Critical Release Notice

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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.

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UCS DMS-250

Operations Support Systems (OSS) Interface Guide

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About this document

This document provides information about the primary Operations Support System (OSS) interfaces used with the UCS DMS-250 switch. It describes the purpose of each interface, illustrates the interfaces physical location in the switch lineup, defines the datafill required to install the interface, and addresses any network management issues associated with the interface. Nothing in this document shall be deemed to create any contractual obligation between Nortel (Northern Telecom) and any customer, or to alter or amend in any manner any existing rights and obligations that may be set forth in a contract between Nortel and a customer. The terms and conditions set forth in any contract between Nortel and a customer shall supersede any conflicting procedures or statements contained in this document.

This document serves as a guide to the UCS DMS-250 switch interfaces. This document does not provide detailed operating information for all subsystems accessed through the interfaces. Detailed operating procedures for each subsystem are provided in the referenced documents

How to check the version and issue of this document

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

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

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References in this document

The following documents are referred to in this document:

- *UCS DMS-250 Commands Reference Manual*, 297-2621-819
- *UCS DMS-250 Call Detail Record Reference Manual*, 297-2621-119
- *UCS DMS-250 Billing Server Application Guide*, 297-2621-320
- *UCS DMS-250 TCP/IP Applications Guide*, 297-2621-340
- *UCS DMS-250 X.25 Data Transport Applications Guide*, 297-2621-360
- *UCS DMS-250 Operational Measurements Reference Manual*, 297-2631-814
- *UCS DMS-250 Logs Reference Manual*, 297-2631-840
- *UCS DMS-250 Data Schema Reference Manual*, 297-2631-851
- *SuperNode Data Manager Carrier Operational Measurements Data Delivery User Guide*, 297-2667-321
- *SuperNode Data Manager SuperNode Billing Application User Guide*, 297-2667-328

Overview of OSS interfaces

This document provides information about the primary Operations Support System (OSS) interfaces used with the UCS DMS-250 switch. The following chapters describe the purpose of each interface, define the interfaces physical location in the switch lineup, explain the datafill required to install the interface, and address network management issues associated with the interface, where applicable.

This document organizes the UCS DMS-250 switch OSS interface types into four distinctive groups. The following paragraphs provide a brief overview of each interface group and the associated functional applications.

X.25 interface

The X.25 interface provides file transfer capabilities between the UCS DMS-250 switch and a central host computer system. X.25 is used for applications such as billing data, operational measurements (OM), log reports, and switch database updates. The following functional applications are available with the X.25 interface:

- Automatic file transfer (AFT)—enables the transfer of device-independent recording package (DIRP) generated files from the UCS DMS-250 switch to a single host across an X.25 link.
- AFT multi-network protocol (AFT-MNP)—transfers DIRP generated files from the UCS DMS-250 switch to a maximum of four hosts.
- Manual file transfer (MFT)—enables users to manually transfer files between the UCS DMS-250 switch and a host.
- Spontaneous reporting (SPR)—enables the UCS DMS-250 switch to transfer logs and trunk group operational measurements (OM) to a host.
- Maintenance and Administration Position (MAP)—the X.25 interface allows remote MAP access to the switch.

TCP/IP Ethernet interface

The Transmission Control Protocol/Internet Protocol (TCP/IP) accesses the Ethernet Interface Unit (EIU) located in the UCS DMS-250 switch. Related functional applications include

- File Transfer Protocol (FTP)—used to transfer files to and from the UCS DMS-250 switch and a remote workstation at a host computer.
- Telecommunications Network (Telnet)—permits login from a workstation on the host computer to the remote UCS DMS-250 switch.

Asynchronous interfaces

Asynchronous devices include local Maintenance and Administration Position (MAP) terminals, disk drive units, and magnetic tape units. Device controllers constitute the interface between the UCS DMS-250 switch and asynchronous devices. Specific asynchronous controllers discussed in this document include

- input/output module controller (IOC) shelf—NT1X61 series
- disk drive controller (DDC) card—NT1X55 series
- magnetic tape controller (MTC) card—NT1X68 series
- multi-protocol controller (MPC) card—NT1X89 series
- terminal controller (TC) card—NT1X67 series
- input/output module (IOM) controller card—NTFX30 series
- storage media card (SMC)—NTFX32AA
- disk drive unit (DDU)—NTFX32BA
- digital audio tape (DAT)—NTFX32CA

Man-machine interface (MMI)

Information on the man-machine interface (MMI) command syntax required to execute I/O functions, and the machine responses that occur as a result of these commands, are presented in Chapter 5, “UCS DMS-250 switch access.”

X.25 interface

Overview

The X.25 data transport features provide the X.25 interface for the UCS DMS-250 switch. The X.25 data transport features are part of the standard software package. The X.25 data transport enables file transfers across X.25 links. The UCS DMS-250 switch uses the X.25 level 2 and level 3 protocols to transfer files.

The X.25 interface to the UCS DMS-250 switch supports the following X.25 protocol applications:

- 1980 and 1984 X.25—supports the International Organization for Standards (ISO) specifications ISO 7776 and ISO 8208 for a data terminal equipment (DTE) operating in conformance with the Consultative Committee on International Telegraphy and Telephony (CCITT) 1980 and 1984 recommendations on X.25.
- BX.25—Bellcore variation of X.25 protocol based on CCITT X.25 recommendations. Detailed information about BX.25 protocol is contained in Bellcore technical publications PUB54001.
- Multilink management—provides a means for applications using call processing and data communications to access remote nodes through an X.25 link.
- Remote MAP access—provides remote Maintenance and Administration Positions (MAP) access through an X.25 link, allowing centralized remote maintenance access to multiple users over a single switched virtual circuit (SVC) link.

File transfer capabilities of the X.25 data transport package enables the DMS-250 product to send data such as billing data, operational measurements (OM), and logs from the switch to a host. The file transfer capabilities also enable a central host to update switch databases.

Functional applications

The functional applications available through the UCS DMS-250 switch X.25 interface are described in more detail in the pages that follow.

Automatic file transfer (AFT)

Automatic file transfer (AFT) enables transfer of device independent recording package (DIRP) generated files from the switch to a single host across an X.25 link. The transfer takes place in near real-time without manual intervention.

Information for setting up, datafilling, and initiating an AFT session across a single X.25 link is provided in the following section.

Automatic file transfer-multi-network protocol (AFT-MNP)

Automatic file transfer-multi-network protocol (AFT-MNP) transfers DIRP-generated files from the switch to a maximum of four hosts. The transfers occur in near real-time without manual intervention. With this application, UCS customers can select single-link or multi-link configurations.

Information for setting up, datafilling, and initiating an AFT-MNP session across multiple X.25 links is provided in the following section.

Manual file transfer (MFT)

Manual file transfer (MFT) enables users to manually transfer files between the switch and a host. Either the switch or the host can initiate an MFT. MFTs are accomplished through datafill and CI (Command Interpreter) commands.

For further information about the MFT application, refer to the *UCS DMS-250 X.25 Data Transport Feature Application Guide*, 297-2621-360.

Spontaneous reporting (SPR)

Spontaneous reporting (SPR) enables the switch to transfer logs and trunk group operational measurements (OM) to a host. Two modified SPR sessions—Short INterval Statistics (SINS) and Long INterval Statistics (LINS)—enable the transfer of trunk group OMs. The sessions themselves only enable the flow of logs. CI commands and datafill of the log system turn on or off the flow of logs and allow log selection.

Note: SPR can also be performed over the TCP/IP Ethernet interface.

For further information about the SPR application, refer to the *UCS DMS-250 X.25 Data Transport Feature Application Guide*, 297-2621-360.

Automatic file transfer (AFT)

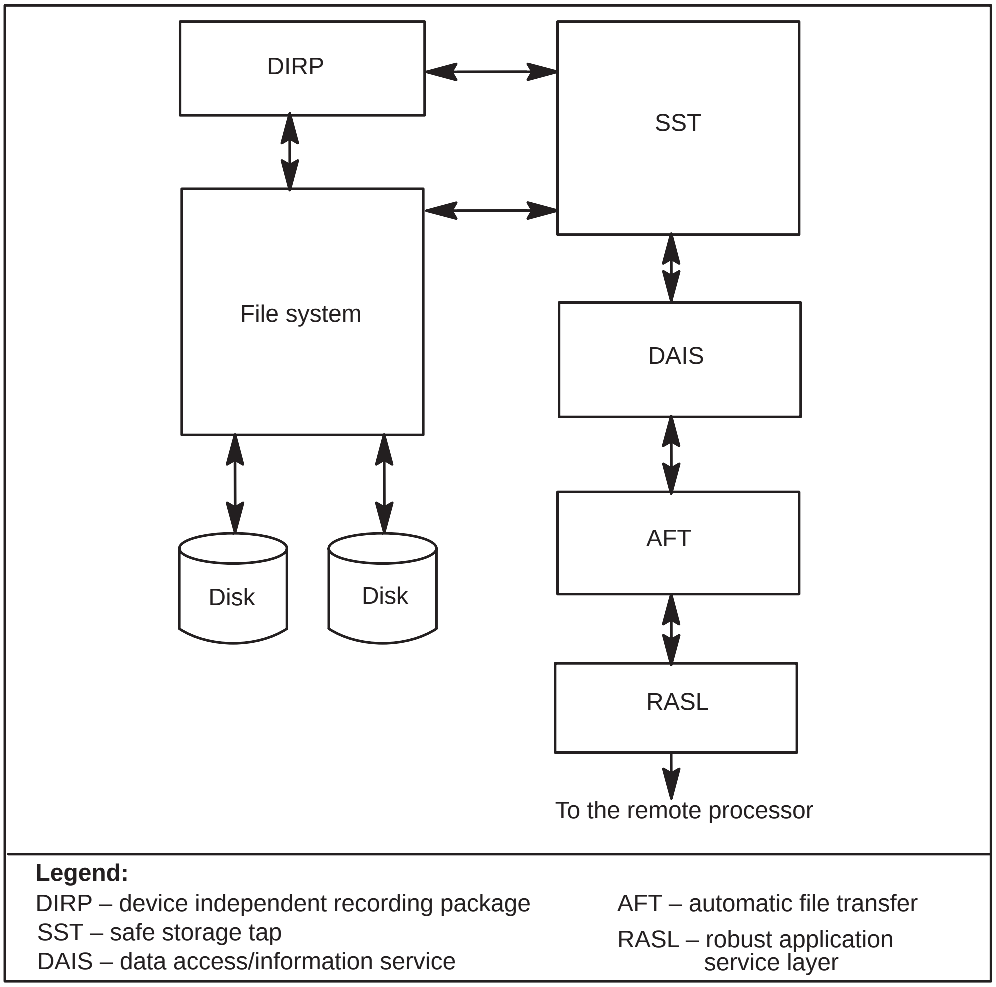
The X.25 data transport software features enable the transfer of files generated by the device independent recording package (DIRP) from the switch to a host. The transfer takes place in near real-time without manual intervention. Automatic file transfer (AFT) enables file transfers across a single X.25 link. Automatic file transfer-multi-network protocol (AFT-MNP) enables file transfers across up to four X.25 links.

Automatic file transfers (both AFT and AFT-MNP) are accomplished through datafill and AFT CI commands. Datafill in the DIRP control tables determines what files are transferred.

After the datafill is complete, executing the AFT CI command STARTAFT starts the AFT system and DIRP recorded files begin to transfer. Files are transferred in the order in which they were created. When a DIRP file that needs to be transferred is found, AFT brings up a session with a remote processor by way of robust application session layer (RASL) and transfers the file. When the file transfer is complete, the process repeats for the next file.

Figure 2-1 shows the data flow for AFT and AFT-MNP.

Figure 2-1
AFT and AFT-MNP data flow



AFT-MNP selects between a single-link or a multi-link configuration. In a single-link configuration, files are transferred across one X.25 link. In a multi-link configuration, files are transferred across up to four X.25 links, increasing traffic capacity and reliability; if one link goes down, the data for that link is sent over the other links. If a failed link restores prior to the completion of the current AFT session, the restored link will not carry data again until the creation of a new AFT session.

AFT-MNP can transfer call detail records (CDRs) and operator services records (OSRs). Operational measurements (OMs) and logs are transferred by way of spontaneous reporting (SPR) sessions. For more information, refer to the *UCS DMS-250 X.25 Data Transport Feature Application Guide*, 297-2621-360, Chapter 4, “Spontaneous reporting.”

Note: RASL is a generic interface that enables any application (in this case, AFT or AFT-MNP) to access any type of supported link.

AFT datafill table relationships

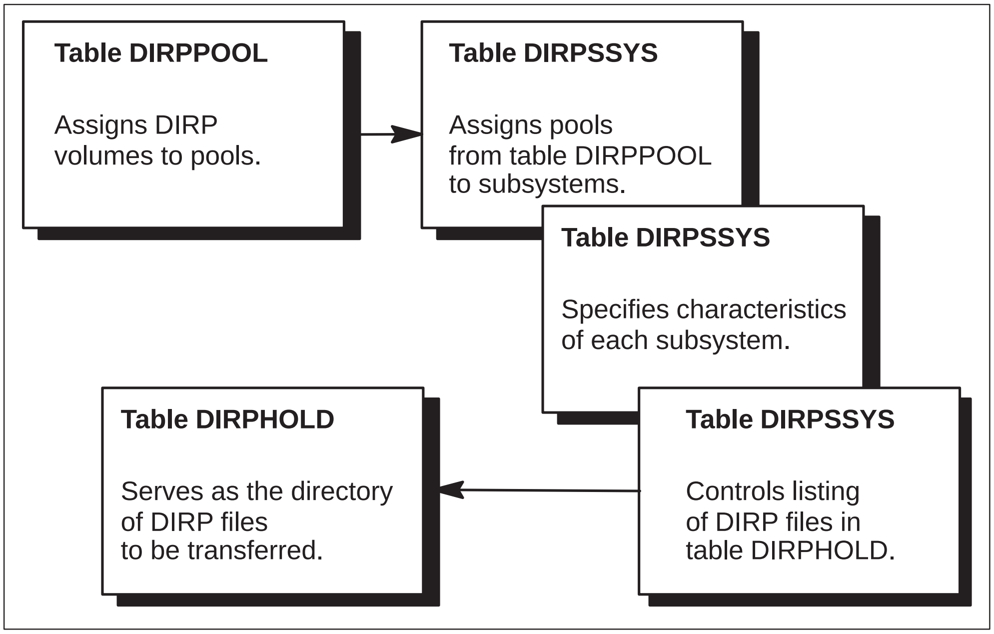
Tables DIRPPOOL, DIRPSSYS, and DIRPHOLD are the DIRP control tables. These tables ensure the proper management of data and recording resources. Table 2-1 describes their functions.

Table 2-1
DIRPPOOL, DIRPSSYS, and DIRPHOLD functions

Table	Function
DIRPPOOL	Lists the collection or pool of recording devices allocated to each contributing subsystem.
DIRPSSYS	Defines the operating parameters of each contributing subsystem. Table DIRPSSYS uses the POOLNAME field to index into table DIRPPOOL.
DIRPHOLD	Serves as a directory for all the closed files that require transmission. For AFT and AFT-MNP, table DIRPHOLD is datafilled by the software.
—end—	

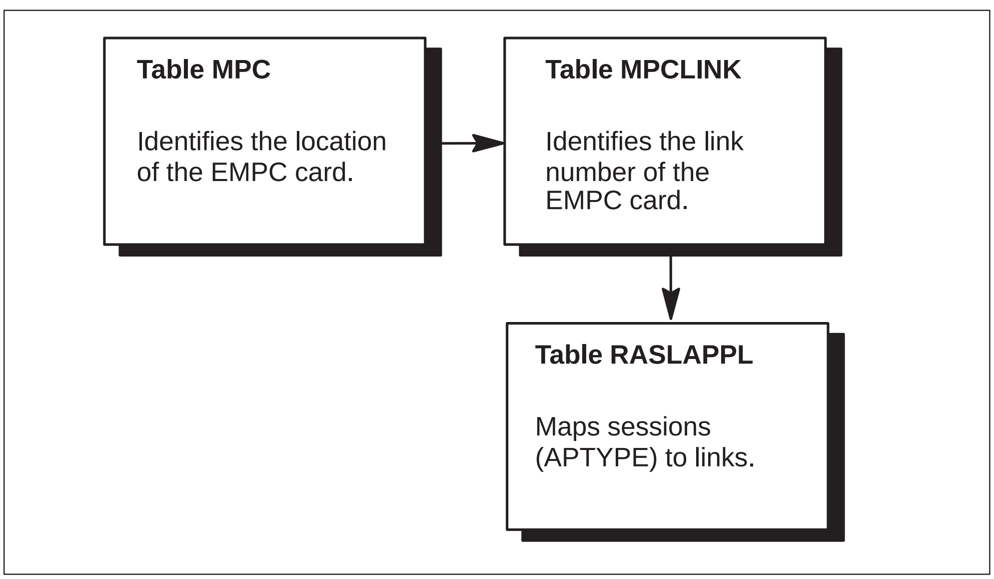
Figure 2-2 shows the relationship between tables DIRPPOOL, DIRPSSYS, and DIRPHOLD.

Figure 2-2
DIRPPOOL, DIRPSSYS, and DIRPHOLD relationships



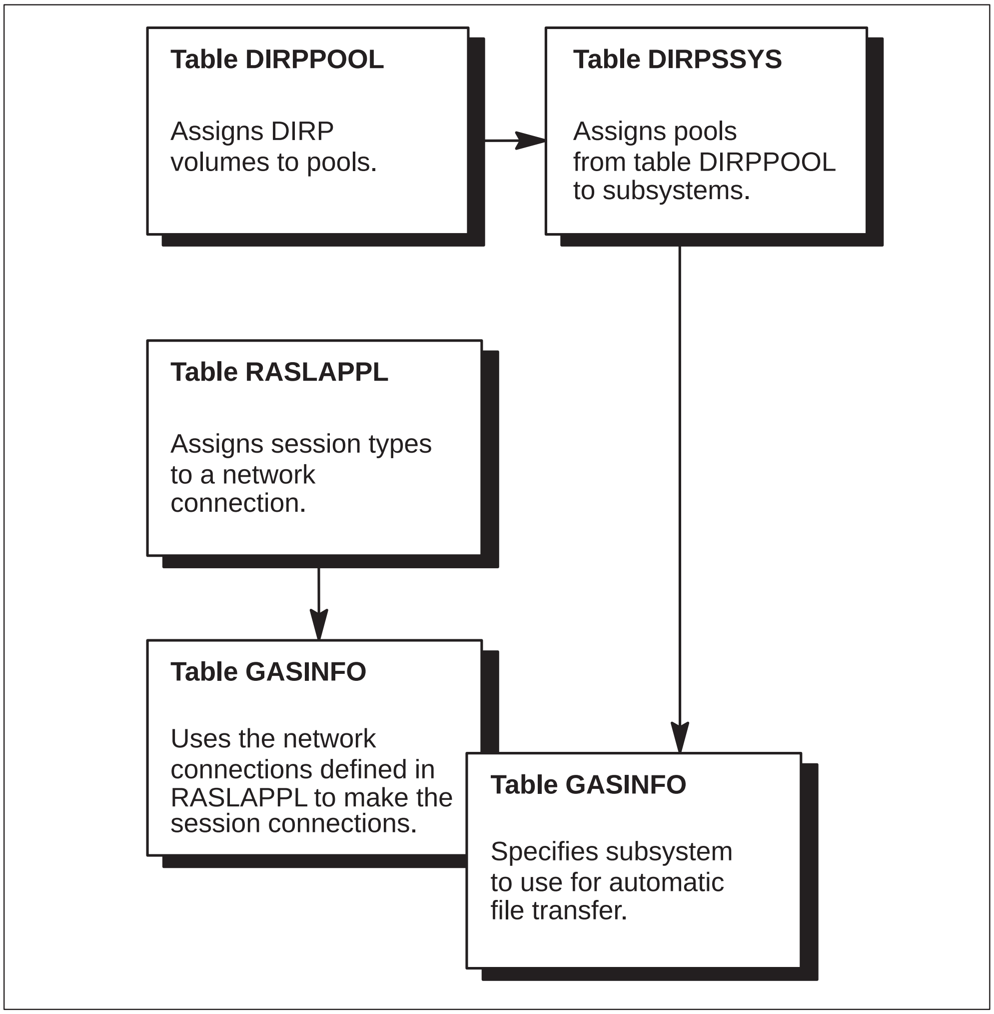
Additional datafill in table RASLAPPL maps the file transfer session to the physical links. Datafill in tables MPC and MPCLINK configures the links. Figure 2-3 shows the relationship between tables MPC, MPCLINK, and RASLAPPL.

Figure 2-3
MPC, MPCLINK, and RASLAPPL relationships



Datafill in table GASINFO uses the network connections defined in table RASLAPPL to make the session connection. The datafill in table GASINFO also specifies which subsystems defined in table DIRPPOOL are used for automatic file transfers. Figure 2-4 shows the relationships between tables DIRPPOOL, DIRPSSYS, RASLAPPL, and GASINFO.

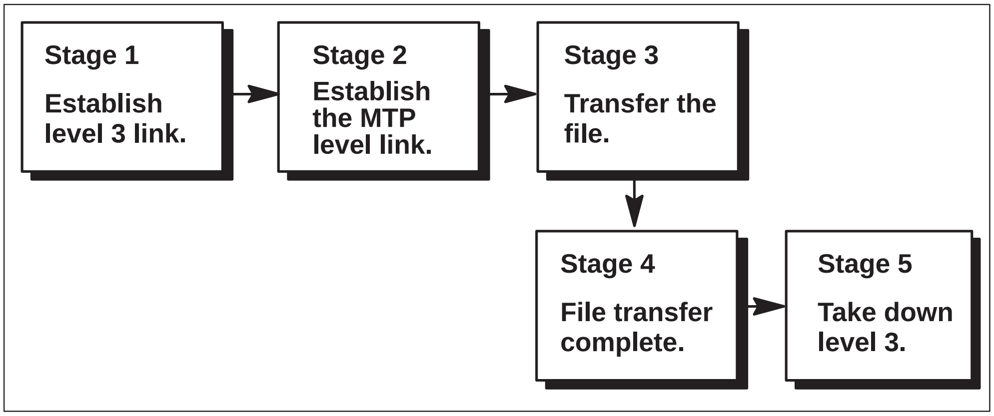
Figure 2-4
DIRPPOOL, DIRPSSYS, RASLAPPL, and GASINFO relationships



Stages of automatic file transfers

AFT-MNP transfers files from the switch to a host in five basic stages as shown in Figure 2-5.

Figure 2-5
AFT session



This section details the five stages of an automatic file transfer session.

Stage 1
The physical link is up, a virtual channel is available, and the host has the resources to handle the file transfer session.

Stage 2
The switch notifies the host of the name of the file to be transferred. The host acknowledges. The switch sends a CNT-PRT message to initiate input on the host. The host responds with a CNT-RED message.

Stage 3
The switch sends data blocks followed by an STS-EOB message. The host must respond with a CNT-RNB message before the timer expires. Otherwise, an error occurs. If the host responds with any other message, an error is assumed and the switch sends an STS-EOF message.

Stage 4
Once the file is sent or an error occurs, both sides agree to take down the MTP application level.

Stage 5
The virtual channel and all associated resources are released.

Once an AFT session is started by the STARTAFT command, DIRP files are transferred to the host in the order in which they were generated. The file transfers continue until the STOPAFT command is executed.

If a file transfer is aborted for any reason, such as the link connection goes down, the file transfer session closes and the file is marked as a partial file transfer (PFT). After the link is established again, AFT resumes the file transfer at the last acknowledged block. PFT is discussed in more detail later in this chapter.

Timers for automatic file transfers

Table 2-2 describe the AFT and AFT-MNP timers during the file transfer process.

Table 2-2
AFT and AFT-MNP timers

Timer	Description
Tn	Timer Tn starts just after the message is sent. It detects MTP level errors. If any response from the other side takes more than Tn seconds, an error is assumed and the session is brought down.
T^0	Timer T^0 specifies how long the switch waits for an STS-ACK message. The timer value is one minute.
T^1	Timer T^1 specifies how long the host waits for a data block. The timer value is five to seven minutes.
T^2	Timer T^2 specifies how long the host waits for an STS-EOB message. The timer value is one minute.
T^3	Timer T^3 specifies how long the host or the switch waits for an STS-CPL message. The timer value is one minute.
T^5	Timer T^5 specifies how long the switch waits for a CNT-RED message. The timer value is one minute.
T^6	Timer T^6 specifies how long the switch waits for a CNT-RNB message. The timer value is three minutes.
T^7	Timer T^7 specifies how long the host waits for an ACS-SFO message. The timer value is five minutes.
T^8	Timer T^8 specifies how long the host waits for a CNT-PRT message. The timer value is one minute.
—end—	

Data flow of automatic file transfers

Figure 2-6 shows how the of AFT data flows and depicts where the timers apply.

Note: The messages shown in Figures 2-6, 2-7, 2-8, 2-10, and 2-11 are detailed in this chapter. See “Multi-Network Protocol,” later in this chapter.

Figure 2-6
Data flow with timers depicted (single-link configuration)

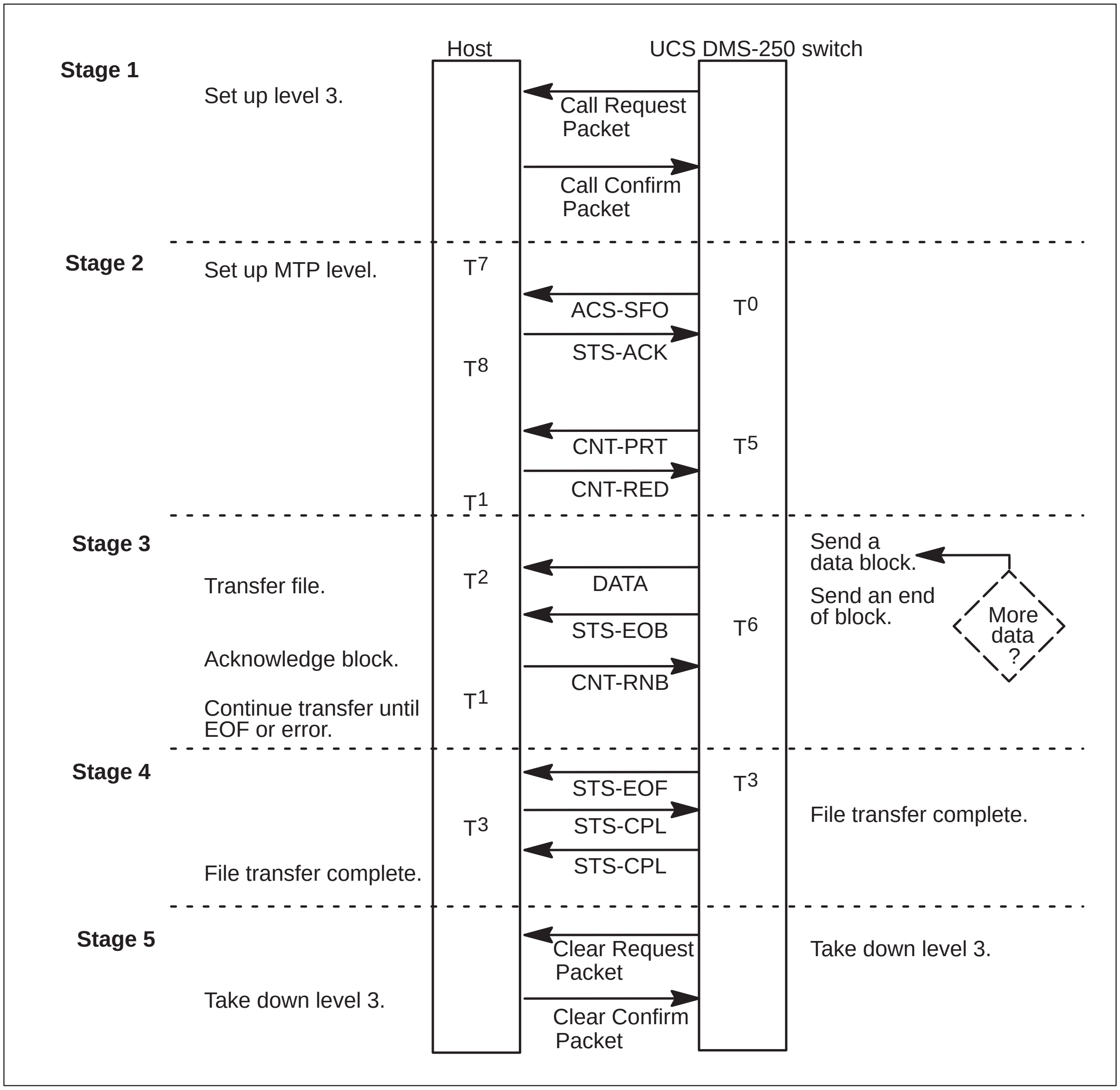
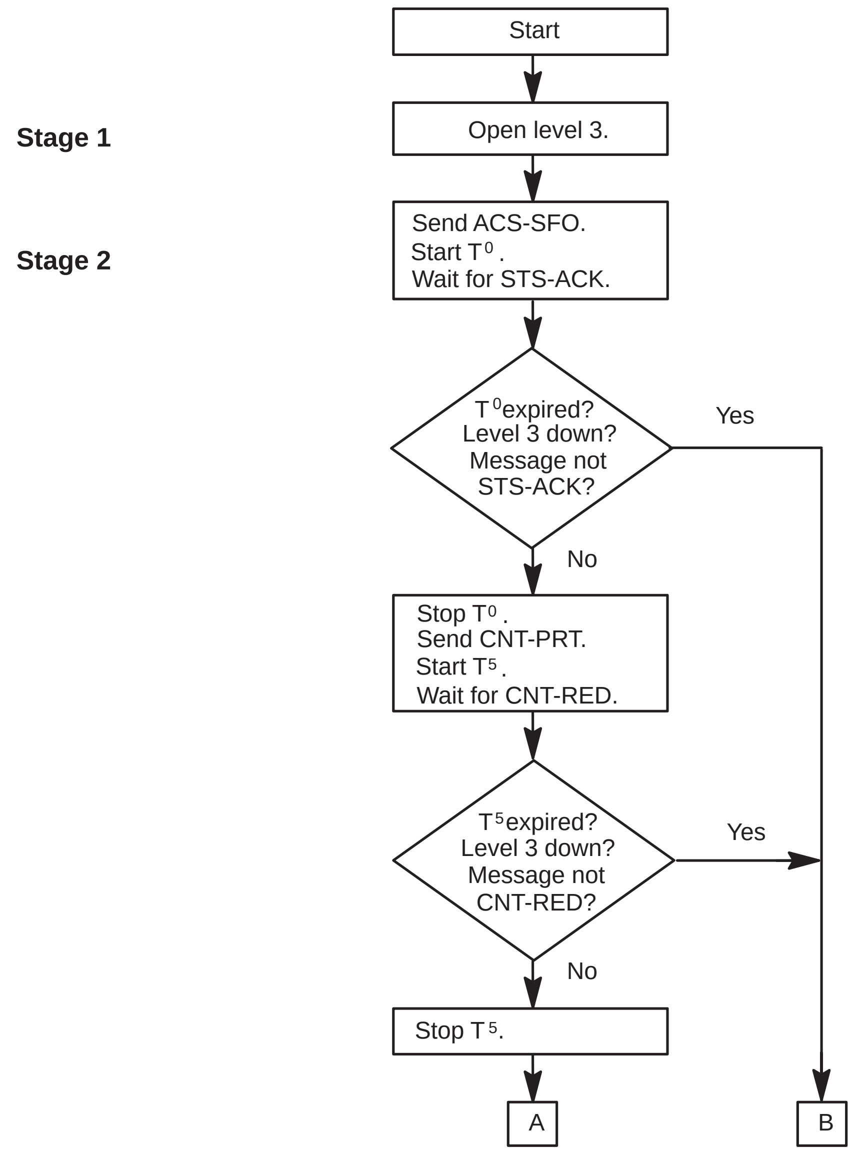


