Critical Release Notice

Publication number: 297-2663-110
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The content of this customer NTP supports the SN06 (DMS) software release.

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

Bookmark Color Legend

Black: Applies to new or modified content for the baseline NTP that is valid through the current release.

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

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

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

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

Publication History

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Standard release 02.02 for software release SN06 (DMS).

Change of phone number from 1-800-684-2273 to 1-877-662-5669, Option 4 + 1.

297-2663-110

Digital Switching Systems

DMS-500

Dialable Wideband Services (DWS) Application Guide

LLT00009 Standard 02.01 August 1998

NORTEL

NORTHERN TELECOM

Digital Switching Systems

DMS-500

Dialable Wideband Services (DWS) Application Guide

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Contents

About this document

This document provides comprehensive information for Dialable Wideband Services (DWS) on the DMS-500 switch. For Feature Group D (FGD), intermachine trunk (IMT), and primary rate interface (PRI) access, it explains the following functions:

- order codes
- trunk selection
- trunk datafill
- call processing
- messaging
- billing

References to unsupported features

Beginning with software release LLT00009, you will find references to the following **unsupported** hardware, applications, and features in some of the DMS-500 documentation:

- Series 20-50 Processor
- Mixed Memory
- MSB7
- INODE
- Billing Server (AP/FP)
- EOPS
- FlexDial
- SL-100 Integrated Peripheral Equipment (IPE) digital phone
- AFT (will be available with SDM on SDMC11)

DMS-500 software is made up of local features of DMS-100 and long-distance features of DMS-250. The NTPs, and other technical documents issued with each software release, include information on new software features and new hardware introduced with the release. NTPs that

do not require revisions, but are still pertinent to the DMS-500 switch, are also included with each release.

Note: Although documentation or references appear in the NTPs, the features, applications, and hardware listed above are **unsupported** on the DMS-500 switch.

Who needs this manual?

This manual is for personnel who are responsible for setting up, administering, and maintaining the DMS-500 switch**.**

To use this manual fully:

- Ensure the DMS-500 switch you are working with is installed, commissioned, and active.
- Receive Nortel (Northern Telecom)-approved training for Table Editor, datafill, translations, and maintenance.

How is this manual arranged?

The information in this manual is arranged as follows:

Chapter 1, Introduction

Chapter 1 provides a general introduction to DWS.

Chapter 2, Trunk selection

Chapter 2 describes the fixed, floating, and flexible methods of trunk selection for connections within the network.

Chapter 3, Trunk datafill

Chapter 3 describes the trunk data and table control information used by wideband call processing and trunk maintenance to recognize, choose, and route calls.

Chapter 4, Call processing

Chapter 4 describes the call processing elements, such as origination, translations, termination, and error conditions for wideband calls.

Chapter 5, ISUP messaging

Chapter 5 describes Integrated Services Digital Network User Part (ISUP) message information.

Chapter 6, PRI messaging

Chapter 6 provides PRI message information.

Chapter 7, Maintenance and billing

Chapter 7 provides maintenance and billing information.

Chapter 8, List of abbreviations

Chapter 8 provides a list of abbreviations used in this manual and their meanings.

Appendix A, Ordering information

Appendix A contains information on how to order Nortel (Northern Telecom) Publications (NTPs) and Product Content Loads (PCLs).

Where does this manual fit in the document suite?

This manual is written specifically for the DMS-500 switch and is part of a suite of documents for the DMS-500 switch. The documentation suite for DMS products reflect the common architecture of the DMS software. This suite includes application guides and reference guides. Application guides provide information on specific DMS-500 features and products. Technical reference guides contain information about logs, commands, operational measurements, and office parameters that are common to the DMS family. The *DMS-500 Master Index of Publications,* 297-2663-001, explains how the documentation suite for the switch is organized.

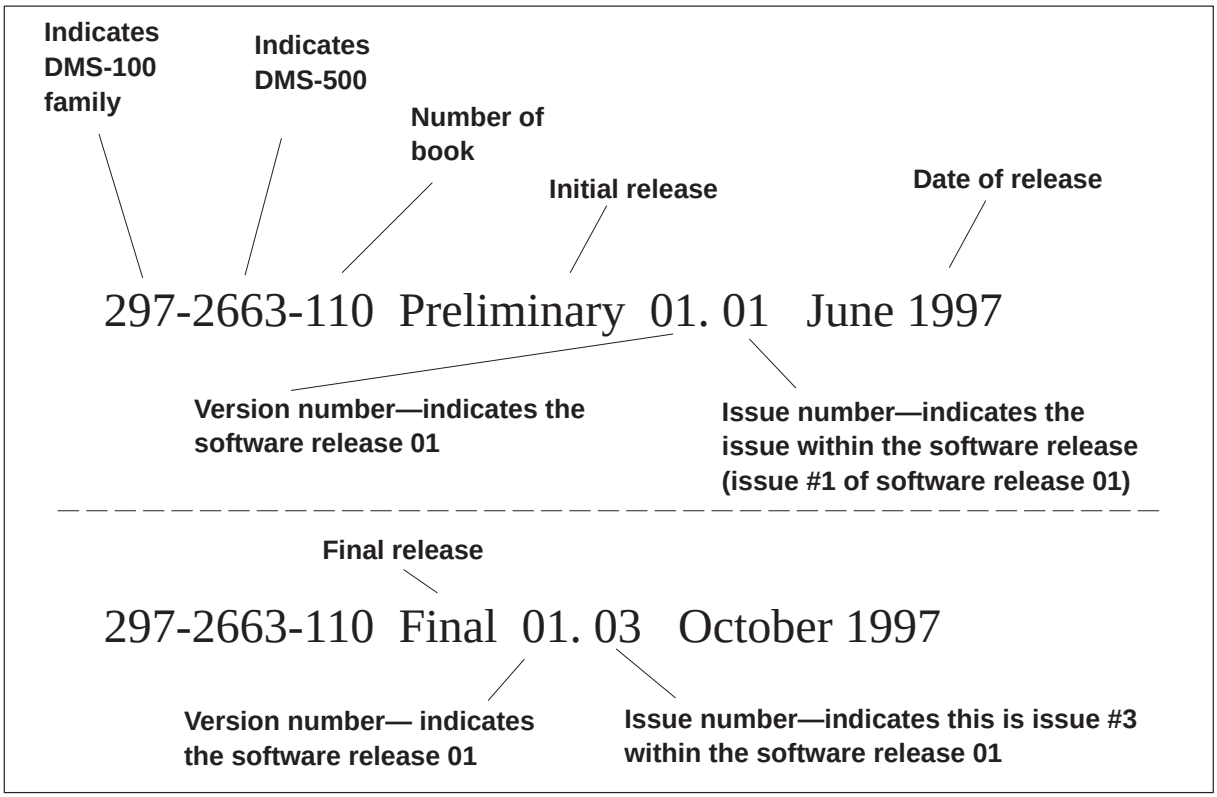
What software release does this manual apply to?

This manual applies to DMS-500 offices that have software release LLT00009. Unless revised, this manual also applies to offices with software releases later than LLT00009.

How to understand document numbers

As shown in the following graphic, the document naming and numbering indicates:

- the document number consisting of the family (297—for DMS family), the product (2663—for DMS-500), and the type of book (last three digits of document number)
- the release (preliminary or final)
- the software release version and the issue number within that release (01.01)
- the date the document was released



How to determine the latest version

More than one version of this manual may exist. To determine whether you have the latest version of this manual, check the release information in the *DMS-500 Master Index of Publications*, 297-2663-001.

What documents are referred to in this manual?

The following documents are referred to in this manual:

- *DMS-500 Data Schema Reference Manual*, 297-2663-851
- *DMS-500 Office Parameters Reference Manual*, 297-2663-855
- *DMS-500 Operational Measurements Reference Manual*, 297-2663-814

Information about related documents can be found in either the *DMS-500 Master Index of Publications*, 297-2663-001, or the *Product Documentation Directory,* 297-8991-001.

Document conventions

This document conforms to the following conventions.

Input prompt (>)

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

>BSY

Commands and fixed parameters

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

>BSY CTRL

Variables

Variables are shown in lowercase letters:

>BSY CTRL ctrl_no

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

Optional variables and parameters

Optional variables and parameters are shown in brackets ([ ]):

>SS setname [INSVSYNC]

Optional variables and parameters shown in brackets use the syntax described above. Each optional variable or parameter is explained in a list that follows the command string.

Responses

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

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

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

1 Manually busy the CTRL on the inactive plane by typing

>BSY CTRL ctrl_no
and pressing the Enter key.

where

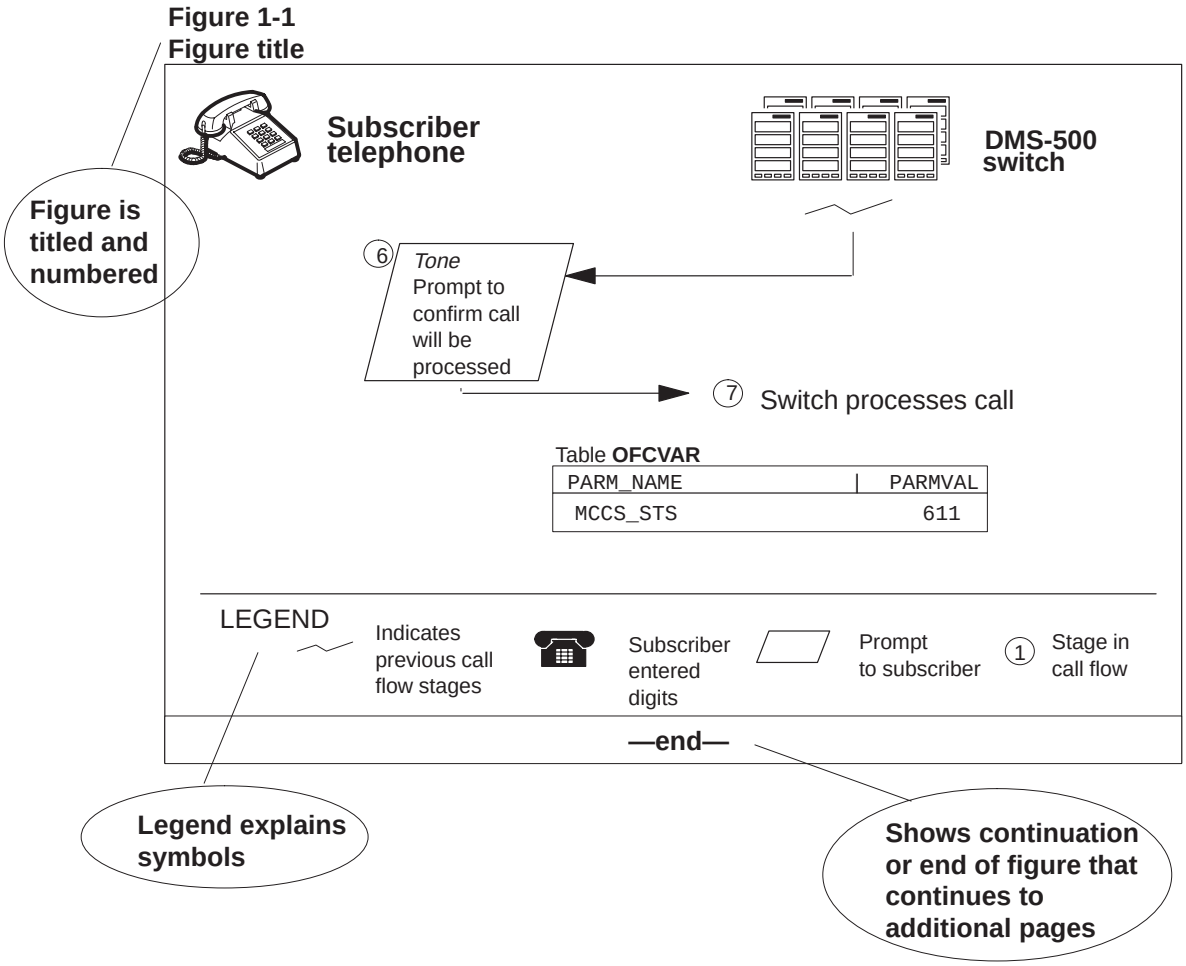
ctrl_no is the number of the CTRL (0 or 1)

Example of a MAP response:

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

Illustrations in figures

The following shows the figure conventions.



