES

1 PRITEAM6                    N CDN  E164  L  8282001 TIE 0 BC SPEECH

TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120

+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Call 3: NPI = PVT, TIE Call Type, SID Index 1 Provided

The SID index will route the call with screening by LINEATTR 0. See Figure 74 and Figure 75.

Figure 74 Call 3—NPI = PVT, TIE Call Type, SID Index 1 Provided—Screen 1

7002313f

```
traver tr priteach n cdn pvt 8282001 tie 1 b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA N N N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE ISAXLA
PRIXLA 1 1023 (OFRT 125) $
TABLE OFRT
 125 ISA N N N PRITEAM6 TIE 0 E164 0
 . TABLE TRKGRP
 . PRITEAM6 PRA 0 NPDGP NCRT ASEQ N (ISDN 501) $ $
 . TABLE LTCALLS
 . ISDN 501 TIE XLAIBN 0 ISDNDEMO 0 0 $
EXIT TABLE OFRT
SCREEN CALL USING LINEATTR FROM LTCALLS
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 OPER 0 NIL NILSFC LATA1 0 NIL NIL 00 N
$
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1) 0
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 8 910 N NP 0 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
TABLE HNPACONT
919 67 1 ( 26) ( 1) ( 0) ( 0) 0
 . SUBTABLE HNPACODE
 . 828 828 DN 919 828
AIN Info Collected TDP: no subscribed trigger.
AIN Info Analyzed TDP: no subscribed trigger.
```

Figure 75 Call 3—NPI = PVT, TIE Call Type, SID Index 1 Provided—Screen 2

7002313g

```
TABLE TOFCNAME
919 828
TABLE DNINV
919 828 2001 L ISDN 1
AIN Term Attempt TDP: no subscribed trigger.
TABLE DNATTRS
TUPLE NOT FOUND
TABLE DNGRPS
TUPLE NOT FOUND
TABLE LCASCRCN
919 LCA1 ( 10) MAND Y
 . SUBTABLE LCASCR
 . 828 828
TABLE PFXTREAT
MAND NP Y NP UNDT

+++ TRAVER: SUCCESSFUL CALL TRACE +++


DIGIT TRANSLATION ROUTES

1 PRITEAM6                    N CDN  E164  L  8282001 TIE 0 BC SPEECH

TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120

+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Call 4: NPI = PVT, TIE Call Type, SID Not Provided

The call will be routed through customer group translations but will end in treatment. See Figure 76.

Figure 76 Call 4—NPI = PVT, TIE Call Type, SID Not Provided

7002313h

```
traver tr priteach n cdn pvt 8282001 tie b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA N N N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE NCOS
ISDNDEMO 0 0 0 UNRES ( XLAS NXLA NXLA NDGT)$
TABLE CUSTHEAD: CUSTGRP, PRELIMXLA, CUSTXLA, FEATXLA, VACTRMT, AND DIGCOL
ISDNDEMO NXLA ISDNCT NXLA 0 ISDNDC
TABLE DIGCOL
ISDNDC 8 COL L 4
NCOS PRELIM XLA name is NIL. Go to next XLA name.
CUST PRELIM XLA name is NIL. Go to next XLA name.
TABLE IBNXLA: XLANAME ISDNCT
ISDNCT 8 EXTN N N Y 919 828 5 $
TABLE TMTCNTL
TITRKGRP ( 0)
 . SUBTABLE TREAT
KEY NOT FOUND
DEFAULT OFFTREAT IS USED
TABLE TMTCNTL
OFFTREAT ( 194)
 . SUBTABLE TREAT
 . RODR N S T120

+++ TRAVER: SUCCESSFUL CALL TRACE +++



TREATMENT ROUTES.  TREATMENT IS: BLDN
1 BLDNANNC
2 T120

+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Console Session C: PRIXLA Y N N

As shown in Figure 77, the TIE call type is datafilled with the SIDXLA option.

Figure 77 Table LTCALLS with SIDXLA Y N N Option Selection

7002314a

```
TABLE: LTCALLS
                LTID                             XLARTSEL
                                                              OPTIONS
------------------------------------------------------------------
   ISDN     700     TIE XLAIBN     0        ISDNDEMO 0    0
                                               (SIDXLA PRIXLA Y N N)$
```

Figure 78 shows the SIDXLA display.

Figure 78 SIDXLA Display

7002314b

```
PRIXLA     Y     N     N
           •Treat No Sid = Y....Treat if no SID if provided.
                 •No Call Screen = N...screen per table lineattr
                       •Route on XlARTE = N....DO NOT override the
                       NPI...the NPI will determine the type of
                       translation
```

Call 1: NPI = E164, TIE Call Type, SID Index 1 Provided

The SID index will route the call with screening by LINEATTR 0. See Figure 79 and Figure 80.

Figure 79 Call 1—NPI = E164, TIE Call Type, SID Index 1 Provided—Screen 1

7002314c

```
traver tr priteach n cdn e164 8282001 tie 1 b
TABLE TRKGRP
PRITEACH PRA 0 PRAC NCRT ASEQ N (ISDN 700) $ $
TABLE LTCALLS
ISDN 700 TIE XLAIBN 0 ISDNDEMO 0 0 (SIDXLA PRIXLA Y N N) $
TABLE CUSTSTN
TUPLE NOT FOUND
TABLE OFCVAR
AIN_OFFICE_TRIGGRP NIL
TABLE ISAXLA
PRIXLA 1 1023 (OFRT 125) $
ROUTE FROM ISAXLA WILL BE USED IF CALL SCREENING IS SUCCESSFUL
TABLE OFRT
 125 ISA N N N PRITEAM6 TIE 0 E164 0
 . TABLE TRKGRP
 . PRITEAM6 PRA 0 NPDGP NCRT ASEQ N (ISDN 501) $ $
 . TABLE LTCALLS
 . ISDN 501 TIE XLAIBN 0 ISDNDEMO 0 0 $
EXIT TABLE OFRT
SCREEN CALL USING LINEATTR FROM LTCALLS
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 OPER 0 NIL NILSFC LATA1 0 NIL NIL 00 N $
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE STDPRTCT
POTS ( 1) ( 1) 0
 . SUBTABLE STDPRT
WARNING: CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 8 910 N NP 0 NA
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS:   NONE OVRNONE  N
TABLE HNPACONT
919 67 1 ( 26) ( 1) ( 0) ( 0) 0
 . SUBTABLE HNPACODE
 . 828 828 DN 919 828
AIN Info Collected TDP: no subscribed trigger.
AIN Info Analyzed TDP: no subscribed trigger.
```

Figure 80 Call 1—NPI = E164, TIE Call Type, SID Index 1 Provided—Screen 2

7002314d

```
TABLE TOFCNAME
919 828
TABLE DNINV
919 828 2001 L ISDN 1
AIN Term Attempt TDP: no subscribed trigger.
TABLE DNATTRS
TUPLE NOT FOUND
TABLE DNGRPS
TUPLE NOT FOUND
TABLE LCASCRCN
919 LCA1 ( 10) MAND Y
 . SUBTABLE LCASCR
 . 828 828
TABLE PFXTREAT
MAND NP Y NP UNDT

+++ TRAVER: SUCCESSFUL CALL TRACE +++


DIGIT TRANSLATION ROUTES

1 PRITEAM6                    N CDN  E164  L  8282001 TIE 0 BC SPEECH

TREATMENT ROUTES.  TREATMENT IS: GNCT
1 T120

+++ TRAVER: SUCCESSFUL CALL TRACE +++
```

Call 2: NPI = E164, TIE Call Type, SID Index Not Provided

The call is terminated immediately. See Figure 81.

Figure 81 Call 2—NPI = E164, TIE Call Type, SID Index Not Provided

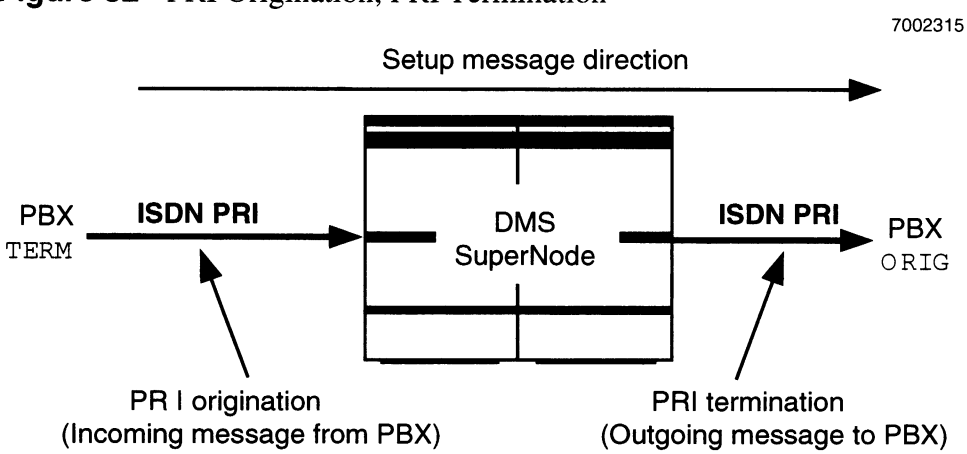
7002314e

```
traver tr priteach n cdn e164 8282001 tie b
TREAT NO SID OPTION WAS SELECTED IN LTCALLS

+++ TRAVER: CALL TRACE TERMINATED DUE TO DATA TROUBLE +++

TREAT NO SID OPTION WAS SELECTED IN LTCALLS


+++ TRAVER: CALL TRACE TERMINATED DUE TO DATA TROUBLE +++
```

Translations for PRI Terminations

The definition of PRI termination is a call outgoing from the DMS SuperNode or DMS-250 to a Private Branch Exchange (PBX) switch utilizing PRI trunking facilities. Figure 82 shows a PRI termination as defined from the perspective of the DMS SuperNode or DMS-250.