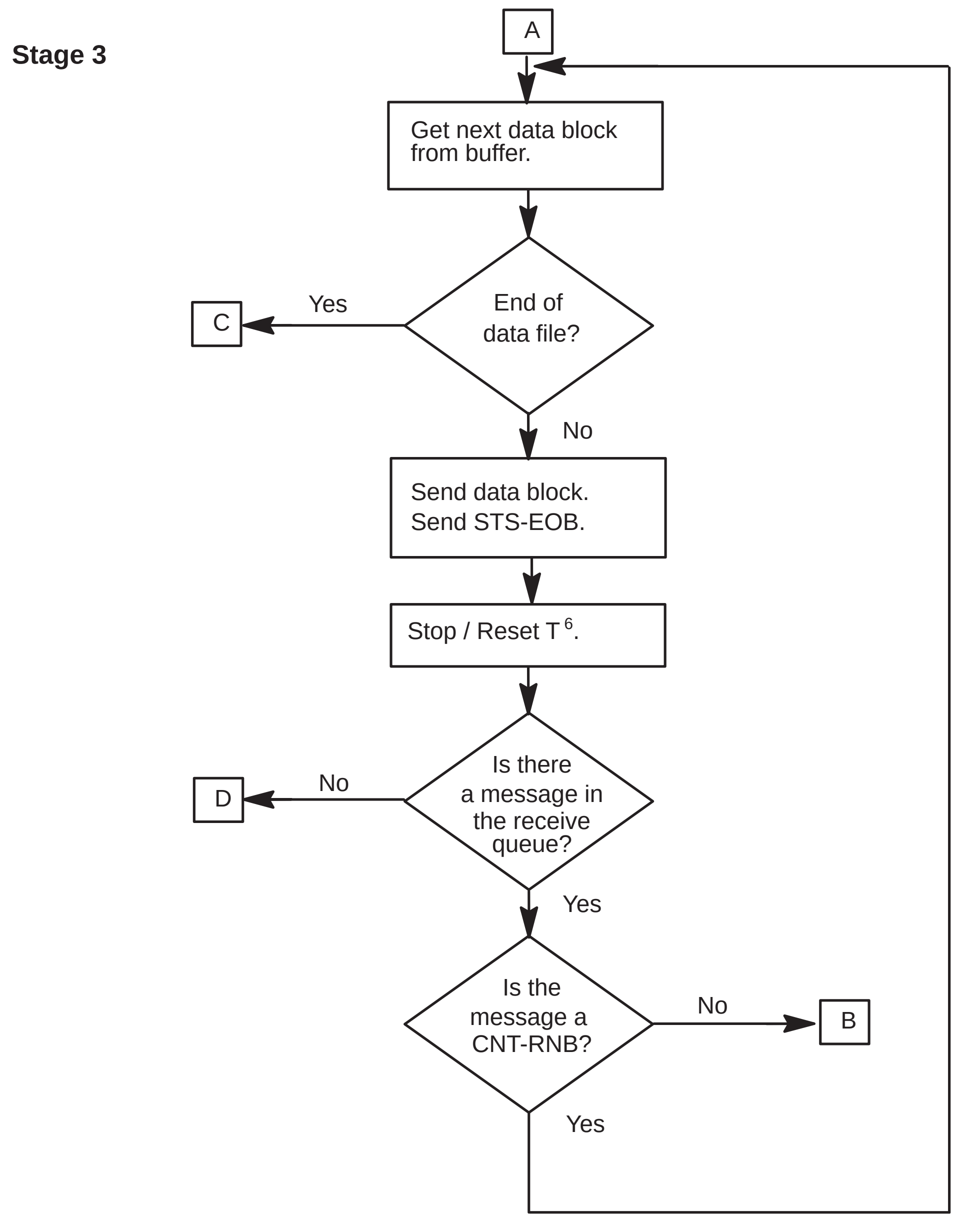
Figure 2-7 shows the five stages of an AFT from the perspective of the switch.

Figure 2-7
Data flow when the switch sends a file to the host



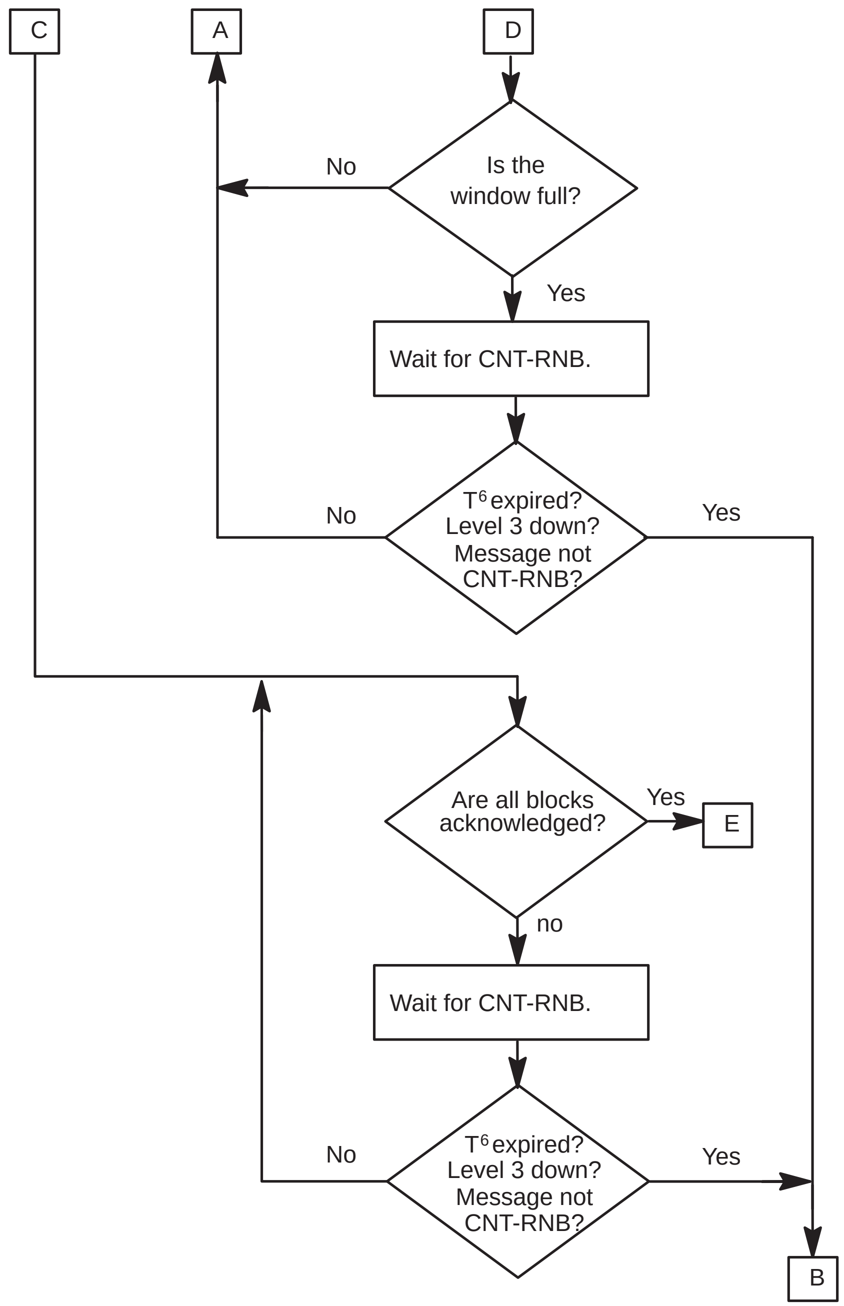
—continued—

Figure 2-7
Data flow when the switch sends a file to the host (continued)



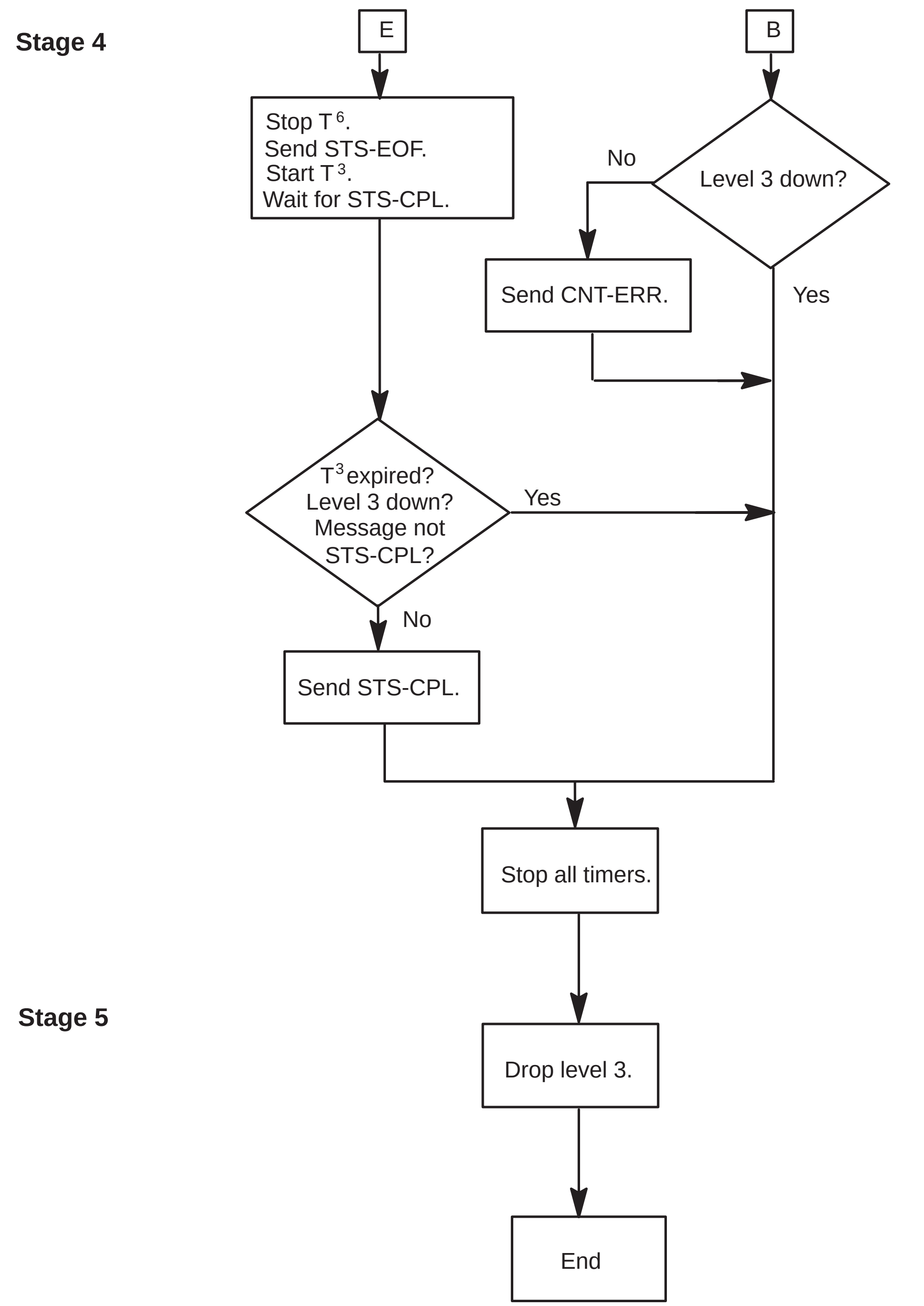
—continued—

Figure 2-7
Data flow when the switch sends a file to the host (continued)



—continued—

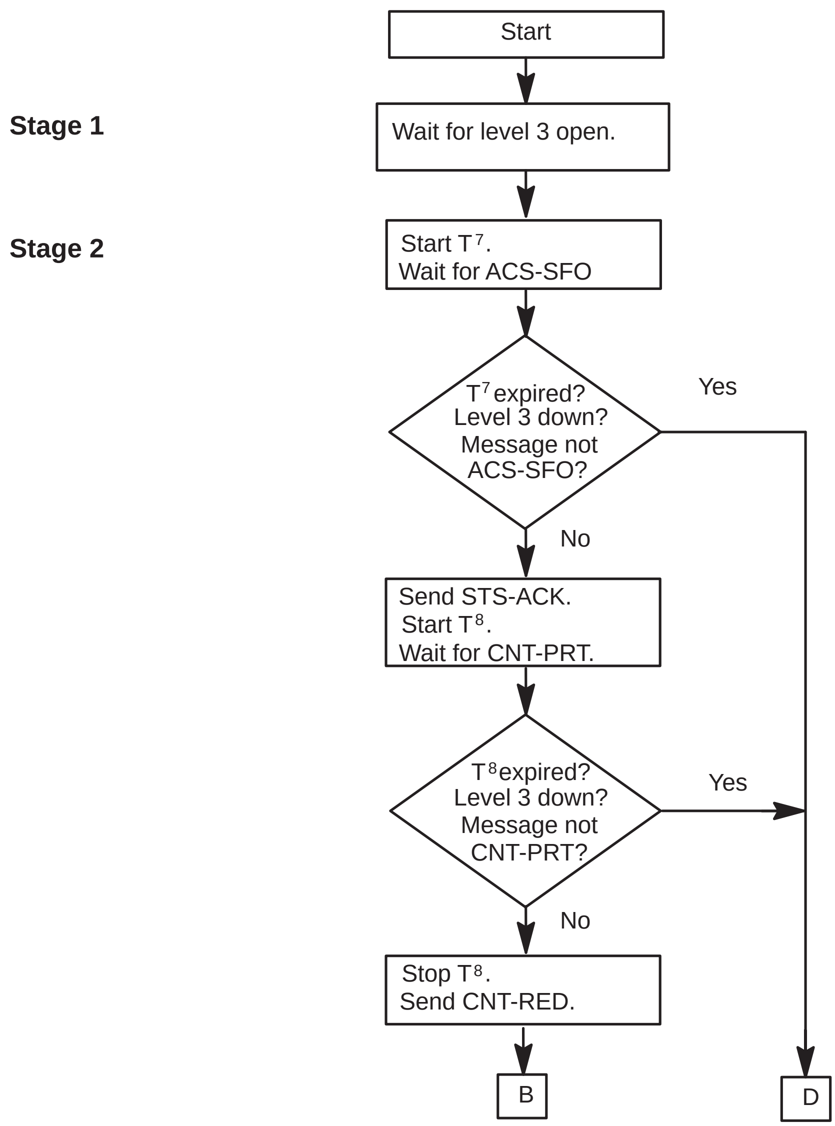
Figure 2-7
Data flow when the switch sends a file to the host (continued)



—end—

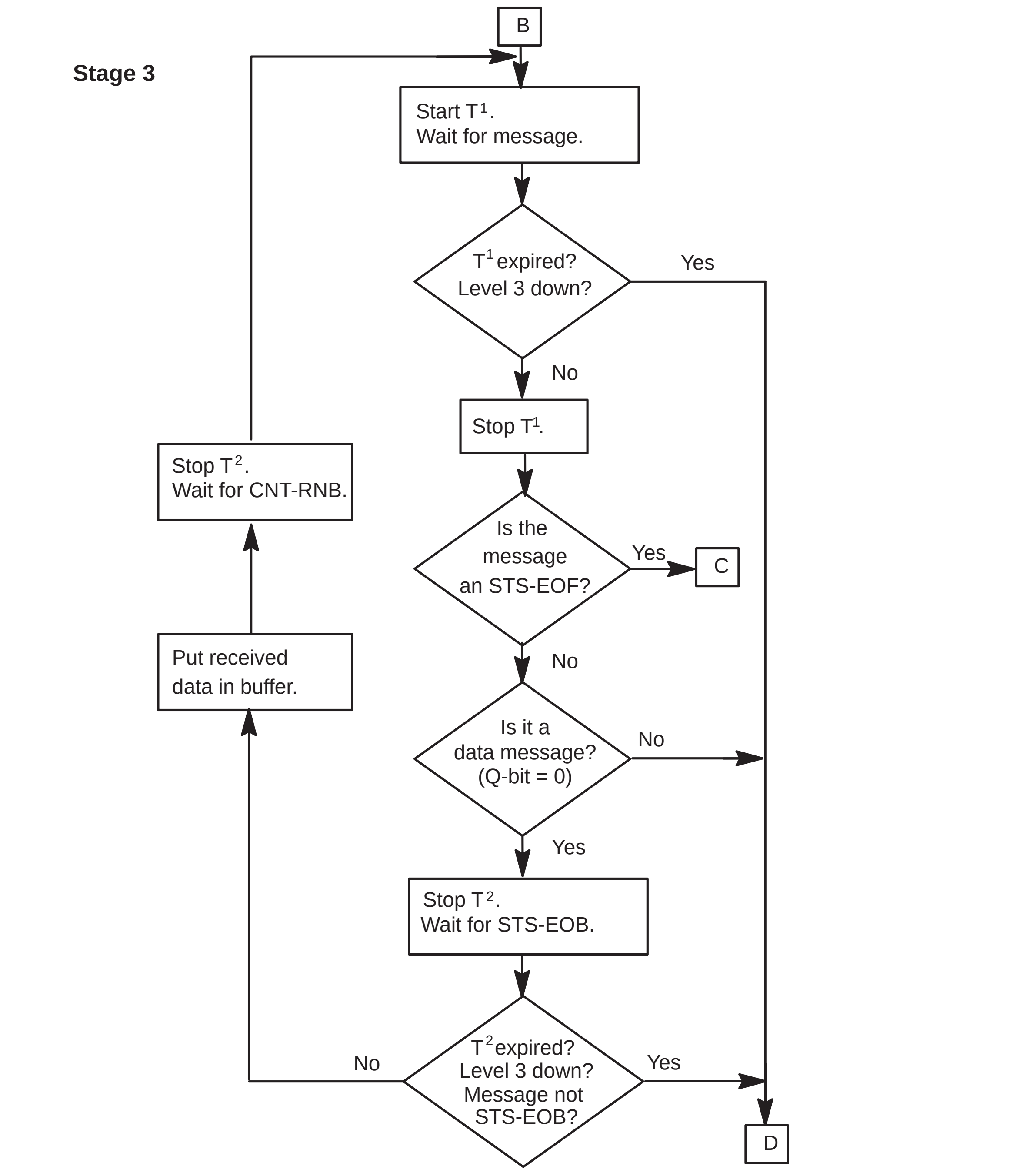
Figure 2-8 shows the five stages of an AFT from the perspective of the host receiving the file transfer.

Figure 2-8
Data flow when the host receives a file from the switch



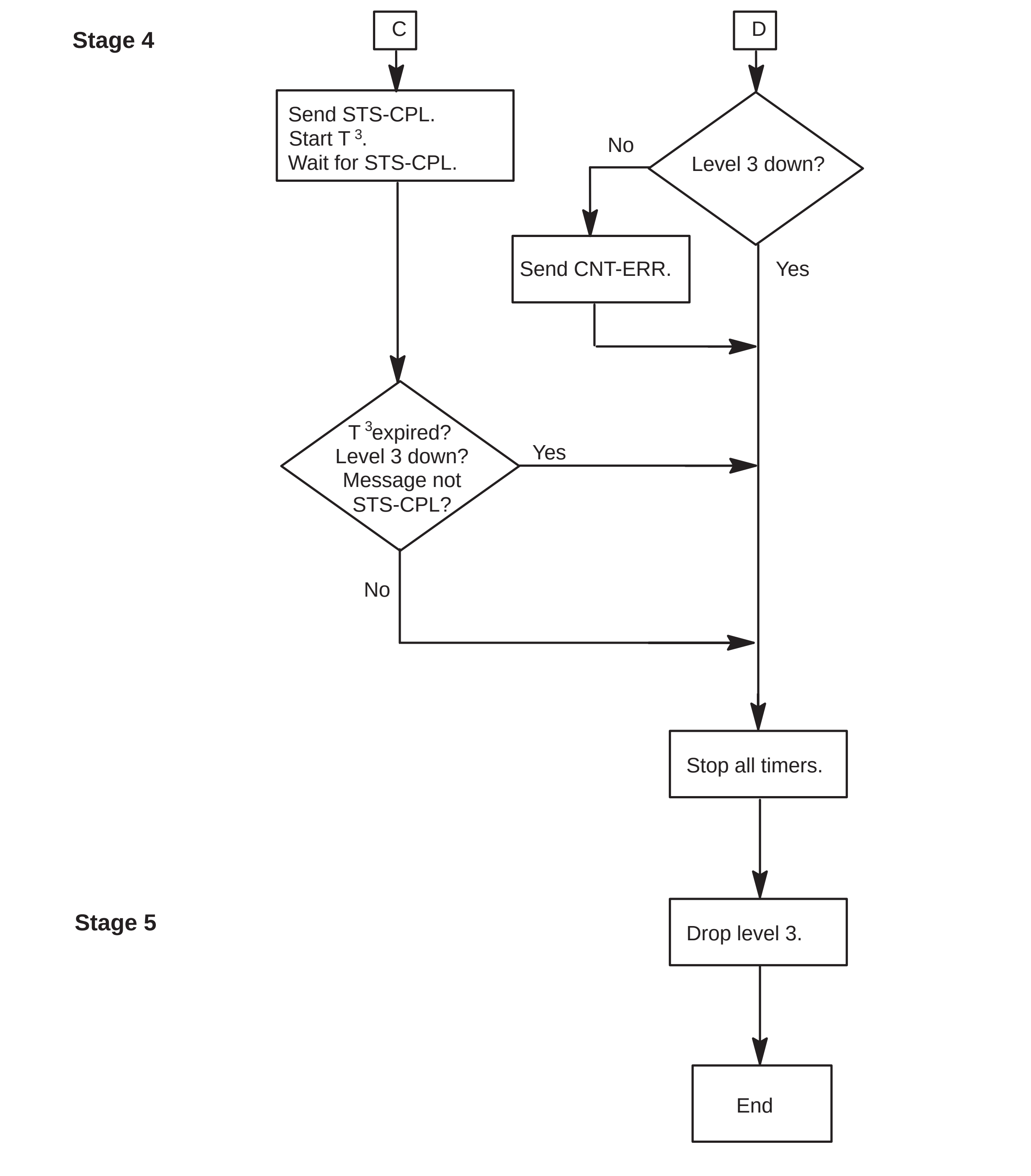
—continued—

Figure 2-8
Data flow when the host receives a file from the switch (continued)



—continued—

Figure 2-8
Data flow when the host receives a file from the switch (continued)



—end—

AFT-MNP configurations

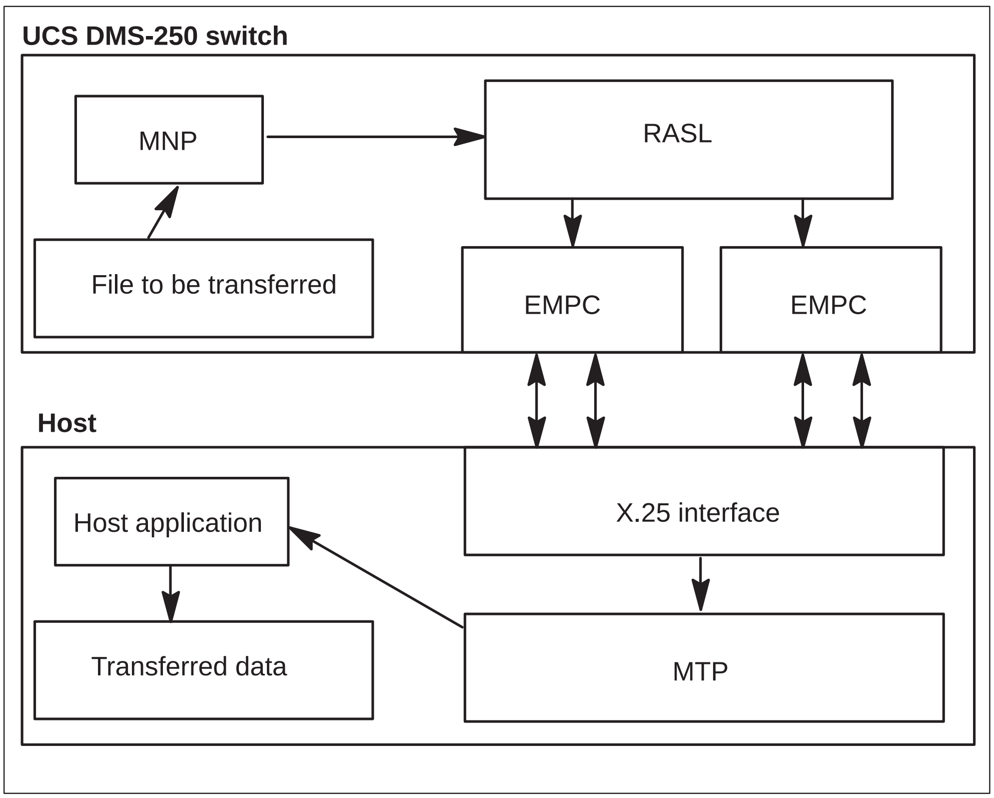
The AFT-MNP enables a switch to transfer files in near real-time with either a single-link or multi-link configuration.

AFT-MNP provides load sharing and link recovery over a maximum of four enhanced multi-protocol controller (EMPC) links that can be either V.35 or RS-232 ports. If one link goes down, traffic is distributed over the remaining links without manual intervention.

Traffic is sent over the EMPC links at either 9.6 kbit/s or 19.2 kbit/s on an RS-232 port; or at either 9.6 kbit/s, 19.2 kbit/s, or 56 kbit/s on a V.35 port.

Figure 2-9 shows data transfer over two EMPC links.

Figure 2-9
AFT-MNP data transfer over two links



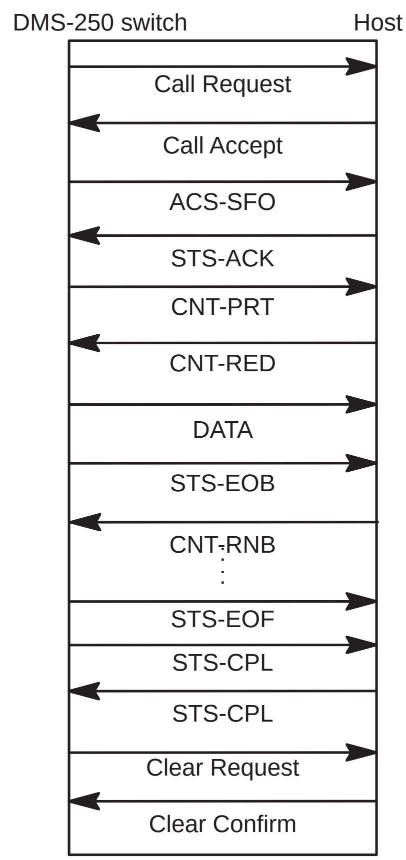
Single-link configuration

In a single-link AFT-MNP configuration, the network connection is established at the beginning of the file transfer process. If the link goes down during the data transfer stage, MNP tries to bring it back up.

When the STARTAFT command is executed, Message Transfer Protocol (MTP) starts the connection setup between the two ends. The connection remains open until the STOPAFT command is executed. Figure 2-10 shows the message sequence for a single-link configuration.

Note: MTP is the application protocol that controls file transfers. For details on MTP see “Multi-Network Protocol,” later in this chapter.

Figure 2-10
Message sequence (single-link configuration)



The sequence of events for the file transfer in a single-link configuration is as follows:

1 The link performs the file transfer start-up message exchange. That is, messages ACS-SFO, STS-ACK, CNT-PRT, and CNT-RED are sent.