Numbering ranges for dialing plans

The following numbering ranges apply for any dialing plan listed in this manual:

- N = 2–9
- W = 0–1
- X = 0–9
- Z = 2–8

What precautionary messages mean

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

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

Examples of the precautionary messages follow.

ATTENTION Information needed to perform a task

ATTENTION

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

DANGER Possibility of personal injury

DANGER

Risk of electrocution

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

WARNING Possibility of equipment damage

WARNING

Damage to the backplane connector pins

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

CAUTION Possibility of service interruption or degradation

CAUTION

Possible loss of service

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

Introduction

Dialable Wideband Services (DWS) is a multi-rate, circuit-mode service that transmits data calls at transmission rates ranging from 64 kbit/s to 1.536 Mbit/s. DWS is part of a group of features that allows a user to establish a real-time connection across the switched network to any other bandwidth-compatible DWS subscriber by dialing a single directory number. Since the user selects the rate (or bandwidth) with each call placed, DWS is also called *bandwidth on demand*.

Note: Only dialable circuit-switched services use DWS. Packet-switched frame relay services do not use this feature.

Connectivity

DWS establishes a wideband connection using combinations of Customer Premise Equipment (CPE), Intemachine Trunks (IMT), Integrated Services Digital Network User Part (ISUP) Feature Group D (FGD) trunks, and Primary Rate Interface (PRI) trunks. (See Figure 1-1.) The following configurations are supported:

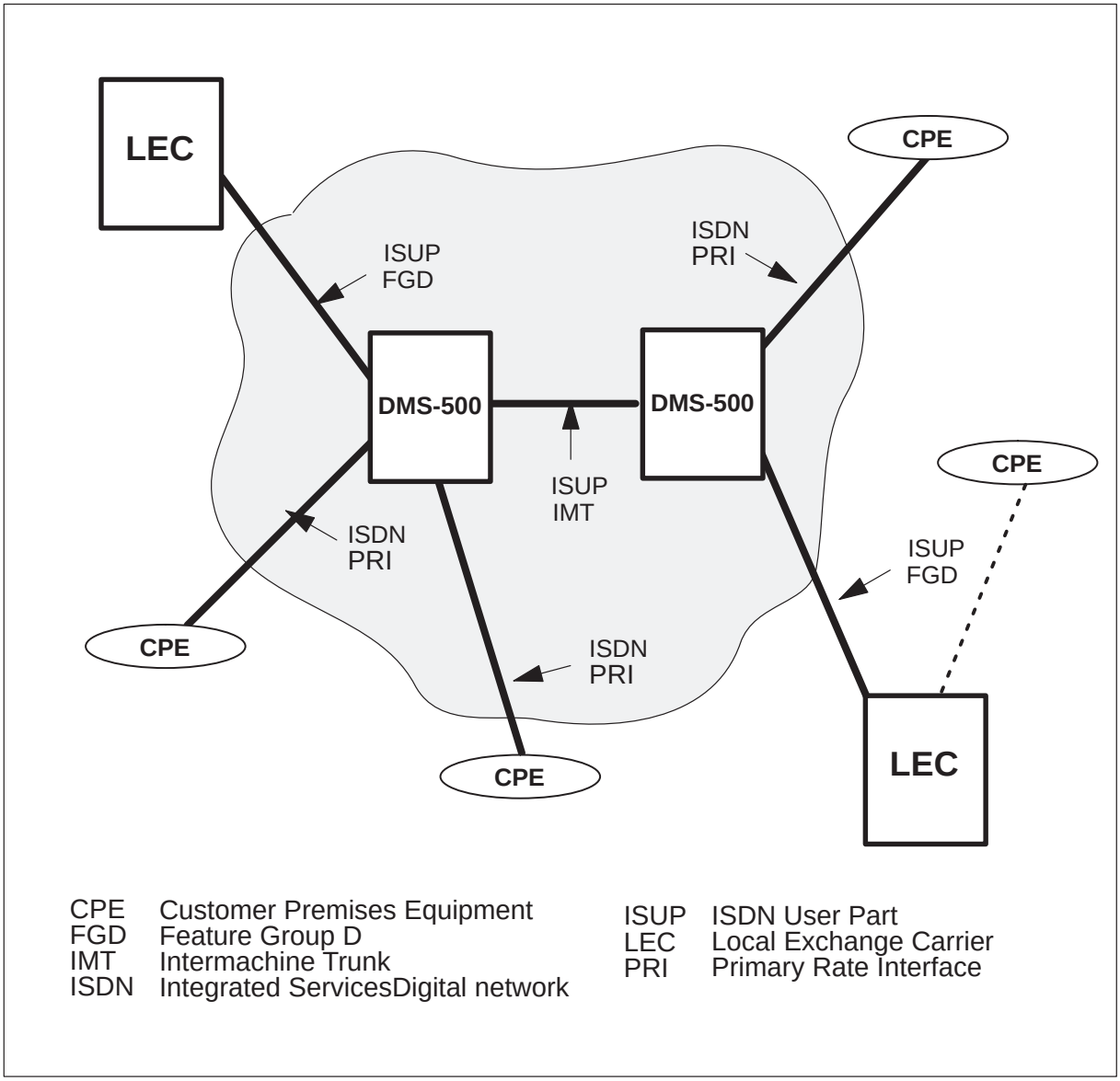
- CPE to CPE using wideband PRI trunk
- interworking between wideband PRI, ISUP IMT, and ISUP FGD trunks within a DMS-500 switch

  Note: DWS can function on more than one DMS-500 switch.

Network connections are transparent to user information. Once the DWS connection is established, the selected channels may be employed according to user requirements (for example, voice, data, video, or image) and hardware configuration requirements (for example, CPE type, use) — not DMS-500 switch requirements. Connections are established in real-time by the originating, terminating, and tandem switching nodes. The rate (or bandwidth) is user-selectable on a per-call basis.

End-users currently connected to the interexchange carriers (IEC) through PRI are able to upgrade current CPE integrated narrowband voice, narrowband data, and wideband data onto the same access trunk group.

Figure 1-1
DWS connectivity



Service operation

Before DWS, data calls were transferred using a single channel on a DS-1 span. This channel limitation kept the network connection rate to a maximum speed of 64 kbit/s. The 64 kbit/s rate did not support the data transfer rates associated with today's data applications (video transmission, videoconferencing, LAN/WAN interconnectivity, electronic data exchange, CAD/CAM, and image processing).

With DWS, users are able to access additional channels at speeds up to 1.536 Mbit/s without the presence of physically hardwired, dedicated resources. PRI trunking also allows the IEC user to connect CPE directly to the DMS-500 switch. Since the local exchange carrier (LEC) is bypassed and associated access charges are not incurred, the IECs receive a significant cost savings. DWS also allows the IEC to offer customized services directly to their major end-users.

Data transfer rates

Wideband data for a single call through the network is transmitted using a variable number (N) of the DS-0 channels available on a DS-1 span. From two to twenty-four 64 kbit/s channels can be used to transfer per call data. Since the network can change bit rates by no more than 64 kbit/s, channel speed is increased in 64 kbit/s increments (up to a maximum of 1.536 Mbit/s). By grouping multiple circuit-switched DS-0 channels together for one call, DWS provides a higher bit rate channel for the call as a whole. For additional information, see Table 1-1.

Note: All the channels used on the incoming or outgoing call must reside on the same DS-1.

Table 1-1
Data transfer rates

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

SOC option

Software Optionality Control (SOC) option UDWS0001 must be turned on in order for wideband services to be made available. This option contains the following features:

- Enhanced Time Switch
- DWS Base
- DWS Flexible
- DWS ISUP Base
- DWS EANT ISUP
- DWS ISUP IMT
- UCS DWS FGD ISUP for IEC02
- PRI for DWS

Feature requirements and limitations

Hardware

The following hardware is required for DWS:

- Enhanced Network (ENET)—ENET provides constant delay among all the wideband DS-0 channels across the switching network.
- NTAX78AA (release 0D2 hardware)—timeswitch software that provides a constant delay across the digital trunk controller (DTC) or ISDN digital trunk controller (DTCI).
- NTBX01AB Enhanced ISDN Signaling Protocol (EISP)—EISP card must be located in the DTCI.
- NT6X01AD frame—houses DTCs and DTCIs.

  Note: Frame NX6X01AB uses the NT6X02YS upgrade kit to house DTCs and DTCIs. Frame NT6X01AA is not supported.

- NT6X50AB (release 67 or higher)—DS-1 interface card.

  Note: The NTX6X50EC card is not supported.

- These features support the link peripheral processor (LPP), and the link interface module (LIM).

Implementation limits

The following limitations affect DWS implementation:

- Narrowband calls may originate and terminate in wideband trunk groups if table TRKGRP datafill does not include the blocking narrowband calls (BLOCKNB) option.

— If a narrowband call is originated on a wideband trunk, the cell receives BCNI treatment if the BLOCKNB is present.

— If a narrowband call is routed to a wideband trunk with the BLOCKNB option set, the call

– route advances if the wideband trunk is not the last trunk found in the route list

– receives treatment of BCNI if the wideband trunk is the last trunk found in the route list

- If an originating wideband call attempts to terminate on a non-wideband trunk group, the call route advances until it reaches a wideband trunk group.
- Wideband calls routed to an operator receive the treatment ORIGINATION_DENIED.
- The ENET is required to provide constant delay among all the wideband DS-0 channels across the switching network.
- The following are not supported:

— Wideband test calls are not supported (outpulsing from the TTP MAP level).

— Continuity testing is not supported for wideband trunk group agencies.

— Off-hook and on-hook queueing are not supported for wideband trunk groups.

— Off-hook queueing is not supported for PRI wideband trunk groups.

— INBAND DTMF digit collection (for example, PIN digits, account codes, authorization codes, reorigination digit, and feature control digit) is not supported.

— Rate negotiation is not supported.

— Routing to tones or announcements is not supported for wideband calls.

— Routing to an operator is not supported.

— PRI B-channel negotiation is not supported.

— Satellite hop is not supported for PRI wideband calls.

DWS network configurations

Figures 1-2 through 1-5 show examples of possible DWS network configurations using the DMS-500 switch.

Note: All trunks displayed in Figures 1-2 through 1-5 are DWS trunks.