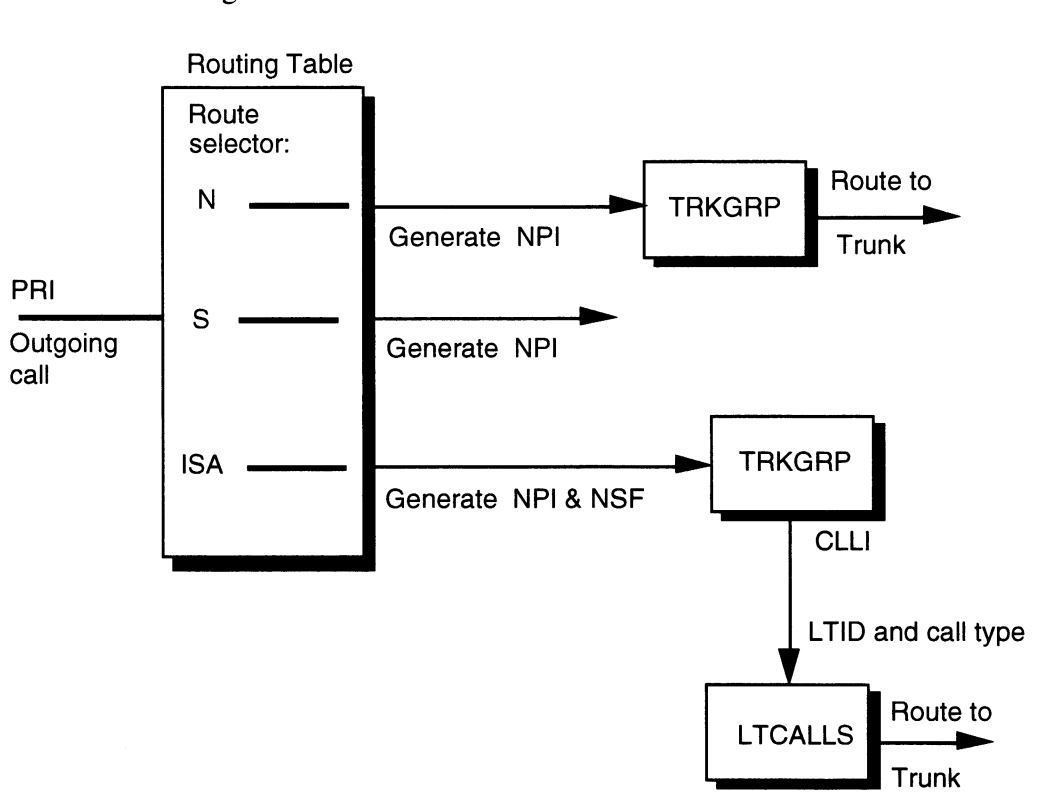
Figure 82 PRI Origination, PRI Termination



When a call terminates, the routing table provides the trunk group Common Language Location Identifier (CLLI) and depending on the type of route, the Numbering Plan Indicator (NPI) only or the NPI and Network Specific Facilities (NSF) combination.

Figure 83 shows a terminating PRI call and its associated table flow.

Figure 83 Terminating PRI Call



The N and S route selectors have not been modified to allow the data entry of NPI and NSF information:

- A default NPI is assigned based on the type of number dialed.
- A call from a POTS origination will default to a Numbering Plan Indicator (NPI) of E.164.
- A Meridian Digital Centrex (MDC) origination that is screened into plain ordinary telephone service (POTS) tables (such as being pointed to a DOD selector in Table IBNXLA) will also default to an NPI of E.164.
- All other MDC originators will default to an NPI of PVT.

The ISA selector is the only way to pass call type information to the far node and is the selector of choice.

For the DMS SuperNode to route to a node, existing system routing tables are used:

- Tables OFRT, OFR2, OFR3, and OFR4 (Office Route tables)
- Tables IBNRTE, IBNRT2, IBNRT3, and IBNRT4 (Integrated Business Network Route tables)
- Table HNPACONT.HNPARTEREF (routing subtable for Home Numbering Plan Area Control table)

When the ISA route selector is utilized within these tables, the following information is necessary:

- PRI trunk group CLLI
- Call type (PUB, PVT, and FX)

Subtable RTEREF, OFRT Tables, and Extensions

Routing tables list the elements on which a call can be routed. Certain call types require additional information to complete the Setup message which is to be sent over the D-channel to the far office. Therefore, each call type will require its own distinctive parameters.

Figure 84 and Figure 85 show the relationship of the routing tables.

Figure 84 HNPACONT Routing Table

7002317

```
Table: HNPACONT

STS SNPA NORTREFS NOAMBIGC RTEREF HNPACODE  ATTRIB  RTEMAP
-------------------------------------------------------------

002   3   1     (    2)     (    1)      (    0)     (    0)


HNPACONT.RTEREF

 RTE       SEL OHQ CBQ EXP                              RTELIST
-------------------------------------------------------------
3    (ISA    N    N    N   TRN0PRITR3     PVT     0 E164    0)$
```

Figure 85 OFRT Routing Table

7002318

```
Table: OFRT

 RTE  RTELIST
-------------------------------------------------------

77    (ISA N N N    TRN0PRISL1 PUB NONE  N   N     0)$

78    (ISA N N N    TRN0PRISL1 TIE    0     PVT     0)$

79    (ISA N N N    TRN0PRITR3 PUB NONE  N  N    10)$

96    (ISA N N N    TRN0PRISL1 INWATS   32  PVT     0)$
```

Note: Tables OFR2, OFR3, and OFR4 are identical in function and datafill to Table OFRT; likewise Tables IBNRT2, IBNRT3, and IBNRT4 are identical to Table IBNRTE.

Call Types

For the indicated call types, use the listed additional parameters.

PRIVATE, INWATS, TIE, and FX:

- The facility number (FACNUM) is a number associated with the particular switch in the PRI network.

  — 0 to 1023

- The Numbering Plan Indicator (NPI) identifies which type of numbering this call will use: E164 for public calls or PVT for private network calls.

  — E164 or PVT

- The Digit Manipulation Index (DMI) allows you to specify an index for digit manipulation in Table DIGMAN.

WATS

- Zone is the OUTWATS zone number for the call.

  — 0 to 9, A, B, C, or AUTO

- The Numbering Plan Indicator (NPI) identifies which type of numbering this call will use: E164 for public calls or PVT for private network calls.

  — E164 or PVT

- The DMI allows you to specify an index for digit manipulation.

Public

- OATYPE is the type of operator access required. Enter OP for Zero Plus (0+), OM for Zero Minus (0-), or NONE (no operator access allowed.)

  — OP, OM, or NONE

- Transit Network Selector (TNS) is placed in the Setup message. This number may be provided by the call originator or the number may not be required. Enter C when the TNS is to be determined from the call originator or N for no TNS.

  — 0 to 999, C, or N

- NPOS—If Y is entered for no calling number identification required (NPOS), calling number identification is not required for Operator Number Identification (ONI)-fail or Automatic Number Identification (ANI)-fail calls incoming on Traffic Operator Position System (TOPS) trunk groups. If N is entered, calling number identification is required for these types of trunk groups.

  — N, Y

- The DMI allows you to specify an index for digit manipulation.

PRI Call Process

Starting with the routing Table HNPACONT.RTEREF, a PRI call is processed as follows:

1. The RTEREF subtable in Table HNPACONT uses the ISA route selector to route the call to the trunk CLLI 'TRN0PRITR3. Assume the call type to be private (PVT). The CLLI value is used to access Table TRKGRP (Trunk Group).

2. In Table TRKGRP, the LTID of the trunk group is obtained. Using the LTID associated with the trunk CLLI as well as the call type (PUB), Table LTCALLS is accessed next.

3. Table LTCALLS determines whether or not the call type is allowed on the trunk. If a tuple that matches the LTID and call type is found in Table LTCALLS, the call is allowed and is routed over the trunk to the termination PBX. The NPI and NSF are forwarded to the PBX in the Setup protocol message.

If Table LTCALLS does not have a tuple that matches the LTID requirements, then the DMS SuperNode blocks the call and the caller receives treatment.

Check Your Learning

Please answer the following:

1. Describe two ways to translate incoming Equal Access (EA) calls.

Dialed Carrier Access Code (CAC) or Transit Network Selector Information Element to send the CAC.

2. What is the only call type available for Option EA in Table LTCALLS?

Public

3. What table works in conjunction with LTCALLS and defines Service Identifier (SID) ranges?

ISAXLA

4. Describe the function of the SID.

Shortens call processing

Lesson 4

Q.931 Signaling

The purpose of this lesson is to provide you with the skills to interpret the data of those information elements (IEs) of a Q.931 protocol Call Setup message that apply to initiating call processing.

Note: This material is not meant to be a detailed discussion on Q.931 signaling or the Call Setup message. This lesson is designed to show you how your datafill determines what the far office receives and what the information you receive from the sending office looks like. This should enhance your understanding as we look at the datafill of the remainder of the Primary Rate Interface (PRI) translations tables.

Lesson Objectives

After completing this lesson, you will be able to:

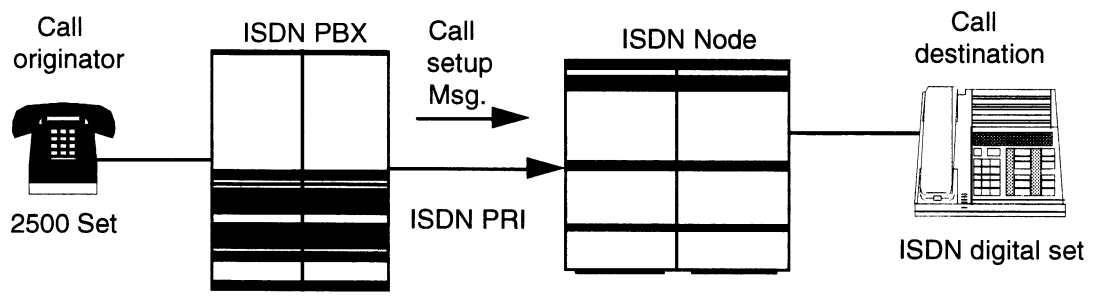
- Identify the information elements (IEs) of the Call Setup message.

Introduction

Traditional call control signaling translates calls using primarily one piece of information, the called number. In the Integrated Services Digital Network (ISDN) environment and specifically with PRI, much more information is passed between connecting offices to determine the destination of the call.

During the various stages of call processing, a number of messages pass information between offices. But the Call Setup message has the responsibility of giving the receiving switch the necessary information to translate the call. We will concentrate on this message. Figure 86 depicts the path of the Call Setup message between connecting offices.

Figure 86 Call Setup Message



Call Setup Message

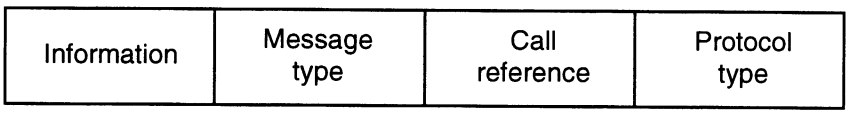
To initiate a call, the Call Setup message is sent from the originating node to the network and from the network to the destination node. Within each message are certain components called information elements (IEs). As shown in Figure 87, each IE contains a particular piece of data.

The information in the IE fields is organized as follows:

- The protocol type field identifies the message protocol, in this case, Q.931.
- The message type field identifies the Call Setup message (or other message type).
- The call reference field is defined in the following text.
- All other elements are contained in the information field.

Figure 87 Q.931 Message Format

7002402



We will only cover those elements pertinent to PRI. Some of the mandatory elements are explained next.

Call Reference

The call reference field contains a number assignment that identifies a specific call on a particular D-channel. This number assignment is assigned

- At the beginning of the call and remains fixed throughout the lifetime of the call
- By software and establishes the unique Layer 2 logical link connection for that call

Bearer Capability (BC)

The Bearer Capability IE indicates the bearer service to be provided and conforms to CCITT recommendation I.231. The components of the bearer capability IE are the transfer capability, the transfer mode and rate, the protocol ID, and the data rate. The transfer mode for all PRIs is circuit mode (no packet switching).

Once the Bearer Capability IE is received, its information is compared to the bearer service of the call's destination. BC information is specified in Table BCDEF (Bearer Capability Definition) and Table BCCOMPAT (Bearer Capability Compatibility).

The default transfer capabilities have these values:

1. Speech
   - — Transfer rate: 64 kbps
   - — Layer 1 protocol ID: Mu-law
   - — Data rate: not present

Note: This supports voice and voice-band data connections.