2 The data is sent, up to the window size, over the link. A window sets the limit on how many blocks can be unacknowledged during data transfer. Data transfer continues until all data is sent.

3 The link performs the file transfer wrap-up message exchange. That is, messages STS-EOF and STS-CPL are sent.

4 The network connection is closed.

Multi-link configuration

In an AFT-MNP configuration with multiple links, the network connection is established over a maximum of four links at the beginning of the file transfer process. If a link goes down during the data transfer stage, the unacknowledged data for that link is retransmitted over the remaining links.

When a link goes down, the system attempts to bring it back up. Once the link is up, data is not transferred over the link until the next file transfer.

Figure 2-11 shows the message sequence for a dual-link configuration with two links.

The sequence of events for the file transfer in a two-link configuration is as follows:

1 Both links perform the file transfer start-up message exchange. That is, messages ACS-SFO, STS-ACK, CNT-PRT, and CNT-RED are sent over both links.

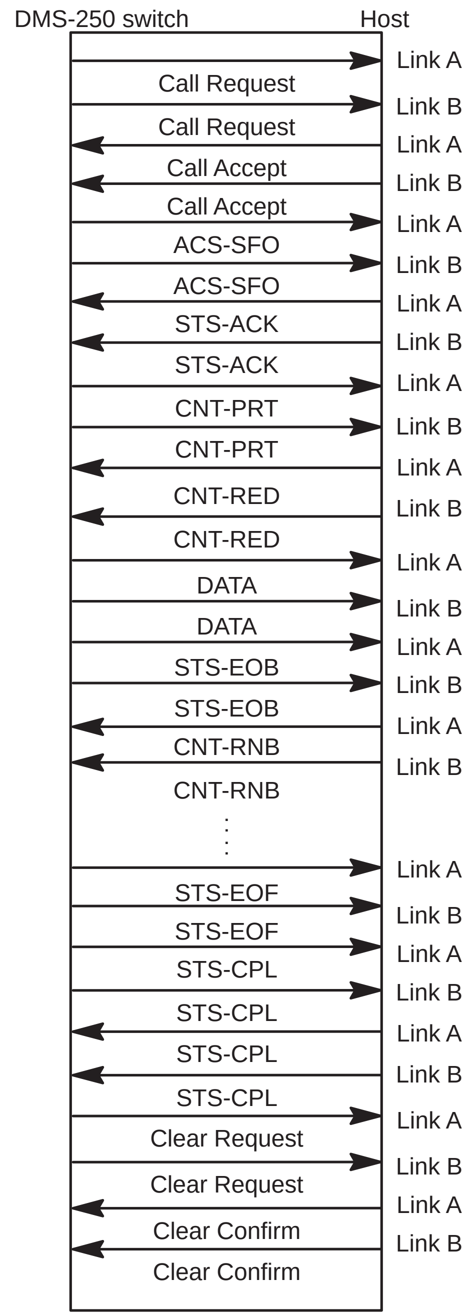
2 The data is sent, up to the window size, over both links. Data transfer continues until all data is sent.

3 Both links perform the wrap-up message exchange. That is, messages STS-EOF and STS-CPL are sent over both links.

4 The network connections are closed.

Note: MTP is the application protocol that controls file transfers. See “Multi-Network Protocol,” later in this chapter for details on MTP.

Figure 2-11
Message sequence (dual-link configuration)



Windows and timers

For both AFT and AFT-MNP, data is sent across the X.25 link in 2k-octet blocks. A window sets the limit on how many blocks can be unacknowledged during data transfer. When the number of unacknowledged blocks equals the window size, data transfer stops until receiving an acknowledgment. Typically, the window size is one or two.

AFT-MNP windows and timers

MTP implements two windows for AFT-MNP: a network connection window and a global window. Datafill in table GASINFO determines the size of the network connection window. The size of the global window is the sum of the number of links in the network connection window when all links are in service. If the network connection window size is exceeded for a specific link, data transfer is suspended on that link.

If the number of unacknowledged data packets exceeds the global window size, the entire session is suspended. A global window timer that consists of a 1-minute establishment phase and a 3-minute, 15-second data transfer phase is started. When the global window timer expires, the link that caused the timeout is removed from the service list. All unacknowledged data for that link is sent to the remaining links for retransmission.

Note: If the network connection window size is one, a data block must be acknowledged with a CNT-RNB message before another data block can be sent. If the network connection window size is greater than one, CNT-RNB acknowledgments can arrive in any sequence.

Automatic file transfer process

DIRP records to disk the AFT and AFT-MNP transfer files. Files recorded to disk are listed in table DIRPHOLD. Safe Store Tap (SST) supplies a directory of DIRP files in the order they were created. Files are transferred in the order in which they are created. AFT and AFT-MNP also transfer the active DIRP file. When it needs to use the disk space, DIRP automatically removes files that have completed transfer from the disk .

File transfer status

DIRP assigns a status to each file on the disk. As a file moves through the transfer process, its status on the disk changes as follows:

- Available—A newly created, but not yet transferred file is marked as available (A) to take billing.
- Unprocessed—After the file is no longer able to take billing, DIRP marks its status as unprocessed (U).

- Processed—After the file is transferred successfully and stored according to the archive option (set by office parameter), it is marked as processed (P).

When disk space is required, processed files automatically are deleted from DIRP. This deletion occurs after the time period specified in the Retention Period In Days (RETPD) field of table DIRPSSYS expires. This field prevents the user from accidentally destroying data. If an attempt is made to erase a tape file prior to the expiration date, the system prompts the user. (See the section entitled “Datafilling table DIRPSSYS,” later in this chapter.)

Archive to tape

AFT default settings allow you to write files to tape for backup purposes. With this option, DIRP marks all files as unprocessed (U) until you manually write the files marked U to tape. DIRP does not remove unprocessed files from the disk. After the files are written, DIRP changes the file status to processed (P) and removes these processed files as it needs disk space.

No archive to tape

AFT offers the option of not requiring files to be manually archived. However, the billing files that the switch captures under the Call Detail Record (CDR) stream must be manually archived to tape. This means DIRP marks all non-CDR files that have successfully transferred as processed (P). DIRP removes these processed files as it needs disk space.

This option is set in table OFCVAR with the office parameter AFT_REMOVE_COPY_TO_TAPE. Refer to “AFT datafill requirements” in this chapter for more information on setting this option.

Note: The status of an CDR file cannot be changed by this feature. You must copy all CDR records to tape before DIRP marks them as processed.

File transfer order

File transfer order is determined by these rules:

- When an automatic file transfer session is initiated (by datafill in table GASINFO), AFT requests a directory from SST and selects the oldest file in the pending state as the next file to transfer.
- Before the start of each new file transfer, AFT requests a new directory from SST and merges the local directory with the new directory. AFT then transfers the files in the following order:

— Override files are chosen over all other files. Override files are indicated by the O–> pointer in the directory display. An override file can be set by the far-end processor or by executing the CI command SETOVR.

— If no file is designated as an override file, then the file with the N–> pointer (next) is selected for transfer. This file is the next oldest file available for transfer in the AFT directory. Each time a file transfer starts, a new next file is chosen. The next file to transfer can also be set by executing the CI command SETAFT. The A–> pointer indicates the file that is being transferred.

Note: Do not manually add file names to table DIRPHOLD when using AFT. Doing so can interfere with the way DIRPHOLD files are sorted in creation order.

Partial file transfer

If there is a break in the connectivity while a file is being tranferred, PFT enables the transfer to be recovered. A partial file transfer (PFT) is the transfer of the rest of a file that has not completely transferred. The file is marked as a “PFT” file.

AFT (or AFT-MNP) saves the number of the last block that he remote processor acknowledged. When connectivity is established again, the file transfer continues. The transfer starts with the block that is one greater than the last block acknowledged.

PFT recovery can occur only under one of these conditions:

- a warm or cold restart
- a break in connectivity with the remote processor
- a failure to communicate with SST
- an error condition that requires the session to be taken down

If a reload restart occurs, PFT cannot recover the file that is actively being transferred. The DIRP file information is added to table DIRPHOLD as an unprocessed file. The next file variable does not survive the reload restart. When a new SST directory is received, the oldest pending file is chosen as the next file. The files that existed before the reload restart are set to the manual transfer state. These files must be transferred manually.

DIRP naming conventions

The software generates the DIRP file name. The file status, time stamp, file sequence, and contributing subsystem make up the DIRP file name.

AFT sends DIRP files in real-time across the data link. DIRP supports a variable naming convention for DIRP files that uses this format:

ZYYMMDDHHNNSSXXXX

where:

Z	file status: A—available file, U—unprocessed file, P—processed file, R—retained file
YY	year
MM	month
DD	day
HH	hour
NN	minutes
SS	sequence number (0–99); this field identifies the file sequence number across all subsystems. For example, the first file might be allocated to AMA and be given sequence number 0. The next file allocated is given sequence number 1, even if it is for OM or JF.
XXXX	DIRP recording subsystem (for example, AMA, JF, OCC, OM)

When DIRP creates an active file, it assigns the file status “A” as part of the file name. When a new file is rotated to become an available file, the file status in the previous file name changes to “U.” The status changes to “P” once the files are transferred across the data link. The status is the only portion of the file name that changes. The other characters remain constant and uniquely identify the file on the switch.

Imbedding the DIRP file name in the ACS-SFO message

Datafilling the FILENAME field in table GASINFO with a value of “$” causes the DIRP file name to be used in the file name field of the ACS-SFO message.

Message Transfer Protocol

Message Transfer Protocol (MTP) is the application protocol that controls file transfers for the AFT feature. MTP provides a simple interface between the operating systems of the switch and the host. X.25 level 2 and level 3 provide the reliable data communications protocol. AFT uses these message types:

- ACS-SFO—access request message, start file outgoing
- STS-ACK—status message, access request acknowledged
- CNT-PRT—control message, set device to print mode
- CNT-RED—control message, set device to read mode

- CNT-RNB—control message, request next block
- STS-EOB—status message, end of block
- STS-EOF—status message, end of file
- STS-CPL—status message, access complete
- CNT-ERR—control message, error message sent from either side on an error condition
- Data message—a 2k-octet block of data

Message formats

The following subsections show the format of the MTP messages that AFT uses.

ACS-SFO

ACS-SFO is the access request message that the switch sends to initiate a file transfer. The format of the ACS-SFO message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 1 1	03	ACS-SFO
Octet 2	0 1 1 0 0 1 0 1	65	ACS-SFO
Octet 3	0 0 0 0 0 0 0 0	00	ACS-SFO
Octet 4– Octet 15			File name: first 12 characters of the DIRP file name
Octet 16– Octet 20			Subfile name: last five characters of the DIRP file name
Octet 21	0 0 1 0 0 0 0 0	20	
Octet 22	0 0 1 0 0 0 0 0	20	
Octet 23	0 0 1 0 0 0 0 0	20	
Octet 24	0 0 1 0 0 0 0 0	20	
Octet 25	0 0 1 0 0 0 0 0	20	
Octet 26	0 0 1 0 0 0 0 0	20	
Octet 27	0 0 1 0 0 0 0 0	20	
Octet 28	0 0 1 0 0 0 0 0	20	Generation name
Octet 29	0 0 1 0 0 0 0 0	20	
Octet 30	0 0 1 0 0 0 0 0	20	
Octet 31	0 0 1 0 0 0 0 0	20	
Octet 32	0 1 1 1 1 1 1 1	7F	LBA indicator
Octet 33			Last block ack’d (byte 0)
Octet 34			Last block ack’d (byte 1)
Octet 35			Last block ack’d (byte 2)
Octet 36			Last block ack’d (byte 3)
Octet 37	0 0 1 0 0 0 0 0	20	

Table 2-3 describes the fields in the ACS-SFO message.

Table 2-3
ACS-SFO field descriptions

Field	Description
File name	The file name datafilled in table GASINFO. Datafilling a value of “$” in the FILENAME field in table GASINFO embeds the first 12 characters of the DIRP file name here.
Subfile name	Not used.
Generation name	The starting sequence number for the file transfer.
LBA indicator	The last block acknowledged indicator.
Last block acked	The sequence number of the last data block acknowledged (LBA) by the host. A new file transfer is assigned an LBA sequence number of 0. The range of LBA sequence numbers is 0–4,294,836,225 (4 octets.)
—end—	

STS-ACK

The host sends the STS-ACK message in response to the ACS-SFO message to accept the file transfer request. The format of the STS-ACK message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	STS-ACK
Octet 2	1 0 0 0 0 0 0 1	81	STS-ACK
Octet 3	0 0 0 0 0 0 0 0	00	STS-ACK

CNT-PRT

The switch sends the CNT-PRT message to the host when it is ready to transfer data. The format of the CNT-PRT message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	CNT-PRT
Octet 2	1 0 1 0 0 0 1 0	A2	CNT-PRT

CNT-RED

The host sends the CNT-RED message to start the file transfer. The CNT-RED message also sets the window size for the transfer. Bits 3–7 contain the window size minus 1. Bits 0–2 contain the type code. The window size is usually 1; type code should be 6. The format of the CNT-RED message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	CNT-RED
Octet 2	1 0 1 0 0 0 1 1	A3	CNT-RED
Octet 3	0 0 0 0 0 1 1 0	06	CNT-RED

Data message

The data message is a 2k-octet block of data. It contains the data that is retrieved from a data file on the disk. MTP differentiates the data message from other messages by setting the Q-bit to zero.

STS-EOB

The STS-EOB message follows the data message. The switch sends this message to describe the data block just sent. The last two octets contain the number of octets in the DATA message, binary coded. The format of the STS-EOB message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	STS-EOB
Octet 2	1 0 0 0 0 1 0 0	84	STS-EOB
Octet 3			Number of octets (LSB)
Octet 4			Number of octets (MSB)

CNT-RNB

The host sends this message when it is ready to receive the next data block. In order to maximize throughput, the CNT-RNB should be sent before the sender's window fills up. To prevent an upper-level protocol error, the CNT-RNB must be received by the sender before timer T6 expires. The format of the CNT-RNB message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	CNT-RNB
Octet 2	1 0 1 0 0 0 0 1	A1	CNT-RNB
Octet 3	0 0 0 0 0 0 0 0	00	CNT-RNB

STS-EOF

The switch sends the STS-EOF message when the entire file is transferred. The format of the STS-EOF message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	STS-EOF
Octet 2	1 0 0 0 0 0 1 1	83	STS-EOF

STS-CPL

The STS-CPL message is sent by both ends to complete the current session. The format of the STS-CPL message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	STS-CPL
Octet 2	1 0 0 0 0 0 1 0	82	STS-CPL

CNT-ERR

An MTP error generates a CNT-ERR message. The format of the CNT-ERR message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 0	0 0 0 0 0 0 0 0	00	NUL
Octet 1	x x x x x x x x	XX	Error Code
Octet 2	x x x x x x x x	XX	Error Code

XX is the two-byte error code. Table 2-4 lists the possible error codes. All values are hexadecimal.

Table 2-4
CNT-ERR error codes

Error Code		Explanation
E0	00	Error not specified
E1	01	Out–of–sequence message
E2	02	Illegal user identification
E3	03	Reserved
E4	04	Record size maximum greater than buffer
E5	05	Access code not supported
E6	06	Syntax error in spec
E7	07	Illegal access

—continued—

Table 2-4
CNT-ERR error codes (continued)

E8	08	No such device or unit
E9	09	Device in use
EA	0A	Hardware protection violation
EB	0B	Hardware fault
EC	0C	Data media fault
EE	EE	No current file available
EF	EF	Already set to current
F0	F0	Not specified file admin
F1	F1	No such file
F2	F2	Duplicate file
F3	F3	Software protection violation
F4	F4	Access locked
F5	F5	Directory full
F6	F6	Device full
	—end—	

Data message

The data message is a 2k-octet block of data. It contains the data that is retrieved from a data file on the disk. MTP differentiates the data message from other messages by setting the Q-bit to zero.

Multi-Network Protocol

Multi-Network Protocol (MNP) is a modified MTP implemented for the AFT-MNP feature. MNP uses these MTP message types:

- ACS-SFO—access request message, start file outgoing
- STS-ACK—status message, access request acknowledged
- CNT-PRT—control message, set device to print mode
- CNT-RED—control message, set device to read mode (modified)
- CNT-RNB—control message, request next block (modified)
- STS-EOB—status message, end of block (modified)
- STS-EOF—status message, end of file
- STS-CPL—status message, access complete

- CNT-ERR—control message, error message sent from either side on an error condition
- CNT-INT—control interrupt
- Data message—a 2k-octet block of data

The following pages show the format of the MTP messages that are modified and used by AFT-MNP.

CNT-RED

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	CNT-RED
Octet 2	1 0 1 0 0 0 1 1	A3	CNT-RED

STS-EOB

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	STS-EOB
Octet 2	1 0 0 0 0 1 0 0	84	STS-EOB
Octet 3			Number of octets (LSB)
Octet 4			Number of outcasts (MSB)
Octet 5			Sequence number (LLSB)
Octet 6			Sequence number (LMSB)
Octet 7			Sequence number (MLSB)
Octet 8			Sequence number (MMSB)

Table 2-5 describes the fields in the STS-EOB message.

Table 2-5
STS-EOB field descriptions

Field	Description
Number of octets	The number of octets in the data block just sent. The range is 1–2048 (2 octets).
Sequence number	The sequence number of the data block just sent. The range is 1–4,294,836,225 (4 octets).
—end—	

CNT-RNB

The host sends the CNT-RNB message when it is ready to receive the next data block. The CNT-RNB message contains the sequence number of the received data block. The format of the CNT-RNB message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 1	0 0 0 0 0 0 0 0	00	CNT-RNB
Octet 2	1 0 1 0 0 0 0 1	A1	CNT-RNB
Octet 3			Sequence number (LLSB)
Octet 4			Sequence number (LMSB)
Octet 5			Sequence number (MLSB)
Octet 6			Sequence number (MMSB)

Table 2-6 describes the fields in the CNT-RNB message.

Table 2-6
CNT-RNB field description

Field	Description
Sequence number	The sequence number of the data block just sent. The range is 1–4,294,836,225 (4 octets).
—end—	

CNT-INT

The CNT-INT message is an interrupt message. The format of the CNT-INT message is as follows:

Q-bit: 1	Bits 7 6 5 4 3 2 1 0	Hex	Description
Octet 0	0 0 0 0 0 0 0 0	00	CNT-INT
Octet 1	1 0 1 0 0 1 0 0	A4	CNT-INT
Octet 2	0 0 0 0 0 0 0 0	00	CNT-INT

AFT–generated logs

This section briefly describes the two log reports that AFT and AFT-MNP generate: AFT001 and AFT002. Refer to the *UCS DMS-250 Logs Reference Manual*, for detailed descriptions of these logs.

AFT001 (AFT event log)

The switch generates an AFT001 log at the start and the end of a file transfer. The log text describes the start or the end of the file transfer.

AFT002 (AFT information log)

The AFT002 log provides information about the AFT system including normal events, such as a specific override, and error conditions, such as an error when sending data over the RASL (Robust Application Session Layer) network connection. The log text specifies the event or error. The switch can generate an AFT002 log at any time.

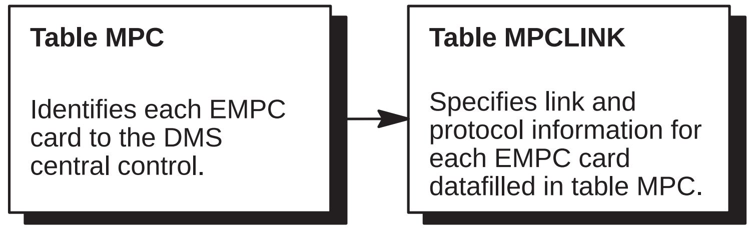
AFT and AFT-MNP datafill requirements

To set up an AFT or AFT-MNP session, the following tables must be datafilled in the order shown:

- MPC
- MPCLINK
- DIRPPOOL
- DIRPSSYS
- RASLAPPL
- GASINFO

Table MPC (Multi-Protocol Controller) and table MPCLINK (Multi-Protocol Controller Link) must be datafilled first. The relationship between tables MPC and MPCLINK is shown in Figure 2-12.

Figure 2-12
Relationship between tables MPC and MPCLINK



Note: Table MPCLINK uses the MPCNO field datafilled in table MPC to identify the enhanced multi-protocol controller (EMPC) card.

Table MPC

Table MPC contains the values required to implement the multiprotocol controller (MPC) in the DMS switch. Table MPC identifies the MPC card hardware to the DMS central control (CC). Table MPC requires one entry or tuple for each MPC.

Each entry contains the following:

- an index number for the MPC
- the number of the input/output controller (IOC) shelf where the card resides
- the card circuit number
- the product engineering code (PEC)
- the identification (ID) for the preferred download file

The device that contains the download file can appear before tuple entry in table MPC. The device can appear in a list before the first manual download. In these occurrences, a subsequent download or return to service (RTS) normally succeeds and does not list the download file.

Datafill sequence and meaning

Enter data in table IOC before table MPC.

Enter data in table MPC before table MPCLINK. Table MPCLINK provides protocol support and link information for cards configured in table MPC.

Table MPC field descriptions Table 2-7 gives the field names and descriptions for table MPC. Some fields have additional values besides those given here.

Table 2-7
Table MPC field descriptions

Field	Subfield or refinement	Entry	Explanation and action
MPCNO		see subfield	*MULTI-PROTOCOL CONTROLLER NUMBER*. This field consists of subfield K.
	K	0–255	*MULTI-PROTOCOL CONTROLLER NUMBER KEY*. Enter a number for one MPC. Number the MPCs as desired. This subfield does not have a default value.
MPCIOC		0–19	*MULTI-PROTOCOL CONTROLLER INPUT/OUTPUT CONTROLLER*. Enter the number of the IOC shelf on which the MPC card resides. This subfield does not have a default value.
IOCCCT		0, 4, 8, 12, 16, 20, 24, 28, 32	*INPUT/OUTPUT CIRCUIT NUMBER*. Enter the slot position on the IOC shelf multiplied by 4, from 0–32. Entries out of this range are not correct. This subfield does not have a default value.

Note: This table shows only those values that are valid for the X.25 data transport enhancement package.

—continued—

Table 2-7
Table MPC field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
EQ		1X89AA, 1X89BA, 1X89BB FX30AA FX30BA	*EQUIPMENT CODE*. Enter the Nortel PEC number for the associated MPC card. Enter 1X89AA for the MPC card or 1X89BA/BB for the enhanced MPC (EMPC) card. Enter FX30AA if the specified IOC is an IOM. Entries out of this range are not correct. This subfield does not have a default value.
DLDFILE		8 alphanumeric characters	*DOWNLOAD FILE*. Enter a file name that begins with MPC. Enter an X for X25ORIG, 0 (zero) for X2580), 4 for X.25, or A for asynchronous protocol software. Enter four alphanumeric characters that designate the Telecom software release cycle and the load designation. An example of a file name is MPCX33AB. Software download files are interchangeable between MPC and EMPC. For IOM MPC, use default name IOM$LOAD. This subfield does not have a default value. ***Note:*** For automatic location identification (ALI), the system enters data in field DLDFILE. The system enters data to specify the asynchronous protocol software download files for the current MPC load. The fourth character of the download filename is the letter A.
Note: This table shows only those values that are valid for the X.25 data transport enhancement package.			
—end—			

Datafill example

Figure 2-13 shows a datafill example for table MPC.

Figure 2-13
Datafill example for table MPC

```
MPCNO MPCIOC IOCCCT     EQ  DLDFILE
________________________________________________________

    0      0     12 1X89AA MPCX33AB
    1      1     12 1X89AA MPCX33AB
```

Additional information

Information on how to enter data in table MPC from a maintenance and administration position (MAP) terminal appears in this section.

When you enter data in table MPC from a MAP position complete the following steps. Complete these steps to identify the MPC (NT1X89AA) and EMPC (NT1X89BA/BB) cards to the CC:

1. List the device directories of the download files to place the files in the user directory. The CC recognizes the download files in the user directory. If the device directories for the download files do not appear, a warning message appears. The warning message appears when the system writes the tuple to table MPC.
2. Add the following information in table MPC:
   - — the MPC numbers
   - — the IOC shelves and circuit positions where the MPC and EMPC cards are configured
   - — the NT PECs for the cards
   - — the download file names for the MPC and EMPC cards

The following limits apply when you enter data in table MPC from a MAP terminal:

- You can delete tuples in table MPC under the following conditions:
  - — the MPCs that correspond are offline

— you delete the associated tuples in table MPCLINK

- You can change field DLDFILE in a tuple of table MPC. To change other fields, delete the tuple and enter the tuple again. The file name in field DLDFILE can change to a file name of the same load. For example, to change file name MPC434R1, download MPC402BX. These files are 1984 X25 protocol versions. You can not download a 1980 X25 protocol version if table MPC contains a 1984 X25 protocol. An example of a 1980 X25 protocol version is MPC003AB. If the system downloads a wrong protocol version, the system generates the following error message:

```
NEW DOWNLOAD FILE INDICATES CHANGE IN BOARD PROTOCOL.
MPC MUST BE DELETED AND RE-ADDED TO CHANGE PROTOCOL.
PROCESSING ERROR.
```

- List the directory of the storage device, that contains the download file, where the CC can recognize the file. List this directory before you enter a tuple. The CC must recognize the file at the time of entry. List the directory to place the file in the user directory. For example, you can perform the command interpreter (CI) command LISTVOL on a disk like D000XPM, to list the download file. If you do not list the download file, entry of data succeeds with a warning that the download can fail. In other occurrences, you can add a tuple to table PMLOADS. Add this tuple to identify the image name and device name for the download file.

Table MPCLINK

Table MPCLINK specifies link and protocol information for cards entered in table MPC. The user can enter correct multiprotocol controller (MPC) link definitions and protocol groups. The user can enter a group of protocol-specified fields in table MPCLINK.

Table MPCLINK supports the application of the 1980 CCITT X.25 layered protocol and asynchronous communications in the MPC. Table MPCLINK supports the application of the previous X25ORIG (BX25) protocol. Protocol support makes sure the establishment and maintenance of links and conversations occurs.

The fields in table MPCLINK identify the MPC data links to the central control (CC). The fields identify the MPC data links like table MPC identifies the MPC hardware to the CC. These fields do not have default values. The user must enter these fields.

The protocol in use determines protocol parameter descriptions. Most parameter fields do not require datafill. Parameter fields require datafill when adjustments occur to the default values assumed on the peripheral modules (PM). These adjustments occur when a download of the PM occurs. These fields contain timing and messaging specifications.

The user can enter a list of parameter entries and values. This list has different lengths. When you enter data in parameters at the MAP (maintenance and administration position) terminal, a prompt appears. This prompt appears until you enter a $. Parameters in which you do not enter data retain the established default values. The parameters receive these default values during download. The user can change most of the fields in a tuple when the affected link is in a busy state.

To view all link parameter values on the MPC card, enter the following command at the MPC level of the MAP. Type

>QLINK linknum
and press the Enter key.

where

linknum specifies which link number (2 or 3) on the MPC the system queries for parameter values

Note: Command QLINK requires a link that contains entries and an in-service MPC.

The MPC has a limited amount of buffer allocation space. The data packet size determines the number of buffers normally dedicated to an activity on a single circuit. The default number of buffers is two. Requests for additional buffers occur from a general buffer pool. This type of allocation indicates a single channel can use the buffers that remain.

Applications, that output messages, can receive an MPC return code when buffers are not available. An MPC return code causes a CC delay of 10 s before the system sends the block to the MPC again. The system can take a list of parameter entries and values out of active service. The list of parameter entries and values has different lengths.

You must enter data in specified parameters in table MPCLINK. These parameters apply to the X.25 protocols. You must enter data in these parameters to correspond to the circuit subscription configuration for DATAPAC or the host data packet network (DPN).

The following parameters must match the circuit subscription:

- local data network address (DNA)
- number of permanent virtual circuits (PVC)
- number of switched virtual circuits (SVC)
- packet window size

These parameters must correspond exactly to subscription requirements. Users must know the requirements of features that use the MPC. Users must understand the circuit subscriptions or the environment in which the circuit subscriptions operate. Users must configure cards and links in tables MPC and MPCLINK to conform to the requirements of higher-level applications.

Warning: If field PARM = L2WINDOW for all protocols, field SIZE must be the same value at the DTE and DCE ends of the data link. When field PARM = L3WINDOW for all protocols, field SIZE must have the same value at the DTE and DCE ends of the data link. If the field SIZE values are different at the DTE and DCE ends of the data link, call processing errors, malfunctions, and lost revenue can occur.

Datafill sequence and meaning

You must enter data in table MPC before you enter data in table MPCLINK.

Table MPCLINK field descriptions

Table 2-8 gives the field names and descriptions for table MPCLINK. Some fields have additional values besides those given here. This table shows only those values that are valid for the X.25 data transport enhancements package.

Table 2-8
Table MPCLINK field descriptions

Field	Subfield or refinement	Entry	Explanation and action
LINKKEY		see subfields	*Link key*. This key field contains subfields MPCNO and LINKNO.
	MPCNO	0 to 255	*Multiprotocol controller number*. This field specifies the current multiprotocol controller (MPC) or enhanced multiprotocol controller (EMPC) card for this entry. Enter the MPC/EMPC number as entered in table MPC. This subfield does not have a default value.