Figure 1-2
ISUP to ISUP network configuration

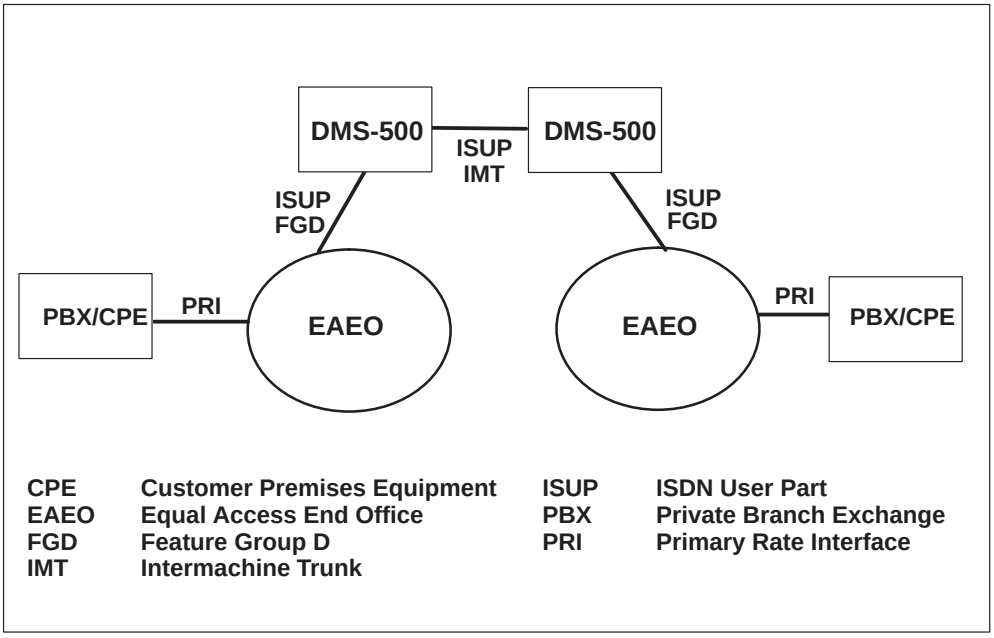


Figure 1-3
ISUP to PRI network configuration

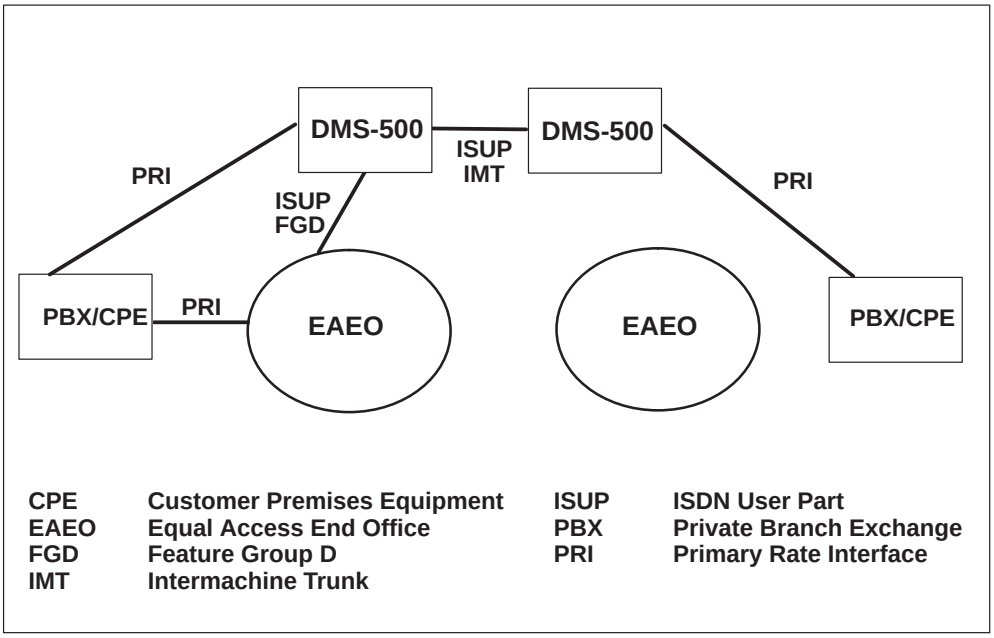


Figure 1-4
PRI to ISUP network configuration

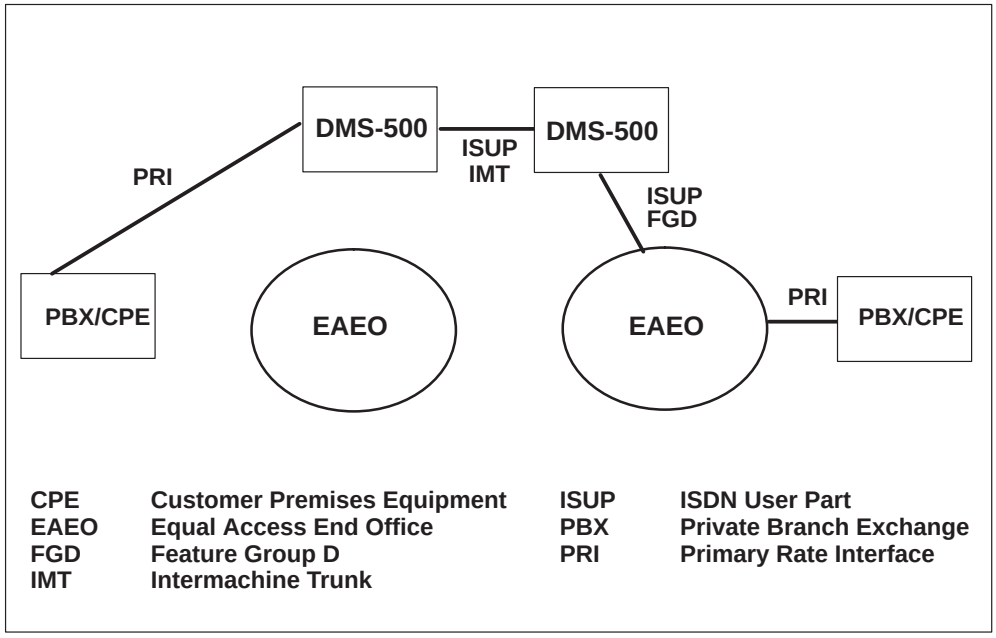
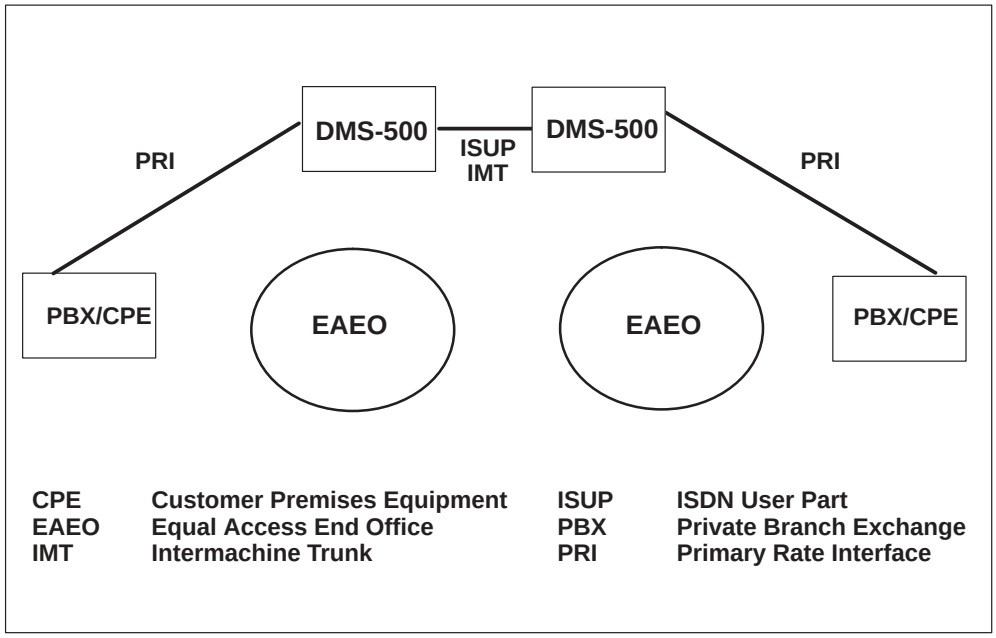


Figure 1-5
PRI to PRI network configuration



Trunk selection

DWS packages for both ISUP and PRI messaging support the following trunk selection methods for connections within the network:

- fixed—6 or 24 consecutive DS-0 channels on the same T1 are selected. Starting channels must be 1, 7, 13, or 19. Only H0 (6 channels, 384 kbit/s) and H11 (24 channels, 1.536 Mbit/s) wideband calls are allowed.
- floating—any number of consecutive DS-0 channels on the same T1 are selected. These consecutive channels can start on any channel in the T1.
- flexible—any number of DS-0 channels on the same T1 are selected. The channels do not have to be consecutive and can start on any channel in the T1. Channel order must be maintained, however.

Note: The fixed method is the most restrictive method; flexible is the least restrictive.

Fixed selection

The fixed method allows selection of any number of consecutive DS-0 channels in the DS-1. Selections begin and end with exact boundaries; exact starting channel numbers are also defined.

Note: At present only H0 (6 channels, 384 kbit/s) and H11 (24 channels, 1.536 Mbit/s) can be used for fixed selection.

Floating selection

The floating method allows selection of any number of consecutive DS-0 channels on the DS-1 span. These channels can begin at any point on the DS-1 span, but all must reside on the same DS-1.

Flexible selection

The flexible method allows selection of any number of DS-0 channels in the DS-1 span that is used for a wideband call. DS-0 selection occurs in a random fashion and does not use the “block type” of the previous selection routines. For this reason, the flexible method reduces fragmentation on the DS-1, because it is able to select fragmented idle members on it.

See Figure 2-1 for trunk selection methods and Table 2-1 for channel selection method comparison.

Figure 2-1
Trunk selection methods

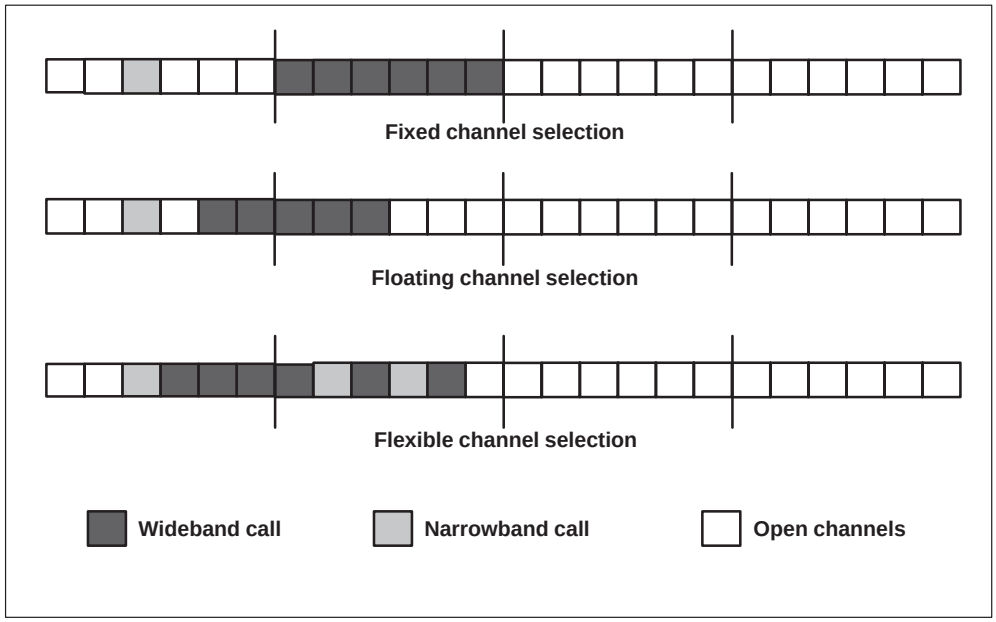


Table 2-1
Channel selection method comparison

Description	Fixed Channel	Floating Channel	Flexible Channel
Limited to boundary of single DS-1	Yes	Yes	Yes
Starting channels allowed.	Must be: 1, 7, 13, or 19	Any channel (1-24) allowed	Any channel (1-24) allowed
Range of “N” allowed	H0 (N=6) or H11 (N=24)	Any value of “N” (2-24) allowed	Any value of “N” (2-24) allowed
Non-contiguous channel selection allowed.	No	No	Yes
Mixing of narrowband and wideband channels allowed.	Yes	Yes	Yes

Trunk datafill

Introduction

The switch must access the databases located in the translations data tables located in the DMS-Core in order to route a call. Each table (designated by a unique name) has a specific purpose and contains a certain type of data. A table is made up of horizontal rows and vertical columns of data. Each row contains one record of data called a “tuple”; each column is called a “field”.

Wideband call processing and trunk maintenance use table control information to recognize, choose, and route calls on idle trunks. When processing a call, the DMS-500 switch may access many tables to collect the data needed to complete a call.

DWS datafill requirements

Data tables must be datafilled with the correct information for wideband call processing to operate properly. Requirements and recommendations for DWS datafill include:

- All DS-0s used in a wideband call must be datafilled in the same trunk group and reside on the same DS-1 span.
- DWS-specific office parameters must be set correctly. For example:
  - — MAX_NUM_WIDEBAND_CALLS—located in table OFCENG, this parameter must be set to the maximum number of wideband calls that can be active at one time in the switch.

    The value ranges from 9 to 4096 with two wideband extension blocks allocated for each call. The default value is 200. However, customer predefined values override the system default.

    Note: The user must perform a cold restart when decreasing the value of this parameter.

  - — ISUP_SUBGRP_GLARE_AVAILABLE—located in table OFCOPT, this parameter must be set to “Y” in order to datafill GLARETYPE to SCRPYLD in table TRKSGRP.

    Note: For additional information on office parameters, see the *DMS-500 Office Parameters Reference Manual*, 297–2663–855.