2. 64 kbps unrestricted digital, rate adapted from 56 kbps

   — Transfer rate: 64 kbps

   — Layer 1 protocol ID: rate adaptation

   — Data rate: 56 kbps

Note: This specifies that the 56 kbps data rate adaptation scheme used is a CCITT standard which sets every eighth bit to 1. The advantage of setting the eighth bit to 1 is that it meets the current ZCS "ones density" requirements and allows transmission of the user's data over trunks still using in-band A/B bit signaling.

3. 64 kbps clear, unrestricted digital

   — Transfer rate: 64 kbps

   — Layer 1 protocol ID: not present

   — Data rate: not present

Note: This allows the digital data to be routed over facilities that support the Bipolar Eight Zero Substitution (B8ZS) transmission scheme. This transmission scheme avoids the necessity for zero code suppression and allows 64 kbps "clear" data to be transmitted.

4. 64 kbps restricted

   — Transfer rate: 64 kbps

   — Layer 1 protocol ID: not present

   — Data rate: not present

Note: This allows the digital data to be routed with a restricted data transfer capability. The restriction is that some transmission facilities require a certain "ones density" (for example, no more than 15 consecutive zeros) or they may lose synchronization, which would corrupt the customer's digital data. To avoid losing synchronization, a method known as Zero Code Suppression (ZCS) inserts a "1" into the bit stream at appropriate intervals.

5. 3.1 kHz audio

   — Transfer rate: 64 kbps

   — Layer 1 protocol ID: Mu-law

   — Data rate: not present

Note: This supports voice and voiceband data connections.

6. 384 kbps video and data, unrestricted

   — Transfer rate: 384 kbps

   — Data rate: not present

7. 1,536 kbps video and data, unrestricted

   — Transfer rate: 1,536 kbps

   — Data rate: not present

8. Multirate, unrestricted digital

   — Transfer rate: multirate

   — Rate multiplier: 2 to 24

   — Data rate: not present

Transfer Rate Notes:

Note 1: If the information transfer rate is either 384 kbps or 1,536 kbps and the channel selection option is FIXED, then the bearer capability IE is coded with a corresponding transfer rate of 384 kbps or 1,536 kbps.

Note 2: If the channel selection option is FLOATING or FLEXIBLE, then the bearer capability IE is coded with a transfer rate of "multirate" (64 kbps base rate) and "rate multiplier" of 6 or 24.

Channel Identification

This IE specifies the B-channel selected by the originating node. Two components of this element are of interest for PRI:

- The Channel Identifier (CID) represents the individual time slot of the B-Channel selected, taken from Table TRKMEM (Trunk Member).
- The Interface Identifier (IID) is
  - — A number assigned to the DS1 physical circuit in Table LTCPSINV (Line Trunk Controller Peripheral Side Inventory)
  - — Unique within the PRI trunk group
- This number identifies the physical DS1 circuit on which the selected B-channel resides and is vital when the PRI trunk group encompasses more than one DS1 circuit. The IID may be omitted sometimes if the selected B-Channel resides on the same DS1 as the D-channel.

Channel Selection

For Dialable Wideband Service (DWS), the channel identification IE identifies the channels selected for 384 kbps and 1,536 kbps circuit-mode bearer capabilities. All the selected channels are on the same DS1 interface. The number of channels identified corresponds to the information transfer rate and rate multiplier fields of the bearer capability IE.

The following IEs are optional and are defined in Subtable HNPACONT.RTEREF, Table OFRT (Office Route), and other routing tables.

Called Party Number

This element identifies the called party of a call.

Type of Number

- Unknown
- International number: open numbering plan (country code + national number)
- National number: ten-digit number
- Subscriber number: seven digits or less

Number Digits

The called number digits are listed here.

Numbering Plan Indicator (NPI)

This entry is vital to defining the screening and routing of PRI calls. The NPI defines the numbering plan of the called number:

- 164 represents the public numbering plan. The Public Switched Telephone Network in North America conforms to this plan.
- Private numbering plan (PVT) is used when the called number does not conform to the standards of E.164.

The data tables that will perform the translations of the called digits are determined by the value of the NPI. See Lesson 3, *Integrated Services Access (ISA)*, for more detail.

Network Specific Facilities (NSF) (Call Type)

This is the identifier of the network facilities which are to be invoked to complete a particular call. Two of the components within this IE are part of the key, which directs a call into ISA translations for call completion.

Binary Facility Coding Value (BFCV)

This value identifies the call type which, along with the LTID, is the key field pointer into Table LTCALLS:

- Public (PUB)—no BFCV
- Private (PVT)—BFCV may be omitted when NPI-PVT
- Inwats (INWATS)
- Outwats (WATS)
- Foreign exchange (FX)
- TIE trunk (TIE)

The indication of this call type information in the NSF allows separate translations to be built for each call type specified. If no NSF IE is included in the setup message, then the call type equals the NPI:

- PUBLIC when the NPI is E.164
- PRIVATE when the NPI is private

Service Identifier (SID)

Calls types which have a potential to use private facilities or which may occur more than once in a switch can specify the target facility by using this entry. The SID

- Can represent a trunk, route, or CLLI number for the call types of
  - — PRIVATE
  - — INWATS
  - — TIE
  - — Foreign Exchange (FX)
- Specifies the band for OUTWATS circuits

Calling Party Number

The same components that were in the called party number IE are also included in the calling party number IE. For the calling party number IE, there are two additional fields.

Presentation Indicator

This entry helps determine if the calling party number is to be displayed to the terminating party. If required, it is retrieved from Table DNGRPS and Table DNATTRS (see note):

- Presentation allowed
- Presentation restricted
- Number not available

Note: The DMS-250 does not use Tables DNGRPS and DNATTRS.

Screening Indicator

The Screening Indicator identifies the source of the calling number:

- User provided, the true individual calling party number
- Network provided, the default calling party number provided

Original Called Number

This element provides the original called number when a call redirection has occurred. The Network Redirection and Reason feature allows for the display of the original called number and the reason for redirection.

This element contains all the elements of the calling party number IE plus the following:

Original Redirection Reason

- No reason supplied
- Call forwarding busy
- Call forwarding no reply
- Call transfer
- Call pickup
- Call forwarding unconditional

Redirection Counter

- Number from 0 to 5

Display

This provides information as a part of the Network Name Display feature. This IE may appear more than once in one Call Setup message, for instance, to supply the calling, called, and original called names.

Transit Network Selector

This element identifies a transit network, most commonly the Carrier Identification Code (CIC) of an interexchange carrier. User-specific digits may be specified here to provide the access code to private leased facilities. ISA routing allows the service provider to input this information into the Call Setup message of outgoing calls.

Carrier Access Codes (CACs) may be included in the called party number IE instead:

- Type of network identification
  - — User specified
  - — National Network Identification
- Network identification plan
  - — Unknown
  - — Carrier Identification Code (CIC or CAC)
  - — User-specific (for example, access code for private leased circuits)

Network Identification Characters

These characters identify the digits of the CAC or the user-specific digits.

Progress Indicator

This element describes an event that has occurred during the life of a call. A very common message that is sent by this element is "call is not end-to-end ISDN; further call progress information may be available in-band."

Facility Indicator

The facility indicator IE indicates that a supplementary service has been initiated, such as Network Ring Again. This element is sent as part of a *connectionless* message.

Check Your Learning

1. When no NSF is specified, what information determines the call type to be associated with a PRI call, and in which information element (IE) can it be found?

NPI in INFO

2. Name the IE by which each PRI call is identified uniquely throughout its lifetime:

Progression Indentifier (PI)

3. Name the IE that may be used to transmit interLATA carrier information:

Transit

Lesson 5

Bearer Capability Routing

The purpose of this lesson is to provide you with the skills to interpret Bearer Capability (BC) translations and routing tables used with Primary Rate Interface (PRI), and routing and digit analysis of Integrated Services Digital Network (ISDN) traffic on PRI trunks.

Lesson Objectives

After completing this lesson, you will be able to:

- Identify the steps that the switch follows in determining Bearer Capability (BC).
- Identify datafill for
  - — Table BCDEF (Bearer Capability Definition)
  - — Table BCCOMPAT (Bearer Capability Compatibility)
- Datafill
  - — Table RCNAME (Routing Characteristic Name)
  - — Table RTECHAR (Routing Characteristics)
- Identify datafill for
  - — Table XLAMAP
  - — Table PXLAMAP
- Interpret routing characteristics in a Translation Verification (TRAVER) utility example.

ISDN Routing and Digit Analysis

ISDN routing and digit analysis is defined by Bellcore document TR-448. Digital Multiplex System (DMS) software packages NTX767AA and NTX768AA (for the end office [EO] and toll office, respectively) comply with that technical reference (TR).

In a previous lesson, you learned that in addition to the called number, Q.931 signaling transports "non-digit" routing information to a receiving office. You will now need to consider the following analysis of this information:

- Type of number (part of the Called Directory Number (CDN) information element (IE))
- Bearer Capability
- Transit network selector
- Keypad IE (see note)
- Operator system access IE (see note)

Note: The keypad and operator system access information elements (IEs) are analyzed in this system but are not supported by PRI. These will not be considered.

Carrier Digits

Carrier digits may be transported in the Called Party Number IE or the Transit Network Selector (TNS) IE. When these digits are transported in the TNS IE, the receiving PRI office composes a complete called number as follows:

- Prefixes the TNS digits with **10** or **101** and then adds these digits to the front of the called number

Bearer Capability

The Bearer Capability (BC) IE specifies the type of transmission service available to the user. The transmission characteristics are defined in Table BCDEF (Bearer Capability Definition). The BC IE provides information required to access Table BCDEF and to obtain a BC name. The BC name is required in the translation system to determine the path of the call.

In the ISDN/Meridian Digital Centrex (MDC) environment, the BC determines the compatibility of call originations to their intended terminations, whether to other trunks or to terminal equipment.

The PRI transports the default transfer capabilities shown in Table 9.

Table 9 Default Transfer Capabilities

1. **Speech**

Transfer rate	64 kbps
Layer 1 protocol ID	Mu-law
Data rate	not present

2. **64 kbps unrestricted digital, rate adapted from 56 kbps**

Transfer rate	64 kbps
Layer 1 protocol ID	Rate adaptation
Data rate	56 kbps

3. **64 kbps clear, unrestricted digital**

Transfer rate	64 kbps
Layer 1 protocol ID	not present
Data Rate	not present

4. **64 kbps restricted**

Transfer rate	64 kbps
Layer 1 protocol ID	not present
Data rate	not present

5. **3.1 kHz audio**

Transfer rate	64 kbps
Layer 1 protocol ID	Mu-law
Data rate	not present

Table 9 Default Transfer Capabilities (continued)

6. **384 kbps video and data, unrestricted**

Transfer rate	384 kbps
Data rate	not present

7. **1536 kbps video and data, unrestricted**

Transfer rate	1536 kbps
Data rate	not present

8. **64 kbps (base rate), Multirate unrestricted digital**

Transfer rate	multirate
Rate multiplier	2 to 24
Data rate	not present

Datafill

The following tuples must be datafilled prior to using Bearer Capability routing and screening:

- OFCENG—BC_CHECKING_SCOPE sets the level of BC screening:
  - — NONE—no BC screening done in the office
  - — ISDN—BC screening done only on BRAKS ISDN terminals
  - — IBN—BC screening done on entire office
- OFCENG—DEFAULT_BEARER_CAPABILITY sets the default BC for all agents in the office that have no BC option assigned and do not provide a BC information element as part of the call setup.
- OFCENG—NUM_RC_EXT_BLKS determines the number of routing characteristic extension blocks required. One block will be required for any call routed using Bearer Capability routing characteristics. If this value is set too low, calls may be blocked.