—continued—

Table 2-8
Table MPCLINK field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
	LINKNO	0 to 3	*Link number*. You can only specify logical links 2 or 3. A data link cable can connect to MPC physical ports 1, 2, or 3. Physical ports 2 and 3 are low speed RS232 ports (19.2K and below). Physical port 1 is a high speed V.35 port (56/64K). If the data link cable connects to port 3, specify link 3. If the data link cable connects to port 2, specify link 2. The RS232 is the default ELECTSPEC. The RS232 is not a datafill requirement. If the data link cable connects to port 1, specify link 3 with an ELECTSPEC of V35. This field does not have a default value.
LINKALM (BCS35-)		Y or N	*Link alarm*. Enter Y to activate the MPCLINK alarm for system busy (SYSB) MPC links. Enter N if you do not want to activate the MPCLINK alarm for system busy (SYSB) MPC links. ***Note:*** If you enter N in field LINKALM, the system does not generate MPC908 (MPC link state transition) logs. For IOM MPC, the system checks the link for changes that are not normal. If the change is not normal, the system generates an MPC908 (MPC link state transition) log. If the change is normal, the system does not generate an MPC908 log. The default value on dump and restore procedures for pre-BCS35 is Y.

—continued—

Table 2-8
Table MPCLINK field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
PRTCLDAT		see subfield	*Protocol data area*. This field contains subfield PROTOCOL.
	PROTOCOL	ASYNC X2580 X2584 X25ORIG	*Link protocol data*. The protocol selection must correspond to the download file that table MPC specifies. Enter ASYNC. Enter data in subfield LINKNABL as follows. Enter data in additional refinements. Datafill for additional refinements appears in Table 2-9. Enter X2580 or X2584. Enter data in subfield LINKNABL as follows. Enter data in additional refinements. Datafill for additional refinements appears in Table 2-10. Enter X25ORIG. Enter data in subfield LINKNABL as follows. Datafill for additional refinements appears in Table 2-12. This subfield does not have a default value.
	LINKNABL	0 to 32767	*Link enable*. Enter the time-out, in min, before the system system busies (SBSY) and returns to service (RTS) a link that is not fully active. This value must be a multiple of 5. Enter 0 to disable the function. This subfield does not have a default value. ***Note:*** If the entry is not zero, the system activates one link. When the other link reaches the timeout threshold, the system SBSY and RTS the active link and the MPC card. To prevent this condition, enter 0 to disable the function.

—end—

PROTOCOL = ASYNC

If the entry in subfield PROTOCOL is ASYNC, enter data in refinements PARMASYN and STRASYNC. The datafill for these refinements appears in Table 2-9.

Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC

Field	Subfield or refinement	Entry	Explanation and action
	PARMASYN	see subfield	*Parameter synonym*. This refinement contains subfield PARM. Enter this refinement with a vector list of a maximum of 19 link configuration parameters.
	PARM	APLDEFN BAUDRATE CHARBITS ECHO FCHARCNT FLOWCTRL IMODE L1IDLY L2IDLY LINEMODE LNKDOWN MODMCTRL NCHARTMO NCHTMOIN OMODE PARITY STOPBITS XPARENT	*Parameter protocol*. This vector field contains 19 parameter options. Some parameters are like the parameters used to configure a link that uses X25ORIG or X2580 protocols. If less than 19 options are a requirement, enter $ to end the list. When you enter data in all parameter options, proceed to field STRASYNC. Field STRASYNC appears later in this table. Enter APLDEFN (application definition) to specify application-specified processing. Enter data in refinement ADEFN. Datafill for refinement ADEFN appears later in this table. Enter BAUDRATE (baud rate) to specify the link baud rate. Enter data in refinement RATE. Datafill for refinement RATE appears later in this table. Enter CHARBITS (character bits) to specify the number of bits that represent each character. Enter data in refinement LEN. Datafill for refinement LEN appears later in this table.

—continued—

Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter ECHO to specify if the MPC must echo input responses received from the remote. Enter data in refinement ECHO. Datafill for refinement ECHO appears later in this table. Enter FCHARCNT (fill character control) to specify the number of times the system transmits an intermessage fill character. Field FILLCHAR specifies the intermessage fill character that the system transmits. Enter data in refinement FCNT. Datafill for refinement FCNT appears later in this table. ***Note:*** Entry FCHARCNT is only correct when the entry in subfield OMODE is CHR. Enter FLOWCTRL (flow control) to specify the link flow control sequence for incoming traffic. Enter data in refinement FLOW. Datafill for refinement FLOW appears later in this table. Enter IMODE (input mode) to indicate the operation mode for the input link (receive direction). Enter data in refinement MD. Datafill for refinement MD appears later in this table. Enter L1IDLY (level 1 input delay) to specify the maximum layer 1 input delay. This delay occurs when the system passes an input buffer to the layer 2 or layer 3 protocol for additional processing. Enter data in refinement T0. Datafill for refinement T0 appears later in this table.

—continued—

Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter L2IDLY (level 2 input delay). This entry specifies the maximum layer 2 input delay allowed to handle an input buffer output to the CC for additional processing. Enter data in refinement T1. Datafill for refinement T1 appears later in this table. ***Note:*** The entry in refinement T0 for entry L1IDLY must be less than the entry in refinement T1 for entry L2IDLY. This requirement does not apply when one or both refinements are 0. Enter LINEMODE (line mode) to indicate the line mode for the link. Enter data in refinement MODE. Datafill for refinement MODE appears later in this table. Enter LNKDOWN (link down timer) to specify the amount of time a modem link is idle. The modem link is idle until the system records the modem link down. Enter data in refinement T1. Datafill for refinement T1 appears later in this table. ***Note:*** Entry LNKDOWN is only correct when subfield MODMCTRL is FULLMODM. Enter MODMCTRL (modem control) to specify the type of modem control the link presents. Enter data in refinement MODM. Datafill for refinement MODM appears later in this table. Enter NCHARTMO (intercharacter time-out) to specify the minimum intercharacter time-out for character transmission. Enter data in refinement CHTMO. Datafill for refinement CHTMO appears in this table.

—continued—

Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter NCHTMOIN (intercharacter time-out incoming) to specify the minimum intercharacter time-out for incoming characters. Enter data in refinement CHTMO. Datafill for refinement CHTMO appears later in this chapter. Enter OMODE to indicate the operation mode for the output link (transmit direction). Enter data in refinement MD. Datafill for refinement MD appears later in this chapter. Enter PARITY (parity) to specify the type of parity used on the link. Enter data in refinement PRTY. Datafill for refinement PRTY appears later in this chapter. Enter STOPBITS (stop bits) to specify the number of stop bits required for data communications. Enter data in refinement BITS. Datafill for refinement BITS appears later in this chapter. Enter XPARENT (transparency) to allow DLE character stuffing to achieve data transparency. Enter data in refinement DLE. Datafill for refinement DLE appears later in this chapter.

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Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	ADEFN	A911 , C911, SMDI, or NONE	*Application definition*. If the entry in field PARM is APLDEFN, enter data in this refinement. The applications that are bound to the asynchronous protocol determines the range of possible inputs to this field. The following values are correct entries if the available features that support the values are installed: • A911 This value requires feature AF2146. This feature is E911 Open Interface to ALI Database for Call Processing. • C911 This value requires feature AF2759. This feature is E911 Direct Access to AT&T ALI Controller. • SMDI This value requires feature AF2471. This feature is SMDI Conversion to Use MPC. The default value is NONE. This value indicates that basic asynchronous processing occurs.
	RATE	B300, B600, B1200, B2400, B4800, B9600, B19200, B14400, B28800	*Baud rate*. If the entry in field PARM is BAUDRATE, enter data in this refinement. Enter the link baud rate. ***Note:*** Baud rates B14400 and B28800 are for IOM MPC only. The default value is B1200 (1200 baud).

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Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	LEN	BIT5, BIT6, BIT7, BIT8	*Character bits*. If the entry in field PARM is CHARBITS, enter data in this refinement. Enter the number of bits that represent each character. The default value is BIT7 (7 bits).
	ECHO	ON or OFF	*Echo*. If the entry in field PARM is ECHO, enter data in this refinement. Enter ON if the MPC must echo input responses received from the remote. Enter OFF if you do not want the MPC to echo input responses received from the remote. The default value is OFF.
	FCNT	0 to 1024	*Fill character control*. If the entry in field PARM is FCHARCNT, enter data in this refinement. Enter the number of times the system transmits an intermessage fill character. Subfield FILLCHAR specifies the intermessage fill character. Fill character control is for applications that must synchronize a remote device, like a terminal, to the link. The default value is 0. ***Note:*** Entry FCHARCNT is correct when the entry in subfield OMODE is CHR.

—continued—

Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	FLOW	NOFLOW or XONOFF	*Flow control*. If the entry in field PARM is FLOWCTRL, enter data in this refinement. Enter the link flow control sequence to control incoming traffic. Enter NOFLOW to indicate a flow control sequence is not available. Enter XONOFF to indicate the American National Standards Institute (ANSI) IA5 XON/XOFF characters are for flow control. The system implements ANSI IA5 XON/XOFF characters as sequences DC1 and DC3 in the sequence specified.
	MD	BLK or CHR	*Input mode*. If the entry in field PARM is IMODE or OMODE, enter data in this refinement. If the entry in field PARM is IMODE, enter the mode in which the input link (receive direction) operates. If the entry in field PARM is OMODE, enter the mode in which the output link (transmit direction) operates. Enter BLK for block mode or CHR for character mode. The default value is BLK.
	MODE	FULL, HALF, SIN, SOUT	*Line mode*. If the entry in field PARM is LINEMODE, enter data in this refinement. Enter the line mode for the link. Enter FULL for full duplex, HALF for half duplex, SIN for simplex-incoming, or SOUT for simplex-outgoing. The default value is FULL.

—continued—

Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	T0	0 or 5 to 255	*Level 1 input delay*. If the entry in field PARM is L1IDLY, enter data in this refinement. Enter the time the maximum layer 1 input delays. Enter the time in increments of 10 ms. The delay occurs when the system passes an input buffer to the layer 2 or layer 3 protocol for additional processing. Entries out of this range are not correct. An entry of 0 causes the system to handle data byte-by-byte between level 1 and level 2. The default value is 100 (1 s). ***Note:*** The entry in refinement T0 for entry L1IDLY must be less than the entry in refinement T1 for entry L2IDLY. This requirement does not apply when one or both refinements are 0.

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Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	T1	0 to 1000	*Link down timer*. If the entry in field PARM is L2IDLY or LNKDOWN, enter data in this refinement. If the entry in field PARM is L2IDLY, enter the maximum layer 2 input delay. Enter this delay in intervals of 10 ms. This delay is the time the system allows to handle an input buffer output to the CC for additional processing. The correct range is 0 or 5 to 1000. If the entry in field PARM is LNKDOWN, enter the amount of time a modem link is idle. The modem link is idle until the system records the modem link down. Enter the time in increments of 10-ms. Entries out of this range are not correct. The default value is 200 (2 s). ***Note:*** The entry in refinement T0 for entry L1IDLY must be less than the entry in refinement T1 for entry L2IDLY. This requirement does not apply when one or both refinements are 0.

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Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	MODM	DIAL FULLMODM NOMODM or PARTIAL	*Modem control*. If the entry field PARM is MODMCTRL, enter data in this refinement. Enter the type of modem control the link presents. If the entry in refinement MODE is HALF or SOUT, enter FULLMODEM. The default value is FULLMODM. If the entry in subfield PROTOCOL is ASYNC, you can enter the value DIAL. If you enter DIAL, the MPC assumes the connection is not dedicated. The MPC allows the application to send commands to the modem to establish a connection.
	CHTMO	0 to 500	*Intercharacter time-out*. If the entry in field PARM is NCHARMO or NCHTMOIN, enter data in this refinement. If the entry in field PARM is NCHARMO, enter the minimum intercharacter time-out, in increments of 10-ms, for character transmission. If the entry in field PARM is NCHTMOIN, enter the minimum intercharacter time-out. Enter this value in increments of 10-ms for incoming characters. The default value is 0. This value indicates a delay is not present between characters on transmission. This value represents block data transfer.

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Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PRTY	EVEN NONE or ODD	*Parity*. If the entry in field PARM is PARITY, enter data in this refinement. Enter the type of parity used on the link. Enter EVEN for even parity, NONE for a parity that is not present, and ODD for odd parity. The default value is EVEN. The system does not support mark and space parity.
	BITS	S1, S2, S15	*Stop bits*. If the entry in field PARM is STOPBITS, enter data in this refinement. Enter the number of stop bits required for data communications. The default value is S1 (1 bit). The value S15 represents 1.5 bits.
	DLE	NODLE or YES	*Transparency*. If the entry in field PARM is XPARENT, enter data in this refinement. Enter NODLE if DLE character stuffing to achieve data transparency cannot occur. An entry of YES allows DLE character stuffing to achieve data transparency. The default value is NODLE.
	STRASYNC	see subfield	*String asynchronous*. This subfield contains subfield STRID.

—continued—

Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	STRID	FILLCHAR IEOM ISOM OEOM OSOM	*String identification*. This subfield is a vector that contains six parameter options. To change a parameter default value, enter the parameter option and the associated value. If less than six options are a requirement, enter $ to end the list. If the entry in field PARM is OMODE and the entry in refinement MD is CHR, enter FILLCHAR (fill character). Enter data in refinement TSTRVAL. Datafill for refinement TSRVAL appears later in this table. Enter IEOM for incoming end of message. Enter data in refinement STRVAL. Datafill for refinement STRVAL appears later in this table. Enter ISOM for incoming start of message. Enter data in refinement STRVAL. Datafill for refinement STRVAL appears later in this table. Enter OEOM for outgoing end of message. Enter data in refinement STRVAL. Datafill for refinement STRVAL appears later in this table. Enter OSOM for outgoing start of message. Enter data in refinement STRVAL. Datafill for refinement STRVAL appears later in this table.

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Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	TSTRVAL	0 to 9 and A to F (0 or 2 characters)	*Test string value*. If the entry in subfield STRID is FILLCHAR, enter data in this refinement. This parameter allows for the specification of an intermessage fill character. This character is for use in some applications to synchronize a remote device to the link. A terminal is an example of a remote device. Enter characters in multiples of two. The system performs range checking. The default value is a no-fill character. A no-fill character is equivalent to the entry of a vector of zero length (nil).

—continued—

Table 2-9
Conditional datafill for table MPCLINK; PROTOCOL = ASYNC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	STRVAL	0 to 9 and A to F (to a maximum of 8 characters)	*String value*. If the entry in subfield STRID is IEOM, ISOM, OEOM, or OSOM, enter data in this refinement. This parameter specifies the end-of-message or start-of-message sequence verified on all incoming or outgoing messages on the link. Enter characters in groups of two. Each two-character block of the entered string represents from one to four hexadecimal characters. The system can find the character sequence that this subfield represents in an incoming message. When this condition occurs, the system removes the characters from the message. If the entry in subfield STRID is IEOM or ISOM, the default value can occur. The default value occurs if an end-of-message or start-of message verification does not occur. The default value occurs if you do not enter characters. If the entry in subfield STRID is OEOM or OSOM, the default value can occur. The default value occurs when you do not add characters to the end of the transmitted message. The default value occurs if you do not enter characters.

—end—

PROTOCOL = X2580 or X2584

If the entry in subfield PROTOCOL is X2580 or X2584, enter data in refinements CONVNABL, PARMS, and EXINF. Datafill for these refinements appears in in Table 2-10.

Table 2-10
Field descriptions for conditional datafill

Field	Subfield or refinement	Entry	Explanation and action
	CONVNABL	0 to 32767	*Conversation enable*. Enter the number of minutes a conversation is not in progress before correcting action occurs. This value must be a multiple of 5. An entry of 0 indicates a period of time is not specified. This field does not have a default value.
	PARMS	see subfield	*Parameter selector (CCITT x 25 CC protocol)*. This field contains subfield PARM.
	PARM	BAUDRATE, CLKSRCE, ELECSPEC, L2MODULO, L2WINDOW, L3ACK, L3DATA, L3MODULO, L3WINDOW, N2, NODETYPE, NUMPVCS, PVCDBIT, R20, R22, R23, R25, SVCS2WAY, SVCSIN, SVCSOUT, T1_S, T1_10MS, T20, T21, T22, T23	*Parameter selector*. Enter this field with a vector that has a maximum of 37 parameter options. Enter the parameter option and the associated value to change a parameter default value. Enter parameters as a group of the parameter type. You must enter the parameter name and the value. Enter these items one item at a time in any order. If less than 37 options are a requirement, enter $ to end the list. After you enter all parameter options, proceed to field EXINF. Field EXINF appears later in this table. Enter BAUDRATE (baud rate) to specify the baud rate. Enter data in refinement RATE. Datafill for refinement RATE appears later in this table.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Enter CLKSRCE (clock source) to specify the source for the MPC system clock. Enter data in refinement SOURCE. Datafill for refinement SOURCE appears later in this table.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)	T25, T26, T2_S T2_10MS, T3_S, T3_10MS, T4_S, T4_10MS, THRUPUT	Enter ELECSPEC (physical link specification) to determine the electrical specification for links 2 and 3 on the MPC. Enter data in refinement SOURCE. The refinement SOURCE appears later in this table. Enter L2MODULO (frame level modulo counter) to specify a numbering design for end-to-end messaging at level 2. Enter data in refinement MODVAL as described later in this table. Enter L2WINDOW (frame window size) to specify the size of the frame window. Enter data in refinement SIZE. Datafill for refinement SIZE appears later in this table. **Warning:** Field SIZE must have the same value at the DTE and DCE ends of the data link. If the value is not the same, call processing errors, malfunctions, and lost revenue can occur. Enter L3ACK (level 3 packet acknowledgement) to specify packet acknowledgement. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter L3DATA (level 3 data packet size) to specify the maximum number of bytes of user data allowed in a data packet. Enter data in refinement DATASIZE. Datafill for refinement DATASIZE appears later in this table.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Enter L3MODULO (level 3 packet level modulo counter) to specify a protocol numbering design for end-to-end messaging at level 3. Enter data in refinement MODVAL. Datafill for refinement MODVAL appears later in this table.
			Enter L3WINDOW (level 3 packet window) to specify the packet-level window size. Enter data in refinement SIZE. Datafill for refinement SIZE appears later in this table.
			Warning: Field SIZE must have the same value at the DTE and DCE ends of the data link. If the value is not the same, call processing errors, malfunctions, and lost revenue can occur.
			Enter N2 (retransmission counter) to specify the size of the retransmission counter. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table.
			Enter NODETYPE (node type or address) to specify the node type or address of the MPC. Enter data in refinement NODE. Datafill for refinement NODE appears later in this table.
			Enter NUMPVCS (number of permanent virtual circuits [PVC]) to specify the number of PVCs on the link. Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this table.
	PARM (continued)		Enter PVCDBIT (PVC bitset) to activate the X.25 D-bit facility on PVC channels. Enter data in refinement BITSET. Datafill for refinement BITSET appears later in this table.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Enter R20 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T20). Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. The user must enter data in parameter T20. Enter R22 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T22). Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Parameter T22 must contain data. Enter R23 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T23). Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Parameter T23 must contain data. Enter R25 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T25). Enter data in refinement VALUE. Datafill for refinement value appears later in this table. Parameter T25 must contain data.

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Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter SVCS2WAY. This entry is the number of 2-way switched virtual circuit (SVC). Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this table.
			Enter SVCSIN (number of one-way incoming SVCs). Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this table.
			Enter SVCSOUT (number of one-way outgoing SVCs). Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this table.
			Enter T1_S (timer 1 in steps of 1-s) to specify the timer value in seconds. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table.
			Enter T1_10MS (timer 1 in steps of 10m-s) to specify the timer value in milliseconds. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table.
			Note: You can enter data in timer T1_S or timer T1_10MS. You cannot enter data in both timers.
			Enter T20 (restart request timer) to determine the transmission of requests to restart level 3. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table.

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Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter T21 (call restart response timer) to time the remote response to a call request packet. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T22 (reset request timer) to time the remote response to a reset request. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T23 (clear request response timer) to time the remote response to a reset to clear a virtual call. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T25 (packet acknowledgement timer) to time an acknowledgement is from the remote of the reception of a level 3 packet. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T26 (interrupt response timer) to time the remote response if the system transmits an interrupt packet at level 3. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T2_S (timer 2 in steps of 1-s) to specify the timer value in seconds. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table.

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Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter T2_10MS (timer 2 in steps of 10-ms) to specify the timer value in milliseconds. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. ***Note:*** You can enter data in timer T2_S or timer T2_10MS. You cannot enter data in both timers. Enter T3_S (timer 3 in steps of 1-s) to specify the timer value in seconds. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T3_10MS (timer 3 in steps of 10-ms) to specify the timer value in milliseconds. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. ***Note:*** You can enter data in timer T3_S or timer T3_10MS. You cannot enter data in both timers. Enter T4_S (timer 4 in steps of 1-s) to specify the timer value in seconds. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T4_10MS (timer 4 in steps of 10-ms) to specify the timer value in milliseconds. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table.

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Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Note: You can enter data in timer T4_S or timer T4_10MS. You cannot enter data in both timers. Enter THRUPUT (throughput class) to specify the throughput class across the link for outgoing data. Enter data in refinement RATE. Datafill for refinement RATE appears later in this table.
	RATE	B300, B600, B1200, B2400, B4800, B9600, B14400, B19200, or B28800 NOVALUE, T75, T150, T300, T600, T1200, T2400, T4800, T9600, T19200, or T48000	*Baud rate*. If the entry in field PARM is BAUDRATE or THRUPUT, enter data in this refinement. If the entry in field PARM is BAUDRATE, enter the baud rate value for data transmission compatible to the ends of the circuit. The baud rate value represents bits per second. If field CLKSRCE contains INTERNAL, you can enter data in field BAUDRATE. ***Note:*** The IOM MPC supports baudrates B14400 and B28800. The default value is B2400. If the entry in field PARM is THRUPUT, enter NOVALUE. This entry indicates that you accept the throughput class transmission rate entered in refinement RATE. Enter one of the throughput values (T75 to T48000) for selection of a throughput class other than the default value.

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Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	SOURCE	INTERNAL or EXTERNAL	*Clock source.* If the entry in field PARM is CLKSRCE or ELECSPEC, enter data in this refinement.
		RS232 or V35 or 512KV35	If the entry in field PARM is CLKSRCE, enter INTERNAL for the MPC card, or EXTERNAL for a modem device. Link 2 and link 3 must have the same clock source. The clock source can be internal or external. If link 2 and link 3 have different clock sources, the system generates an error message. The default value is EXTERNAL. If the entry in field PARM is ELECSPEC, enter RS232. This entry is the electrical specification for links 2 and 3 on the NT1X89AA multiprotocol controller (MPC) card. If the enhanced MPC (EMPC) is installed, enter RS232 (port 3 is link 3) or V35 (port 1 is link 3). You must enter one of these values because the NT1X89BA/BB enhanced multiprotocol controller card supports both specifications. ***Note:*** The IOM MPC can have value 512KV35. This value supports X2580 or X2584 protocols. The default value is RS232.

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Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	MODVAL	MOD8 or MOD128	*Frame level modulo counter*. If the entry in field PARM is L2MODULO or L3MODULO, enter data in this refinement. Enter a numbering design for end-to-end messaging at level 2 or level 3. Modulo 8 frame sequencing (MOD8) supports a maximum level 2 or level 3 window size of 7. The refinement SIZE is 7. The default value is MOD8.
	SIZE	1 to 127	*Frame window size*. If the entry in field PARM is L2WINDOW or L3WINDOW, enter data in this refinement. Enter the size of the frame window. The frame window is the number of frames that level 2 and level 3 software sends before the levels require a confirmation. The confirmation indicates the software received the first frame. The recommended frame window is 7 because this frame window transmits data faster. In conditions specified, the end application cannot allow a frame window of 7. The digital terminal equipment (DTE) and the digital carrier equipment (DCE) must agree on this parameter. The default value is 2.

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Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE	0 to 255	*Value*. If the entry in field PARM is one of the following, enter data in refinement VALUE: L3ACK, N2, R20, R22, R23, R25, T1_S, T1_10MS, T20, T21, T22, T23, T25, T26, T2_S, T2_10MS, T3_S, T3_10MS, T4_S, T4_10MS. If the entry in field PARM is L3ACK, the system uses this level 3 timer with subfields T2_S and T2_10MS. The entry is in units of 10 ms. The entry must be less than the values in subfields T2_S and T2_10MS. This requirement does not apply if both values are 0. The preferred value is a minimum of 20 ms less than the values in subfields T2_S and T2_10MS. The operating system timing functions of the following cards determine the preferred value: • the NT1X89AA multiprotocol controller cards • the NT1X89BA/BB enhanced multiprotocol controller cards The default value of 0 indicates the system immediately acknowledges incoming data at level 3. To conserve packets when refinement VALUE is not 0, the system starts the timer for an incoming packet. The system starts the timer and waits for reciprocal outgoing data. The reciprocal outgoing data can carry the acknowledgment of the incoming data. If outgoing data is not present, the system acknowledges the incoming data when refinement VALUE expires.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Do not enter data in refinement VALUE unless a pattern of data is present and recognized. The user must use the Level 3 packet acknowledgment correctly. If the user does not use acknowledgment correctly, throughput from the remote node is affected. The default value is 0.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		If the entry in field PARM is N2, 0 is not a correct entry. A value of 255 indicates the counter size does not have a limit. This counter determines the number of times level 2 transmits a frame again. Level 2 transmits the frame again for which the level does not receive an acknowledgment in the retransmission time. Field PARM is T1. The default value is 10. If the entry in field PARM is R20, 0 is not a correct entry. Enter the maximum number of expirations of the restart request timer. Field PARM is T20. When the value for entry T20 expires, the system sends the level 3 restart request again. The system resends the level 3 restart request until the number of requests equals the value entered for value R20. Timing stops if the system receives confirmation of the request. The default value is 1. If the entry in field PARM is R22, 0 is not a correct entry. The default value is 1. If the entry in field PARM is R23, 0 is not a correct entry. Enter the number of clear request retransmissions sent before the counter clears.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			If the entry in field PARM is R25, enter the number of data retransmissions attempted before the system fails the message. The system resets the channel. The data that the system does not acknowledge after the packet acknowledgment timer (T25) expires determines the channel. The default value is 0. If the entry in field PARM is T1_S, 0 is not a correct entry. Enter the time value in steps of 1 s. Entry T1_S is a timer used at level 2 to determine if the remote responds correctly. The system uses this timer with entry N2. The link can change state and reinitialize. This condition occurs under the following conditions: • if the T1_S timer expires the number of times specified in refinement VALUE for parameter N2 • if the T1_S timer does not send the correct acknowledgment of a frame to the remote device The entry in refinement VALUE must be equal to the entry of the remote DCE or DTE for local timer (T_2S) accuracy. If the entry in field PARM is T1_10MS or T2_10MS, the range is 0 or 5 to 255. Enter the time value in steps of 10 s.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		***Note:*** You can enter timer T1_S or timer T1_10MS. You cannot enter both timers. If you do not enter timer T1_S or timer T1_10MS, the default value for timer 1 is 5 s. If the entry in field PARM is T2_S, this timer is the guideline to send an acknowledgment for data received. The real value of this entry must be less than the value entered in refinement VALUE for T1_S or T1_10S. Enter the time value in steps of 1 s. ***Note:*** You can enter timer T2_S or timer T2_10MS. You cannot enter both timers. If you do not enter timer T2_S or timer T2_10MS, the default value for timer 2 is 3 s.
	VALUE (continued)		If the entry in field PARM is T20, T21, T22, or T23, 0 is not a correct entry. The default for timer T20 is 180. The default for timer T21 is 200. The default for timer T23 is 180. If the entry in field PARM is T25, an entry of 0 indicates a time period that is not specified. Value 0 is not a correct entry for protocol X2580. The default value is 0. If the entry in field PARM is T26, 0 is not a correct entry. The default value is 180.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			If the entry in field PARM is T3_S, 0 is not a correct entry. Enter the time value in steps of 1 s. This timer is the idle channel timer. This timer determines when the link logically disconnects after detection of the idle channel state. The system enters the idle channel state when one end detects that I-frames or flags are not incoming on a channel from the remote device. The idle channel time value must be greater than the inactive link timer value. The idle channel time value must be greater than the timer values for timers T1_S or T1_10MS, and T2_S or T2_10MS. If the entry in field PARM is T3_10MS or T4_10MS, the range is 5 to 255. Enter the time value in steps of 10 s. ***Note:*** You can enter data in timer T3_S or timer T3_10MS. You cannot enter data in both timers. If you do not enter timer T3_S or timer T3_10MS, the default value for timer 3 is 25 s.

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		If the entry in field PARM is T4_S, 0 is not a correct entry. Enter the time value in steps of 1 s. This timer is the inactive link timer. This timer times the periodic transmission of a frame to check remote responsiveness. This timer checks remote responsiveness when a higher level of activity on the link is not present. The inactive link timer value must be less than the idle channel timer value. The idle channel timers are T3_S or T3_10MS. The inactive link timer value must be greater than the values for timers T1_S or T1_10MS. ***Note:*** You must enter data for timer T4_S or timer T4_10MS. You cannot enter data for both timers. If you do not enter data for timer T4_S or timer T4_10MS, the default value for timer 4 is 10 s.
	DATASIZE	P16, P32, P64, P128, P256, P512, P1024, P2048, or P4096	*Level 3 data packet size*. If the entry in field PARM is L3DATA, enter data for this refinement. Enter the maximum number of bytes of user data allowed in a data packet. The default value is P128.
	NODE	DCE or DTE	*Node type or address*. If the entry in field PARM is NODETYPE, enter data in this refinement. Enter the node type or address of the MPC. Enter DCE for digital carrier equipment or DTE for data terminal equipment. This entry indicates to the MPC that frame addressing is DCE or DTE. The default value is DTE.