- Tables must be datafilled in the following order:
  - — LTCINV—Line Trunk Controller Inventory
  - — LTCPSINV—Line Trunk Controller P-side Inventory
  - — CARRMTC—Carrier Maintenance Control
  - — CLLI—Common Language Location Identifier
  - — CLLICDR—Common Language Location Identifier Call Detail Record
  - — TRKGRP—Trunk Group
  - — TRKSGRP—Trunk Subgroup
  - — TNTMAP—Treatment Cause to Map
- DWS-specific datafill must be located in the following tables:
  - — LTCINV
  - — LTCPSINV
  - — CARRMTC
  - — TRKGRP
  - — TRKSGRP
- Circuit identification codes (CIC) must be datafilled correctly in table Trunk Member (TRKMEM).
- DS-1 spans must be datafilled consecutively in table TRKMEM. Both ends of the span must also be set up consistently.
- Wideband traffic can be segregated from the rest of the narrowband traffic to make better use of trunking resources (table TRKGRP, option BLOCKNB).
- Glare must be reduced by:
  - — ensuring FirstFit trunk selection method has been used on two-way trunk groups (table TRKGRP, options SELSEQ and WBSEARCH)
  - — datafilling two-way trunk groups with an ascending sequence (ASEQ) on the switch at one end of the trunk and a descending sequence (DSEQ) on the switch at the other end of the trunk (table TRKGRP, options SELSEQ and WBSELSEQ)

    Note: Sequence alternation causes the switches to search for available DS-1s from opposite ends of the set of DS-1 span on a two-way trunk group.

  - — selecting one-way trunks for wideband calls

Table LTCINV

LTCINV contains the C-side inventory for peripheral modules (PM). The DTCAX78 card must be datafilled in field OPTCARD. This card is required for wideband services for each DTC or DTCI used by wideband dedicated trunk groups.

Table LTCPSINV

LTCPSINV contains the P-side links for PMs. The DS-1 links on the DTC or DTCI that carry wideband calls must be datafilled as wideband. After table CARRMTC is datafilled, changes must be made to LTCPSINV to allow the DTC or DTCI to carry wideband traffic. This is done by datafilling each span that hosts a wideband trunk in LTCPSINV with the corresponding entry from table CARRMTC.

Table 3-1 provides additional information on DWS-specific datafill in LTCPSINV. Figure 3-1 provides an example of the output when spans 3 through 12 are required for host wideband trunks. Also see information on table CARRMTC.

Table 3-1
Table LTCPSINV - DWS-specific datafill

Field	Subfield	Description
LTCNAME (Line Trunk Controller Name)		This field is made up of the following subfields: • XPMTYPE • XPMNO
	XPMTYPE (XPM Type)	Enter DTC or DTCI.
	XPMNO (XPM Number)	Enter the XPM number (range = 0 to 255)
PSLINKTAB (P-side Link Table)		This field is made up of the following subfield: • EXP_SIDES
	—continued—	

Table 3-1
Table LTCPSINV - DWS-specific datafill (continued)

Field	Subfield	Description
	EXP_SIDES (Extended P-sides Platform Indicator)	Enter No (N). Go to LTC_TAB.
	LTC_TAB (Line Trunk Controller Table)	This field is made up of the following subfields: • PSLINK • PSDATA
	PSLINK (P-side Link)	Enter the P-side port number (range 0 to 19).
	PSDATA (P–side Data)	This field is made up of the following subfield: • AREASELECT
	AREASELECT (Area Select)	Enter DS1PRA to indicate an interface with ISDN trunks. Also datafill the following: • IID (Interface Identifier) = unique DS-1 identifier (range = 0 to 31) • LINEEQ (Line Length from DS–1 circuit to first DS–1 office repeater) = line length value associated with the NT6X50EC card located in table CARRMTC or NIL ***Note:*** Figure 3-1 shows the IID fields set to values 0, 1 2, 17, 18 and LINEEQ set to NIL.
CARRIDX (Carrier Index)		Enter a valid template name from table CARRMTC or DEFAULT .
ACTION (Action)		Enter Yes (Y) if the carrier is removed from service when specified errors occur or No (N).
	—end—	

Figure 3-1
Table LTCPSINV - span assignments for DWS in a DTCI

```
LTCNAME
                                                                PSLINKTAB
_____________________________________________________________________________
DTCI    0
    N  (0 DS1PRA WIDEBAND N 0 NIL)  (1 DS1PRA DEFAULT N 0 NIL)
     (2 DS1PRA DEFAULT N 0 NIL)  (3 DS1PRA WIDEBAND N 0 NIL)
     (4 DS1PRA WIDEBAND N 1 NIL)  (5 DS1PRA WIDEBAND N 2 NIL)
     (6 DS1PRA WIDEBAND N 0 NIL)  (7 DS1PRA WIDEBAND N 1 NIL)
     (8 DISPRA WIDEBAND N 2 NIL)  (9 DS1PRA WIDEBAND N 0 NIL)
     (10 DS1PRA WIDEBAND N 1 NIL  (11 DS1PRA WIDEBAND N 2 NIL)
     (12 DS1PRA WIDEBAND N 0 NIL)  (13 DS1PRA DEFAULT N 0 NIL)
     (14 DS1PRA DEFAULT N 0 NIL)  (15 DS1PRA DEFAULT N 0 NIL)
     (16 DS1PRA DEFAULT N 0 NIL)  (17 DS1PRA DEFAULT N 17 NIL)
     (18 DS1PRA DEFAULT N 18 NIL)  (19 DS1PRA DEFAULT N 0 NIL) $
```

Table CARRMTC

CARRMTC allows DMS-500 switch administration to datafill PM maintenance control information, out-of-service limits for alarms, and system return-to-service occurrences. Datafill in the FRAME FORMAT (FF) and ZERO_LOGIC (ZLG) fields must be set correctly or wideband calls do not operate correctly. In addition, values in these fields must be based on the existing default values for the DTC and DTCI. Table 3-2 provides additional information on DWS-specific datafill in table CARRMTC.

Table 3-2
Table CARRMTC - DWS–specific datafill

Field	Subfield	Description
CSPMTYPE (C-side Node Peripheral Module Type)		Enter DTC or DTCI.
TMPLTNM (Template Name)		Enter WIDEBAND or any other appropriate name. ***Note:*** This entry also appears in the inventory tables in field CARRIDX.
ATTR (Attribute)		This field is made up of the following subfield: • CARD • SELECTOR

—continued—

Table 3-2
Table CARRMTC - DWS–specific datafill (continued)

Field	Subfield	Description
	CARD (Card)	Enter NT6X50AB. ***Note:*** When the NT6X50AB card is entered, datafill is required in subfield SELECTOR, fields FF and ZLG.
	CARD (Card)	Enter NT6X50AB. ***Note:*** When the NT6X50AB card is entered, datafill is required in subfield SELECTOR, fields FF and ZLG.
	SELECTOR (Selector)	Enter DS1.
	FF (Frame Format)	Enter ESF (extended superframe format.
	ZLG (Zero Logic)	Enter B8ZS (bipolar 8-bit zero substitution).
—end—		

Table TRKGRP

TRKGRP contains customer-defined data associated with each trunk in a trunk group and defines the logical and physical characteristics of that trunk group. The datafill in TRKGRP is used by wideband call processing and trunk maintenance to recognize, choose, and route idle trunks. Table 3-3 provides information on the trunk types supported by the DMS-500 switch.

Table 3-3
Trunk types supported on DMS-500

Generic trunk name	Nortel trunk name (signaling type)	Customer designation
ISUP IMP (ISDN User Part Intermachine Trunk)	IMT (ISUP)	IMT = USCUST
ISUP FGD (ISDN User Part Feature Group D)	EANT (ISUP)	FGD = UCS
PRI ISDN (Primary Rate Interface Integrated Services Digital Network	PRA250 (PRI)	

ISUP IMT/IMT (ISUP) datafill

The bolded entries in the following example show wideband-specific datafill for an ISUP IMT/IMT (ISUP) trunk:

```
GRPKEY  GRPTYP  TRAFSNO PADGRP  NCCLS   CUSTOMER COD DIR
PRTNM   SELSEQ  WBSELSEQ        WBGRPING      WBSEARCH
OPTIONS
_____________________________________________________________
ISUP    IMT     0       PDGP      NCIT USCUST    0  2W
   UNI  WIDEBAND    ASEQ    FLEXIBLE   FIRSTFIT
BLOCKNB  $
```

ISUP FGD/EANT (ISUP) datafill

The bolded entries in the following example shows wideband-specific datafill for an ISUP FGD/EANT (ISUP) trunk:

```
GRPKEY  GRPTYP  TRAFSNO PADGRP    NCCLS COS DIR PRTNM
SELSEQ  WBSELSEQ        WBGRPING  WBSEARCH  ...
OPTIONS
_____________________________________________________________
U2WFGD  EANT    0       NPDGP     NCIT  0   2W  UNI
WIDEBAND        ASEQ    FLEXIBLE   FIRSTFIT     BLOCKNB
$
```

PRI ISDN/PRA250 (PRI) datafill

The bolded entries in the following example shows wideband-specific datafill for an PRI ISDN/PRA250 trunk:

```
GRPKEY  GRPTYP  TRAFSNO PADGRP  NCCLS   UCSUT   SELSEQ
WBSELSEQ        EBGRPING        WBSEARCH
       OPTION
_____________________________________________________________
UCSPRIFLX PRA250 0      NPDGP  NCIT    UCSUST    WIDEBAND
ASEQ    FLEXIBLE        FIRSTFIT        BLOCKNB
```

In order to allow wideband calls on a PRA250 trunk, the following fields in TRKGRP must be set correctly:

- SELSEQ
- OPTION
  - — BLOCKNB

Table 3-4 provides additional information on DWS-specific datafill in table TRKSGRP.

Table 3-4
Table TRKGRP, PRA250 trunk type - DWS-specific datafill

Field	Subfield	Description
GRPTYP (Group Type)		Enter PRA250
SELSEQ (Selection Sequence)		Enter WIDEBAND. ***Note 1:*** Datafilling SELSEQ as WIDEBAND can only be applied to new trunk groups. Therefore, to provide DWS capability on existing trunk groups, the trunk groups must be deleted from table TRKGRP and re-added with SELSEQ datafilled as WIDEBAND. Once the trunks are defined as WIDEBAND, call processing associates queues and data structures to the trunk group that are relevant only to wideband trunks. To change SELSEQ from WIDEBAND to another value, the corresponding TRKGRP tuple must be deleted first. ***Note 2:*** Use WIDEBAND as the value only when the DWS SOC feature is set to “ON”; do not use this value when SOC is set to “IDLE”. This limitation also applies to WBSELSEQ, WBGRPING, and WBSELSEQ. When SOC is “IDLE”, the DMS-500 rejects tuples with these values.

—continued—

Table 3-4
Table TRKGRP, PRA250 trunk type - DWS-specific datafill (continued)

Field	Subfield	Description
	WBSELSEQ (Wideband Selection Sequence)	Enter ASEQ to specify that the DS-0s are selected in ascending order. ***Note:*** This option searches for an available trunk across DS-1s, beginning with the one that was datafilled first. Then it searches across the DS-0s in that DS-JU1, beginning with the lowest numbered DS-0. Enter DSEQ to specify descending order. This option searches for an available trunk across DS-1s, beginning with the one that was datafilled last. Then it searches across the DS-0s in that DS-1, beginning with the highest numbered DS-0. ***Note:*** Datafill a trunk group as ASEQ on the switch at one end of the trunk and as DSEQ on the switch at the other end of the trunk. This datafill avoids glare by causing the two switches to search for available DS-1s from opposite ends of the set of DS-1s on a trunk group.
	WBGRPING (Wideband Grouping)	Enter FIXED, FLOATING, or FLEXIBLE. ***Note:*** This option specifies the time slot arrangement types that may be used by call processing (trunk selection method). The value can be changed only if no subgroup in table TRKSGRP is associated with the trunk group.
	WBSEARCH (Wideband Search)	Enter either of the following: • BESTFIT—allows the largest groups of contiguous channels to remain unused and therefore available for large bandwidth calls. This option minimizes fragmentation. • FIRSTFIT—selects the first available channels. This option helps to avoid glare. ***Note:*** The option entered specifies the search method used to find a group of timeslots.