Figure 88 shows the datafill for Table OFCENG.

Figure 88 Table OFCENG

7002501

```
TABLE: OFCENG
                          PARMNAME                            PARMVAL
-------------------------------------------------------------------------
                 BC_CHECKING_SCOPE                                IBN
          DEFAULT_BEARER_CAPABILITY                            SPEECH
                    NUM_RC_EXT_BLKS                              1000
```

The default transfer capabilities are defined in Table BCDEF and are associated with a BC name as shown in Figure 89.

Figure 89 Table BCDEF

7002502

```
TABLE: BCDEF
TOP
             KEY                                                 BCDATA
-------------------------------------------------------------------------
          SPEECH                         SPEECH CIRCUIT    CCITT
         64KDATA                       UNRESDIG CIRCUIT    CCITT
          64KX25   RESDIG CIRCUIT NETWORK   DTU   X25 Y     AUTO
         56KDATA UNRESDIG CIRCUIT NETWORK   DTU  NONE Y    56KBS
        DATAUNIT UNRESDIG CIRCUIT NETWORK   DTU TLINK Y    56KBS
          64KRES                         RESDIG CIRCUIT    CCITT
          3_1KHZ                       AU3_1KHZ CIRCUIT    CCITT
           7_KHZ                         AU7KHZ CIRCUIT    CCITT
      VOICE_DATA                       AU3_1KHZ CIRCUIT    CCITT
64K_RATE_AD_DATA                       UNRESDIG CIRCUIT    CCITT
BOTTOM
```

Table BCCOMPAT, shown in Figure 90, lists all compatible BC pairs.

Figure 90 Table BCCOMPAT

7002503

```
TABLE: BCCOMPAT
TOP
KEY
---
SPEECH 3_1KHZ
SPEECH VOICE_DATA
64KX25 64KRES
56KDATA DATAUNIT
56KDATA VOICE_DATA
DATAUNIT 56KDATA
DATAUNIT 64KRES
64KRES 64KX25
64KRES DATAUNIT
3_1KHZ SPEECH
3_1KHZ VOICE_DATA
BOTTOM
>
```

When an originating PRI call is received, the BC information is transformed into one of the default BC names. All calls originating from a PRI and terminating on a line via a trunk will use this BC screening facility. The BC from the incoming PRI is compared (using Table BCCOMPAT) against the BC of the terminating interface to determine whether the call should be passed or blocked.

Additionally, for a data call to provide a "64 kbps clear" data rate across the DMS network, it is essential that no gain nor loss is inserted when the network connection is made. However, PAD values are still needed to calculate the correct gain or loss levels for voice calls.

The following holds true for PRI trunk calls:

- If the BC indicates a data call, no gain or loss will be inserted when making the network connection.
- If the BC shows "speech," normal pad group data from Table TRKGRP will be used to calculate the required gain or loss adjustment in making the network connection.

CDN Number Types

The number entry in the CDN information element indicates these types of public network access:

- Local (or subscriber) number
- National number
- International number

TNS Number Types

The number entry in the TNS information element indicates two types of network access digits:

- National network identification (NA)
- User-specific network identification (US)

Type of Access

The operator system access information element specifies the type of operator access needed. **PRI does not support this.**

Once the IEs that determine the Bearer Capability and type of number information are received, Table RTECHAR (Routing Characteristics) is accessed. Table RTECHAR then assigns a name (RCNAME). If an RCNAME cannot be found for a given set of routing characteristics, then the default value "NILNAME" is associated with that call.

Table RCNAME (Routing Characteristics Name) must be datafilled before Table RTECHAR is datafilled. Refer to Figure 91 and Figure 92 for example datafill.

Figure 91 Table RCNAME

7002504

```
TABLE: RCNAME
 NAMEKEY
-------------
64KC700
64KUSS
56KNAME
```

Figure 92 Table RTECHAR

7002505

```
TABLE: RTECHAR

RCKEY
  GROUPRC
-------------------------------------------------
64KC700
  (CDN NA $) (BC    64KDATA    $)

64KUSS
  (TNS  NA        $) (BC     64KDATA    $)$
```

ISDN Pretranslation System

The ISDN pretranslation system performs analysis of digits, translators, and routing characteristics. It will commence routing the call based on the called digits and a translator name.

Altering the translation name through routing characteristics will change the call route without affecting the existing MDC and POTS tables:

- If MDC translations have been specified, then the translator obtained from Table NCOS or CUSTHEAD will be coupled with the RCNAME to access Table XLAMAP.
- If POTS translations have been specified, then the pretranslator obtained from Table LINEATTR will be coupled with the RCNAME to access Table PXLAMAP.
- If the call is a POTS call, the translations proceed using the new pretranslator.
- If the call is screened through MDC translations, the translations proceed using the new Integrated Business Network (IBN) translator.

Altering of translator names is done in Table XLAMAP or Table PXLAMAP, shown in Figure 93 and Figure 94.

Note: These tables do not exist within the DMS-250.

Figure 93 Table XLAMAP

7002506

```
Table XLAMAP

XLAKEY                                                  DATA
------------------------------------------------------------
64KC700  ISDNC01        (ROUTE   OFRT  6)(XLA PRIXLA)
```

Figure 94 Table PXLAMAP

7002507

```
TABLE: PXLAMAP

PXLAKEY                                   DATA
----------------------------------------------
 64KUSS POTS                    ( XLA 6K33)$
```

Extension Blocks

Before translations can be performed based on routing characteristics, extension blocks must be allocated to store them during the call processing of each applicable call. Blocks are allocated in the NUM_RC_EXT_BLKS parameter in Table OFCENG. If left at the default value of zero, no routing characteristics will be recognized by the switch. There must be at least one extension block for each call with routing characteristics. Changing this parameter requires a cold restart.

Routing Characteristics for Public Call Type TNS

The following TRAVER shows how the DMS uses the routing characteristic name assigned in Table RTECHAR to select a unique screening table to perform the translations when the characteristics of the call differ from the default values. Notice that Table PXLAMAP is accessed to assign a different pretranslator for this call.

>TRAVER TR TRN0PRITRN3 N CDN E164 17032224444 TNS NA CIC '333' B

Where	Trunk	=	TR
	CLLI	=	TRN0PRITR3
	Keypad	=	N
	Called #	=	CDN
	NPI	=	E164
	Digits	=	17032224444
	Calltype	=	PUB
	TNSIE	=	TNS
	TNSTON	=	NA
	TNSNPI	=	CIC
	TNS_Digits	=	'333'
	Bearer Capability	=	64KDATA
	Trace	=	B

See Figure 95 through Figure 98 for examples of this TRAVER.

Figure 95 Routing Characteristics for Public Call Transit Network Selector—Screen 1

7002507b

```
>TRAVER TR TRN0PRITR3 N CDN E164 17032224444 TNS NA CIC '333' BC 64KDATA B
Warning  Routing characteristics are present.
         Originator must be able to send in
         characteristics specified.
TABLE RTECHAR
 . 64KUSS (TNS NA BC 64KDATA $)$
```

Figure 96 Routing Characteristics for Public Call Transit Network Selector—Screen 2

7002507c

```
TABLE TRKGRP
TRN0PRITR3 PRA 0 NPDGP NCRT ASEQ $ (ISDN 700) $
TABLE LTCALLS
ISDN 700 PUB XLALEC 0 (EA USS333 Y) $
TABLE LINEATTR
0 1FR NONE NT NSCR 0 919 POTS LCA1 N OPER N 0 NIL NILSFC LATA1 0 NIL NIL 00 N
LCABILL OFF - BILLING DONE ON BASIS OF CALLTYPE
TABLE PXLAMAP
 . 64KUSS POTS ( XLA 6K33)$
TABLE STDPRTCT
6K33 ( 1) ( 0)
 . SUBTABLE STDPRT
WARNING  CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
 . 10333 10333 EA DD 5 P R333 USS333 N
TABLE PXLAMAP
 . Tuple not found. Default to old pretranslator name.
 . TABLE STDPRTCT
 . R333 ( 1) ( 0)
 .  . SUBTABLE STDPRT
WARNING  CHANGES IN TABLE STDPRT MAY ALTER OFFICE
BILLING.  CALL TYPE DEFAULT IS NP.  PLEASE REFER TO
DOCUMENTATION.
.  .  17 19 EA DD 1 T NA USS333 Y OFRT 33 1 1 Y
```

Figure 97 Routing Characteristics for Public Call Transit Network Selector—Screen 3

7002507d

```
TABLE OFRTMAP
 . Tuple not found. Default to old index.
 .  .  . TABLE OFRT
 .  .  .   33 N D OCCFGD333DD 0 N N
 .  .  .      S D EAPEG
 .  .  .      N D LATATANDEM2W 15 D081 N
 .  .  .      S D NCAANNC
 .  .  . EXIT TABLE OFRT
 . SUBTABLE AMAPRT
 . KEY NOT FOUND
 . DEFAULT VALUE IS    NONE OVRNONE  N
TABLE HNPACONT
919 64 1 ( 5) ( 1) ( 0) ( 0)
 . SUBTABLE HNPACODE
 . 703 703 FRTD 1
 . SUBTABLE RTEMAP
 . Tuple not found. Default to old index.
 . SUBTABLE RTEREF
 .    1 N D OCCFGC288DD 0 N N
 .      S D EAPEG
 .      S D NCAANNC
 . EXIT TABLE RTEREF
EXIT TABLE HNPACONT
TABLE LCASCRCN
919 LCA1 ( 8) MAND Y
 . SUBTABLE LCASCR
 . TUPLE NOT FOUND.  DEFAULT IS NON-LOCAL
TABLE PFXTREAT
MAND DD N DD UNDT
OVERLAP CARRIER SELECTION (OCS) APPLIES
TABLE LATAXLA
LATA1 703 INTER INTER STD
```

Figure 98 Routing Characteristics for Public Call Transit Network Selector—Screen 4

7002507e

```
TABLE OCCINFO
USS333 333 EAP Y Y N Y Y Y Y Y Y Y LONG 0 NONE Y N Y N N N Y N Y N N N
TABLE EASAC
TUPLE NOT FOUND
Using Equal Access (EA) route    OFRT   33 from Pretranslation
TABLE OFRT
  33 N D OCCFGD333DD 0 N N
     S D EAPEG
     N D LATATANDEM2W 15 D081 N
     S D NCAANNC
EXIT TABLE OFRT
+++ TRAVER  SUCCESSFUL CALL TRACE +++
DIGIT TRANSLATION ROUTES
1 OCCFGD333DD           7032224444          ST
2 EAPEG
3 LATATANDEM2W          D081                ST
4 NCAANNC
TREATMENT ROUTES.  TREATMENT IS  GNCT
1 T120
+++ TRAVER  SUCCESSFUL CALL TRACE +++
```

Check Your Learning

1. What does the Bearer Capability (BC) information element specify?

Type
Route

2. Bearer Capability checks determine the compatibility of call originations with their intended terminations.

True or False

3. Altering of translator names is done in which table(s)?

XLAMAP
PXLAMAP

Lesson 6

PRI Network Features

The purpose of this lesson is to provide you with the skills to configure network feature translations in an Integrated Services Digital Network (ISDN) node equipped with Primary Rate Interface (PRI).