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Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	NUMVCS	0 to 255	*Number of virtual circuits*. If the entry in field PARM is NUMPVCS, SVCS2WAY, SVCSIN, or SVCSOUT, enter data in this refinement. If the entry in field PARM is NUMPVCS, enter the number of permanent virtual circuits (PVC) on the link. If the system does not configure SVCs, a user can configure a maximum of 255 PVCs. The default value is 3. If the entry in field PARM is SVCS2WAY, enter the number of two-way SVCs configured on the link. If the entry in field PARM is SVCSIN, enter the number of one-way incoming SVCs. If the entry in field PARM is SVCSOUT, enter the number of one-way outgoing SVCs.
	NUMVCS (continued)		If the total number of SVCs on a link is not 0, you must enter SVCDNA in subfield EXINF80. The entry SVCTYPE is not an additional information option with the X2580 protocol. If you do not enter any SVCs, the system configures a default of 0 for each type. This condition occurs if the user enters data in some PVCs. If the system does not enter data in PVCs or SVCs, the system rejects the tuple. The system can configure a maximum of 255 SVCs. The total of combined PVCs and SVCs cannot exceed 255 (NUMPVCS + SVCS2WAY + SVCSIN + SVCSOUT ≤ 255)

—continued—

Table 2-10
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	BITSET	DOFF or DON	*Permanent virtual circuit d-bit set*. If the entry in field PARM is PVCDBIT, enter data in this refinement. Enter DOFF to disable the D-bit facility. Enter DON to activate the D-bit facility. Over a network PVC, the network subscription must include the D-bit to use parameter PVCDBIT correctly. The MPC sends all user data with the D-bit set. The MPC acknowledges all incoming D-bit data. This condition applies to PVCs on the link. The call setup process determines the use of the D-bit for an SVC. The default value is DOFF.
	EXINF	see subfield	*Example information protocol*. This field contains subfield EXINFO.
	EXINFO	SVCDNA	*Example information protocol*. Enter SVCDNA if the link uses SVCs. Enter data in refinement DIGITS. If the link uses SVCs, enter $. SVCDNA is the only correct entry.
	DIGITS	0 to 9 (vector of a maximum of 15 entries)	*Digits*. Enter the digits for the network address.

—end—

PROTOCOL = X2580 or X2584

If the entry in subfield PROTOCOL is X2580 or X2584, enter data in refinements CONVNABL, PARMS, and EXINF. Datafill for these refinements appears in Table 2-11.

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584

Field	Subfield or refinement	Entry	Explanation and action
	CONVNABL	0 to 32767	*Conversation enable*. Enter the number of minutes a conversation is not in progress before the system takes corrective action. This value must be a multiple of 5. An entry of 0 indicates a period of time that is not specified. This subfield does not have a default value.
	PARMS	see subfield	*Parameters*. This refinement contains subfield PARMSEL.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM	BAUDRATE, CLKSRCE, CTSTIMER, DCDTIMER, ELECSPEC, ENVIRON, FACILCODE, INITROLE, L1PTTOPT, L2ACCESS, L2MODULO, L2WINDOW, L3DATA, L3MODULO, L3WINDOW, LINEMODE, LINKCONT, LINUSAGE, N2, NODETYPE, NUMPRIO, NUMPVCS, NUMSVCS, PHONE, POOLPCT, R20, R22, R23, R25, R27, STANDARD, SYNCMODE, T1, T2, T20, T21, T22, T23, T24, T25, T26, T27, THRUPUT, TIDLE, TINACTIVE	*Parameter selector*. Enter this field with a vector of a maximum of 46 parameter options. Enter the parameter option and the associated value to change a parameter default value. You must enter parameters as a combination of the parameter type. Enter the parameter name and the value. Enter these items one item at a time in any order. If you require less than 46 options, enter $ to end the list. After you enter all parameter options, proceed to field EXTRAINF. A description of this field appears later in this table. Enter BAUDRATE (baud rate) to specify the baud rate. Enter data in refinement RATE. Datafill for refinement RATE appears later in this table. Enter CLKSRCE (clock source) to specify the source for the MPC system clock. Enter data in refinement SOURCE. Datafill for refinement SOURCE appears later in this table. The system does not support CTSTIMER. The CTSTIMER is the call-through simulator (CTS). Enter CTSTIMER to indicate that timing for CTS is not active on the MPC. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table. The DCDTIMER (DCD timer) is not supported. Enter DCDTIMER to indicate timing failure for DCD. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter ELECSPEC (physical link specification) to determine the electrical specification for links 2 and 3 on the MPC. Enter data in refinement SPEC. Datafill for refinement SPEC appears later in this table. Enter ENVIRON (environment) to specify the protocol environment to establish communications. Enter data in refinement MPCENVRN. Datafill for refinement MPCENVRN appears later in this table. The system does not support FACILCODE (facility code). Enter FACILCODE. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table. Enter INITROLE (initialization role) to indicate the role of the MPC during initialization. Enter data in refinement ROLE. Datafill for refinement ROLE appears later in this table. Enter L1PTTOPT (dedicated link) to specify if the link is dedicated. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter L2ACCESS (level 2 link access procedure) to specify the link access. Enter data in refinement PROTOCOL. Datafill for refinement PROTOCOL appears later in this table.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter L2MODULO (level 2 frame level modulo counter) to specify a numbering scheme for end-to-end messaging at level 2. Enter data in refinement MODVAL. Datafill for refinement MODVAL appears later in this table. Enter L2WINDOW (level 2 frame window size) to specify the size of the frame window. Enter data in refinement SIZE. Datafill for refinement SIZE appears later in this table. **Warning:** Field SIZE must have the same value at the DTE and DCE ends of the data link. If the value is not the same, call processing errors, malfunctions, and lost revenue can occur. Enter L3DATA (level 3 data packet size) to specify the maximum number of bytes of user data allowed in a data packet. Enter data in refinement DATASIZE. Datafill for refinement DATASIZE appears later in this table. Enter L3MODULO (level 3 packet level modulo counter). This entry specifies a protocol numbering scheme for end-to-end messaging at level 3. Enter data in refinement MODVAL. Datafill for refinement MODVAL appears later in this chapter. Enter L3WINDOW (level 3 packet window) to specify the packet level window size. Enter data in refinement SIZE. Datafill for refinement SIZE appears later in this chapter.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Warning: Field SIZE must have the same value at the DTE and DCE ends of the data link. If the value is not the same, call processing errors, malfunctions, and lost revenue can occur. Enter LINEMODE (line mode) to specify the line mode. Enter data in datafill refinement MODE. Datafill for refinement MODE appears later in this chapter. Enter LINKCONT (link control) to specify the link control protocol. Enter data in refinement CONTROL. Datafill for refinement CONTROL appears later in this chapter. Enter LINUSAGE (line usage) to specify the type of circuit. Enter data in refinement LINE. Datafill for refinement LINE appears later in this chapter. Enter N2 (retransmission counter) to specify the size of the retransmission counter. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter NODETYPE (node type or address) to specify the node type or address of the MPC. Enter data in refinement NODE. Datafill for refinement NODE appears later in this chapter. Enter NUMPRIO (number with priority) to specify the number of virtual circuits with high priority. Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this chapter. Enter NUMPVCS. This entry is the number of permanent virtual circuits (PVC). This entry specifies the number of PVCs on the link. Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this chapter. Enter NUMSVCS. This entry is the number of simultaneous virtual circuits (SVC). This entry specifies the number of SVCs on the link. Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this chapter. The system does not support PHONE (phone). Enter PHONE. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this chapter. Enter POOLPCT (pool percentage) to specify the percentage of total buffer pool resources that belong to PVCs. Enter data in refinement PERCENT. Datafill for refinement PERCENT appears later in this chapter.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter R20 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T20). Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter. The user must enter data in parameter T20. Enter R22 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T22). Enter data in refinement VALUE. Datafill for refinement VALUE appears in this chapter. You must enter parameter T22. Enter R23 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T23). Enter data in refinement VALUE. Datafill for refinement VALUE appears in this chapter. You must enter parameter T23. Enter R25 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T25). Enter data in refinement VALUE as appears in this chapter. You must enter parameter T25. The system does not support R27 (reject retransmission count). Enter R27. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this chapter.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter STANDARD (standard) to specify the protocol standards the system must follow for communications on the link. Enter data in refinement STANDARD. Datafill for refinement STANDARD appears later in this chapter. Enter SYNCMODE (synchronous mode) for synchronous communications. Enter data in refinement MODE. Datafill for refinement MODE appears later in this chapter. Enter T1 (retransmission timer) to set the time for the level 2 retransmission timer. This setting specifies if the remote MPC responds correctly. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter. The system does not support T2 (checkpoint). Enter T2. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this chapter. Enter T20 (restart request timer) to determine the transfer of requests to restart level 3. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter. Enter T21 (call restart response timer) to time the remote response to a call request packet. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter T22 (reset request timer) to time the remote response to a reset request. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T23 (clear request response timer) to time the remote response to a reset to clear a virtual call. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. The system does not support T24 (window update timer). Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table. Enter T25 (packet acknowledgement timer) to time an acknowledgement from the remote that reception of a level 3 packet occurred. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T26 (interrupt response timer) to time the remote response if the system transmits an interrupt packet at level 3. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. The system does not support T27 (reject response timer). Enter T27. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Enter THRUPUT (throughput class) for the throughput class across the link for outgoing data. Enter THRUPUT. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table. Enter TIDLE (idle channel timer) to determine when the system logically disconnects a link after the system detects an idle channel state. The idle channel state occurs when one end detects that I-frames or flags are not incoming. The I-frames or flags are not incoming on a channel from the remote. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter TINACTIVE (inactive link timer) to time the periodic transmission of a frame. Perform this action to check remote responsiveness if applications activity does not occur on the link. Enter TINACTIVE to enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table.
	RATE	B300, B600, B1200, B2400, B4800, B9600, B14400, B19200 or B28800	*Baud rate*. If the entry in field PARM is BAUDRATE, enter data in this refinement. Enter the baud rate value for data transmission that is compatible for both ends of the circuit. The baud rate value is in bits per second. The user can enter data in field BAUDRATE if entry of field CLKSRCE is INTERNAL. ***Note:*** The IOM MPC supports baudrates B14400 and B28800. The default value is B2400.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	SOURCE	INTERNAL or EXTERNAL	*Clock source*. If the entry in field PARM is CLKSRCE, enter data in this refinement. Enter INTERNAL for the MPC card or EXTERNAL for a modem device. Links 2 and 3 must have the same clock source. If the user enters a different clock source for links 2 and 3, the system generates an error message. The default value is EXTERNAL.
	DEFAULT	NOVALUE or T75, T150, T300, T600, T1200, T2400, T4800, T9600, T19200, or T48000	*Default*. Enter data in this refinement if the entry in field PARM is one of the following: • CTSTIMER • DCDTIMER • FACILCODE • PHONE • R27 • T2 • T24 • T27 • THRUPUT If the entry in field PARM is THRUPUT, enter NOVALUE. This entry allows the acceptance of the throughput class transmission rate entered in refinement RATE. To select a throughput class other than the default value, enter one of the throughput values. The throughput values are T75 to T48000. If the entry in field PARM is any value other than THRUPUT, the system does not support the parameter. Enter NOVALUE. The default value is NOVALUE.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	ELECSPEC	RS232 or V35	*Specification*. If the entry in field PARM is ELECSPEC, enter RS232 as the electrical specification for links 2 and 3. Links 2 and 3 are on the NT1X89AA multiprotocol controller (MPC) card. If the enhanced MPC (EMPC) is installed, enter RS232 or V35. Port 3 is link 3 for RS232. Port 1 is link 3 for V35. The NT1X89BA/BB enhanced MPC card supports both specifications. The default value is RS232.
	MPCENVRN	DCETODTE or DTETODXE	*Environment*. If the entry in field PARM is ENVIRON, enter this refinement. This parameter specifies the protocol environment to establish communications. If the entry in refinement NODE is DCE, enter DCETODTE. If the entry in refinement NODE is DTE, enter DTETODXE. The default value is DTETODXE.
	ROLE	PASSIVE	*Initialization role*. If the entry in field PARM is INITIROLE, enter data in this refinement. Enter PASSIVE to indicate the role of the MPC during initialization. The default value is PASSIVE.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE	0 to 255 or YES or NO	*Value*. Enter data in this refinement if the entry in field PARM is one of the following: • L1PTTOPT • N2 • R20 • R22 • R23 • R25 • T1 • T20 • T21 • T22 • T23 • T25 • T26 • TIDLE • TINACTIVE If the entry in field PARM is L1PTTOPT, if the link is a dedicated link enter YES. Enter NO if the link is not a dedicated link. If the entry in field PARM is N2, a value of 255 indicates the counter size does not have a limit. This counter determines how many times level 2 transmits a frame again. The system does not receive acknowledgment for this frame in the retransmission time. Field PARM is T1. The default value is 10.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		If the entry in field PARM is R20, 0 is not a correct entry. Enter the maximum number of expirations of the restart request timer (T20). When the value entered for entry T20 expires, the system resends the level 3 restart request. The system resends the request the number of times data is entered for value R20. Timing stops if the system receives confirmation of the request. The default value is 1. If the entry in field PARM is R22, 0 is not a correct entry. The default value is 1. If the entry in field PARM is R23, 0 is not a correct entry. Enter the number of clear request retransmissions sent before the system clears the counter. If the entry in field PARM is R25, enter the number of data retransmissions attempted before the system fails the message. The data that is not acknowledged after the packet acknowledgment timer (T25) expires, determines how the system resets a channel. The default value is 0.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		If the value in field PARM is T1, enter time, in seconds, for the retransmission timer. The system uses a timer at level 2 to determine if the remote MPC responds. Time can expire. the number of times entered for protocol N2 without correct acknowledgment. The correct acknowledgment is of a transmitted frame from the remote. When these conditions occur, the link changes state and reinitializes. An entry of 0 indicates a period of time that is not specified. This entry is not correct. The default value is 3. If the entry in field PARM is T20, T21, T22, or T23, 0 is not a correct entry. The default for timer T20 is 180. The default for timer T21 is 200. The default for timer T23 is 180. If the entry in field PARM is T25, an entry of 0 indicates a time period that is not specified. The default value is 0. If the entry in field PARM is T26, 0 is not a correct entry. The default value is 180. If the entry in field PARM is TIDLE, 0 is not a correct entry. Enter the amount of time, in seconds, that a channel can remain idle before the system disconnects the channel.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		The default value is 180. If the entry in field PARM is TINACTIVE, 0 is not a correct entry. Enter the time, in seconds, that the link can remain idle before the system deactivates the link. The default value is 180. ***Note:*** The value of the inactive link timer (TINACTIVE) must be less than or equal to the value of the idle channel timer (TIDLE). The value of the inactive link timer must be greater than the value of the transmission timer (T1).
	PROTOCOL	LAPB	*Link access procedure*. If the entry in field PARM is L2ACCESS, enter data in this refinement. The system can support link access procedure balance mode (LAPB). Enter LAPB as the type of level 2 link access procedure. The default value is LAPB.
	MODVAL	MOD8 or MOD128	*Frame level modulo counter*. If the entry in field PARM is L2MODULO or L3MODULO, enter data in this refinement. This parameter specifies a numbering scheme for end-to-end messaging at level 2 or level 3. The only correct entry is MOD8. Modulo 8 frame sequencing (MOD8) supports a maximum level 2 or level 3 window size of 7. The refinement SIZE is 7. The default value is MOD8.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	SIZE	1 to 127	*Frame window size*. If the entry in field PARM is L2WINDOW or L3WINDOW, enter data in this refinement. Enter the size of the frame window. The frame window refers to the number of frames that level 2 and level 3 software send before the software requires confirmation. The software receives confirmation that the system received the first frame. The recommended frame window value is 7. A frame window of 7 transmits data faster. The end application does not always allow a frame window of 7. The digital trunk equipment (DTE) and the digital carrier equipment (DCE) must agree on this parameter. The default value is 2. **Warning:** Field SIZE must have the same value at both the DTE and DCE ends of the data link. If the value is not the same, call processing errors, malfunctions, and lost revenue can occur.
	DATASIZE	P256	*Level 3 data packet size*. If the entry in field PARM is L3DATA, enter data in this refinement. Enter the maximum number of bytes of user data allowed in a data packet. The maximum number is 256 (P256). Entries outside this range are not correct. The default value is P128.

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Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	MODE	FDUPLEX SYNC	*Synchronous mode*. If the entry in field PARM is LINEMODE or SYNCMODE, enter data in this refinement. If the entry in field PARM is LINEMODE, full duplex is the only mode that operates on the MPC. Enter FDUPLEX. If the entry in field PARM is SYNCMODE, communications are synchronous on the MPC. Enter SYNC. The default value is SYNC.
	CONTROL	HDLC	*Link control*. If the entry in field PARM is LINKCONT, enter data in this refinement. High-level data link control (HDLC) is the only link control protocol that the MPC can support. Enter HDLC. The default value is HDLC.
	LINE	LEASED	*Line usage*. If the entry in field PARM is LINUSAGE, enter data in this refinement. The MPC can support the four-wire leased circuit (full duplex). Enter LEASED. The default value is LEASED.
	NODE	DCE or DTE	*Node type or address*. If the entry in field PARM is NODETYPE, enter data in this refinement. Enter the node type or address of the MPC. Enter DCE for digital carrier equipment or DTE for data terminal equipment. This entry indicates to the MPC that frame addressing is DCE or DTE. The default value is DTE.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	NUMVCS	0 to 255	*Number of virtual circuits*. If the entry in field PARM is NUMPRIO, NUMPVCS or NUMSVCS, enter data in this refinement. If the entry in field PARM is NUMPRIO, enter the number of virtual circuits with high priority. The value must be less than the total number of virtual circuits entered. The number of circuits entered is protocol NUMPVCS + protocol NUMSVCS. If the user does not specify protocol NUMPVCS or NUMSVCS, the entry for protocol NUMPRIO must be less than 3.
—continued—			

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	NUMVCS (continued)		The default value is 0. If the entry in field PARM is NUMPVCS, enter the number of permanent virtual circuits (PVC) on the link. If the system does not configure SVCs, you can configure a maximum of 255 PVCs. The default value is 3 if the user does not enter data in parameter NUMPVCS or subfield NUMSVCS. If the user specifies parameter NUMSVCS, the default value for parameter NUMPVCS is 0. The user enters a value that is not zero to specify parameter NUMSVCS. If the entry in field PARM is NUMSVCS, enter the number of SVCs configured on the link. The user can enter a value that is not zero for parameter NUMSVCS. If the user enters this value, the user must enter SVCDNA and SVCTYPE in subfield EXINFSEL. The user can configure a maximum of 255 SVCs. The combination of PVCs and SVCs cannot exceed 255.
	PERCENT	0 to 100	*Pool percentage*. If the entry in field PARM is POOLPCT, enter data in this refinement. Enter the percentage of total buffer pool resources for permanent virtual circuits (PVC). The default value is 0.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	STANDARD	BX25 CCITT80 or DDNBASIC	*Standard*. If the entry in field PARM is STANDARD, enter data in this refinement. This parameter specifies the protocol standards the system must follow for communications on the link. The SVC users must specify CCITT80. The PVC users do not need to enter data in this parameter. The default value is BX25.
	EXTRAINF	see subfield	*Extra information*. This refinement contains subfield EXINFSEL.
	EXINFSEL	SVCDNA SVCTYPE	*Extra information selector*. If SVCs are not on the link, do not enter data in this subfield. Enter a maximum of two selectors. If less than two selectors are a requirement, enter $ to end the list. Enter SVCDNA for a data network address. Enter data in refinement DIGITS. Enter SVCTYPE for a switched virtual circuit (SVC) network. Enter data in refinement NETWORK. ***Note:*** If the user does not enter data in SVCs, the system configures a default of 0 for each type. The user must enter data in some permanent virtual circuits (PVC). If the user does not enter data in PVCs, the system rejects the tuple.

—continued—

Table 2-11
Conditional datafill for table MPCLINK; PROTOCOL = X2580 or X2584 (continued)

Field	Subfield or refinement	Entry	Explanation and action
	DIGITS	0 to 9 (vector of a maximum 15 digits)	*Digits*. If the entry in subfield EXINFSEL is SVCDNA, enter data in this refinement. Enter the digits that define the network address. Additional data entries are not a requirement.
	NETWORK	DATAPAC, NTELPAC, DDN	*Network*. If the entry in subfield EXINFSEL is SVCTYPE, enter data in this refinement. Enter the SVC network format. Entries outside this range are not correct.

—end—

PROTOCOL = X25ORIG

If the entry in subfield PROTOCOL is X25ORIG, enter data in refinements CONVNABL, PARMS, and EXTRAINF. The datafill for these refinements appears in in Table 2-12.

Table 2-12
Field descriptions for conditional datafill

Field	Subfield or refinement	Entry	Explanation and action
	CONVNABL	0 to 32767	*Conversation enable*. Enter the number of minutes a conversation is not in progress before the system takes corrective action. This value must be a multiple of 5. An entry of 0 indicates a period of time that is not specified. This subfield does not have a default value.
	PARMS	see subfield	*Parameters*. This refinement contains subfield PARMSEL.

—end—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM	BAUDRATE, CLKSRCE, CTSTIMER, DCDTIMER, ELECSPEC, ENVIRON, FACILCODE, INITROLE, L1PTTOPT, L2ACCESS, L2MODULO, L2WINDOW, L3DATA, L3MODULO, L3WINDOW, LINEMODE, LINKCONT, LINUSAGE, N2, NODETYPE, NUMPRIO, NUMPVCS, NUMSVCS, PHONE, POOLPCT, R20, R22, R23, R25, R27, STANDARD, SYNCMODE, T1, T2, T20, T21, T22, T23, T24, T25, T26, T27, THRUPUT, TIDLE, TINACTIVE	*Parameter selector*. Enter this field with a vector of a maximum of 46 parameter options. Enter the parameter option and the associated value to change a parameter default value. You must enter parameters as a combination of the parameter type. Enter the parameter name and the value. Enter these items one item at a time in any order. If you require less than 46 options, enter $ to end the list. After you enter all parameter options, proceed to field EXTRAINF. A description of this field appears later in this table. Enter BAUDRATE (baud rate) to specify the baud rate. Enter data in refinement RATE. Datafill for refinement RATE appears later in this table. Enter CLKSRCE (clock source) to specify the source for the MPC system clock. Enter data in refinement SOURCE. Datafill for refinement SOURCE appears later in this table. The system does not support CTSTIMER. The CTSTIMER is the call-through simulator (CTS). Enter CTSTIMER to indicate that timing for CTS is not active on the MPC. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table. The DCDTIMER (DCD timer) is not supported. Enter DCDTIMER to indicate timing failure for DCD. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter ELECSPEC (physical link specification) to determine the electrical specification for links 2 and 3 on the MPC. Enter data in refinement SPEC. Datafill for refinement SPEC appears later in this table. Enter ENVIRON (environment) to specify the protocol environment to establish communications. Enter data in refinement MPCENVRN. Datafill for refinement MPCENVRN appears later in this table. The system does not support FACILCODE (facility code). Enter FACILCODE. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table. Enter INITROLE (initialization role) to indicate the role of the MPC during initialization. Enter data in refinement ROLE. Datafill for refinement ROLE appears later in this table. Enter L1PTTOPT (dedicated link) to specify if the link is dedicated. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter L2ACCESS (level 2 link access procedure) to specify the link access. Enter data in refinement PROTOCOL. Datafill for refinement PROTOCOL appears later in this table.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter L2MODULO (level 2 frame level modulo counter) to specify a numbering scheme for end-to-end messaging at level 2. Enter data in refinement MODVAL. Datafill for refinement MODVAL appears later in this table. Enter L2WINDOW (level 2 frame window size) to specify the size of the frame window. Enter data in refinement SIZE. Datafill for refinement SIZE appears later in this table. **Warning:** Field SIZE must have the same value at the DTE and DCE ends of the data link. If the value is not the same, call processing errors, malfunctions, and lost revenue can occur. Enter L3DATA (level 3 data packet size) to specify the maximum number of bytes of user data allowed in a data packet. Enter data in refinement DATASIZE. Datafill for refinement DATASIZE appears later in this table. Enter L3MODULO (level 3 packet level modulo counter). This entry specifies a protocol numbering scheme for end-to-end messaging at level 3. Enter data in refinement MODVAL. Datafill for refinement MODVAL appears later in this chapter. Enter L3WINDOW (level 3 packet window) to specify the packet level window size. Enter data in refinement SIZE. Datafill for refinement SIZE appears later in this chapter.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Warning: Field SIZE must have the same value at the DTE and DCE ends of the data link. If the value is not the same, call processing errors, malfunctions, and lost revenue can occur. Enter LINEMODE (line mode) to specify the line mode. Enter data in datafill refinement MODE. Datafill for refinement MODE appears later in this chapter. Enter LINKCONT (link control) to specify the link control protocol. Enter data in refinement CONTROL. Datafill for refinement CONTROL appears later in this chapter. Enter LINUSAGE (line usage) to specify the type of circuit. Enter data in refinement LINE. Datafill for refinement LINE appears later in this chapter. Enter N2 (retransmission counter) to specify the size of the retransmission counter. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter NODETYPE (node type or address) to specify the node type or address of the MPC. Enter data in refinement NODE. Datafill for refinement NODE appears later in this chapter. Enter NUMPRIO (number with priority) to specify the number of virtual circuits with high priority. Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this chapter. Enter NUMPVCS. This entry is the number of permanent virtual circuits (PVC). This entry specifies the number of PVCs on the link. Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this chapter. Enter NUMSVCS. This entry is the number of simultaneous virtual circuits (SVC). This entry specifies the number of SVCs on the link. Enter data in refinement NUMVCS. Datafill for refinement NUMVCS appears later in this chapter. The system does not support PHONE (phone). Enter PHONE. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this chapter. Enter POOLPCT (pool percentage) to specify the percentage of total buffer pool resources that belong to PVCs. Enter data in refinement PERCENT. Datafill for refinement PERCENT appears later in this chapter.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter R20 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T20). Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter. The user must enter data in parameter T20. Enter R22 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T22). Enter data in refinement VALUE. Datafill for refinement VALUE appears in this chapter. You must enter parameter T22. Enter R23 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T23). Enter data in refinement VALUE. Datafill for refinement VALUE appears in this chapter. You must enter parameter T23. Enter R25 (restart requests count) to specify the maximum number of expirations of the restart request timer (entry T25). Enter data in refinement VALUE as appears in this chapter. You must enter parameter T25. The system does not support R27 (reject retransmission count). Enter R27. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this chapter.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter STANDARD (standard) to specify the protocol standards the system must follow for communications on the link. Enter data in refinement STANDARD. Datafill for refinement STANDARD appears later in this chapter.
			Enter SYNCMODE (synchronous mode) for synchronous communications. Enter data in refinement MODE. Datafill for refinement MODE appears later in this chapter.
			Enter T1 (retransmission timer) to set the time for the level 2 retransmission timer. This setting specifies if the remote MPC responds correctly. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter.
			The system does not support T2 (checkpoint). Enter T2. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this chapter.
			Enter T20 (restart request timer) to determine the transfer of requests to restart level 3. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter.
			Enter T21 (call restart response timer) to time the remote response to a call request packet. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this chapter.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	PARM (continued)		Enter T22 (reset request timer) to time the remote response to a reset request. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T23 (clear request response timer) to time the remote response to a reset to clear a virtual call. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. The system does not support T24 (window update timer). Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table. Enter T25 (packet acknowledgement timer) to time an acknowledgement from the remote that reception of a level 3 packet occurred. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter T26 (interrupt response timer) to time the remote response if the system transmits an interrupt packet at level 3. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. The system does not support T27 (reject response timer). Enter T27. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
			Enter THRUPUT (throughput class) for the throughput class across the link for outgoing data. Enter THRUPUT. Enter data in refinement DEFAULT. Datafill for refinement DEFAULT appears later in this table. Enter TIDLE (idle channel timer) to determine when the system logically disconnects a link after the system detects an idle channel state. The idle channel state occurs when one end detects that I-frames or flags are not incoming. The I-frames or flags are not incoming on a channel from the remote. Enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table. Enter TINACTIVE (inactive link timer) to time the periodic transmission of a frame. Perform this action to check remote responsiveness if applications activity does not occur on the link. Enter TINACTIVE to enter data in refinement VALUE. Datafill for refinement VALUE appears later in this table.
	RATE	B300, B600, B1200, B2400, B4800, B9600, B14400, B19200 or B28800	*Baud rate*. If the entry in field PARM is BAUDRATE, enter data in this refinement. Enter the baud rate value for data transmission that is compatible for both ends of the circuit. The baud rate value is in bits per second. The user can enter data in field BAUDRATE if entry of field CLKSRCE is INTERNAL. ***Note:*** The IOM MPC supports baudrates B14400 and B28800. The default value is B2400.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	SOURCE	INTERNAL or EXTERNAL	*Clock source*. If the entry in field PARM is CLKSRCE, enter data in this refinement. Enter INTERNAL for the MPC card or EXTERNAL for a modem device. Links 2 and 3 must have the same clock source. If the user enters a different clock source for links 2 and 3, the system generates an error message. The default value is EXTERNAL.
	DEFAULT	NOVALUE or T75, T150, T300, T600, T1200, T2400, T4800, T9600, T19200, or T48000	*Default*. Enter data in this refinement if the entry in field PARM is one of the following: • CTSTIMER • DCDTIMER • FACILCODE • PHONE • R27 • T2 • T24 • T27 • THRUPUT If the entry in field PARM is THRUPUT, enter NOVALUE. This entry allows the acceptance of the throughput class transmission rate entered in refinement RATE. To select a throughput class other than the default value, enter one of the throughput values. The throughput values are T75 to T48000. If the entry in field PARM is any value other than THRUPUT, the system does not support the parameter. Enter NOVALUE. The default value is NOVALUE.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	ELECSPEC	RS232 or V35	*Specification*. If the entry in field PARM is ELECSPEC, enter RS232 as the electrical specification for links 2 and 3. Links 2 and 3 are on the NT1X89AA multiprotocol controller (MPC) card. If the enhanced MPC (EMPC) is installed, enter RS232 or V35. Port 3 is link 3 for RS232. Port 1 is link 3 for V35. The NT1X89BA/BB enhanced MPC card supports both specifications. The default value is RS232.
	MPCENVRN	DCETODTE or DTETODXE	*Environment*. If the entry in field PARM is ENVIRON, enter this refinement. This parameter specifies the protocol environment to establish communications. If the entry in refinement NODE is DCE, enter DCETODTE. If the entry in refinement NODE is DTE, enter DTETODXE. The default value is DTETODXE.
	ROLE	PASSIVE	*Initialization role*. If the entry in field PARM is INITIROLE, enter data in this refinement. Enter PASSIVE to indicate the role of the MPC during initialization. The default value is PASSIVE.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE	0 to 255 or YES or NO	*Value*. Enter data in this refinement if the entry in field PARM is one of the following: • L1PTTOPT • N2 • R20 • R22 • R23 • R25 • T1 • T20 • T21 • T22 • T23 • T25 • T26 • TIDLE • TINACTIVE If the entry in field PARM is L1PTTOPT, if the link is a dedicated link enter YES. Enter NO if the link is not a dedicated link. If the entry in field PARM is N2, a value of 255 indicates the counter size does not have a limit. This counter determines how many times level 2 transmits a frame again. The system does not receive acknowledgment for this frame in the retransmission time. Field PARM is T1. The default value is 10.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		If the entry in field PARM is R20, 0 is not a correct entry. Enter the maximum number of expirations of the restart request timer (T20). When the value entered for entry T20 expires, the system resends the level 3 restart request. The system resends the request the number of times data is entered for value R20. Timing stops if the system receives confirmation of the request. The default value is 1. If the entry in field PARM is R22, 0 is not a correct entry. The default value is 1. If the entry in field PARM is R23, 0 is not a correct entry. Enter the number of clear request retransmissions sent before the system clears the counter. If the entry in field PARM is R25, enter the number of data retransmissions attempted before the system fails the message. The data that is not acknowledged after the packet acknowledgment timer (T25) expires, determines how the system resets a channel. The default value is 0.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		If the value in field PARM is T1, enter time, in seconds, for the retransmission timer. The system uses a timer at level 2 to determine if the remote MPC responds. Time can expire. the number of times entered for protocol N2 without correct acknowledgment. The correct acknowledgment is of a transmitted frame from the remote. When these conditions occur, the link changes state and reinitializes. An entry of 0 indicates a period of time that is not specified. This entry is not correct. The default value is 3. If the entry in field PARM is T20, T21, T22, or T23, 0 is not a correct entry. The default for timer T20 is 180. The default for timer T21 is 200. The default for timer T23 is 180. If the entry in field PARM is T25, an entry of 0 indicates a time period that is not specified. The default value is 0. If the entry in field PARM is T26, 0 is not a correct entry. The default value is 180. If the entry in field PARM is TIDLE, 0 is not a correct entry. Enter the amount of time, in seconds, that a channel can remain idle before the system disconnects the channel.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	VALUE (continued)		The default value is 180. If the entry in field PARM is TINACTIVE, 0 is not a correct entry. Enter the time, in seconds, that the link can remain idle before the system deactivates the link. The default value is 180. ***Note:*** The value of the inactive link timer (TINACTIVE) must be less than or equal to the value of the idle channel timer (TIDLE). The value of the inactive link timer must be greater than the value of the transmission timer (T1).
	PROTOCOL	LAPB	*Link access procedure*. If the entry in field PARM is L2ACCESS, enter data in this refinement. The system can support link access procedure balance mode (LAPB). Enter LAPB as the type of level 2 link access procedure. The default value is LAPB.
	MODVAL	MOD8 or MOD128	*Frame level modulo counter*. If the entry in field PARM is L2MODULO or L3MODULO, enter data in this refinement. This parameter specifies a numbering scheme for end-to-end messaging at level 2 or level 3. The only correct entry is MOD8. Modulo 8 frame sequencing (MOD8) supports a maximum level 2 or level 3 window size of 7. The refinement SIZE is 7. The default value is MOD8.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	SIZE	1 to 127	*Frame window size*. If the entry in field PARM is L2WINDOW or L3WINDOW, enter data in this refinement. Enter the size of the frame window. The frame window refers to the number of frames that level 2 and level 3 software send before the software requires confirmation. The software receives confirmation that the system received the first frame. The recommended frame window value is 7. A frame window of 7 transmits data faster. The end application does not always allow a frame window of 7. The digital trunk equipment (DTE) and the digital carrier equipment (DCE) must agree on this parameter. The default value is 2. **Warning:** Field SIZE must have the same value at both the DTE and DCE ends of the data link. If the value is not the same, call processing errors, malfunctions, and lost revenue can occur.
	DATASIZE	P256	*Level 3 data packet size*. If the entry in field PARM is L3DATA, enter data in this refinement. Enter the maximum number of bytes of user data allowed in a data packet. The maximum number is 256 (P256). Entries outside this range are not correct. The default value is P128.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	MODE	FDUPLEX SYNC	*Synchronous mode*. If the entry in field PARM is LINEMODE or SYNCMODE, enter data in this refinement. If the entry in field PARM is LINEMODE, full duplex is the only mode that operates on the MPC. Enter FDUPLEX. If the entry in field PARM is SYNCMODE, communications are synchronous on the MPC. Enter SYNC. The default value is SYNC.
	CONTROL	HDLC	*Link control*. If the entry in field PARM is LINKCONT, enter data in this refinement. High-level data link control (HDLC) is the only link control protocol that the MPC can support. Enter HDLC. The default value is HDLC.
	LINE	LEASED	*Line usage*. If the entry in field PARM is LINUSAGE, enter data in this refinement. The MPC can support the four-wire leased circuit (full duplex). Enter LEASED. The default value is LEASED.
	NODE	DCE or DTE	*Node type or address*. If the entry in field PARM is NODETYPE, enter data in this refinement. Enter the node type or address of the MPC. Enter DCE for digital carrier equipment or DTE for data terminal equipment. This entry indicates to the MPC that frame addressing is DCE or DTE. The default value is DTE.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	NUMVCS	0 to 255	*Number of virtual circuits*. If the entry in field PARM is NUMPRIO, NUMPVCS or NUMSVCS, enter data in this refinement. If the entry in field PARM is NUMPRIO, enter the number of virtual circuits with high priority. The value must be less than the total number of virtual circuits entered. The number of circuits entered is protocol NUMPVCS + protocol NUMSVCS. If the user does not specify protocol NUMPVCS or NUMSVCS, the entry for protocol NUMPRIO must be less than 3.
—continued—			