—continued—

Table 3-4
Table TRKGRP, PRA250 trunk type - DWS-specific datafill (continued)

Field	Subfield	Description
OPTION (Option)		Enter BLOCKNB to block narrowband calls. For additional information on available options, see the *Customer Data Schema Reference Manual*, 297–2663–851. Select BLOCKNB in the following instances: • SOC is set to “ON”. • Enable BLOCKNB to allow the blocking of narrowband calls on wideband trunks. This prevents narrowband calls from terminating or originating on a member-specified trunk group. ***Note:*** If blocking is enabled during call processing, any existing narrowband calls remain up until normal termination. No new narrowband calls are permitted on the trunk group. Narrowband test calls are supported on wideband trunks even with BLOCKNB enabled. If a narrowband call is terminated to a wideband trunk with BLOCKNB enabled, one of the following occurs: — if the wideband trunk is not the last trunk found in the route list, the route advances. The call continues to “route advance” until the route list is exhausted and it receives a “generalized, no circuit (GNCT)” treatment. — If the wideband trunk is the last trunk found in the route lists, the call receives a “bearer capability not implemented” (BCNI) treatment.
—end—		

Table TRKSGRP

TRKSGRP lists the supplementary information for each subgroup assigned to one of the trunk groups listed in table TRKGRP. Datafill in table TRKSGRP is used to control signaling information, including the recovery scheme for glare.

DWS-specific fields in TRKSGRP include

- GLARETYP—Glare occurs when switches in the network seize both ends of a trunk at the same time. Depending on trunk type, control glare by using one following:
  - — ISUP FGD—set to SGRPYLD; a priority is then assigned to one of the switches.
  - — PRI—set to BCHGLARE; select YIELD and STAND to indicate whether the trunk is going to stand or yield in a glare situation. Do not datafill BCHGLARE with the same value on both ends.

  Note: Set ISUP_SUBGROUP_GLARE_AVAILABLE in table Office Options (OFCOPT) to yes (“Y”). This value must be set correctly in OFCOPT for GLAREYLD (table TRKSGRP) to function properly.

- VERSION—set to UNISPEC20 to which version protocol being used.

Additional information important to the operation of parameters in TRKSGRP includes

- odd/even CIC glare resolution method is not permitted for any of the IMT or EANT trunk groups with SELSEQ datafilled as WIDEBAND.
- signaling type must be ISUP or PRI.

Call processing

Routing a call

Call processing elements for a wideband call include

- call origination
- translations
- termination handling
- error conditions

Call origination

DWS supports originations from both ISUP-FGD/EANT (ISUP) and PRI-ISDN/PRA250 (PRI) agencies.

ISUP-FGD call origination

DMS-500 switches check the following to determine whether an incoming call on an ISUP-FGD trunk is a wideband call:

- wideband transfer rate—value must be present in the information transfer rate (ITR) field of the mandatory parameter User Service Information (USI) and contained in the Initial Address Message (IAM).
- channel assignment map (CAM)—must be present in the IAM.

  Note: The CAM is used on wideband flexible calls. For an H0 (6x64) or H11 (24x64) fixed or floating wideband call, the switches do not send the CAM.

- trunk group—datafill specifies the network uses ISUP-FGD trunk group for wideband calls.

Note: CPE requires two DS-1 carriers to originate an H11 call. Datafill must have 24 B-channels on one DS-1 and the D-channel for the CPE on the other DS-1. The other 23 channels are available for calls when datafilled as B-channels for the DS-1 that contains the D-channel.

PRI call origination

DMS-500 switches check the following to determine whether an incoming call on a PRI trunk is a wideband call:

- ITR—CPE equipment sends a SETUP message to the DMS-500 switch to establish a wideband call from a primary rate interface (PRI) originator. The switches recognize the call as a wideband call by the presence of the ISDN ITR field of the bearer capability (BC) information element (IE) in the SETUP message.

  Note: For wideband, the ITR field contains the value 10011 for an H0 (6x64) call, 10101 for an H11 (24x64) call, or 11000 when using the transfer rate multiplier. In addition, CPE requires two DS-1 carriers to originate an H11 call. Datafill must have 24 B-channels on one DS-1 and the D-channel for the CPE on the other DS-1. For the DS-1 that contains the D-channel, the other 23 channels are available for calls when datafilled as B-channels.

- Wideband—PRA250 trunk group on which the SETUP message is received can be datafilled as wideband in the field SELSEQ. If the field is not identified as such, the switches apply bearer capability not implemented (BCNI) treatment.

Extension blocks

Each wideband call requires two extension blocks. These blocks (allocated on wideband ISUP-IMT, ISUP-FGD, or PRI-ISDN trunk groups) store call processing information associated with the wideband call.

The number of wideband extension blocks available is defined by the office parameter MAX_NUM_WIDEBAND_CALLS in table OFCENG. This parameter indicates the maximum number of wideband calls that can be active at any one time on the DMS-500 switch.

Translations

DWS on DMS-500 switches support the following route selectors in the Route Reference (RTEREF), Foreign Numbering Plan Area Code Subtables (FNPACONT), and Office Route (OFRT) in table Home Numbering Plan Area Code Subtables (HNPACONT):

- S—standard
- T—table routing
- N—non-standard
- ST—chaining of route lists (same table route)
- CND—time of day screening (conditional route)

- ST—translate again using digit manipulation route
- EXDS—extended digit screening route

If datafill routes a wideband call using a selector that is not supported, the switches block and apply general no circuit (GNCT) treatment.

If a switch receives a wideband IAM or SETUP message across a non-wideband trunk group, it rejects the call and generates a WB103 log.

Termination handling

Termination is handled according to the following:

- Any ISUP or PRI wideband call can terminate to any other ISUP or PRI wideband call.
- If the route choice provided by translations that contains non-wideband trunk group CLLI is selected, the network route advances the call through the route list until it finds datafill for a wideband trunk group CLLI. If a wideband trunk is not found, the switches generate a WB105 log.
- If the originating wideband call is terminating and the selection method is set to FLEXIBLE, a new CAM is formatted and built into the outgoing IAM. The CAM in the outgoing IAM reflects the correct selected terminating circuits that are found in terminating trunk groups that have WBGRPING=FLEXIBLE.

  Note: CAM is not used if N=24.

- Channel identification with PRI is sent on the SETUP message, except when the call is a 24-channel call.
- Terminations are made using the selector in (RTEREF) in table HNPACONT when terminating on-net or off-net.

Error conditions

The following are error conditions which may occur during call processing:

- unsuccessful call setup
- fragmentation
- glare handling and recovery
- seize failures
- equipment failures

Unsuccessful call setup

When the desired bandwidth cannot be allocated, the cause value GNCT is applied to the call and a RELEASE message with the cause value ISDN_UNAVAILABLE is returned to the CPE, and the call is rejected.

If an IAM with wideband indicators is received on a non-wideband ISUP trunk agency, the call is released with cause BC NI.

If a narrowband call terminates to a wideband trunk group and the BLOCKNB field is set to Y for that trunk group in table TRKGRP, the narrowband call route advances.

If one or more channels lose integrity, the call is taken down. Logs TRK113 and ENCP100 are output.

If the ISDN ITR field in a SETUP message indicates the a PRI call is wideband (and the trunk group is a PRI trunk group that has not been datafilled) then the BC NI treatment is applied to the call and a RELEASE message with the cause value ISDN_BC_NOT_IMPLEMENTED is returned to the CPE, and the call is rejected.

Fragmentation

Fragmentation occurs for fixed and floating wideband groupings when there are not any number of contiguous circuits (DS-0s) available on a DS-1. Flexible groupings take advantage of fragmentation on a DS-1 by using whatever number of circuits are available on that DS-1 to complete the call.

If there are not any number of circuits for the wideband call (fixed, floating, or flexible) on a single DS-1, the call still cannot be completed, even if there are enough DS-0s spread across all DS-1s of that trunk group.

Selection of WBSEARCH BESTFIT (table TRKGRP) minimizes the possibility of fragmentation. However, it does not eliminate it completely.

Glare handling and recovery

Glare is the blocking of a call due to the simultaneous seizure of a channel at both ends of the call. Glare occurs when a switch receives an IAM or SETUP message for a trunk member after another switch has already sent an IAM or SETUP message to select that same trunk.

In ISUP-FGD, the recovery field is datafilled in table TRKSGRP. One end of the trunk is datafilled STAND and the other YIELD. The switch that has the trunk subgroup datafilled to YIELD allows the incoming call to have the channels on which glare occurred; it releases the channels from the call that had also attempted to use them. The YIELD side route advances in an

attempt to obtain the channels required to complete the call. The FIRST FIT trunk selection method reduces the chances for glare.

Note: Reselecting is not supported with wideband calls on wideband trunks.

In PRI, the recovery field is datafilled in the BCHGLARE field in table TRKSGRP. One end of the trunk is datafilled STAND and the other YIELD. The switch that has the trunk group datafilled to YIELD allows the incoming call to have the channels on which glare occurred; it releases the channels from the call that had also attempted to use them. The YIELD side route advances in an attempt to obtain the channels required to complete the call. The switch with the trunk datafilled to STAND, uses the seized channels and is not affected in the GLARE condition.

It is recommended that a two-way trunk group be datafilled as ASEQ on the switch at one end of the trunk and as DSEQ on the switch at the other end of the trunk. This causes the two switches to search for available DS-1s from opposite ends of the set of DS-1s on a two-way trunk group.

Seize failures

A seize failure is the inability to terminate to the selected agent. Seize failures are caused by receiving a blocking message (BLO) or a reset circuit message (RSC) instead of an address complete (ACM)/answer message (ANM) on ISUP. For wideband calls, a seize failure will cause a route advance.

Equipment failures

Certain conditions may cause trunk state changes. The following conditions cause the wideband call to be taken down:

- Digital trunk controller (DTC) or digital trunk controller interface (DTCI) goes system busy (SYSB)
- DTC or DTCI goes C-side busy (CBSY)
- DTC or DTCI is manual busy (MB)
- carrier failure (CFL)
- ENET fails
- LIU7/CCS7 route set fails

  Note: If the wideband call is an established call (answered), the call stays up. If the call is in a transition state, it comes down. New calls cannot be originated if this is the only route set used by the trunk set.

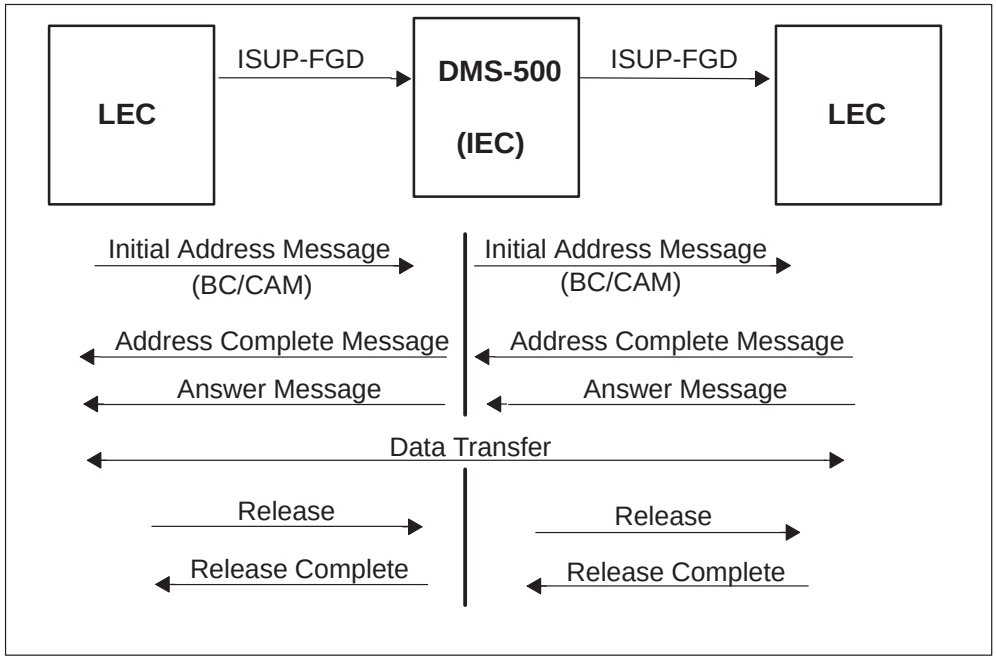
ISUP messaging

In wideband, one set of messages sets up all connections for a call. This is different from sending separate Integrated Services Digital Network (ISDN) User Part (ISUP) messages for each channel.