Lesson Objectives

After completing this lesson, you will be able to datafill the tables for the following features:

- Network Ring Again (NRAG)
- Network Names (NETNAMES)
- Calling Line Identification (CLID)

Note: This chapter deals with NRAG over PRI trunk facilities only. The tables necessary to deploy interworking NRAG with PRI and Common Channel Signaling 7 (CCS7) require CCS7 tables. Refer to Nortel Course 0477, *CCS7 Translations*.

Table LTDATA

Table LTDATA (Logical Terminal Data) contains information associated with a Logical Terminal Identifier (LTID) such as the default calling party number. For PRI, this table is optional.

PRI Fields

The following field is used for PRI:

- DFLTCGN is the default calling directory number for incoming calls. If no billing directory number is supplied in Table TRKGRP and no calling party number (CGN) is supplied in the Call Setup message, this ten-digit DN will be used for billing and display purposes.

Datafill

A datafill example with field description is shown in Figure 99.

Figure 99 Table LTDATA

7002601a/b

```
TABLE: LTDATA

LTDKEY
                                                  LTDRSLT
-------------------------------------------------------
ISDN  900   DN
                                DN 919 481 3333       $
```

RNDELV

The RNDELV option is created under the "service option" selector and will provide the ability to screen outgoing Redirecting Number information for the LTID. The values for this new parameter are:

- ALWAYS—The RN information is always included in the outgoing Setup message to the PRI trunk regardless of the Privacy Indicator (PI) value in the Redirecting Number (RN) information.
- SCREENED—The calling party number portion of the RN information will be included in the outgoing Setup message based on the PI value in the RN information. If the PI is set to "presentation restricted," then the calling party number digits will not be included. This is the default value if the option is not assigned to the outgoing interface.
- NEVER—The RN information is not included in the outgoing Setup message. Thus the calling party number is unavailable to the destination network.

A default value of "SCREENED" will be set to all interfaces when they are allocated. Customers do not have to datafill this parameter unless they want to change this default value for that interface.

Note: Table DNSCRN will have two new screens, CLILTID1 and CLILTID2.

Network Ring Again

The PRI Network Ring Again (NRAG) capability allows the Ring Again feature to work when the calling and called parties are on different switches connected by Primary Rate Interface (PRI) trunks or by a combination of PRI and Common Channel Signaling 7 (CCS7) links. An end user located in any of the switching nodes in the combined PRI/CCS7 network can apply NRAG against a busy station located in any of the nodes in the same network and customer group.

This feature allows an end user who calls a busy station to queue against that station and be recalled when it becomes idle. When the end user accepts the recall, the original call is automatically set up again.

NRAG is implemented through messages that are passed back and forth between the originating and terminating switches. There can be intermediate switches between the originator and the terminator. All switches must be connected by either PRI or CCS7.

- The party who activates NRAG is at the originating switch.
- The party who is busy is at the terminating switch.
- The NRAG messages are passed (interworked) from one switch to another using the message routing Table MSGRTE.
- The messages contain the Transaction Capability Application Part (TCAP) information required by NRAG.

The following tables are necessary to allow NRAG to work over a PRI:

- Table TCAPTRID (Transaction Identifier)
- Table NETNAMES (Network Names)
- Table CUSTNTWK (Customer Network) (see note)
- Table MSGRTE (Message Route)

Note: The DMS-250 switch *does not use* Table CUSTNTWK.

Table TCAPTRID

Table TCAPTRID (Transaction Identifier) specifies the Network Ring Again feature as a Transaction Capabilities Application Part (TCAP) application and to indicate the number of transaction IDs required by the feature.

PRI Fields

The following fields are relevant to PRI:

- TCAPAPPL defines the type of TCAP application NRAG.
- NUMTRIDS specifies the number of transaction IDs required by the network for NRAG.
- IDPLUSER identifies pools in use when the value is set to Y. The TCAP transaction and component identifiers are dynamically allocated by Table IDPOOLS. When set to N, the transaction and component identifiers are engineered in Table TCAPTRID.

Datafill

An example datafill entry can be seen in Figure 100.

Figure 100 Table TCAPTRID

7002602

```
TABLE: TCAPTRID
TOP
TCAPAPPL NUMTRIDS NUMCOMPS IDPLUSER
-----------------------------------
NRAG 64 0  N
PVN 100 0  N
ACBAR 256 0 N
NACD 64 0  N
DNVAL 100 0 N
NMS 64 0  N
FREEPHONE 64 0 N
AIN 64 64 N
CNAMD 64 0 N
BOTTOM
```

Table NETNAMES

Table NETNAMES (Network Names) defines the name of the logical network to which the end user belongs. The datafill for each network must be consistent on all switches involved. If routing through Table MSGRTE is not chosen, the TCAP messages are routed through the signaling connection control part (SCCP) NRAG system.

NRAG does not require a value in subfield OPTION in Table NETNAMES to cause the TCAP messages to route through Table MSGRTE. The options NINTNRAG and NMRTNRAG are required to prevent NRAG messages from being sent trough Table MSGRTE.

PRI Fields

The following fields are used for PRI:

- NETNAME—the 1- to 32-character alphanumeric name of the logical network to which the subscriber belongs.
  - — Alphanumeric
  - — The default NETNAME is **PUBLIC**. It is automatically datafilled and cannot be deleted.
- EXTNETID—the external network identifier. This number identifies the network to all switches in the network. This number must be unique and must match the destination EXTNETID in order to pass the NRAG messages. The service providers must agree on the values used.
- OPTION—allows the DMS SuperNode to generate NRAG facility reject messages when incoming messages cannot be translated. This option prevents the system from discarding messages.

Datafill

An example datafill entry can be seen in Figure 101.

Figure 101 Table NETNAMES

7002603

```
TABLE: NETNAMES
TOP
NETNAME EXTNETID NETDIGS
                              NETOPTS
--------------------------------
RTECISDN       10        7
                                   $
```

Table CUSTNTWK

Table CUSTNTWK is used to associate the customer group with its logical networks and to specify NRAG.

Note: The DMS-250 does not use Table CUSTNTWK.

PRI Fields

The following fields are used for PRI:

- CUSTGRP—enter the 1- to 16-character name of the customer group. This name must already appear in Table CUSTENG.
- NETNAME—enter the name of a logical network from Table NETNAMES.
- NETCGID—enter a number to uniquely identify the customer group throughout the network. Enter a number from 1 to 4,096. Name display is supported for parties who belong to the same network customer group (have the same NETCGID).
- OPTIONS—enter NTWKRAG for Network Ring Again.

Datafill

Figure 102 shows example datafill for this table.

Figure 102 Table CUSTNTWK

7002604

```
TABLE: CUSTNTWK
CUSTNAME    NETNAME    NETCGID
                                                        DNREVXLA
                                                         OPTIONS
-------------------------------------------------------------------
ISDNGRP     RTECISDN       100                                    $
                          (NTWKRAG 10    5   2   5 1   5    ONNET)$
```

Table MSGRTE

Table MSGRTE (Message Route) determines where a message is routed. The table is concerned with routing messages and not with establishing call connections. All switches in the path must have appropriate datafill in Table MSGRTE.

Table MSGRTE must be datafilled for NRAG to function. The table is indexed by a three-subfield key consisting of a network identifier (NETID), and two digit string subfields (FROMDIGS and TODIGS). The data in the table is a list of routes made up of one to four route elements. Each route element in the route list requires a LOCAL, PRA, or SS7 route selector. When the selector is PRA, a PRI facility message is created and sent to the PRI facility process in the next switch. When the selector is SS7, an SCCP unit data message is created and sent to the SCCP interwork system in the switch. These messages contain the TCAP information needed by NRAG.

PRI Fields

These are the PRI fields:

- NETID identifies the name of a logical network from Table NETNAMES
- FROMDIGS/TODIGS (From Digits and To Digits) define two paths:
  - — One path for facility messages with one switch as the destination.
  - — One path for facility messages with the other switch as the destination.
    - Therefore, two sets of tuples need to be created: one set to match one switch when it is the destination of facility messages, and one set to match the other switch when it is the destination of facility messages.
    - For example, if the 832-digit phone sends a message to the 362-digit phone, the digits of the destination (362) are considered the outpulsed digits. Another tuple is necessary for digits 832 to 832 when the 362-digit phone sends a message to the 832-digit phone (with 832 as the destination digits).
- MSGRTES contains the list of routes to be used to send the NRAG messages.
- MSGRTESEL identifies the message route selector. Enter LOCAL, PRA, or SS7.
  - — Enter LOCAL if the message should terminate on this switching node.
  - — Enter PRA if the message should be routed over a D-channel on a PRI trunk to the next office.
  - — Enter SS7 if the message should be routed over a CCS7 trunk to the next office.

- The remaining fields in Table MSGRTE cover the route selector:
  - — The LOCAL selector routes calls to a directory number within the switching unit.
  - — The PRA selector routes calls to a trunk Common Language Location Identifier (CLLI).
  - — The SS7 selector routes calls to a destination point code.

Datafill

An example datafill entry can be seen in Figure 103.

Figure 103 Table MSGRTE

7002605

```
TABLE: MSGRTE

MSGRTKEY   MSGRTRES
-------------------------------------------------
RTECISDN   481    481   (LOCAL   0       0) $

RTECISDN   859    859   (PRA     TRN0PRITR3   0    N    $) $
```

Network Name Display

The Network Name Display on PRI feature provides the capability of sending name information for ISDN PRI calls.

Five tables are used for this feature:

- Table NETNAMES (Network Names)
- Table CUSTNTWK (Customer Network) (see note)
- Table CUSTSTN (Customer Station) (see note)
- Table DNATTRS (see note)
- Table DNGRPS (see note)

This feature does not add to or change any of these tables. It only provides the software that permits the name to be displayed for ISDN PRI calls.

Note: These tables are not used by the DMS-250.

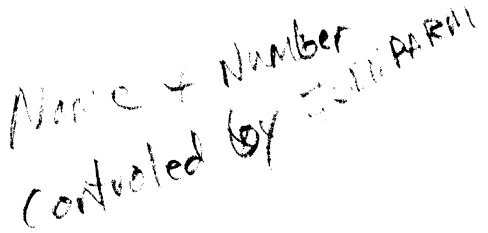


Table NETNAMES

PRI Fields

The following fields are used for Network Name Display on PRI:

- NETNAME—the 1- to 32-character alphanumeric name of the logical network to which the subscriber belongs.