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	NUMVCS (continued)		The default value is 0. If the entry in field PARM is NUMPVCS, enter the number of permanent virtual circuits (PVC) on the link. If the system does not configure SVCs, you can configure a maximum of 255 PVCs. The default value is 3 if the user does not enter data in parameter NUMPVCS or subfield NUMSVCS. If the user specifies parameter NUMSVCS, the default value for parameter NUMPVCS is 0. The user enters a value that is not zero to specify parameter NUMSVCS. If the entry in field PARM is NUMSVCS, enter the number of SVCs configured on the link. The user can enter a value that is not zero for parameter NUMSVCS. If the user enters this value, the user must enter SVCDNA and SVCTYPE in subfield EXINFSEL. The user can configure a maximum of 255 SVCs. The combination of PVCs and SVCs cannot exceed 255.
	PERCENT	0 to 100	*Pool percentage*. If the entry in field PARM is POOLPCT, enter data in this refinement. Enter the percentage of total buffer pool resources for permanent virtual circuits (PVC). The default value is 0.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	STANDARD	BX25 CCITT80 or DDNBASIC	*Standard*. If the entry in field PARM is STANDARD, enter data in this refinement. This parameter specifies the protocol standards the system must follow for communications on the link. The SVC users must specify CCITT80. The PVC users do not need to enter data in this parameter. The default value is BX25.
	EXTRAINF	see subfield	*Extra information*. This refinement contains subfield EXINFSEL.
	EXINFSEL	SVCDNA SVCTYPE	*Extra information selector*. If SVCs are not on the link, do not enter data in this subfield. Enter a maximum of two selectors. If less than two selectors are a requirement, enter $ to end the list. Enter SVCDNA for a data network address. Enter data in refinement DIGITS. Enter SVCTYPE for a switched virtual circuit (SVC) network. Enter data in refinement NETWORK. ***Note:*** If the user does not enter data in SVCs, the system configures a default of 0 for each type. The user must enter data in some permanent virtual circuits (PVC). If the user does not enter data in PVCs, the system rejects the tuple.

—continued—

Table 2-12
Field descriptions for conditional datafill (continued)

Field	Subfield or refinement	Entry	Explanation and action
	DIGITS	0 to 9 (vector of a maximum 15 digits)	*Digits*. If the entry in subfield EXINFSEL is SVCDNA, enter data in this refinement. Enter the digits that define the network address. Additional data entries are not a requirement.
	NETWORK	DATAPAC, NTELPAC, DDN	*Network*. If the entry in subfield EXINFSEL is SVCTYPE, enter data in this refinement. Enter the SVC network format. Entries outside this range are not correct.

—end—

Datafill example

Figure 2-14 shows a datafill example for table MPCLINK.

Figure 2-14
Datafill example for table MPCLINK

```
  LINKKEY LINKALM
                                                          PRTCLDAT
________________________________________________________________________
    0 3        Y
 X2584 0 55 (CLKSRCE EXTERNAL) (ELECSPEC 512KV35) (L2WINDOW 7)
 (L3DATA P256) (NODETYPE DTE) (SVCSWAY 16) (THRUPUT T48000) $
 (SVCDNA 02580081) $

    1 2        Y
  X25ORIG 0 55 (NUMSVCS 15) (T20 5) (N2 10) (TINACTIVE 10) (TIDLE 120)
  (L2WINDOW 7) (L3WINDOW 2) (STANDARD CCITT80) $ (SVCDNA 0115021000)
  (SVCTYPE DDN) $

    2 3        Y
  X25ORIG 55  55 (NUMSVCS 32) (T20 5) (STANDARD CCITT80) (L2WINDOW 7)
  (L3WINDOW 2) (N2 10) (TIDLE 180) (T1 5) $ (SVCDNA 95800240)
  (SVCTYPE DATAPAC) $
```

The example contains three tuples for table MPCLINK.

In the first tuple for MPC 5, link 2:

- MPC number is 5.
- Link number is 2.
- Link alarm is active.
- Protocol is X25ORIG.
- Link enabling time is 35 min.
- Conversation enabling time is 35 min.

This tuple must contain the following parameters:

- Level 2 frame window is 7.
- Clock source is external.
- Packet acknowledgment timer is 180 s.
- Number of PVCs is 3.

  Note: The user does not enter data in protocol NUMSVCS. The entry in subfield EXTRAINF is $.

In the second tuple for MPC 3, link 3:

- The MPC number is 3.
- The link number is 3.
- The link alarm is active.
- The protocol is X25ORIG.
- The link enabling time is 55 min.
- The conversation enabling time is 55 min.

  Note: The user enters one parameter in this tuple. This parameter is the number of SVCs. The number of SVCs is 32.

Refinement NUMVCS for parameter NUMSVCS has a value that is not zero. The user must complete parameters SVCDNA and SVCTYPE in vector field EXTRAINF as follows:

- The SVC data network address is 3333333.
- The SVC type is DATAPAC.

In the third tuple for MPC 4, link 2:

- The MPC number is 4.
- The link number is 2.

- The link alarm is not active.
- The protocol is ASYNC.
- The link enabling time is 55 min.

This tuple must contain the following parameters:

- The number of bits per character is 7.
- Baud rate is 1200.
- Modem control is FULL.
- Number of stop bits is 1.
- Number of start bits is 1. Default values do not appear.
- Line mode is FULL.
- Parity is EVEN.
- The APLDEFN is NONE.

The link configuration parameters include outgoing end-of-message sequence. The outgoing end-of-message sequence is 0D0A19.

Datafilling table DIRPPOOL

Table DIRPPOOL (Device Independent Recording Package Pool) assigns a pool number, pool name, and device type to a group of volumes to be mounted to a DIRP subsystem. Table DIRPSSYS uses the pool name to specify which pool of volumes a particular subsystem uses. A pool can be referenced by more than one subsystem.

Table DIRPPOOL can contain up to 16 pools, and each pool can contain up to 8 recording volumes. Table 2-13 describes the fields in table DIRPPOOL.

Table 2-13
Table DIRPPOOL field descriptions

Field	Subfield or refinement	Entry	Explanation and action
POOLNO		0–31	*POOL NUMBER*. Enter a value to represent the index number for the recording pool. Select POOLNO when creating individual pools.
POOLNAME		1–8 alphanumeric characters	*POOL NAME*. Enter up to eight alphanumeric characters to define the pool name. Table DIRPSSYS uses this name to index into table DIRPPOOL.

Table 2-13
Table DIRPPOOL field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
POOLTYPE		Regular, Parallel	*POOL TYPE*. Enter the type of volume that the pool contains.
DEVTYPE		TAPE, TAPEX, DISK	*DEVICE TYPE*. Enter either TAPE, TAPEX, or DISK to specify the device type for the pool.
VOLUME0–7		alphanumeric, $	*VOLUMES 0–7*. Specify the volumes assigned within the pools (for example, T0, T1 for tape or D000VOL1, D000AMA1 for disk). Do not mix TAPE and DISK or TAPEX and DISK in one pool. Enter $ if no volume is to be entered.
—end—			

Restrictions for datafilling table DIRPPOOL

These restrictions apply when datafilling table DIRPPOOL:

- Volumes can be changed only from a volume name to nil ($) or from nil to a volume name. To change a volume name, change the original name to nil. After the system generates a DIRP 1001 log report to confirm the change, change the nil entry to the new volume name.
- When a request is made to change a volume to nil ($), DIRP closes as many files as possible on that volume. The request remains pending until this process is completed. The system changes the volume nil only when there are no open DIRP files left on it.
- The device type can be changed if there are no volumes in the pool.
- A tuple in this table can be deleted only if all volumes are assigned as nil ($) and no subsystem references this pool from table DIRPSSYS.
- When a tuple is added or changed, DIRP confirms that the volumes assigned are valid and available.
- A particular volume can be assigned only once in all pools.
- A volume assigned to a pool cannot be assigned elsewhere as a parallel volume (see table DIRPSSYS), and vice versa.
- When more than one volume is assigned to a particular subsystem, arrange them in the table in a pattern of alternating IOC control.

- A volume cannot be deleted from a pool while files on it are being transmitted via the remote data polling feature.
- If a volume is deleted from a pool, all entries for files on the volume are deleted from table DIRPHOLD. Operating company personnel are responsible for transferring and processing these files.
- The pool name can be changed at any time.

Figure 2-15 shows a datafill example for table DIRPPOOL.

Figure 2-15
Datafill example for table DIRPPOOL

```
POOLNO POOLNAME POOLTYPE  DEVTYPE   VOLUME0   VOLUME1
 VOLUME2  VOLUME3  VOLUME4  VOLUME5  VOLUME6  VOLUME7
________________________________________________________
     0  AMAPOOL  REGULAR     TAPE         $        $
       $         $        $        $      $        $
     1  OCCPOOL  REGULAR    DISK    D000AFT1  D000AFT2
D000AFT3  D000AFT4        $        $      $        $
```

Datafilling table DIRPSSYS

Table DIRPSSYS (Device Independent Recording Package Subsystem) configures each subsystem that will use DIRP to record the files that AFT transfers. Table DIRPSSYS can contain up to 24 subsystems.

The fields in this table describe functions that DIRP can perform. The datafill for a specific field determines how DIRP implements that function for the corresponding subsystem.

Table DIRPSSYS uses the pool name to index into table DIRPPOOL, the table that assigns DIRP volumes to pools. Table 2-14 describes the fields in table DIRPSSYS.

Table 2-14
Table DIRPSSYS field descriptions

Field	Subfield or refinement	Entry	Explanation and action
SSYSNAME		alphanumeric	*SUBSYSTEM NAME*. Enter a valid subsystem name to define the subsystem that indexes into table DIRPSSYS (for example, AMA, OM, JF, OCC, SMDR).
READRITE		Y or N	*READ AFTER WRITE*. Enter Y to specify data is to be read after it is written to device types TAPE or DISK (not TAPEX). Setting the value to Y ensures that the information was correctly received by the device before proceeding to the next I/O operation. Enter N if read after write is not needed.
NUMFILES		1–4	*NUMBER OF FILES*. Specifies how many subsystem files are open at any given time. If the value is greater than one, then one of the files serves as the available file, while the other files serve as the standby files. In an emergency, standby files enable a switch of recording duty to a standby device if the available file fails. To ensure correct file assignments across the IOC, do not enter a value of 3. If NUMFILES is assigned a value greater than one, at least one alarm level must be specified.

Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).

—continued—

Table 2-14
Table DIRPSSYS field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
MINFILES		0–3	*MINIMUM NUMBER OF FILES*. Specifies the minimum number of files that must be open at all times. The value must be at least one less than the value of NUMFILES. The system prevents the user from manually closing down the files of a contributing subsystem unless the number of files available for recording data is at least the value entered here.
POOLNAME		1–8 alphanumeric characters	*POOL NAME*. Defines the name of the collection, or pool, of volumes available to a contributing subsystem. Since this field indexes into DIRPPOOL, the entry here must be a valid pool name and must correspond to an entry in table DIRPPOOL. POOLNAME cannot be changed if there are any files open for the subsystem. ***Note:*** Only one subsystem can use a given pool name.
Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).			
—continued—			

Table 2-14
Table DIRPSSYS field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
FILENAME		1–17 alphanumeric characters, $	*FILE NAME*. Enter a valid file name or $. If $ is entered, the system generates a file name that includes file status, a time stamp, file sequence, and a contributing subsystem name. If any of the allowed 17 characters are entered, FILENAME is set to device type TAPE or TAPEX. Disks ignore these 17 characters and always generate a system file name. If special characters are used, (such as a period), single quotes may be required to enclose them (‘’). The system file name is unique and is useful in managing files after DIRP has finished with them. It is recommended that $ always be entered for the JF (Journal File) subsystem to provide chronological ordering information so that a load can be reconstructed from multiple JF files.

Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).

—continued—

Table 2-14
Table DIRPSSYS field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
ALARM0–3		CR, MJ, MN, NA	*FILE ALARMS 0 TO 3*. These fields (ALARM0–ALARM3) control the alarm levels raised when the specified number of files associated with each field either do not exist or are not open for recording. The fields perform these functions: • ALARM0—Sets the alarm level when no files are open. • ALARM1—Sets the alarm level when one file is open. • ALARM2—Sets the alarm level when two files are open. • ALARM3—Sets the alarm level when three files are open. Enter one of these values in each alarm field: • CR—Critical • MJ—Major • MN—Minor • NA—No Alarm The specified severity of an alarm can be the same in one field as the field next to it; however, it cannot increase in severity as more files become open. For example, ALARM1 and ALARM2 can both be minor alarms, but ALARM2 cannot be major while ALARM1 is minor.
Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).			

—continued—

Table 2-14
Table DIRPSSYS field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
RETPD		1–499	*RETENTION PERIOD IN DAYS*. Specifies the retention period in days. This field enforces tape file security. If an attempt is made to erase a file before the expiration date, the system prompts the user. This warning prevents the user from accidentally destroying data. Once the expiration date passes, the file can be erased without special security prompts. This field applies to disk and tape files recorded directly by the DIRP utility. It does not apply to tape files that are copied. For files recorded to disk, this field determines whether the DIRP utility can reclaim the disk space for recording. For files recorded to magnetic tape, this field determines whether the file can be manually erased. This can affect downstream processing. The system erases a file on disk only if the file name begins with P, and then it erases the oldest file on the volume first.
CRETPD		1–499	*RETENTION PERIOD IN DAYS FOR COPIED-TO FILES*. Specifies the retention period in days for copied-to files. The default value is the value entered in the RETPD field.
PARLPOOL		1–8 alphanumeric characters	*PARALLEL POOL*. Enter a valid pool name from table DIRPPOOL to define the parallel pool.

Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).

—continued—

Table 2-14
Table DIRPSSYS field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
PARCONC		Y or N	*PARALLEL CONCURRENT*. Enter Y to activate concurrent parallel recording, if PARVOL is defined. (A subsystem must be datafilled before changing PARCONC from N to Y.) If no errors are discovered, then no new message is displayed. If an error is displayed, table control displays an appropriate message.
MANDPALM		NA, MN, MJ, CR	*MANDATORY PARALLEL ALARM*. Once the MANDPALM field is set to a particular alarm level, Nortel technical support is needed to change to a less severe alarm level.
FILEDATE		OPENED, FIRSTACT, LASTACT, CLOSED	*FILE DATE*. This field allows the system to automatically redate the file. This facility applies only to disk because tape names cannot be renamed safely. Enter one of these values: • OPENED—Places the file name date/time stamp on the file when the file is first opened. • FIRSTACT—Places the date/time stamp on the file the first time the file becomes active. • LASTACT—Updates the file name each time the file becomes active. • CLOSED—Updates the file name when the file is finally closed.

Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).

—continued—

Table 2-14
Table DIRPSSYS field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
Scheduled Rotation		see subfields	*SCHEDULED ROTATION*. Subfields SHEDDAYS, SHEDBASE, and SHEDINCR control the scheduled rotation, which rotates the recording duty from an active file to the first standby. Scheduled rotation stops recording in one file and starts recording in another file at a specified time. By this process, data recording duties are interchanged. Field ROTACLOS specifies whether to close the previously active file.
	SHEDDAYS	Y or N (Character string with 7 boolean fields)	*SCHEDULED ROTATION DAYS*. Specifies the days of the week for rotations. Enter Y or N for each day of the week (Monday through Sunday).
	SHEDBASE	0–23	*SCHEDULED ROTATION BASE*. Specifies the hour the first rotation occurs. More than one rotation can be scheduled per day; see the SCHEDINCR subfield described next.
	SHEDINCR	X1, X2, X3, X4, X6, X8, X12, X24, NOROTATE	*SCHEDULED ROTATION INCREMENTS*. Specifies the number of hours between scheduled rotations, using the first rotation as a base. For example, to schedule rotations at 8:00 a.m. and 8:00 p.m., set SHEDBASE to 8 and SHEDINCR to X12. If no rotation is scheduled, enter NOROTATE in this field.
ROTACLOS		BOTH	*ROTATE CLOSE*. This field closes the file automatically after a scheduled or manual rotation. Enter BOTH for AFT. This value specifies that the files are to be closed, if possible, after both manual and scheduled rotations.

Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).

—continued—

Table 2-14
Table DIRPSSYS field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
AUTOXFER		FULL	*AUTOMATIC TRANSFER*. Controls whether closed files are listed in the DIRP directory table DIRPHOLD. Remote data polling and the DIRPAUTO utility both use this directory of closed files. Enter FULL for AFT. This value enables downstream users to interface the DMS by way of remote data polling to close active/standby files. The files are then identified in table DIRPHOLD. This indicates there are DIRPAUTO and XFER functions, and XFER can rotate and close files.
SPACROTE		Y or N	*SPACE ROTATE*. Enter Y or N to indicate whether the space rotation feature is used in the DIRP utility. If set to Y, files cannot be erased before the date set in the RETPD field. If set to N, the DIRP utility erases an unexpired file to reclaim the disk space for recording.

Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).

—continued—

Table 2-14
Table DIRPSSYS field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
MAXDFSIZ		5–64	*MAXIMUM DISK FILE SIZE*. Specifies the maximum size for the DIRP utility disk files in megabytes. This value corresponds to the maximum size the DIRP utility allows for files in the subsystem defined in that tuple.
PRIORTIO		Y or N	*PRIORITY I/O FILE*. Enter Y or N to indicate whether files associated with this subsystem are high priority. Value Y specifies that files are high priority and have recording priority over other subsystems when writing to and from the I/O devices. Nortel recommends setting this field to Y for most billing purposes.
Note: Prior to adding a tuple to this table, the subsystem to which the tuple pertains to must identify itself to DIRP (bound in).			
—end—			

Additional information about table DIRPSSYS:

- Adding a tuple may require a system warm-start.
- When adding a tuple, DIRP attempts to open up to a total number of files specified by the value entered in field NUMFILES.
- Deleting tuples requires assistance from Nortel technical support.
- Deleting a tuple removes the ability of the subsystem to record.
- Deletion of a tuple can be performed only if there are no files open for that subsystem and PARVOL is assigned as $.
- When deleting a tuple or changing the pool name, all entries for files from that subsystem are deleted from table DIRPHOLD.

For more information on billing capacity, refer to *UCS DMS-250 Billing Server Application Guide*, 297-2621-320.

Figure 2-15 shows a datafill example for table DIRPSSYS.

Figure 2-16
Datafill example for table DIRPSYS

```
SSYSNAME READRITE NUMFILES MINFILES POOLNAME FILENAME
ALARM0 ALARM1 ALARM2 ALARM3 RETPD CRETPD PARLPOOL PARCONC
FILEDATE SHEDDAYS SHEDBASE SHEDINCR ROTACLOS AUTOXFER
SPACROTE MAXDFSIZE PRIORTIO
________________________________________________________
    AMA        Y         2        1  AMAPOOL        $
   CR       MJ    NA      NA     30    30          $     NO
  OPENED  NNNNNNN        0  NOROTATE    BOTH     FULL
      N       64         Y

    OCC        Y         2        1  OCCPOOL        $
   CR       MJ    NA      NA     30    30          $     NO
  OPENED  NNNNNNN        0  NOROTATE    BOTH     FULL
      N       64         Y
```

Datafilling table RASLAPPL

Table RASLAPPL (Robust Application Session Layer Application) maps sessions to links by assigning each session type to a network connection (field NETCON). This network connection is then assigned to a link access type (field ACSINFO).

Table RASLAPPL provides a generic application layer interface to various data communications facilities, including MPC, X25ORIG, or X2580 Nortel (Northern Telecom) X.25 devices. The robust application session layer provides a single interface to support the Network Management system, and serves as a black box interface between applications and data communications systems.

The ACSINFO field acts as a selector. That is, the remainder of the datafill depends on the chosen link access type . Because the link access type for an AFT session is always MPCSVC, this document includes only those fields that appear when field ACSINFO is datafilled with a value of MPCSVC.

Table 2-15 describes the fields in table RASLAPPL.

Table 2-15
Table RASLAPPL field descriptions

Field	Subfield or refinement	Entry	Explanation and action
NETCON		1–16 alphanumeric characters	*NETWORK CONNECTION*. Enter the identifier for the network connection.
APTYPE		AFT, MNP	*Application type*. To set up an AFT session, enter AFT. To set up an AFT-MNP session, enter MNP. ***Note:*** You can datafill a maximum of three AFT sessions.
BUFFSIZE		2–4096	*BUFFER SIZE*. Enter the maximum number of bytes expected in a message received from the far end. Typically for AFT, BUFFSIZE=256.
NUMBUFFS		1–128	*NUMBER OF BUFFERS*. Enter the number of buffers allocated. The value should be larger for higher traffic applications.
ACSINFO		MPCSVC	*ACCESS SELECTOR*. Enter MPCSVC.
MPCNO		0–255	*MULTI-PROTOCOL CONTROLLER NUMBER*. Enter the number that corresponds to table MPC.
LINKNO		0–3	*MULTI-PROTOCOL CONTROLLER LINK NUMBER*. Enter the link number from table MPCLINK.
DNA		0–9 up to 15 digits	*DATA NETWORK ADDRESS*. For outgoing applications, enter the adderess of the remote node to which the connection is being made. For incoming applications, enter the only node address from which a request to establish a connection is accepted.
USERDATA		0–F up to 32 hex digits	*USER DATA*. Enter user data.

—end—

Restrictions for datafilling table RASLAPPL

The following restrictions apply when datafilling table RASLAPPL:

- Table RASLAPPL requires access to aminimum of two links.
- Usage of the CI delete/change command is limited.

Figure 2-17 shows a datafill example for table RASLAPPL for an AFT session.

Figure 2-17
Datafill example for table RASLAPPL for an AFT session

```
NETCON APTYPE BUFFSIZE  NUMBUFFS        ACSINFO
____________________________________________________
  AFT1    AFT     256         4  MPCSVC 2 3 $ $
```

Figure 2-18 shows a datafill example for table RASLAPPL for an AFT-MNP session.

Figure 2-18
Datafill example for table RASLAPPL for an AFT-MNP session

```
NETCON APTYPE BUFFSIZE  NUMBUFFS        ACSINFO
____________________________________________________
  MNP1    MNP     256         4  MPCSVC 2 3 $ $
  MNP2    MNP     256         4  MPCSVC 3 3 $ $
```

Datafilling table GASINFO

Table GASINFO (Generic Application Session Information) defines the real-time transfer (RTT) sessions, their mapping to device independent recording pacakage (DIRP) subsystems, and error recover control variables. This table uses the network connections defined in table RASLAPPL to make the session connection. The other fields in table GASINFO determine the DIRP subsystem that creates the files AFT transfers, the remote file name, window size, the SST node instance, and the node type.

The TRANTYPE field acts as a selector. That is, the remainder of the datafill depends on the chosen transfer session type . Because the transfer type for an AFT session is always AFT, this document includes only those fields that appear when field TRANTYPE is datafilled with a value of AFT.

Table 2-16 describes the fields in table GASINFO.