ISUP FGD calls

Figure 5-1 shows ISUP messaging for call setup and release of an ISUP FGD call from one local exchange carrier (LEC) to another through a DMS-500 functioning as an interexchange carrier (IEC). The far-end LEC answers the call. The call is later disconnected by the calling party.

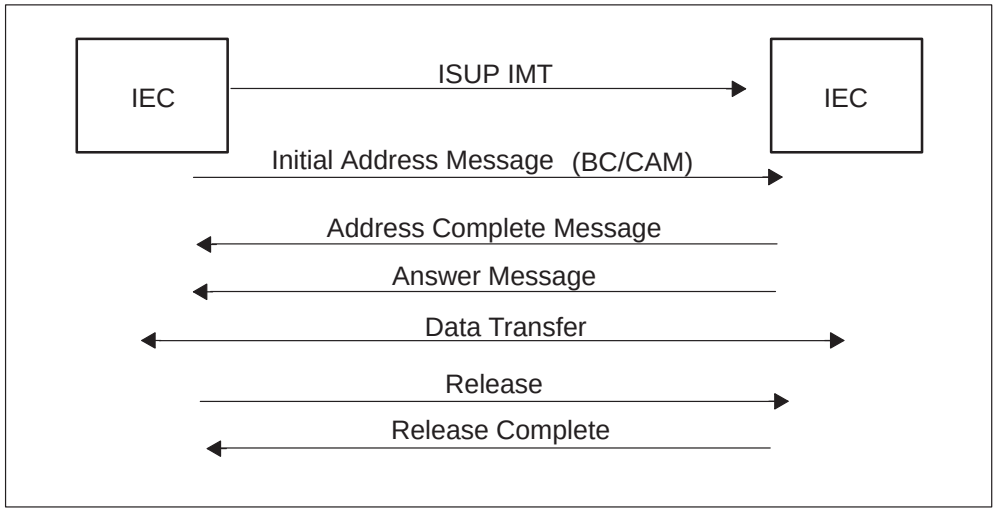
Figure 5-1
ISUP-FGD/EANT (ISUP) messaging



IMT calls

Figure 5-2 shows ISUP messaging for call setup and release of an IMT call from one IEC node to another. The far-end IEC answers the call. The call is later disconnected by the calling party.

Figure 5-2
IMT messaging



User service information (USI)

The USI parameter of the Initial Address Message (IAM) indicates the rate of the wideband call using the information transfer rate (ITR) and the transfer rate multiplier (TRM). The TRM is used only if full N x 64 capability is provided. In order to use the TRM, the ITR is set to 11000 for multirate (64 kbit/s base rate) and the TRM is encoded to the value of N in N x 64. The bandwidth is calculated by multiplying the ITR with the TRM. The USI parameter format is shown in Figure 5-3.

Figure 5-3
USI parameter format

Octet \ Bit	8	7	6	5	4	3	2	1
1	1	0	0	0	1	0	0	0
		Coding standard		Information transfer capability				
2	1	0	0	Information transfer rate				
		Transfer mode						
2.1	1	Transfer rate multiplier						

Coding standard: CCITT
Information transfer capability: unrestricted digital information
Transfer mode: circuit

Transfer rate

The ITR and the TRM are used to indicate the number of channels associated with the wideband call. Tables 5-1 and 5-2 describe the ITR information in the PRI SETUP message and the TRM element in the USI parameter in the IAM.

Table 5-1
ITR values

ITR (PRI SETUP message)	Description	Trunk selection method	Bearer Capability (BC)
10000	64 kbit/s	All methods	Narrowband
10011	384 kbit/s	Fixed	H0
10101	1.536 Mbit/s	Fixed	H11
11000	Multirate (64 kbit/s base rate)	Floating/flexible	TRM parameter size (2 to 24 only)

Table 5-2
ITR/ITM conversion

ITR (PRI SETUP message)	TRM (ISUP IAM message - USI parameter)	Description
10000	10000	1 x 64 (narrowband call)
10011	not required	H0
10101	not required	H11
11000	00010	2 x 64
11000	00011	3 x 64
11000	00100	4 x 64
11000	00101	5 x 64
11000	00110	6 x 64
11000	00111	7 x 64
11000	01000	8 x 64
11000	01001	9 x 64
11000	01010	10 x 64
11000	01011	11 x 64
11000	01100	12 x 64
11000	01101	13 x 64
11000	01110	14 x 64
11000	01111	15 x 64
11000	10000	16 x 64
11000	10001	17 x 64
11000	10010	18 x 64
11000	10011	19 x 64
11000	10100	20 x 64
11000	10101	21 x 64
11000	10110	22 x 64

—continued—

Table 5-2
ITR/ITM conversion (continued)

ITR (PRI SETUP message)	TRM (ISUP IAM message - USI parameter)	Description
11000	10111	23 x 64
11000	11000	24 x 64
—end—		

Channel assignment map (CAM)

The optional CAM parameter is required in the IAM to support non-contiguous allocations of DS-0s. Given the channel identification code (CIC) and the bandwidth of the call, it is possible to determine all the DS-0s involved in a fixed or floating wideband call. This is because the CIC indicates the first DS-0 in the call, and the rest of the DS-0s wideband trunk members are consecutively datafilled in table TRKMEM.

The CAM in the IAM establishes a non-contiguous wideband call. This parameter indicates which DS-0 channels on the DS-1 are being used for the flexible wideband call by providing a mapping of the DS-0 channels. With this information, a transfer rate value for anywhere from 2 to 24 can be used and also determined for the call.

The CAM is carried in the IAM of the CIC and is associated with the lowest numbered DS-0 timeslot. The CAM is not used for fixed or floating wideband calls. Nor is it used for 24-channel wideband calls. Figure 5-4 illustrates the IAM CAM parameter.

Figure 5-4
ISUP IAM CAM parameter

Octet \ Bit	8	7	6	5	4	3	2	1
1	CAM							
2	Length of CAM parameter contents							
3	0 Spare 0		Channel type (000001)					
4	8	7	6	5	4	3	2	1
5	16	15	14	13	12	11	10	9
6	24	23	22	21	20	19	18	17

Parameter fields values and meanings:

Octet 3: CHANNEL TYPE
000001—DS-1 channel type

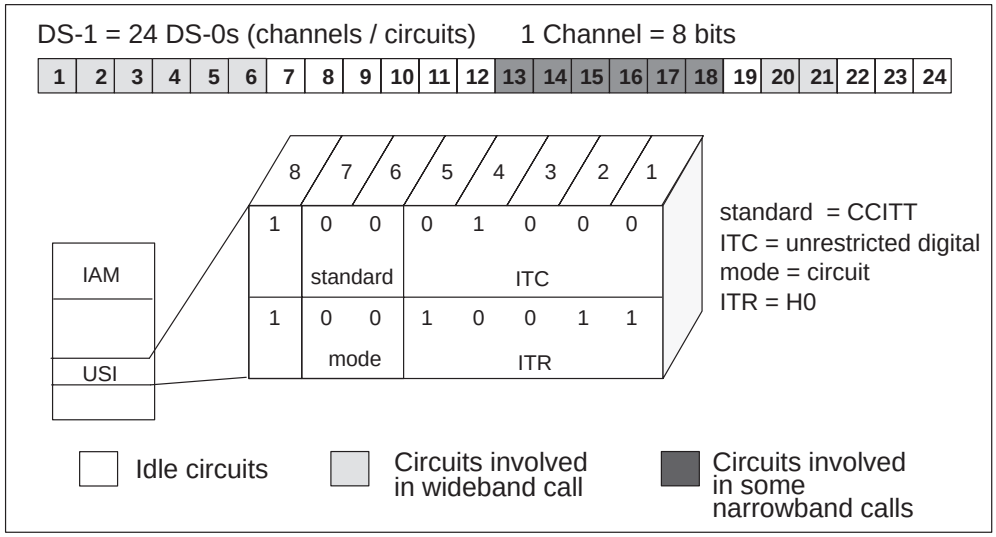
Octet 4–6: SLOT MAP
(1–24)—Representation of DS-0 channels 1 through 24. 1 represents DS-0, channel 1; 24 represents DS-channel 24. A slot with value 0 indicates the channel is not in use for the wideband call. A value of 1 indicates the channel is in use for the wideband call.

Fixed IAM format

Figure 5-5 shows the fixed IAM format. This is the most restrictive of all the wideband trunk grouping methods. The TRM and CAM are not required since the system knows the H0 boundaries.

This figure also shows an example of fragmentation. The boundary restrictions of the fixed format prevent other wideband calls with fixed format from using the remaining idle circuits on this DS-1.

Figure 5-5
Fixed IAM format, H0 illustrated



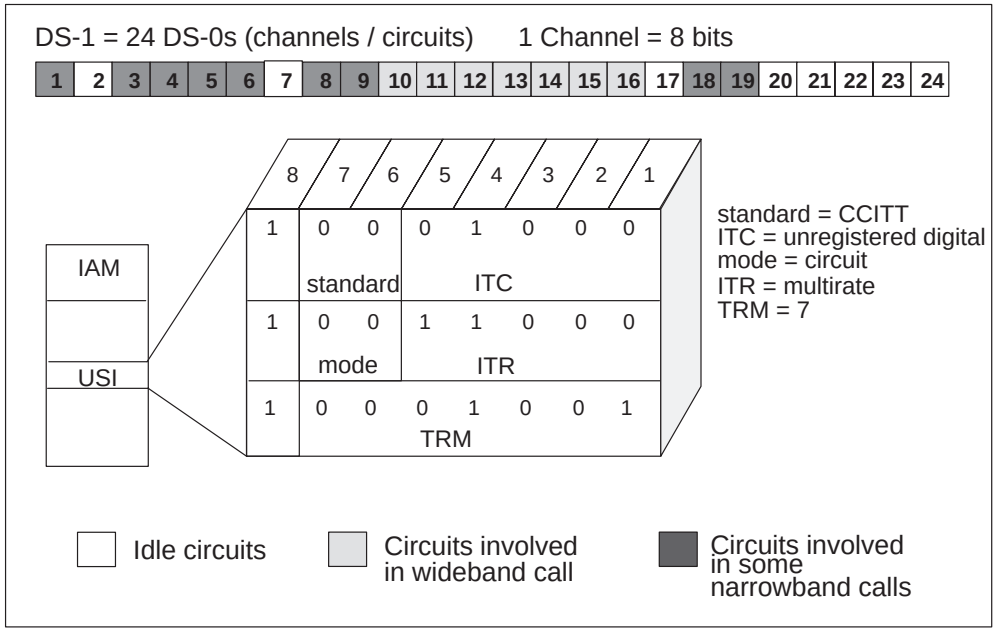
Note: Figure 5-5 provides an example of a two-channel call, which fixed wideband trunks do not support.

Floating IAM format

Figure 5-6 shows the floating IAM format. This is less restrictive than the fixed method of trunk grouping. The TRM indicates the number of DS-0s involved in the call. The CAM is not needed, because the system knows the next number of contiguous DS-0s are involved in the call.

The floating method reduces fragmentation somewhat and uses resources more efficiently than the fixed method. Because the floating method is not limited to specific boundaries, if another wideband call arrives and requests five or less consecutive DS-0s, this DS-1 can satisfy the request.