  — Alphanumeric

Note: The default NETNAME is PUBLIC and is automatically datafilled. It cannot be deleted.

- OPTION—NMDSP to enable name display for the network.
- NMXCHG—the method used for name exchange. The two choices are SETUP or QUERY.

Datafill

An example datafill entry can be seen in Figure 104.

Figure 104 Table NETNAMES

7702606

```
NETNAME    EXTNETID    NETDIGS
                                                          NETOPTS
-----------------------------------------------------------------
RTECISDN        10         7
                                                 (  NMDSP SETUP)$
```

Table CUSTNTWK

Figure 105 is a datafill example of Table CUSTNTWK for PRI Network Name Delivery.

Figure 105 Table CUSTNTWK

7002606b

```
TABLE: CUSTNTWK
CUSTNAME    NETNAME    NETCGID
                                                          DNREVXLA
                                                           OPTIONS
-----------------------------------------------------------------
ISDNGRP     RTECISDN       100                                   $
                                                 (   CLID    ONNET)$
```

Table CUSTSTN

Table CUSTSTN (Customer Station) enables the name display for the customer group.

PRI Fields

The following fields are used for PRI:

- CUSTNAME—the name of the customer group. The name can be 1 to 16 characters.
- OPTNAME—enter NAMEDISP.
- OPTION—enter NAMEDISP.

Datafill

An example datafill entry can be seen in Figure 106.

Figure 106 Table CUSTSTN

7002607

```
TABLE: CUSTSTN

CUSTNAME   OPTNAME                                          OPTION
-------------------------------------------------------------------
ISDNGRP    NAMEDISP  NAMEDISP
```

Calling Line Identification (CLID)

The Calling Line Identification (CLID) or Calling Number Delivery feature provides a display of the calling party number at the terminating interface. See note below. The calling number is delivered as a defined information element. The number is not delivered if it is restricted or not available.

The number may be restricted because of datafill at the originating switch. In the DMS SuperNode, this datafill is provided by the SUPPRESS option datafilled in Tables DNATTRS, DNGRPS, or NETNAMES.

The calling number may not be available when the call is routed over certain existing facilities such as PTS trunks. This occurs if the INFO+ number delivery (NTX795AA) software package is not in operation.

Option	Suppress
Suppress number	Y or N
Suppress name	Y or N

Note: The Calling Line Identification (CLID) or Calling Number Delivery feature **is not** a feature on the DMS-250. Tables DNATTRS and DNGRPS **are not used** by the DMS-250.

Table DNATTRS

Figure 107 shows an example of the datafill in Table DNATTRS.

Figure 107 Table DNATTRS

7002608

```
                KEY
                                                        DATA
                                                     OPTDATA
-------------------------------------------------------------
919 832 2011
(PUBLIC ( SUPPRESS Y Y)  $)
(RTECISDN ( NAME JIM_HENDERSON) $)$
                                                           $
```

SERVORD

SERVORD is used to

- Assign the BLOCKCGN option to the DN
- Assign the NAME option to the DN
- Assign the SUPPRESS option to the DN

SERVORD is also used to datafill Table KSETLINE to specify the DNs associated with an LTID and to define various DN parameters. Datafill in Table KSETLINE includes blocking the delivery of the calling number for incoming calls at the terminating end with the BLOCKCGN option.

In addition, SERVORD is used to datafill Table DNATTRS to specify DN-level DN attributes, including the

- DN and name defined for calling line identification
- SUPPRESS parameter, which is used to specify CLID suppression by DN

Figure 108 through Figure 113 show SERVORD prompts for Calling Line Identification with various options.

Figure 108 SERVORD Prompts for Calling Line Identification—Option BLOCKCGN

Prompt	Valid Input	Explanation
DN_OR_LEN	7 digits	Directory or line equipment number. Enter the directory number.
OPTKEY	1 to 69	Option key. Enter the number of the key associated with the DN.
OPTION	BLOCKCGN	Option. Enter the BLOCKCGN option to block the delivery of the CLID for incoming calls at the call termination end.

Figure 109 SERVORD Prompts for Calling Line Identification—Option BLOCKCGN in Prompt Mode

7002-1

```
SO
>ADO
SONUMBER: NOW 93 04 12
>(CR)
DN_OR_LEN:
>8322011
OPTKEY:
>1
OPTION:
>BLOCKCGN
OPTKEY:
>$
```

Figure 110 SERVORD Prompts for Calling Line Identification—Option NAME

Prompt	Valid Input	Explanation
DN_OR_LEN	7 digits	Directory or line equipment number. Enter the directory number.
OPTKEY	1 to 69	Option key. Enter the number of the key associated with the DN.
OPTION	NAME	Option. Enter the NAME option to define the display name for CLID provision.
NETNAME	1 to 32 characters	Network name. Enter the name of the network in which the NAME option will apply.
DISPLAYNAME	up to 15 characters	Display name. Enter the name to be displayed when CLID is provided to the terminating agent.

Figure 111 SERVORD Prompts for Calling Line Identification—Option NAME in Prompt Mode

7002-2

```
SO
>ADO
SONUMBER: NOW 93 04 22
>(CR)
DN_OR_LEN:
>8322011
OPTKEY:
>1
OPTION:
>NAME
NETNAME:
>PUBLIC
DISPLAYNAME:
>JIM_HENDERSON
NETNAME:
>$
OPTKEY:
>$
```

Figure 112 SERVORD Prompts for Calling Line Identification—Option SUPPRESS

Prompt	Valid Input	Explanation
DN_OR_LEN	7 digits	Directory or line equipment number. Enter the directory number.
OPTKEY	1 to 69	Option key. Enter the number of the key associated with the DN.
OPTION	SUPPRESS	Option. Enter the SUPPRESS option to suppress CLID provision for the DN.
NETNAME	1 to 32 characters	Network name. Enter the name of the network in which the SUPPRESS option will apply.
SUPPRESS_DN	Y or N	DN suppression. Enter Y to specify that the DN display should be suppressed or N to specify that it should not be suppressed.
SUPPRESS_NAME	Y or N	Name suppression. Enter Y to specify that the name display should be suppressed or N to specify that i should not be suppressed.

Figure 113 SERVORD Prompts for Calling Line Identification—Option SUPPRESS in Prompt Mode

7002-3

```
SO
>ADO
SONUMBER: NOW 93 04 22
>(CR)
DN_OR_LEN:
>8322011
OPTKEY:
>1
OPTION:
>SUPPRESS
NETNAME:
>PUBLIC
SUPPRESS_DN:
>Y
SUPPRESS_NAME:
>Y
NETNAME:
>$
OPTKEY:
>$
```

Table DNGRPS

Table DNGRPS contains customer group-level DN attributes, defining a range of DNs as a customer group and enabling CLID suppression by customer group.

Note: Table DNGRPS needs to be datafilled only once for each customer group.

The following figure shows the datafill specific to Calling Line Identification for Table DNGRPS. Only the fields that apply to Calling Line Identification are shown. For a description of the other fields, refer to the data schema section of this document.

Datafill

An example datafill entry can be seen in Figure 114.

Figure 114 Table DNGRPS

7002609

```
TABLE: DNGRPS

AREACODE OFCCODE  FROMDIGS  TODIGS                              NETOPTS
--------------------------------------------------------------------------
    919     832      2011    2019  (RTECISDN (SUPPRESS Y N) $)$
```

DISPLAYS one name for Seq Number

Check Your Learning

1. Table LTDATA is mandatory for ISDN PRI.

   True or False?

2. Identify the tables necessary for Network Ring Again (NRAG) implementation over a PRI.

   Page 194

3. What global numeric identifiers allow for feature operations to take place over PRI/SS7 links?

   TABLE

   MSGRTE

Glossary

A

AMA—Acronym for Automatic Message Accounting.

ANI—Acronym for Automatic Number Identification.

authorized call type—Synonymous with bearer services.

Automatic Number Identification (ANI)—The number identification of the calling station. This number is used for billing records generated by an interLATA/international carrier. ANI is used in the United States only. Contrast with operator number identification.

B

B sub-b channel (Bb)—A 64-kbps channel carrying multiplexed B-channel data packets to the packet handler.

B-channel —A 64 kbps digital, bidirectional channel used by Integrated Services Digital Network (ISDN) for carrying either circuit-switched voice or data or packet-switched data.

B-packet—Packet data that is transmitted over a B-channel.

B8ZS—Abbreviation for bipolar with 8 zero substitution.

Basic Rate Access (BRA)—Synonym for Basic Rate Interface.

Bb—Abbreviation for B sub-b channel.

BC—Acronym for Bearer Capability.

Bearer Capability (BC)—(1) 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.

(2) 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).

bearer services—A characteristic associated with a logical terminal (service profile) in functional signaling. It offers a pool of bearer capabilities to a logical terminal. Also known as call type. *See also* Integrated Services Access (ISA).

Binary Facility Coding Value (BFCV)—This value identifies the call type which, along with the logical terminal identifier (LTID), is the key field pointer into Table LTCALLS.

BRA—Acronym for Basic Rate Access.

BRI—Acronym for Basic Rate Interface.

C

C-side—Abbreviation for central side.

CAC—Acronym for Carrier Access Code.

call—(1) In a DMS switch, any demand to set up a connection through the switch.

(2) A queue.

(3) A unit of telephone traffic.

call processing—The software system that handles the processes involved in setting up connections through the DMS SuperNode Family network between calling and called parties.

call setup—A message sent from the originating node to the network and from the network to the destination node to initiate a call.

call type—See bearer services.

called party number—An information element of a call setup message that identifies the called party of a call.

Calling Line Identification (CLID)—A feature that provides a display of the calling party number at the terminating interface. The calling number is delivered as a defined information element. The number is not delivered if restricted or not available. Also called Calling Number Delivery feature.

Calling Number Delivery—A feature that provides the directory number of the calling party to the terminating PRI.

CCITT—Consultative Committee on International Telephony and Telegraphy.

CCS7—Acronym for Common Channel Signaling 7.

central office (CO)—The physical location where communications common carriers terminate customer lines and locate the switching equipment which interconnects those lines.

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

channel identification—An information element that specifies the B-channel selected by the originating node.

Channel Identifier (CID)—Represents the individual time slot of the B-channel selected; taken from Table TRKMEM (Trunk Member).

CLI—Acronym for Calling Line Identification.

CLLI—Acronym for Common Language Location Identifier.

CO—Acronym for central office.

Common Channel Signaling 7 (CCS7)—Digital, message-based network signaling standard defined by the CCITT which separates call signaling information from voice channels so that interoffice signaling is exchanged over a separate signaling link.

CPCI—Acronym for ISDN Common Peripheral Controller.

CS data—Circuit-switched data carried on B-channel.

D

D-channel—(1) For BRI, the D-channel is a 16 kbps, bidirectional channel. It carries call control messages between a terminal on an ISDN interface and the exchange termination. 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.

(2) For PRI, the D-channel is a 64 kbps, bidirectional channel.

D-channel handler (DCH)—Card in an ISDN Line Group Controller (IGCI) or in an ISDN Line Trunk Controller (LTCI) that provides the primary interface to all D-channels. The DCH performs Q.921 LAPD Layer 2 (Data Link) processing. It is connected permanently to an ISDN loop and receives or sends messages on the signaling/packet channel.