Table 2-16
Table GASINFO field descriptions

Field	Subfield or refinement	Entry	Explanation and action
NETCON		1–16 alphanumeric characters	*NETWORK CONNECTION*. Enter the network connection name datafilled in table RASLAPPL.
	TRANTYPE	AFT	*TRANSFER TYPE*. To set up an automatic file transfer session, enter AFT.
	SSYS	AMA, CDR, JF, OM	*SUBSYSTEM*. Enter the DIRP subsystem to use for the automatic file transfers. The subsystem must be defined in table DIRPSSYS.
	FILENAME	1–12 alphanumeric characters, $	*FILENAME*. Enter the filename to use in the MTP message. To imbed the DIRP file name in the ACS-SFO message, enter $.
	WINDOW	1–8	*WINDOW*. Enter the window size for file transfers.
	RETRY	0–99	*RETRY*. Enter the number of times that AFT should try to resend the file.
NODETYPE		EIOC_MP, CP_CORE, CFP, EIOC_FP, FOREIGN	*NODE TYPE*. Enter the DAIS node type of the machine where SST resides. ***Note:*** Office parameter NODE in table OFCENG contains the node type and node instance.
NODEINST		0–99	*NODE INSTANCE*. Enter the DAIS node instance of the machine on which SST resides.

—end—

Restrictions for datafilling table GASINFO

Refer to the UCS DMS-250 Customer Data Schema Reference Manual for applicable delete/change commands.

Figure 2-19 shows a datafill example for table RASLAPPL for an AFT session.

Figure 2-19
Datafill example for table RASLAPPL for an AFT session

```
GASKEY                          SPECS
__________________________________________________________
AFT     AFT AMA $   4   3   FOREIGN 0
```

Figure 2-20 shows a datafill example for table GASINFO for an AFT-MNP session.

Figure 2-20
Datafill example for table GASINFO for an AFT-MNP session

```
GASKEY                          SPECS
__________________________________________________________
MNP1    AFT AMA $   4   3   FOREIGN 0
```

Office parameter for tape archive option

The office parameter AFT_REMOVE_COPY_TO_TAPE in table OFCVAR controls the tape archive option. This option allows you to choose whether to archive successfully transferred files to tape.

To archive all files on tape prior to automatic deletion from DIRP, set AFT_REMOVE_COPY_TO_TAPE to no (N). With this setting, AFT waits to change the status of successfully transferred files to processed (P) until the files are manually archived. DIRP does not automatically delete files with an unprocessed (U) status. This means you may need to archive files to tape to free disk space for use by DIRP.

To automatically delete non-CDR files after they have successfully transferred, set AFT_REMOVE_COPY_TO_TAPE to yes (Y). (Non-CDR files are non-billing files; for example, DLOG, JM, and OM files.) AFT marks these files as processed (P) in table DIRPHOLD. These files are automatically deleted as disk space is needed. The tape CDR subsystem files (the billing files captured under the CDR stream) must still be copied after successful transfer before AFT will mark them as processed.

The following settings in table DIRPSSYS apply to the tape archive option:

- Set the field AUTOXFER to FULL; this places the file in table DIRPHOLD.
- Set ROTACLOS to BOTH; DIRP closes a subsystem’s available file after each rotation.
- The field RETPD applies to disk and tape files that the DIRP utility records. It does not apply to tape files that are copied manually by the user.
  - For files recorded to disk, the RETPD field determines wheteher the DIRP utility can reclaim the space for recording. If the SPACROTE field is set to Y, files cannot be erased before the expiration date set in the RETPD field. If SPACROTE is set to N, the DIRP utility erases an unexpired file to reclaim the space for recording.
  - For files recorded automatically to magnetic tape by DIRP, the RETPD field determines whether the file can be manually erased. This can affect downstream processing.

Initiating an AFT session

After datafilling the required tables, execute the following CI commands to initiate file transfer.

AFT

The CI commands specific to AFT are in the AFT CI directory. Enter “AFT” from any MAP level to enter the AFT level that enables you to enter the AFT CI commands.

STARTAFT <session>

The STARTAFT command starts the transfer of files in the AFT system. The parameter <session> specifies the name of an AFT session defined in table GASINFO. When this command is executed, a one-minute timer is started. You can enter the QUERYAFT command to verify that the correct file will be transferred.

When the timer expires, AFT begins transferring files. If there is an override file in the AFT system, AFT transfers that file. Otherwise, AFT transfers the next file. An example of the SARTAFT command for session “aft1” follows:

STARTAFT aft1

X.25 hardware requirements

The UCS DMS-250 X.25 data transport package requires the following hardware:

- One NT1X89BB enhanced multi-protocol controller (EMPC) card for communication between the switch and the UCS host.

  For reliability and redundancy, provision two NT1X89BB cards. Each card can interface to a maximum of two physical X.25 links.

  The MPC file must be downloaded onto the NT1X89BB card. The file name is MPC0nnxx where nn is the software load stream number and xx is the release version of that software load. For example, MPC030BH is the MPC downloadable file for the BCS30BH software load.

- Modems are required to connect the switch to the host if the distance to the host is greater than 50 feet (15m), the Electronic Industries Association (EIA) standard for RS-232.

Enhanced multiprotocol controller (EMPC)

The NT1X89BB enhanced multi–protocol controller (EMPC) is an upgrade of the NT1X89BA EMPC, which is a general-purpose data communication board that resides on the input/output controller (IOC) shelf. The EMPC supports simultaneous RS-232C operation on two programmable ports (2 and 3). Both cards allow these ports to be configured at the maximum rate of 19.2 kbit/s, but the EMPC version has programmable logic (internal Y-connector) that allows a separate V.35 connection on physical port 1 for speeds up to 56 and 64 kbit/s. EMPC allows simultaneous operation of two links where one employs the V.35 port interface and the other remains RS-232C, or where both links employ RS-232C links. However, protocols (BX.25, Sync, and Async) cannot be mixed on one EMPC.

EMPC functional description

The NT1X89BB card provides data communications for the UCS DMS-250 switch. The enhancements to the card provide the following features:

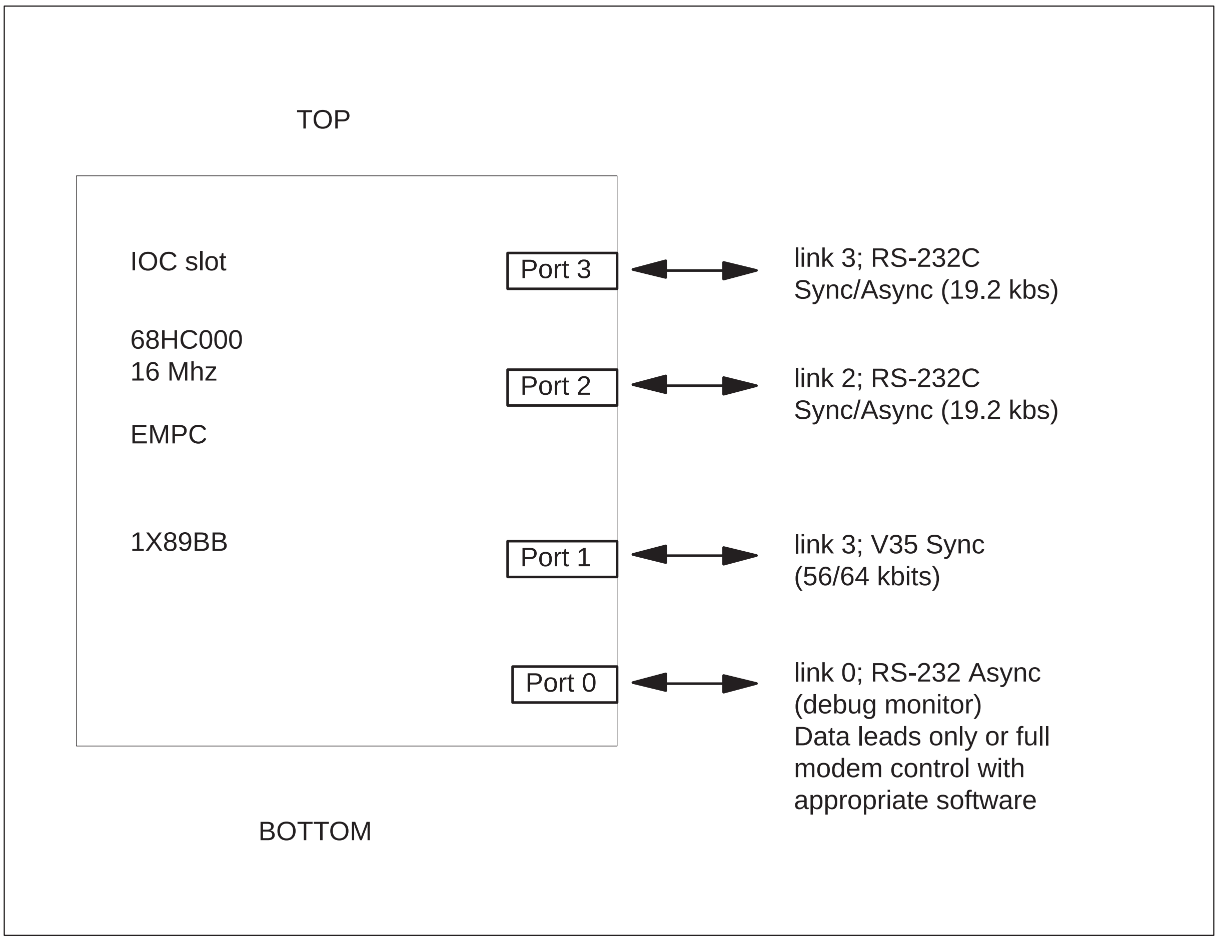
- builds on the existing MPC ROM firmware base to provide downloading and diagnostic compatibility with the existing CC interface
- removes the diagnostics associated with the previous RS-366 port interface because it does not exist in the EMPC
- increases processing speed

Hardware description

The hardware in the NT1X89BB provides four ports capable of input-output to the external world. However, unlike the MPC, these four physical ports of the EMPC map to only three data links; two of the ports (1 and 3) are driven by the same data link, as illustrated in Figure 2-21.

- Port 0—Async only RS-232, for MPC Debug purposes only
- Port 1—Sync V.35, datafilled as Link 3
- Port 2—Sync/Async RS-232
- Port 3—Sync/Async RS-232

Figure 2-21
NT1X89BB EMPC interfaces



EMPC signaling

Interface cables

The cables for the V.35 port (Port 1) are:

- IOC bulkhead to 34-pin connector, NT0X96EF
- IOC bulkhead to DB25 connector, NT0X96EG

The cables for the RS-232 ports (Ports 2 and 3) are:

- Asynchronous—IOC to DB25, NT0X96EH
- Synchronous—IOC to DB25, NT0X26LY

Note: IOC backplanes come in two versions. The older version uses the green hood connectors, and the newer version uses the 2x20 pin connectors.

Interface pin outs

The EMPC employs:

- One of two cables for V.35.
- A DB25 connector. This connector can damage equipment if accidentally connected to RS-232C.
- Other non-V.35 equipment, or V.35 equipment with a DB25 connector that is not compliant with the pin-outs listed in the following table or is not an electrical data communications equipment (DCE).

In addition, the usual V.35 interface connector (34 pin) is available. Its pin-outs are also listed.

Note: There are wiring differences that are dependent on the type of connection, whether it is a V.35 modem or a private line modem.

Table 2-17 lists the pin-outs employed by the EMPC card.

Table 2-17
NT1X89BB EMPC pin outs

DB25 male connector pin	Signal at EMPC	34–pin connector
2	TXDA+	P
3	RXDA+	R
4	RTSV	C
5	CTSV	D
—continued—		

Table 2-17
NT1X89BB EMPC pin outs (continued)

DB25 male connector pin	Signal at EMPC	34–pin connector
6	DSRV	E
7	GROUND	B
8	DCDV	F
13	TXCA–	AA/a
14	TXDA–	S
15	TXCA+	Y
17	RXCA+	V
19	RXCA–	X

—end—

EMPC checklist

Establishing EMPC operation in the UCS DMS-250 switch involves sequentially integrating software and hardware. The checklist provides general guidelines for implementing EMPC functionality in a DMS application. The following four general tasks must be performed before EMPC operation can be activated in the UCS DMS-250 switch:

- Verify EMPC cards installed in the IOC shelf.
- Datafill the MPC tables.
- List the MPC download file.
- Download the MPC software file.

Verify EMPC cards installed in the IOC shelf

Although it may be possible to use only one EMPC card, at least one additional card should be available as a spare. If a second card is installed, it should be on a different IOC shelf to maximize reliability. When installing several EMPC cards, spread the cards evenly over all available IOCs.

Make a note of the positions (IOC number and circuit number) of each EMPC card. This information is used to identify the card while datafilling table MPC.

Datafilling MPC tables

Datafill should be completed before downloading the MPC software. There are several key tables, MPC and MPCLINK, in addition to others that an application may require. Datafill identifies MPC download file, card, and link information to the UCS DMS-250.

List the MPC download file

In table MPC, the download file is identified in field DLDFILE. The MPC download file contains the software for the MPC card and is stored for backup purposes. The MPC download file must be placed in the user directory to allow the switch CC to recognize the file as valid. To place the file in the user directory, list the directory of the storage device holding the download file at the user's MAP terminal. Listing the download file prior to datafilling the file name in table MPC, will generate a warning that the download may fail.

Download the MPC software file

The MPC download files are included in the Peripheral Module (PM) software load delivered either with the switch or as part of a software upgrade. Since the MPC software is treated as an extended peripheral software, the MPC software load must be downloaded to the EMPC card to establish communication with the CC. If the card is not downloaded with the proper MPC software, it will not function. Verification of downloading is accomplished at the MAP MPC board status display level.

If the MPC board status is DNLDED, then the MPC file has been downloaded. A board status of NOLOAD indicates that the MPC software file needs to be downloaded to the EMPC card. The MPC download file activity must successfully complete before the EMPC can be operational.

MPC download file naming convention

There may be several MPC download files identified in the PM software load. The naming convention used for the MPC download file indicated the protocol level, software load level, and load level file version, as follows.

mpcabbnn

where

a =	X—for the BX.25 0—for CCITT 1980 X.25 MPC 4—for CCITT 1984 X.25 MPC
bb =	software load level
nn =	software release version, for example, BX

Examples of actual MPC download file names used for UCS07 follow:

mpc403ac
mpc003ac
mpcx33ab
mpca03ac

TCP/IP Ethernet interface

Overview

Transmission Control Protocol/Internet Protocol (TCP/IP) is a suite of network protocols referred to as “Internet Protocol Suite.” The suite gets its name from two of several protocols that belong to it: the Transmission Control Protocol (TCP) and the Internet Protocol (IP). This chapter explains how a computer uses TCP/IP protocols to connect to and to access the Ethernet Interface Unit (EIU) located in the UCS DMS-250 switch.

Functional applications

The functional applications associated with the UCS DMS-250 switch TCP/IP Ethernet interface are defined in the following paragraphs.

File Transfer Protocol (FTP)

FTP is a protocol that allows files to be transferred between the UCS DMS-250 switch and a remote workstation at a host computer. FTP supports two types of data transfer:

- binary—allows any kind of file to be transferred
- text—restricts transfers to files that contain text only

Information and commands for using FTP at the UCS DMS-250 switch are provided in the section, “Using FTP.”

Telecommunications Network (Telnet)

Telnet is a terminal emulation protocol that permits login from a workstation on the host computer to the remote UCS DMS-250 switch. Using Telnet, a technician at a workstation can run programs that are resident on a remote UCS DMS-250 switch—just as if the workstation were attached to the switch. The MAP screen data from the switch is displayed on the workstation screen. The commands and data entered from the workstation keyboard are sent across the network to the remote switch.

When there is a large amount of data on the switch that needs processing in some way, using FTP to transfer the data across the network for local processing on a workstation is a time-consuming task. It reduces the available network capacity for other users. The Telnet tool is useful because it allows the user to perform tasks on the data and do maintenance remotely.

Information and commands for using Telnet at a workstation are provided in a later section, “Using Telnet.”

Routing Information Protocol (RIP)

Routing Information Protocol (RIP) is a protocol that is used by network devices in the exchange of routing information. The industry standard RIP is implemented for an Ethernet interface unit (EIU) to enable it to participate in the exchange of dynamic routing information with other IP routers on the Ethernet LAN. The dynamic routing information is required on the switch to be able to route datagrams to hosts on distant LANs.

This protocol is transparent to the FTP and Telnet user.

Note: The FTP and Telnet protocols require the user to have some knowledge of the network; details the user needs are provided in this document. Other protocols, like RIP, are transparent to the user; this protocol is introduced in this document and is shown in some illustrations for reference purposes only.

For further information about RIP and other network level protocols, refer to *UCS DMS-250 TCP/IP Applications Guide*.

Spontaneous reporting (SPR)

Spontaneous reporting (SPR) enables the switch to transfer logs and trunk group operational measurements (OM) to a host. Two modified SPR sessions—Short INterval Statistics (SINS) and Long INterval Statistics (LINS)—enable the transfer of trunk group OMs. The sessions themselves enable the flow of logs only. CI commands and datafill of the log system turn on or turn off the flow of logs and allow log selection.

For further information about the SPR application, refer to the *UCS DMS-250 X.25 Data Transport Feature Application Guide,* 297-2621-360.

Using FTP

FTP provides high-speed file transfer capabilities between the UCS DMS-250 switch and a remote workstation at a host computer.

Definition of FTP

FTP is an internationally accepted protocol for exchanging files between computing devices. The FTP implementation on the UCS DMS-250 switch conforms to industry standards. Therefore, files can be exchanged between the computing module (CM), file processor (FP), workstations, mainframes, and other computing platforms that have FTP implementations. The files can be of many formats and the computing devices can be hosts with different file systems.

FTP is a session-oriented tool. This means a session must be established through login before files can be exchanged. This implies the need for userids and passwords.

Client and server programs

The FTP software consists of two parts:

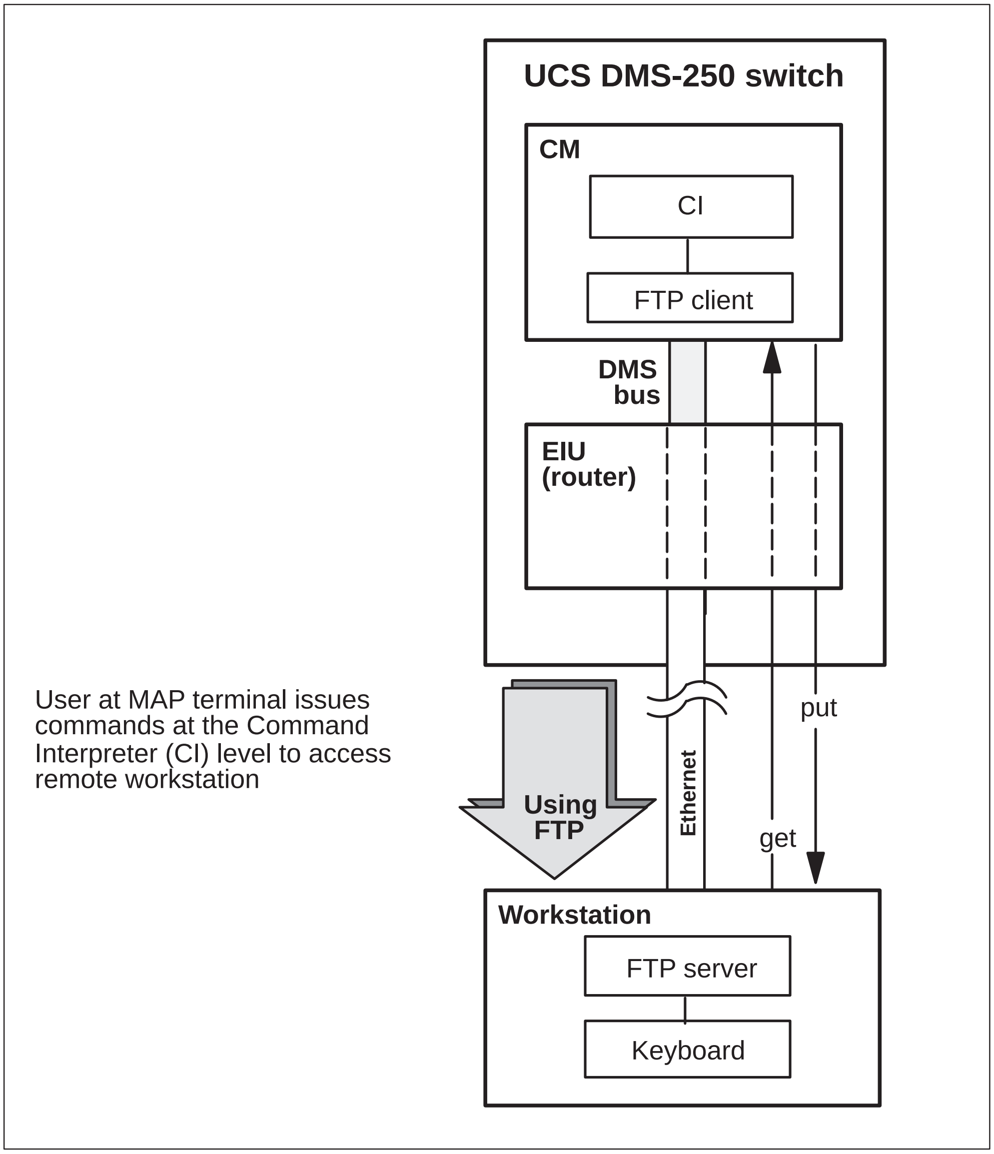
- a client program that resides on the accessing computer (switch)
- a server program that resides on the accessed computer (workstation)

Server and client protocols are required for both ends of two cooperating application processes that are communicating across a network. The cooperating applications could be remote login, file transfer, or any arbitrary application.

The FTP server is a passive logical entity residing at the workstation. It provides some type of specified service based upon the requirements of the application and does not initiate any request or service; instead, it waits (listens) for a request from a client.

The FTP client is an active logical entity residing at the UCS DMS-250 switch. It initiates requests to the server. The client could be viewed as a command that the user issues and the server could be viewed as the object that responds to the client command.

Figure 3-1
Using FTP to transfer files to/from remote host workstation



Filename conventions

Filenames must adhere to the following conventions when using FTP on the UCS DMS-250 switch.

- Full pathnames must start with the “:” character.
- Destination and source file names on the remote host can be in lowercase or uppercase. However, because the switch’s CI tries to convert every letter on the command line to uppercase, single quotation marks must be placed around lowercase pathnames.

UCS DMS-250 switch supported FTP commands

The SuperNode FTP feature provides full file transfer capabilities between UCS DMS-250 nodes, as well as nodes external to the UCS DMS-250 switch. The number of FTP connections is configurable for each node and provides a user interface plus CI for FTP client sessions.

Table 3-1 lists the commands that the UCS DMS-250 FTP client implementation supports. The commands are listed in alphabetic order.

Note: FTP clients are slightly different from one implementation to another. Some clients have more commands than others. The UCS DMS-250 switch’s client has a small command list, but it has the quote command feature that allows it to send any command “as-is.”

Table 3-1
FTP commands

Command	Brief description
ascii	Changes the transfer to ASCII type
binary	Changes the transfer to binary type
cd	Changes the working directory
delete	Deletes the file specified in the pathname
dir	Lists the directory
ftpclose	Closes the connections with the remote host
ftpdebug	Sets debug messages on or off
ftpopen	Establishes connection to remote host
ftpquery	Prints file attributes
ftpquit	Closes the connection
get	Gets a file from the remote server
help	Provides information on commands
lcd	Changes the local working directory
lrecl	Sends the SITE LRECL command
ls	Lists the directory
mkdir	Makes (creates) a new directory
noop	Is a NO-OP (no operation) command

—continued—

Table 3-1
FTP commands (continued)

Command	Brief description
pass	Sends the password to remote host
put	Sends the file to remote host
pwd	Prints the working directory
quit	Closes the connection and quits CI
quote	Sends arguments as typed to the remote host
rename	Renames a file
rmdir	Removes (deletes) a directory
status	Provides the remote status
user	Sends the username to remote host
—end—	

Using basic UCS DMS-250 FTP client functionality

At the UCS DMS-250 switch CI level, use the FTP client to establish a session with a workstation attached to another host. After a session is established, use the *get* and *put* commands to transfer files between the UCS DMS-250 switch and the remote host. The commands to perform this functionality are described next.

Establishing an FTP session from the UCS DMS-250 switch

At the > prompt, enter “FTP” and the CM IP address. An example is given in Figure 3-2.

Figure 3-2
Establishing FTP session from the switch

```
>ftp ‘47.12.0.2’
Allocated a Session ID Successfully
220 crchh93f FTP server (Version $Revision: 1.21 $ $Date:
93/12/21 10:19:25 $)
```

Entering the host's userid and password

Enter the host's userid when prompted for it. In the example in Figure 3-3, the userid is "johnqdoe." When prompted for the password, enter it. The password will not be displayed on your screen.

Figure 3-3
Entering userid and password on the host

```
USERNAME:
>user johnqdoe
331 Password required.
PASSWORD:
>pass <password>
230 User johnqdoe logged in.
```

The user is now logged into the host with IP address 47.12.0.0 at the default directory; in this case, the default directory is the HOME directory of the host.

Finding out where you are

To determine your current working directory, issue the command *pwd* (print working directory). In the example in Figure 3-4, user johnqdoe is shown to be working in the directory /bnr/users/u2/johnqdoe.

Figure 3-4
Determining the current working directory (pwd)

```
>pwd
 251 "/bnr/users/u2johnqdoe" is the current working directory
```

Determining which files are in your directory

To determine what files are in the current working directory, issue the command *ls* to get the file names (Figure 3-5) or the command *dir* to get the filenames with file access privileges, file size, and other information (Figure 3-6).

Figure 3-5
Determining files in the current working directory (ls)

```
>ls
EDMA_Mina_2
TEAM2
WS_FTP_D2
WS_FTP_S1
WS_FTP_S2
al255
```

Figure 3-6
Determining files in the current working directory (dir)

```
>dir
total 2028
drwxr-x---  2 johnqdoe abcdef 1024 Jan 31 20:22 EDMS_Mina_2
-rw-r-----  1 johnqdoe abcdef    0 Jan 29 09:49 TEAM2
-rw-r-----  1 johnqdoe abcdef 1105 Jan 20 13:44 WS_FTP_D2
-rwxr-xr-x  1 johnqdoe abcdef 1142 Feb  6 10:32 WS_FTP_S1
-rwxr-xr-x  2 johnqdoe abcdef 1042 Feb  6 07:48 WS_FTP_S2
drwxr-x---  2 johnqdoe abcdef 1024 Jul 16 1991 al255
```

Changing to another directory at remote host

To change to another directory at the remote host, issue the command *cd* (change directory). Figure 3-7 shows an example of an error that occurs when the quotation marks are not given around the directory pathname.

Figure 3-7
Example of error when using cd command

```
>cd /team/bin
**** error ****
```

The example in Figure 3-7 shows an error condition caused because the UCS DMS-250 CI translates the command to “CD/TEAM/BIN” but /TEAM/BIN does not exist on the other host. To correct this error, use single quotation marks around the path name. This is shown in Figure 3-8.

Figure 3-8
Changing the current working directory at remote host (cd)

```
>cd ‘/team/bin’
200 CWD command okay.
```

Changing to another directory locally

To change to another local directory at the UCS DMS-250 switch, issue the command *lcd* (change local working directory). There are two ways to do this, as shown in Figures 3-9 and 3-10. In these examples, notice the use of single quotation marks and uppercase letters. The quotation marks and all uppercase letters are used this load does not support because disk drive unit (DDU) volumes.

Figure 3-9
Changing the local working directory at the switch (lcd)

```
>lcd ‘/S00DTMCE’
ftp: Local directory changed
```

Figure 3-10
Changing the local working directory (second lcd example)

```
>lcd :/S00DMTCE
ftp: Local directory changed
```

Getting an ASCII file from the remote host

Figure 3-11 shows an example of transferring an ASCII file (named trahelp.text) from the remote host to the current local directory on the UCS DMS-250 switch. Because the FTP default type is ASCII, specifying the type explicitly, as shown in this example, is optional.

Figure 3-11
Transferring a text file from remote host (get)

```
>ascii
200 Type set to A.
>get ‘trahelp.text’ trahelp.text
226 Transfer complete.
12365 bytes transferred in 0hrs.0mins.4secs.110ms (3008 Bps)
```

Putting an ASCII file onto the remote host

Figure 3-12 shows an example of transferring an ASCII file named RECORDFILE from the volume S00DIMAGEREG on the UCS DMS-250 switch to the current working directory on the remote host, renaming it to jan18.log on the remote host.

Note: UCS DMS-250 file and volume names must be uppercase because DDU volumes are not supported in this load.

Because the FTP default type is ASCII, specifying the type explicitly, as shown in this example, is optional.

Figure 3-12
Transferring a text file to remote host (put)

```
>ascii
200 Type set to A.
>put :/S00DIMAGEREG/RECORDFILE ’jan18.log’
226 Transfer complete.
12365 bytes transferred in 0hrs.0mins.4secs.110ms (3008 Bps)
```

Getting a LOAD68K binary file from the remote host

LOAD68K files are binary files. The record length is 256 bytes. Before you transfer a LOAD68K file from the remote host, you must set the type to binary and the record length to 256.

Figures 3-13 and 3-14 show two ways of transferring a binary file named file1.68k in directory /load68k from the remote host to the local directory, S00IMAGE, on the UCS DMS-250 switch. The file is renamed to FILE1$LD on the switch.

Note: Figure 3-13 provides an example of an error situation.