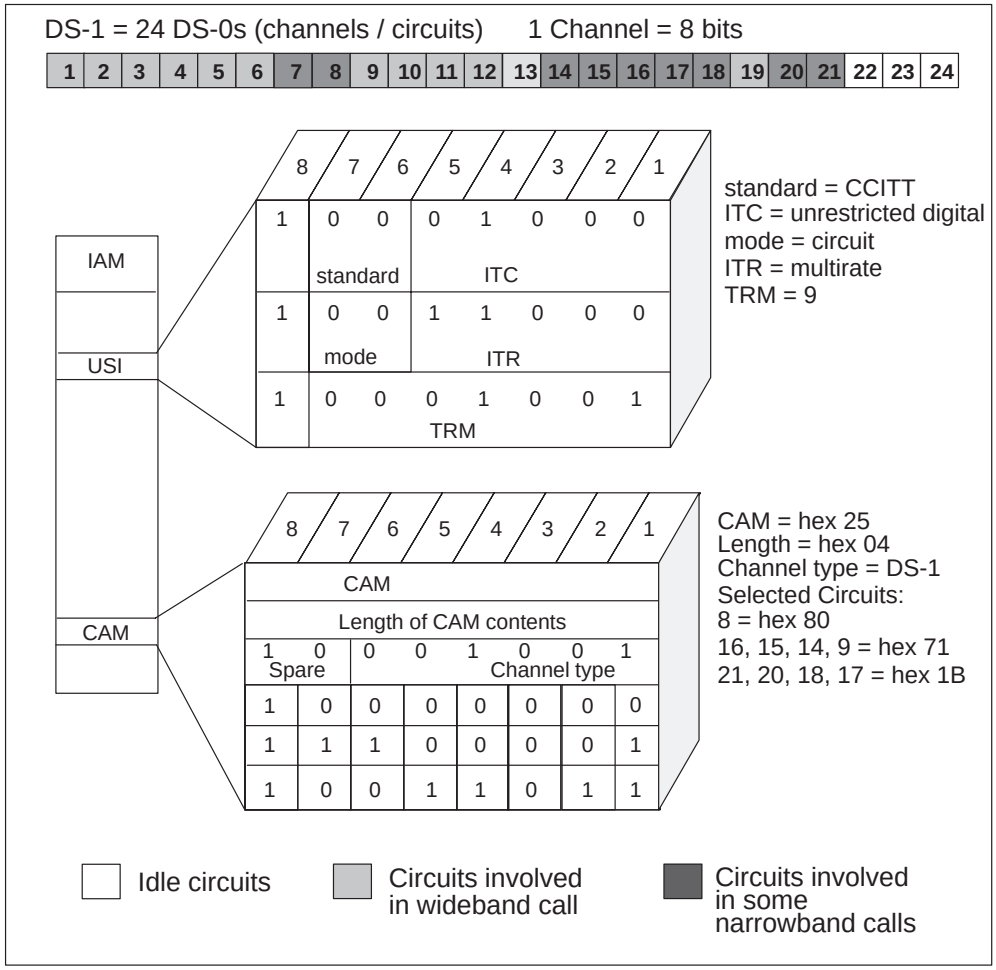
Figure 5-6
Floating IAM format



Flexible IAM format

Figure 5-7 shows the flexible IAM format. This is the least restrictive of the three trunk grouping methods. The TRM indicates the number of DS-0s involved in the wideband call. The CAM is required to indicate which specific DS-0s are being used for the call. The flexible option takes advantage of fragmentation by choosing the idle DS-0s without boundary restrictions.

Figure 5-7
Flexible IAM format



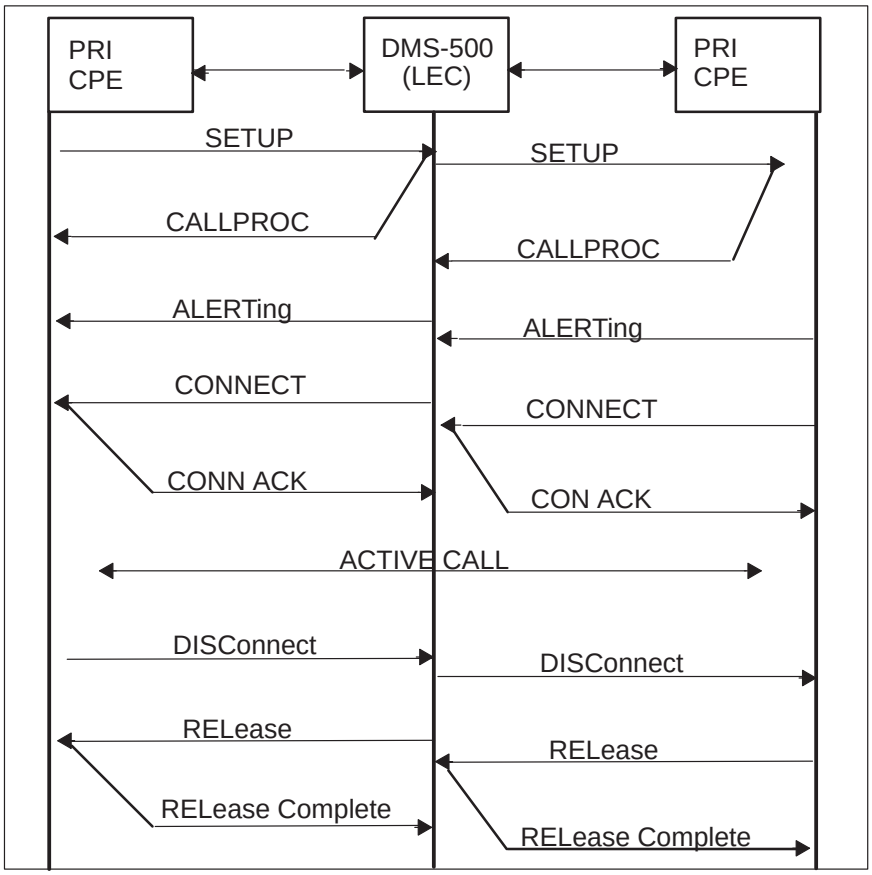
PRI messaging

The PRI trunk group allows the IEC end-user to connect CPE directly to the IEC using DMS-500 switches bypassing the LEC. End-users connected to the IEC across PRI trunks can upgrade CPE by integrating narrowband voice/data and wideband data on the same access trunk group.

PRI to PRI messaging

Figure 6-1 shows PRI messaging for call setup and release of a PRI call from one CPE to another CPE through a DMS-500 switch.

Figure 6-1
DWS PRI to PRI call setup and release



User Service Information (USI)

The USI contains the bearer capability (BC) information element (IE) from the PRI SETUP message. The rate of the wideband call information transfer rate (ITR) and the transfer rate multiplier (TRM) are also shown. Figure 6-2 shows the format of the user service information (USI) parameter.

Figure 6-2
USI parameter

Octet \ Bit	8	7	6	5	4	3	2	1
1	0	0	0	0	0	1	0	0
	Bearer capability information element identifier							
2	Length of bearer capability information element							
3	1	0	0	0	1	0	0	0
Standard		Coding		Information transfer capability				
4	1	0	0	1	1	0	0	0
		Transfer mode		Information transfer rate (example is multirate)				
5	1	Transfer rate multiplier						

Coding standard: CCITT
Information transfer capability: unrestricted digital information
Transfer mode: circuit

Bandwidth calculation

When full N x 64 kbit/s capacity is provided, bandwidth is calculated by multiplying the ITR by the TRM. The ITR is set to 11000 for multirate and the TRM is encoded to the value of N on N x 64. Table 6-1 provides a description of the ITR.

Table 6-1
ITR values

ITR (PRI SETUP message)	Description	Trunk selection method	Bearer Capability (BC)
10000	64 kbit/s	All methods	Narrowband
10011	384 kbit/s	Fixed	H0
10101	1.536 Mbit/s	Fixed	H11
11000	Multirate (64 kbit/s base rate)	Floating/flexible	TRM parameter size (2 to 24 only)

When the ITR equals MULTIRATE (11000), an octet is present in the BC IE. This octet contains the TRM value that indicates the bit rate of the wideband call. Table 6-2 illustrates how the bandwidth is calculated.

Table 6-2
ITR/TRM calculation

ITR	TRM	Description
10000	10000	Narrowband call (64 k/bits)
10011	Not required	H0
10101	Not required	H1
10000	00010	2 x 64
10000	00011	3 x 64
11000	00100	4 x 64
11000	00101	5 x 64
11000	00110	6 x 64
11000	00111	7 x 64
11000	01000	8 x 64
11000	01001	9 x 64
11000	01010	10 x 64
11000	01011	11 x 64
11000	01100	12 x 64

—continued—

Table 6-2
ITR/TRM calculation (continued)

ITR	TRM	Description
11000	01101	13 x 64
11000	01110	14 x 64
11000	01111	15 x 64
11000	10000	16 x 64
11000	10001	17 x 64
11000	00010	18 x 64
11000	10011	19 x 64
11000	10100	20 x 64
11000	10101	21 x 64
11000	10110	22 x 64
11000	10111	23 x 64
11000	11000	24 x 64

—end—

Channel identification (CID)

When the PRI BC IE indicates a wideband call, the CID IE portion of the SETUP message contains information to identify the channels within a single DS-1 carrying the call. This is accomplished using a three-octet B-channel bitmap. Figure 6-3 illustrates the format of the PRI CID parameter.

Figure 6-3
PRI CID parameter

Octet \ Bit	8	7	6	5	4	3	2	1
1	Channel identification information identifier							
2	Length of channel assignment map information element contents							
	1 external	Internal id present	Internal type	0 Spare	Preference excluded		D-channel individual	Channel selection
3.1	1	Interface Identifier						
3.2	1 external	Coding standard 0 0		Number map 1	Channel identification information identifier/ Length of channel assignment map information elements(B-channel units) 0 0 1 1			
3.31	24	23	22	21	20	19	18	17
3.32	16	15	14	13	12	11	10	9
3.33	8	7	6	5	4	3	2	1

PRI and ISUP interworking

The PRI SETUP message is sent by the CPE to initiate the call. This SETUP message is mapped into an ISUP Initial Address Message (IAM) through the CCS7 network. Figure 6-4 illustrates how PRI/ISUP interworking call setup and release occurs.

Figure 6-4
PRI/ISUP interworking call setup and release

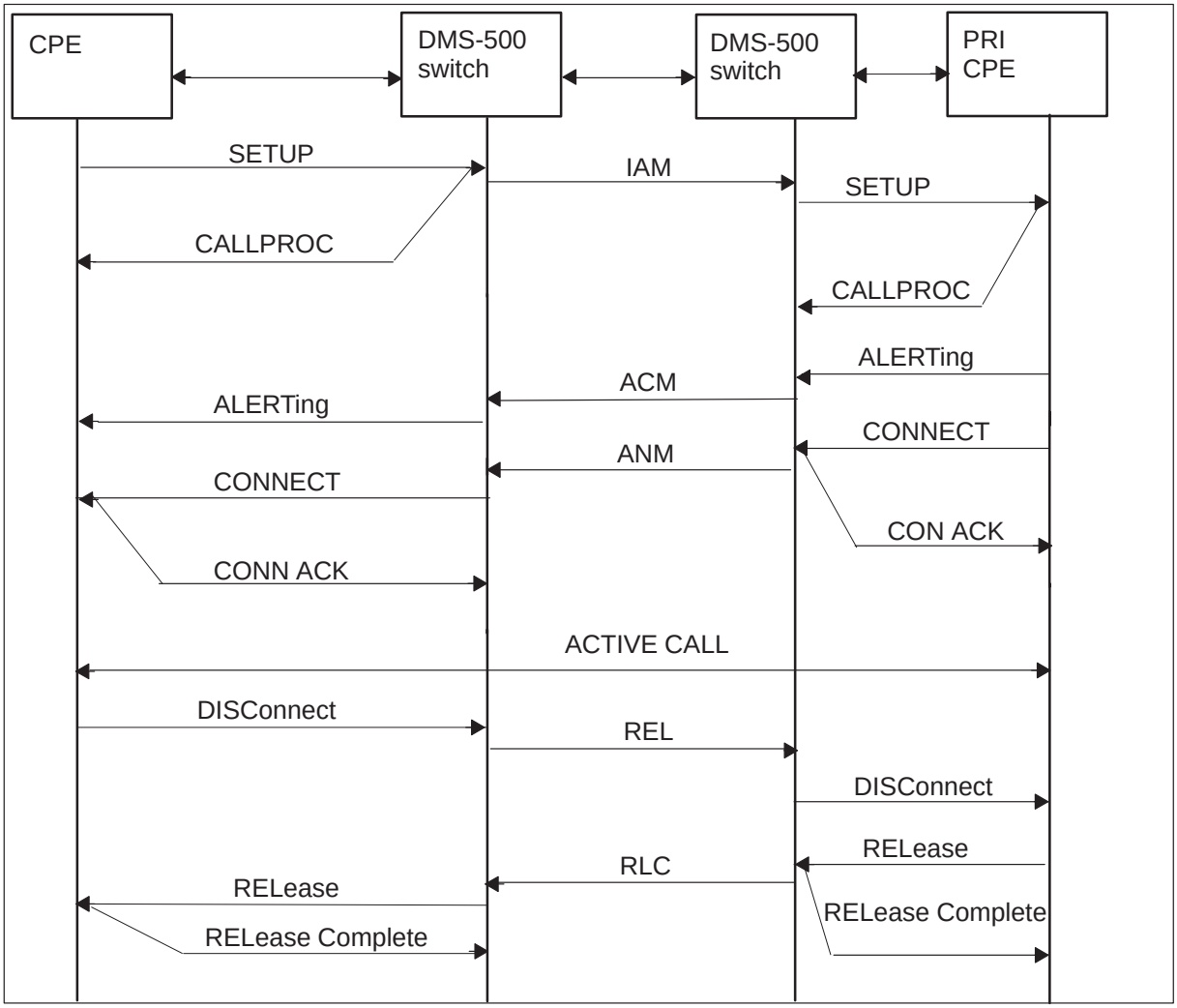


Table 6-3 describes how the IE in the SETUP message maps to IAM messages.