Data Link layer —Layer 2 of the Open System Interconnection (OSI) model that provides error-free, sequenced messaging over a channel. It is used to create logical links between ISDN terminals and the services they access.

DCH—Acronym for D-channel handler.

Dialable Wideband Services (DWS)—A DMS SuperNode data service through Primary Rate Interface (PRI). This public switched service offers variable bandwidth on demand with single number dialing.

Digital Multiplex System (DMS)—Central office 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.

Digital Signal 1 (DS1)—Closely specified bipolar pulse stream with a bit rate of 1.544 Mbps. It carries 24 information channels of 64 kbps each (DS0s). DS1 is the North American standard for digital trunks and is the standard signal used to interconnect Nortel digital systems.

directory number (DN)—Full complement of digits required to designate a subscriber's station within one numbering plan area (NPA). It is usually a three-digit central office code followed by a four-digit station number.

display—An information element (IE) of a Call Setup message that provides information as a part of the Network Name Display feature. This IE may appear more than once in one Setup message, for instance, to supply the calling, called, or original called names.

DMS—Acronym for Digital Multiplex System.

DN—Acronym for directory number.

DS1—Acronym for digital signal 1.

DS1 link—The 8-bit, 24-channel, 1.544-Mbps digital signaling format used in the DMS Family.

DTCI—Acronym for ISDN Digital Trunk Controller.

DWS—Acronym for Dialable Wideband Services.

E

E.164—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.

EA—Acronym for equal access.

EAEO—Acronym for Equal Access End Office.

EISP—Acronym for Enhanced ISDN Signaling Preprocessor.

end office (EO)—Switching office that is arranged for terminating subscriber lines and is provided with trunks for establishing connections to and from other switching offices.

end user—An individual user of a telephone station set that is connected to a DMS switch. Also known as subscriber.

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 Time Switch (ETS)—Card that provides the constant property that Dialable Wideband Service (DWS) requires to maintain the sequenced order of data received (multiple bytes per frame) across the entire switch.

EO—Acronym for end office.

Equal Access (EA)—An operating company tariff offering Local Access and Transport Area (LATA) access equal in type, quality, and price for all connecting interLATA and international carriers (INC).

Equal Access End Office (EAEO)—A central office that provides access to several long-distance carriers.

ESF—Acronym for extended superframe.

ET—Acronym for exchange termination.

ETS—Acronym for Enhanced Time Switch.

Exchange Termination (ET)—Functional name for the ISDN component that serves as the access termination for BRI and PRI interfaces and provides circuit-switched services to the ISDN switch.

Extended Superframe (ESF)—A frame code.

F

facility indicator—An information element (IE) indicating that a supplementary service has been initiated, such as Network Ring Again. This IE is sent as part of a connectionless message.

Foreign Exchange (FX)—Service that allows a telephone PBX to be served by a distant central office (CO) rather than by a CO in the immediate geographical area.

Frame Supervisory Panel (FSP)—Accepts the frame battery feed and ground return from the power distribution center and 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—Acronym for Frame Supervisory Panel.

functional signaling—Intelligent terminal used to share call control functions between switch and terminal.

FX—Acronym for Foreign Exchange.

I

Incoming Wide Area Telephone Service (INWATS)—Telephony service that allows a subscriber to receive long-distance calls originating within specific service areas without a charge to the originating party. A 1-800 number is assigned to a certain PBX to allow for free calls. Also known as 800 service.

information element (IE)—Part of a message that conveys additional information related to the routing and management of calls for the terminal and network in ISDN functional call control. IEs vary depending on the message type.

Integrated Services Access (ISA)—A feature that provides access to public and private network services through one bidirectional common trunk group using a Call Setup message and dialed digits. 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)—Set of standards proposed by the International Telegraph and Telephone Consultative Committee (CCITT) to establish compatibility between the telephone network and various data terminals and devices. ISDN provides a path for transmission of voice, data, and images.

Integrated Trunk Access (ITA)—Allows both ISDN PRI trunks and regular voice trunks to function on the same DS1 facility.

InterLATA—Telecommunications services, revenues, and functions that originate in one Local Access and Transport Area (LATA) and terminate either outside that LATA or inside another LATA.

InterLATA carrier—Any carrier that provides telecommunications services between a point inside a Local Access and Transport Area (LATA) and a point either outside that LATA or inside another LATA.

Interface Identifier (IID)—A number assigned to the DS1 physical circuit in Table LTCPSINV and unique within the PRI trunk group. This number identifies the physical DS1 circuit on which the selected B-channel resides and is vital when the PRI trunk group encompasses more than one DS1 circuit. The IID may sometimes be omitted if the selected B-channel resides on the same DS1 as the D-channel.

INWATS—Acronym for Incoming Wide Area Telephone Service.

ISA—Acronym for Integrated Services Access.

ISDN—Acronym for Integrated Services Digital Network.

ISDN Digital Trunk Controller (DTCI)—A dual-unit peripheral module that provides access for ISDN Primary Rate Interface (PRI) to a Digital Private Branch Exchange (PBX). The DTCI provides call control for PRI functional signaling including D-channel handling and processing, maintenance, and diagnostics.

ISDN Digital Trunk Equipment (DTEI)—Frame that contains the DTCIs, the cooling unit, and the Frame Supervisory Panel (FSP).

ISDN pretranslation system—Performs analysis of digits, translators, and routing characteristics. It will commence routing the call based on the called digits and a translator name.

ISDN Signaling Preprocessor (ISP)—Provides call control messaging and D-channel handler maintenance functions.

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

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.

ISP—Acronym for ISDN signaling pre-processor.

ISUP—Acronym for ISDN User Part.

ITA—Acronym for Integrated Trunk Access.

K

Kbps—Abbreviation for kilobits per second.

Kilobits per second (kbps)—Bit rate expressed in thousands of bits per second.

L

LAPB—Acronym for Link Access Procedure Balanced.

LAPD—Acronym for Link Access Procedure on D-channel.

LATA—Acronym for Local Address and Transport Area.

Line Trunk Controller (LTC)—A peripheral module that is a combination of a group controller and a digital trunk controller providing the services offered by both.

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 D-channel (LAPD)—ISDN access protocol that is used with links established on a D-channel.

Logical Terminal (LT)—The unique identifier that is assigned to a logical terminal when it is datafilled in the ISDN access termination.

LT—Acronym for Logical Terminal.

M

maintenance and administration position (MAP)—Group of components that provide a user interface between operating company personnel and the DMS SuperNode 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.

MAP—Acronym for Maintenance and Administration Position.

Mbps—Abbreviation for megabits per second.

MDC—Acronym for Meridian Digital Centrex.

Megabits per second (Mbps)—Rate of transmission of serial data bits in a time-division multiplexed frame format.

Meridian 1—A stored logic architecture Private Branch Exchange (PBX). The Meridian 1 options 21 to 71 (SL1 system) and 111 to 211 (SL100 system) are the Nortel product lines used for ISDN Primary Rate Interface (PRI).

Meridian Digital Centrex (MDC)—A special DMS business services package that utilizes the data-handling capabilities of DMS SuperNode offices. The MDS is a software-driven central exchange service that provides integrated voice and data features. These features can be programmed for ISDN terminals. MDC was formerly known as Integrated Business Network (IBN).

N

network identification characters—The digits of the Carrier Access Code (CAC) or the user-specific digits.

Network layer—In the OSI model, the local network entity (layer 3) that services the transport layer. It is responsible for ensuring that data passed to it from the transport layer is routed and delivered through the network. In ISDN, the network layer is used to send call control messages.

Network Name Display—Feature that provides the capability of sending name information for ISDN Primary Rate Interface (PRI) calls.

Network Redirection and Reason—Service that informs the calling and called parties about any redirections that may occur during the life of a call.

Network Ring Again (NRAG)—Feature that allows a subscriber who calls a busy station to queue against that station and be recalled when it becomes idle. If the subscriber accepts the recall, the original call will automatically be set up again.

Network Specific Facilities (NSF)—The identifier of the network facilities which are to be invoked to complete a particular call.

NPA—Acronym for Numbering Plan Area.

NPI—Acronym for Numbering Plan Indicator.

NRAG—Acronym for Network Ring Again.

NT—Northern Telecom.

Numbering Plan Area (NPA)—Any of the designated geographical divisions of the United States, Canada, Bermuda, the Caribbean, Northwestern Mexico, and Hawaii within which no two telephones have the same seven-digit number. Each NPA is assigned a unique three-digit area code. Also known as area code.

Numbering Plan Indicator (NPI)—Defines the screening and routing of Primary Rate Interface (PRI) calls where E.164 indicates the public numbering plan and PVT a private numbering plan that does not conform to E.164 standards.

O

Open Systems Interconnection (OSI)—Seven-layer protocol model for communication networks developed by the International Organization of Standards (ISO) and adopted by the Consultative Committee on International Telephony and Telegraphy (CCITT) for an Integrated Services Digital Network (ISDN).

operating company—The owner or operator of a DMS switch.

original called number—An information element of a Call Setup message that provides the original called number when a call redirection has occurred. The Network Redirection and Reason feature allows for the display of the original called number and the reason for redirection.

origination—For a Primary Rate Interface (PRI), defined as a call originating from the ISDN PBX switch to the DMS SuperNode over PRI trunk facilities.

OSI—Acronym for Open Systems Interconnection.

Outbound Wide Area Telephone Service (OUTWATS)—A telephony service provided over one or more dedicated access lines to a 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—Acronym for Outbound Wide Area Telephone Service.

P

P-side—Abbreviation for peripheral side.

Packet Assembler/Disassembler (PAD)—Device that enables data terminal equipment (DTE) not equipped for packet switching to access a packet-switched network. Functions for 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 CCITT term for the component of an Integrated Services Digital Network (ISDN) switch that provides packet switching services.

PAD—Acronym for Packet Assembler/Disassembler.

PBX—Acronym for Private Branch Exchange.

per-trunk signaling—Conventional telephony method used for call processing that multiplexes the control signal of a call with voice and data over the same trunk.

peripheral module (PM)—A generic term referring to all hardware modules of the DMS SuperNode systems that provide interfaces with external line, trunk, or service facilities. PM contains peripheral processors that 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. Contrast with C-side.

PH—Acronym for Packet Handler.

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—Acronym for peripheral module.

POTS—Acronym for plain ordinary telephone service.

PRA—Acronym for Primary Rate Access.

presentation indicator—Part of the Calling Party Number information element that helps determine if the calling party number is to be displayed to the terminating party.

PRI—Acronym for Primary Rate Interface.

Primary Rate Access—Synonymous with Primary Rate Interface.

Primary Rate Interface—Carries nB+D channels over a digital DS1 facility (23B+D in North America, 30B+D in Europe). PRI is used to link private facilities, such as PBXs, LANs, and host computers, with standardized architecture acting as the bridge between private switching equipment and the public network. PRI is also referred to as primary rate access (PRA).

private (PVT)—A call type to establish a unique dialing plan for reaching other locations within a company that has created its own network. These calls are routed over privately owned or leased facilities. Private calls utilize Centrex screening and routing. The digits dialed may not conform to E.164 standards.