Table 6-3
SETUP and IAM message mapping

SETUP	IAM	Status (see Note)
Message type	Message type	Mapped
Bearer capability	User service info	Mapped

—continued—

Table 6-3
SETUP and IAM message mapping (continued)

SETUP	IAM	Status (see Note)
Progress indicator	Forward call indicator	Mapped
Calling party number	Calling party address	Mapped
Called party number	Called party address	Mapped
Network specific facility	Network specific facility	Mapped
Channel ID	Channel assignment map	Mapped
	Nature of connection	Unmapped
	Calling party category	Unmapped

Note: Mapped refers to a one-on-one correlation between the SETUP message and the IAM. Unmapped messages do not have a corresponding message for the SETUP parameter.

—end—

Channel assignment map (CAM)

The IAM must include the optional CAM parameter in order to support non-contiguous allocations of DS-0s. Given the CIC and the bandwidth of the call, it is possible to determine all the DS-0s involved in a fixed or floating wideband call. This is because the CIC indicates the first DS-0 in the call and the rest of the DS-0s are consecutive.

The CAM is carried in the IAM of the CIC associated with the lowest numbered DS-0 timeslot and establishes a non-contiguous wideband call. The CAM value indicates which DS-0 channels on the DS-1 are being used for the flexible wideband call by providing a mapping of the DS-0 channels. With this information, a transfer rate value for anywhere from 2 to 24 can be used and also determined for the call. Figure 6-5 illustrates the format of the IAM parameter with its associated CAM data.

Note: The CAM is not used for fixed or floating wideband calls. It is also not used for 24-channel wideband calls.

Figure 6-5
ISUP IAM parameter (with CAM)

Octet \ Bit	8	7	6	5	4	3	2	1
1	Channel assignment map							
2	Length of channel assignment map parameter contents							
3	0 Spare 0		Channel type (000001)					
4	8	7	6	5	4	3	2	1
5	16	15	14	13	12	11	10	9
6	24	23	22	21	20	19	18	17

Parameter fields values and meanings:

Octet 3: CHANNEL TYPE
000001—DS-1 channel type

Octet 4–6: SLOT MAP
(1–24)—Representation of DS-0 channels 1 through 24. 1 represents DS-0, channel 1; 24 represents DS-0, channel 24. A slot with value 0 indicates the channel is not in use for the wideband call. A value of 1 indicates the channel is in use for the wideband call.

Maintenance and billing

This chapter contains maintenance and billing information for the DWS feature on DMS-500 switches.

Maintenance commands

Wideband trunks may be posted at the trunk test position (TTP) level of the MAP terminal. Commands entered from the maintenance and administration position (MAP) terminal to control test trunk operation include

- Busy
- Forced Release
- Post Wideband
- Wideband CI

Busy (BSY)

If a single trunk is call processing busy (CPB) and the BSY command is issued, the trunk state changes to call processing deload (CPD). CPD indicates to call processing software that the trunk is not to be set to idle (IDL) when the call is released. The trunk state changes from CPD to MB, and the trunk is no longer available for call processing.

If the entire wideband trunk group is posted in the control position and the BSY ALL command is issued, all trunks that are CPB are changed to CPD and set to MB upon call disconnect.

Force release (FRLS)

The FRLS command is an unlisted menu command that is accessible from the hidden command MAP level. An FRLS command issued from the MAP (when the trunk posed is a member of a wideband call) causes the following message to display:

WARNING
This circuit is involved in a wideband call. Do you want to FRLS trunk? PLEASE CONFIRM (Y or N):

If “Y” is entered in response to the warning message, the trunk member that is “force released” is put in an “MB” state. The rest of the members involved in the wideband call become “IDL”. The call is taken down, and a cause value of CI_NORMAL_UNSPECIFIED is returned.

Post wideband (POST WB)

Use the POST WB command to view all trunk circuits involved in a given wideband. For example

>POST WB <CLLI> <MEMBER #>

Wideband (WIDEBAND)

UseWIDEBAND to view an active wideband call by listing all the trunk circuits (both originating and terminating) involved in the call. For example

>WIDEBAND <CLLI> <MEMBER #>

Operational measurements (OMs)

Wideband calls peg the following DWS operational measurements (OMs) and optionally permit these OMs to be generated on a trunk group basis. DWS does not interfere with the following standard OMs, as defined in the *DMS-500 Operational Measurements Reference Manual*, 297–2663–814:

OMGROUP = WIDEBAND

- WBATn—total number of wideband call attempts for each n

  Note: The n variable is the number of 64 k/bits DS-0 channels that the switch uses for a specific call.

- TWBATMPT—total number of wideband call attempts
- TWBCONNT—wideband connections completed
- TWBATB—wideband overflows due to all trunks busy
- TWBFAIL—wideband connections failed
- TWBGLR—wideband calls aborted due to glare
- TWBSWTCH—intraswitch wideband attempts (not pegged by feature)
- TWBINTRA—intraLATA attempts (not pegged by this feature)
- TWBINTER—interLATA attempts (not pegged by this feature)

  Note: The TWBSWTCH, TWBINTRA, and TWBINTER registers appear on the switch, but are not pegged by calls introduced by these features.

- EXT (WIDEBAND_EXT_BLOCK) - wideband extension blocks

OMGROUP = WBTRK

- EQCHATT—equivalent channel attempts
- ECINCTOT—equivalent incoming channel attempts
- EQOVFATB—equivalent overflow all trunks busy

Logs

Wideband logs used by DWS include:

- WB100 (Invalid Trunk State)
- WB101 (Info No Wideband EXT Blocks)
- WB102 (Invalid Transfer Rate)
- WB103 (WB on non-WB Trunk)
- WB104 (Non-bounded on Fixed)
- WB106 (Conflicting Trunk State)
- WB107 (Conflicting Max Available)
- WB108 (Conflicting Available Bandwidth Bitmap)
- WB109 (Conflicting WB Max Available Bandwidth)
- AUD545 (Extension Dump)

Billing information

A call detail record (CDR) with the following fields contain billing information for DWS calls:

- NUMWBCKT
- WBCKTS
- DIGDATA

NUMWBCKT

NUMWBCKT indicates the size of the wideband call. Once the wideband channel is established, the number of circuits grouped together to form the wideband channel is captured in the NUMWBCKT field of the CDR.

The NUMWBCKT field has a range of 2 through 24 (default = 0). A blank, or null value, next to NUMWBCKT indicates that wideband services were not used. This new field is located at the end of the billing record, following ACCTCD.

WBCKTS

WBCKTS indicates which channels on the wideband trunk were involved with the wideband call. A value of 1 indicates that a particular channel was used in the call. A value of 0 indicates that a particular channel was not used in the call.

The WBCKTS field is 24 bits long and separated into three different 8-bit sections. The entire field is read from left to right with the far left bit indicating channel 1 and the far right bit indicating channel 24.

DIGDATA

DIGDATA is a digital data field in CDR that must be set to “Yes” for wideband calls.

Billing record format

Figure 7-1 shows the format of the billing record for DWS calls. In the example, NUMWBCKT indicates the call was a four-channel call. WBCKTS indicates the call was on channels 21 to 24.

Figure 7-1
PRI DWS sample CDR

RECCD	F0
DISCDATE	001
CNPREDIG	0
ANSTYPE	00
PINDIGS	
ORIGTIME	19594
QUEUED	N
DISCTIME	19597
TIMECHNG	N
ANISP	
INFODIG	
CALLDUR	
UNIVACC	
COMPCODE	0
DIALEDNO	7169874
COLLTIME	001
CALLEDNO	7169874
RTENO	00
PREDIG	0
OPART	511
ADIN	00
ORIGOPRT	511
SEQNUM	00011
ORIGDATE	001
FINSID	
TRTMTCD	000
TPART	31
RTELIST	0001
ANISUFF	
DISCTYPE	0
ORIGGRP	0177
ORIGMEM	0000
DIGDATA	Y
TRAP	N
TERMGRP	0179
TERMMEM	0077
COSOVE	N
FINTKGRP	
BILLNUM	8010000
ACCTC D	
NUMBCKT	4
WBCKTS	00000000 00000000 00001111

List of abbreviations

ASEQ
ascending sequence

BC
bearer capability

BC NI
bearer capability not implemented

BLOCKNB
Blocking narrowband calls

CAM
channel assignment map

CBSY
C–side busy

CDR
call detail record

CIC
circuit identification code

CID
channel identification

CFL
carrier failure

CPB
call processing busy

CPD
call processing deload

CPE
customer premises equipment

DS-0
one 64 kbit/s channel on a DS-1

DS-1
24 64 kbit/s channels on a carrier

DSEQ
descending sequence

DTC
digital trunk controller

DTCI
ISDN digital trunk controller

DWS
Dialable Wideband Services

EAEO
equal access end office

EISP
enhanced ISDN signaling protocol

ENET
enhanced network

FGD
feature group D

FRLS
force release

GNCT
generalized no circuit

H0
code point equal to 384 kbit/s

H11
code point equal to 1536 kbit/s

IAM
initial address message

IDL
idle

IE
information element

IEC
interexchange carrier

IMT
intermachine trunk

ISDN
Integrated Services Digital Network

ISUP
ISDN User Part

ITR
information transfer rate

LEC
local exchange carrier

LIM
link interface module

LPP
link peripheral processor

MAP
maintenance and administration position

MB
manual busy

OM
operational measurement

PBX
private branch exchange

PM
peripheral module

PRI
primary rate interface

SOC

Software Optionality Control

SYSB

system busy

TRM

transfer rate multiplier

TTP

trunk test position

USI

user service information

Appendix A
Ordering information

Use the following table for ordering Nortel NTPs (Northern Telecom Publications) and PCLs (Product Content Loads):

Type of product	Source	Phone	Cost
Technical documents (paper or CD-ROM)	Nortel Product Documentation	1-877-662-5669, Option 4 + 1	Yes
Individual NTPs (paper)	Merchandising Order Service	1-800-347-4850	Yes
Marketing documents	Sales and Marketing Information Center (SMIC)	1-800-4NORTEL (1-800-466-7835 * ESN 444-5930)	No
Training documents	Nortel Technical Education Center	1-800-NT-TRAIN (1-800-688-7246)	Yes
PCL software	Nortel	Consult your Nortel sales representative * Employee	Yes

When ordering publications on CD

Please have the CD number and software version available, for example, **HLM-2663-001 02.03**.

When ordering individual paper documents

Please have the document name and number available, for example, **297-2663-900, DMS-500 TOPS User Guide**.

When ordering software

Please have the eight-digit ordering code, for example, **LLT0B005**, as well as the ordering codes for the features you wish to purchase. Contact your Nortel representative for assistance.

Digital Switching Systems

DMS-500

Dialable Wideband Services (DWS) Application Guide

Product Documentation—Dept 3423
Northern Telecom
P.O. Box 13010
RTP, NC 27709–3010
1-877-662-5669, Option 4 + 1

Publication number: 297-2663-110
Product release: LLT00009
Document release: Standard 02.01
Date: August 1998
Printed in the United States of America

NORTEL
NORTHERN TELECOM