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.

progress indicator—Information element of a Call Setup message that describes an event that has occurred during the life of a call.

protocol—A set of strict procedures to establish, maintain, and control communications in which human beings tacitly agree to a set of conventions in language and the flow of speech to ensure some level of understanding.

public (PUB)—A call type that passes through the Public Switched Telephone Network (PSTN) and conforms to the North American Dialing Plan (E.164) standards.

PVT—Abbreviation for private.

Q

Q.921—CCITT recommendation that defines protocols at the data link layer.

Q.931—CCITT recommendation that defines protocols for circuit-switched call control at the network layer.

R

routing table—Lists the elements on which a call can be routed.

S

SAPI—Acronym for Service Access Point Identifier.

Screening Indicator (SI)—Part of the Calling Party information element that identifies the source of the calling number, such as user provided (the true individual calling party number) or network provided (the default calling party number).

Service Access Point Identifier (SAPI)—Identifier that is used by the data link layer (layer 2) protocol to define the type of service allowed to an ISDN terminal.

Service Identifier (SID)—Call types which have a potential to use private facilities or which may occur more than once in a switch can specify the target facility by using this entry. The SID can represent a trunk, route, or CLLI number for the call types of PRIVATE, INWATS, TIE, or Foreign Exchange (FX). It specifies the band for OUTWATS circuits.

Service Order and Query System (SERVORD)—Service Order and Query System (SERVORD) is a user interface that is used to change, add, or delete a subscriber line. Standard telephone industry command format is used.

Setup message—Message sent by either user or network to initiate call establishment.

SI—Acronym for Screening Indicator.

SID—Acronym for Service Identifier.

SMDR—Acronym for Station Message Detail Recording.

Station Message Detail Recording (SMDR)—In Meridian Digital Centrex (MDC), a system that provides recording facilities for the details of billable and non-billable calls for each MDC customer group.

subscriber—An individual user of a telephone station set that is connected to a DMS switch. Also known as end user.

Superframe (SF)—Frame code.

T

Table CARRMTC (Carrier Maintenance)—Stores information regarding the attributes of the individual Primary Rate Interface (PRI) trunks associated in the ISDN Digital Trunk Controller (DTCI). It defines the link coding and frame formats of the PRI trunk and provides maintenance control information for the links.

Table CLLI (Common Language Location Identifier)—Defines a name for each Primary Rate Interface (PRI) trunk group in the same way as for regular trunk facilities.

Table CUSTNTWK (Customer Network)—Assigns the calling line identification option to the customer and indicates what type of display will be allowed.

Table DNGRPS—Associates a name with a range of directory numbers.

Table ISAXLA (Integrated Service Access Translations)—Defines the services-related data associated with ISA calls. It uses a Service Identifier (SID) to determine translations and routing for calls datafilled in Table LTCALLS.

Table ISDNPARM (ISDN Parameters)—Allows the operating company to specify the optional information element handling routine for each primary rate interface (PRI) for the Setup, Notify, and Alert message types.

Table LTCALLS (Logical Terminal)—Provides digit translations.

Table LTCINV (Line Trunk Controller Inventory)—Contains a list of ISDN Digital Trunk Controller (DTCI) peripheral modules and identifies the location of the DTCI hardware, the load and executive programs that are required, and the C-side DS30 link connections to the switched network modules.

Table LTCPSINV (Line Trunk Controller Peripheral Side Inventory)—Stores information about peripheral-side link (or port) assignments.

Table LTDATA (Logical Terminal Data)—Contains information associated with an LTID such as the default calling party. For PRI, this table is optional.

Table LTDEF (Logical Terminal Definition)—Defines logical terminals and each terminal's access.

Table LTGRP (Logical Terminal Group)—Defines the number of logical terminals within a particular group.

Table LTMAP (Logical Terminal Mapping)—Assigns the trunk group CLLI to the ISDN Logical Terminal ID (LTID). All PRI trunk groups must have an entry in this table. Once an entry is accepted, the DMS SuperNode updates Table TRKGRP.

Table MSGRTE (Message Route)—Defines the digits for each trunk group that needs translation for Network Ring Again messages to pass across the network. This table defines the paths between the originator and the terminator.

Table NETNAMES (Network Names)—Defines all supported network names to which the subscriber belongs and the external network identification used by the Network Ring Again feature.

Table PADDATA (Packet Assembler/Disassembler Data)—Defines the loss and level plan for ISDN PRI.

Table PRIPROF (PRI Profile)—Variant control table that provides a pointer from Table LTDEF (Logical Terminal Definition) to allow the declaration of a special PRI PROFNAME containing special functional switches.

Table TCAPTRID (Transaction Identifier)—Specifies the Network Ring Again feature as a Transaction Capabilities Application Part (TCAP) application and indicates the number of transaction IDs required by the feature.

Table TRKGRP (Trunk Group)—Contains the data associated with each PRI trunk group.

Table TRKMEM (Trunk Member)—Defines each trunk associated with its time slot on the DS1 circuit. Each B-channel associated with the trunk group CLLI is assigned to a time slot on the DS1 facility. For example, if there are 23 B-channels, then there are 23 entries with Table TRKMEM, one for each B-channel.

Table TRKSGRP (Trunk Subgroup)—Defines supplementary data associated with the subgroup of a trunk group, such as signaling and timing parameters specific to that trunk. This table assigns the D-channel(s) to each PRI trunk group CLLI.

TCAP—Acronym for Transaction Capability Application Part.

termination—For PRI, a call outgoing from the DMS SuperNode to a PBX switch utilizing PRI trunking facilities.

TIE call—Type of call that occurs on private incoming and outgoing lines between Private Branch Exchanges (PBXs).

Transaction Capability Application Part (TCAP)—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.

Transit Network Selector (TNS)—Information element of a Call Setup message that identifies a transit network, most commonly the Carrier Identification Code (CIC) of an interexchange carrier. User-specific digits may be specified here to provide the access code to private leased facilities. ISA routing allows the service provider to input this information into the Setup message of outgoing calls

Translation Verification (TRAVER)—A diagnostic tool that allows the operating company to access and simulate a telephone call in software, and display the line, trunk, or position to which a call is routed.

U

Unified Processor (UP)—Replaces the master processor, signal processor, and memory cards associated with these processors. The master processor contains the instruction set that implements the task assigned by the central control software. The signaling processor is the interface between a master processor and the control circuits in the line side of a line module.

Universal Tone Receiver (UTR)—A card that receives and processes tones in the RCC2 or ISDN RCC2. It identifies and processes pulse code modulation (PCM) tones from 30 voice channels on the DTCI's parallel speech bus. The UTR is required for A/B bit signaling and is used if standard per-trunk signaling is supported by the DTCI.

V

Visual Display Unit (VDU)—An electronic output device that presents data to a terminal user in the form of a television picture. In a DMS switch, the VDU is one of the components of the MAP terminal and, along with a keyboard, provides the main user interface in the DMS SuperNode switches.

W

WATS—Acronym for Wide Area Telephone Service.

Wide Area Telephone Service (WATS)—A special direct distance dialing service that, for a flat monthly charge or a charge based on accumulated usage, permits either inward or outward dialing between a subscriber and specified areas.

X

XPM—Acronym for an XMS-based peripheral module.

XPM Plus—XMS-based peripheral module that uses enhanced hardware and software.

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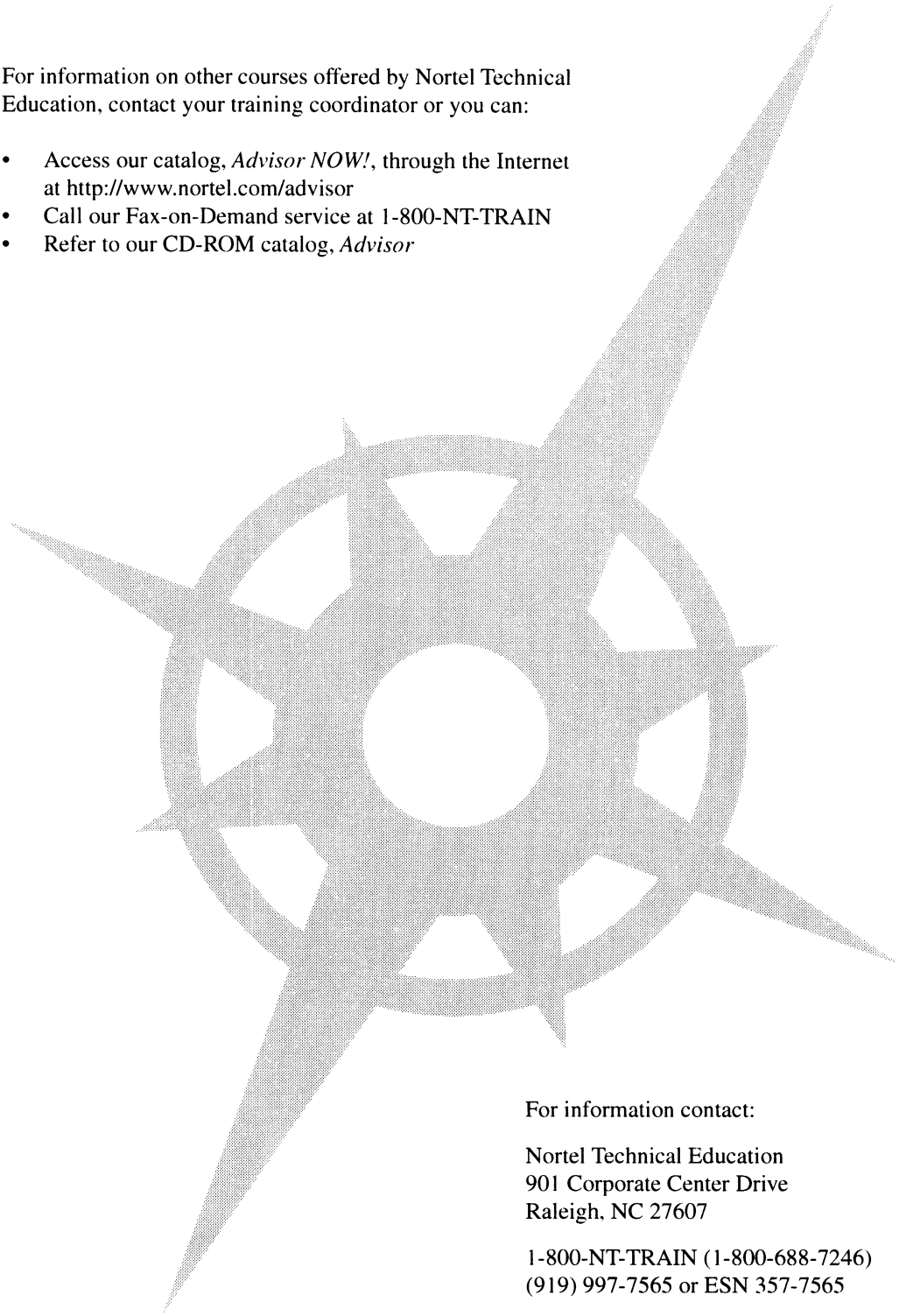

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