Figure 3-13
Transferring a binary file from remote host (get)

```
>binary
200 Type set to I.
>lrecl ‘256’
500 ‘SITE LRECL 256 FIX’” command not understood
****– Ignore the above error message.
>lcd ‘/S00DIMAGE’
>get ‘/load68k/file1.68k’ file1$ld
```

Figure 3-14
Transferring a binary file (second get example)

```
>binary
200 Type set to I.
>get ‘/load68k/file1.68k’ :/S00DIMAGE/file1$ld
```

Getting a UNIPLed SOSIMAGE binary file from the remote host

UNIPLed SOSIMAGE files are binary files with record length of 512 bytes. Before you transfer a UNIPLed SOSIMAGE file from the remote host, you must set the type to binary and the record length to 512.

Figure 3-15 shows an example of transferring a UNIPLed SOSIMAGE binary file named file2.sosimage in directory /unipl from the remote host to the local directory, S00DIMAGEREG, on the UCS DMS-250 switch. The file is renamed to FILE2IMAGE on the switch.

Figure 3-15
Transferring a UNIPLed SOSIMAGE file from remote host (get)

```
>binary
200 Type set to I.
>lrecl ‘512’
502 SITE command not implemented
****– Ignore the above error message.
>get ‘/unipl/file2sosimage’ :/S00DIMAGREG/FILE2IMAGE
```

Getting an IPLed SOSIMAGE binary file from the remote host

IPLed SOSIMAGE files are binary files with record length of 1020 bytes. Before you transfer an IPLed SOSIMAGE file from the remote host, set the type to binary and the record length to 1020.

Figure 3-16 shows an example of transferring an IPLed SOSIMAGE binary file named file3.image in directory /ipl from the remote host to the local directory, S00DIMAGETST, on the UCS DMS-250 switch. The file is renamed to FILE3IMAGE on the switch.

Figure 3-16
Transferring an IPLed SOSIMAGE file from remote host (get)

```
>binary
200 Type set to I.
>lrecl 1020
502 SITE command not implemented.
****– Ignore the above error message.
>get ‘/lpl/file3.image’ :S00DIMAGETST/file3image
```

Putting an IMAGE or UNIPLed load to the remote host

Figure 3-17 shows an example of transferring an image file named IMAGE1 from the volume S00DMTCE on the UCS DMS-250 switch to the current working directory on the remote host, naming it image1 on the remote host. This figure also shows an example of transferring a file named FILE1_UNIPL from the volume S00DMTCE on the UCS DMS-250 switch to the current working directory on the remote host, naming it file1_unipl on the remote host.

Figure 3-17
Transferring IMAGE and UNIPL files to remote host (put)

```
>binary
>put :/S00DMTCE/IMAGE1 ‘image1’
>put :/S00DMTCE/FILE1_UNIPL ’file1_unipl’
```

Using Telnet

Telecommunications Network (Telnet) is a standard protocol used at a host workstation when a user wants to log in from that host workstation onto a remote UCS DMS-250 switch.

Note: A user at a MAP terminal on a UCS DMS-250 switch who wants high-speed file transfer capabilities between that switch and a remote workstation must use FTP (described in the previous section, “Using FTP”).

Definition of Telnet

Telnet can be defined as an application-level service tool of the TCP/IP suite of protocols for communicating between remote computers. This service allows users to log onto a remote system without any knowledge of the lower-level network protocols. Your node is treated as if it were a local terminal on the switch.

Client and server programs

The Telnet software consists of two parts:

- a client program that resides on the accessing computer (workstation)
- a server program that resides on the accessed computer (switch)

The server program at the switch listens on a known port for connections from clients at workstations. After a connection is established, the client redirects all user keyboard input to the server. The server then passes it to the accessed program (for example, a login, CI, or some other program). The server intercepts all program output and redirects it to the client. The client then prints it on the client machine’s screen for the user.

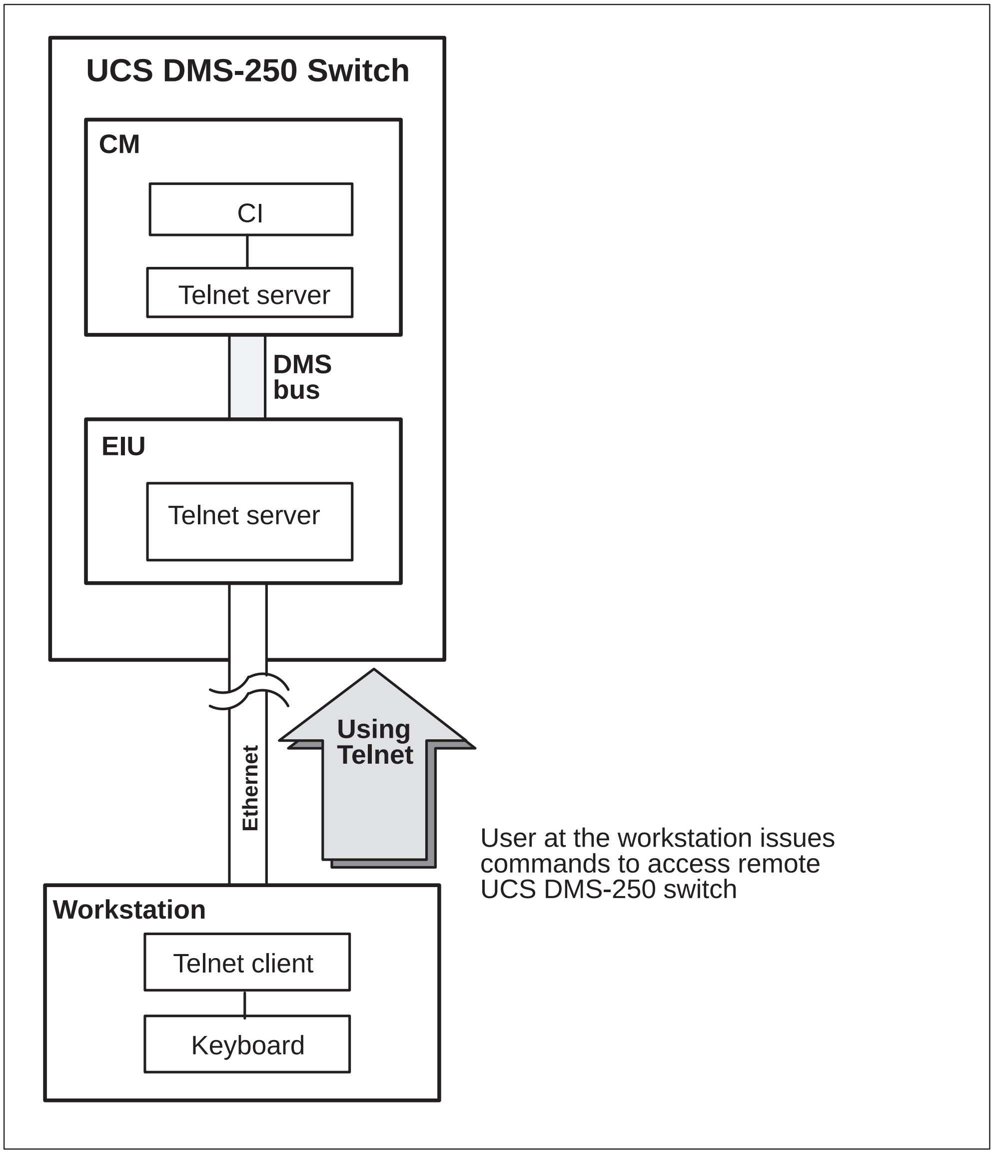
In the UCS DMS-250 switch, the main purpose of the Telnet server is to provide access to MAPCI from a workstation. MAPCI supports asynchronous output to both a scroll area and a “full screen” area. MAPCI input, however, is buffered in a line-by-line mode. The Telnet server performs remote echoing of the input characters back to the Telnet client and ultimately to the workstation.

Telnet architecture

CSP05 software moves the Telnet server from the EIU to the CM. Telnet servers may reside on the file processor, CM, or EIU. By moving the Telnet server to the CM, you can Telnet directly to the CM and other SOS based host processors (such as FP and EIU). See Figure 3-18.

When a user Telnets directly to the CM or FP, the EIU acts as an IP router. If a user Telnets directly to the EIU, the EIU acts as a Telnet host.

Figure 3-18
Using Telnet to access remote UCS DMS-250 switch



Telnet features

The RMAP access and EIU/Telnet enhancements features relating to Telnet are described in the following paragraphs.

Remote MAP access

RMAP access is provided through a Telnet server on the UCS DMS-250 switch. This feature implements an RMAP server on the CM that provides:

- the RMAP implementation of a Physical File System (PFS)

- the implementation of a process for each Telnet session
- a known address to which an RMAP client sends connection requests
- management and auditing of processes
- the Telnet server with CI and MAPCI updates

RMAP access is also provided through a Telnet server that resides on an EIU of the UCS DMS-250 switch that:

- receives keyboard input from a Telnet client program by way of standard utility routines
- provides Telnet access to the UCS DMS-250 switch from any VT100-compatible device that can access the UCS DMS-250 switch by way of TCP/IP; line-by-line and full screen MAP access are supported

Enhancements to Telnet allow:

- support of a subset of the <BREAK> commands which include:
  - — HELP, which outlines differences between Telnet MAP and normal MAP
  - — HT, which halts output to Telnet server, discarding output until the next read request is received
  - — HX, which halts execution message to the Telnet server
  - — HXX (same as HX)
  - — LOGIN, which sends a login message to the Telnet server to start a new CI session
  - — LOGOUT, which sends a logout message to the Telnet server to terminate the session
  - — MORE {# lines}, which turns on the “MORE...” prompt during scrolling; the number of lines default to 24 with a maximum of 999
  - — NOMORE, which turns off the “MORE...” prompt during scrolling
  - — RT, which sends a continue output message to the RMAP server, restarting output
  - — STOP (same as HX)
- more than one input file to be open at a time
- changes to the RMAP protocol to support new message types and changed message types

EIU/Telnet enhancements

EIU/Telnet enhancements provide

- simultaneous Telnet sessions (limited only by the number of TCP connections available) supported on the UCS DMS-250 switch
- logs for statistical and error tracking information
- configurable number of Telnet sessions via table control, using table RMCONFIG

Using basic UCS DMS-250 Telnet functionality

At a host workstation, you can use Telnet to establish a MAP session with the UCS DMS-250 switch. After a session is established, all standard UCS DMS-250 switch MAP commands may be issued to the remote switch from the host workstation. The commands to perform this basic functionality are described next.

CAUTION
Adhere to filename conventions
Uppercase letters must be used when specifying UCS DMS-250 file and volume names because DDU volumes are not supported in this load.

Establishing a Telnet session from the workstation

First, at the $ prompt on your host workstation, enter the Telnet tool. You can do this in one of two ways, as shown in Figures 3-19 and 3-20. The Figure 3-19 example shows how you can type ”Telnet” with the IP address of the EIU node (destination) to which you want to be connected. The IP address format is ddd.ddd.ddd.ddd,where *d* is a decimal number.

Figure 3-19
Establishing a Telnet session from the host (method 1)

```
crchh93f:/bnr/users/u2/johnqdoe $ Telnet 47.92.192.6
Trying...
```

Note: The IP addresses of EIU are datafilled in table IPHOST in field NODEINFO subfield SNADDR and in table IPROUTER in field SNIPADR.

The second way you can establish a Telnet session is to type ”Telnet” and omit the IP address of the EIU node (destination) to which you want to be connected. If you omit the IP address destination or if you specify an asterisk (*), you are prompted for a command. In this case, you issue the subcommand OPEN in response to the telnet> prompt. This is shown in Figure 3-20.

Figure 3-20
Establishing a Telnet session from the host (method 2)

```
crchh93f:/bnr/users/u2/johnqdoe $ Telnet
telnet>OPEN
Trying...
```

After you have specified a node, Telnet responds with a message (“Trying...”) telling you that it is attempting to make the connection (see Figures 3-19 and 3-20). This is followed by a second message either telling you that the connection has been completed or reporting an error. There may be a pause while the network connection is attempted; this is normal.

Logging into Telnet

After a session is established (a connection to the UCS DMS-250 switch has been made), user login is requested. You should log into the switch in the usual manner giving your username and password; you are talking to the switch just as though you were entering data at a MAP terminal. (See Figure 3-21).

Figure 3-21
Logging into a Telnet session

```
Enter username and password
>ab ip
AB logged in on 1994/07/31 at 00:25:20.
94/07/24 14:58 **** mucs02bq_2501 datafill 2501 ****
>
```

At this point, any standard MAP command and operation may be executed and output should be a standard MAP response. For information on standard MAP commands, refer to Chapter 5, “UCS DMS-250 switch access.”

Logging out from Telnet

To log out from a Telnet session, enter ”logout” at a CI prompt (see Figure 3-22).

Figure 3-22
Logging out from a Telnet session

```
>logout
BYE BYE
AB logged out on 1994/07/31 at 00:39:09.
Connection closed by foreign host.
crchh93f:/abc/users/u2/johnqdoe $
```

TCP/IP datafill requirements

The hardware interacts with the software through the tables described in this section. An interdependence exists between several of these tables. Therefore, the tables must be datafilled in a certain order—as listed and described in this section.

In preparing the software to interact with the hardware, you must

- calculate the number of TCP connections needed and configure the computing module (CM) and Ethernet interface unit (EIU)
- datafill the tables (engineer the switch to do the datafill) which, in turn, activates the software

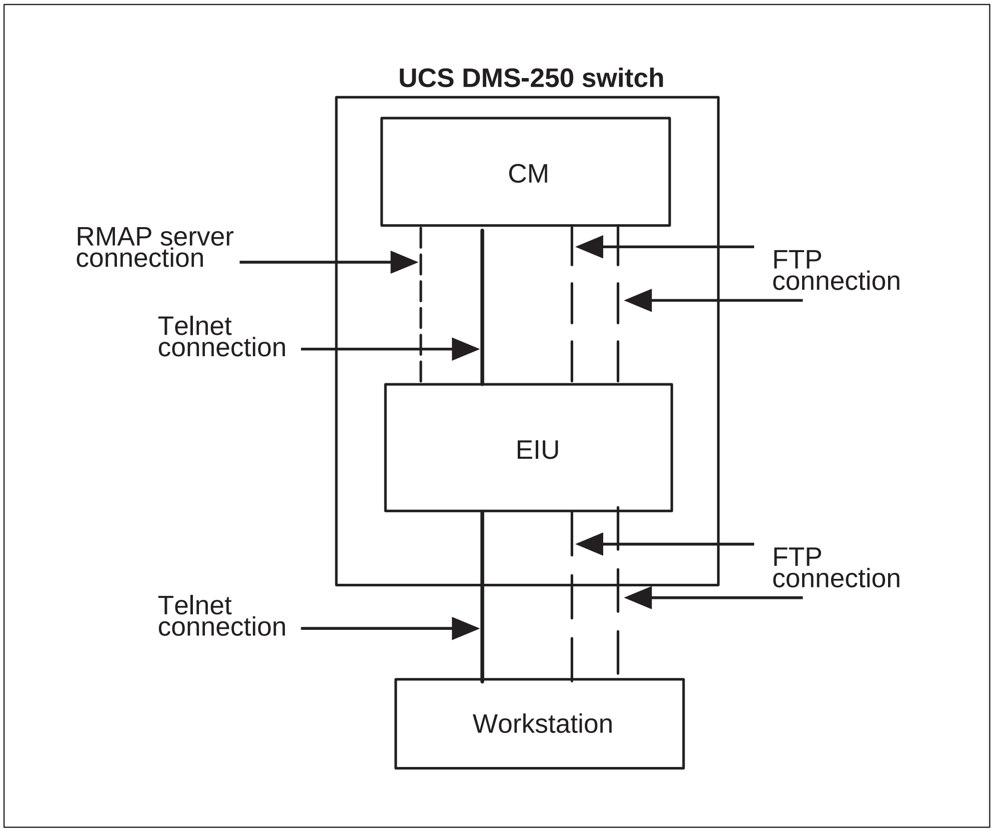
Calculate TCP connections and configure CM and EIU

Certain criteria must be considered when calculating the number of TCP connections you will need. The following are guidelines for calculating the maximum possible number of TCP connections.

- The maximum number of TCP connections that can be made to a CM or an EIU node is 32. The maximum number of Telnet sessions per EIU is 15.
- In table IPHOST, make sure you have enough FTP client and server TCP connections configured for the CM as well as total TCP connections. You do not need to datafill FTP TCP connections for the EIU(s). These connections need to be datafilled only if files are needed from the EIU.You will be using the EIU only as a router. You will need, however, to datafill TCP connections for Telnet connectivity.
- In table RMCONFIG, make sure you have enough Telnet TCP connections configured for the CM and EIUs.
- In addition to current TCP usage, if you want “n” Telnet sessions, you need “n+1” TCP endpoints on the CM and “2n+1” TCP endpoints on the EIU. The Remote MAP (RMAP) server connection takes up the “+1.” For example, three Telnet sessions require four (3 + 1 = 4) TCP endpoints on the CM and seven (2 × 3 = 6 + 1 = 7) TCP endpoints on the EIU.
- TCP endpoints on the CM and EIU are datafilled in table IPHOST. In table RMCONFIG, ensure you have “n” (3, for example) configured for RMAPCONN on the CM and “n” (3, for example) configured for TELNCONN on the EIU.
- If you want “n” FTP client sessions in addition to current TCP usage, you must have “n” FTPCLCON connections on the CM. These connections are datafilled in table IPHOST. Also, “2n” TCP connections for the CM should be datafilled in table IPHOST. For example, four FTP sessions require four FTPCLCON connections on the CM. Also, you need eight (2 × 4 = 8) TCP connections for the CM and sixteen (4 × 4 = 16) TCP connections for the EIU.

Figure 3-23 illustrates one FTP TCP connection and one Telnet TCP connection.

Figure 3-23
One FTP TCP and one Telnet TCP connection



Datafill sequence

To activate the software and provide TCP/IP functionality, the following tables must be datafilled in the order listed.

- LIUINV
- IPNETWRK
- IPHOST
- IPROUTER
- IPPROTO
- IPTHRON
- RMCONFIG
- ENSITES
- ENTYPES
- EXNDINV

The tables are described on the following pages. Datafill examples are given for each table.

Datafilling table LIUINV

Table LIUINV (Link Interface Unit Inventory Table) must be datafilled first. It describes the hardware configuration for all LIUs including EIUs. Currently, a maximum of four EIUs is allowed per UCS DMS-250 switch. All four EIUs can be on a single link peripheral processor (LPP) or can span multiple LPPs. Table 3-2 describes the fields in table LIUINV.

The following tables must be datafilled before datafilling table LIUINV:

- LIMINV
- PMLOADS
- CARRMTC
- SUSHELF

Figure 3-24 provides an example datafill for table LIUINV.

Table 3-2
Table LIUINV field descriptions

Field	Subfield or refinement	Entry	Explanation and action
LIUNAME		see subfields	*LINK INTERFACE UNIT NAME*. This is the key field, which consists of subfields LIUTYPE and LIUNO. This field uniquely identifies the type of LIU that is present in the LPP.
	LIUTYPE	APU, EIU, ELIU, FRIU, LIU7, VPU, or XLIU	*LINK INTERFACE UNIT TYPE*. Enter the LIU type. Enter ELIU if the application specific unit (ASU) type is Ethernet link interface unit. The LIU type APU is the application processing unit card with UNIX (NT9X14DB). The Ethernet interface unit (EIU) replaces the data communication processor (DCP). The frame relay interface unit (FRIU) requires the frame relay access processor card (NTEX31AA) along with a T1 analog paddle board (NTEX30AA).

—continued—

Table 3-2
Table LIUINV field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action

			Though it is possible to specify an LIU7 STPEC with its associated PBINFO as an FRIU, the following error message appears:
			
			`INVALID STPEC FOR AN FRIU`
			
			Similarly, an LIU7 can be incorrectly datafilled with an FRIU STPEC and PBINFO, but the following error message appears:
			
			`INVALID STPEC FOR AN LIU7`
			
			The voice processing unit (VPU) requires a recording and announcement processor card (NTMX97AA) and a 512 channel bus interface paddle board (NTMX99AA).
			
			The X.25 and X.75 link interface unit (XLIU) requires the HDLC frame processor card (NTFX10AA) and the channel bus interface paddle board (NTFX09AA).

	LIUNO	0 to 511	*LINK INTERFACE UNIT NUMBER*. Enter the number assigned to the LIU.
LOCATION		see subfields	*LOCATION*. Enter the location of the LIU on the host link interface module. This field consists of subfields CTRL, SHELFNUM, and LIUSLOT.
	CTRL	see subfield	*CONTROL INFORMATION*. This field consists of subfield CONTROL.
	CONTROL	LIM or MS	*CONTROLLING HOST ENTITY*. Enter MS if the host is a message switch and datafill subfields MSCARD and MSPORT. Enter LIM if the controlling host is a link interface module and datafill field LIMNUM.

—continued—

Table 3-2
Table LIUINV field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
	MSCARD	5 to 23	*MESSAGE SWITCH CARD*. If the entry in field CONTROL is MS, enter the message switch card number. Any entries outside the range indicated for this field are invalid.
	MSPORT	0 to 3	*MESSAGE SWITCH PORT*. If the entry in field CONTROL is MS, enter the message switch port number.
	LIMNUM	0 to 16	*LINK INTERFACE MODULE NUMBER*. If the entry in field CONTROL is LIM, enter the host LIM number on which the LIU resides. Otherwise, leave this field blank.
	SHELFNUM	0 to 3	*SHELF NUMBER*. Enter the shelf number, at the host LIM, on which the LIU is located.
	LIUSLOT	8 to 31	*LINK INTERFACE SLOT*. Enter the slot number, at the host LIM, on which the LIU resides. The LIU can occupy two or three slots. In both configurations, the leftmost card is chosen to represent the logical location of the card. That is, the link general processor (LGP) card for the four-card/three-slot configuration, and the integrated processor and frame bus (IPF) card for the three-card/two-slot configuration. All the shelves that are datafilled on a particular controller must be of the same type (two or three-slot).
LOAD		alphanumeric (vector of up to 8 characters)	*SOFTWARE LOAD NAME*. Enter the table software load name applicable to the LIU. This load is found in table PMLOADS.

—continued—

Table 3-2
Table LIUINV field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
PROCINFO		see subfield	*PROCESSOR INFORMATION*. This field specifies the product engineering code (PEC) of the processors used in the LIU. This field consists of subfield PROCPEC.
	PROCPEC	NTEX22BA, NTEX22BB, or NTEX22CA	*PROCESSOR PRODUCT ENGINEERING CODE*. Enter the PEC of the processor card used in the LIU as follows: • NTEX22BA and NTEX22BB are the PECs for the 8-Mbyte integrated processor and F-bus interface cards. The difference between the NTEX22BA and NTEX22BB cards is in firmware only, the hardware is identical. • Enter NTEX22CA for the 32-Mbyte integrated processor and F-bus interface card.

—continued—

Table 3-2
Table LIUINV field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
CARDINFO		see subfields	*CARD INFORMATION*. This field specifies the card data and consists of subfields APPLPEC.
	APPLPEC	NTEX31AA NTEX31BA NT9X76AA NT9X76CA NTFX10AA NT9X84AA NT9X14DB or NTMX97AA	*APPLICATION PRODUCT ENGINEERING CODE*. Enter the PEC of the application card. Cards NTEX31AA and NTEX31BA are used with FRIU applications. Card NT9X76AA is used with LIU7 applications. Card NT9X76CA is used with Japan ISDN user part (ISUP) LIU7 applications. Card NTFX10AA is used with XLIU applications. Card NT9X84AA is used with EIU and Ethernet link interface unit (ELIU) applications. Card NT9X14DB is used with APUX applications. Card NTMX97AA is used for VPU applications.

—end—

Figure 3-24
Example datafill for table LIUINV

```
TABLE:LIUINV
LIUNAME LOCATION LOAD PROCINFO CARDINFO
----------------------------------------
EIU 102 LIM 0 1 10 ETC02A0 NTEX22BA NT9X84AA NT9X85AA YES 000075F00253
EIU 109 LIM 0 3 10 ETC02A0 NTEX22BA NT9X84AA NT9X85AA YES 000075F00257
EIU 208 LIM 0 2 22 ETC02A0 NTEX22BA NT9X84AA NT9X85AA YES 000075F00254
```

Datafilling table IPNETWRK

Table IPNETWRK (Internet Protocol Network Table) describes the CM node and the default EIU. It also indicates whether messages should be screened out so they will not be accepted from certain nodes, based on table EXNDINV.

Table LIUINV must be datafilled before table IPNETWRK. Changes made to the IP address component in table IPNETWRK force automatic reconfiguration of the IP address components of all nodes listed in tables IPHOST and IPROUTER. Table 3-3 describes the fields in table IPNETWRK.

Table 3-3
Table IPNETWRK field descriptions

Field	Subfield or refinement	Entry	Explanation and action
KEYREF		see subfield	*KEY REFERENCE*. This field consists of subfield TAB_KEY.
	TAB_KEY	0 to 15	*TABLE KEY*. Datafill the network interfaces. A maximum of 16 is allowed.
CMIPADDR		IP address consisting of four numbers from 0 to 255	*COMPUTING MODULE INTERNET PROTOCOL ADDRESS*. Enter the IP address of the computing module (CM). Separate each number in the address with a single space, for example 47 2 86 122 is equivalent to an IP address of 47.2.86.122.

—continued—

Table 3-3
Table IPNETWRK field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
SUBNET		1 to 22	*INTERNET PROTOCOL NETWORK SUBNET RANGE*. Enter the range of the IP network subnet mask bit width. Any entry outside the range indicated for this field is invalid.
OPTION		see subfields	*OPTION*. This field consists of subfields WORD_EIU and EIU_RNG. Up to two options can be entered. If less than two options are required, end the entry with a $.
	WORD_EIU	EIU or EXTERNAL_ ROUTER	*ETHERNET INTERFACE UNIT*. Enter EIU (Ethernet interface unit) or EXTERNAL_ROUTER.
	EIU_RNG	0 to 750	*ETHERNET INTERFACE UNIT RANGE*. Enter the number that is assigned to the EIU.
PARMAREA		see subfields	*PARAMETER AREA*. This optional field consists of subfield PARM. Up to 12 multiples of this field can be entered. If less than 12 multiples are required, end the list of entries with a $.
	PARM	SCRNFLAG	*PARAMETER*. If a screening flag is required, enter SCRNFLAG and datafill refinement SCRNFLAG.
		DFLT_GTWY _IPADDR	If a default gateway IP address for the network is required, datafill refinement GTWY_IPADDR.
		IOM_ INTERFACE	To specify an IOM interface as the LAN interface for the network, enter refinements IOMNUM and PORT.
		IOP_ INTERFACE	To specify an XA-Core IOP interface as the LAN interface for the network, enter refinements IOMNUM, PACKLET, and PORT.
		NULLPARM	Enter NULLPARM for a null parameter.

—continued—

Table 3-3
Table IPNETWRK field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
	SCRNFLAG	Y or N	*SCREEN FLAG* . If the entry in subfield PARM is SCRNFLAG, datafill this refinement. Enter Y (yes) if the status of the SCRNFLAG is active. Otherwise, enter N (no).
	GTWY_ IPADDR	IP address consisting of 4 numbers from 0 to 255	If the entry in subfield PARM is DFLT_GTWY_IPADDR, enter the default gateway IP address. Separate each number in the address with a single space, for example, 47 2 11 109 is equivalent to an IP address of 47.2.11.109.
	IOM_NUM	0 to 255	Enter the IOM number.
	PORT	0 to 255	Enter the associated IOM port number.
	PACKLET	0 to 255	Enter the associated packlet number.

—end—

Figure 3-25 provides an example datafill for table IPNETWRK.

Figure 3-25
Example datafill for table IPNETWRK

```
TABLE:IPNWETWRK
KEYREF CMIPADDR SUBNET OPTION PARMAREA
----------------------------------------
0 47 96 192 66 19 (EIU 208) (EIU 102) $ (SCRNFLAG N) $
```

Datafilling table IPHOST

Table IPHOST (Internet Protocol SuperNode End Hosts Table) is responsible for configuring DMS nodes as Internet hosts. It activates the TCP layer and its applications on those nodes.

Table IPNETWRK must be datafilled before table IPHOST. IPHOST and IPROUTER are dependent on each other, as well as on table IPNETWRK. Whenever a tuple in IPHOST is modified, the corresponding tuple, if any, for the same EIU is also modified and automatically configured in table IPROUTER. The changes to both tables are propagated immediately to all in-service nodes. Similarly, changes made to the IP address component in table IPNETWRK force automatic reconfiguration of the IP address components of all nodes listed in tables IPHOST and IPROUTER. Table 3-4 describes the fields in table IPHOST.

Table 3-4
Table IPHOST field descriptions

Field	Subfield or refinement	Entry	Explanation and action
INDEX		see subfield	*INDEX*. This field consists of subfield NODEIDX.
	NODEIDX	0 to 63	*NODE INDEX*. Enter the node index number.

—continued—

Table 3-4
Table IPHOST field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
NODENAME		AP APU CM EIU ELIU FP MS	*NODE NAME*. Enter the node name: • AP (application processor) • APUX (application processor UNIX) • CM (computing module) • EIU (Ethernet interface unit) • ELIU (Ethernet link interface unit) • FP (file processor) • MS (message switch) ***Note:*** AP and FP can both be datafilled to support the SuperNode UNIX (SNIX) versions of the nodes and IP addresses can be datafilled for both the software operating system and the SNIX sides of the nodes. (The nodes must first be datafilled in table SMNINV.) The IP address for an AP or FP can be software operating side only, or software operating side and SNIX sides. Whether one or two IP addresses are datafilled for an AP or FP node depends on the application on the node. If a node AP is running UNIX, two IP addresses for the node are required.
NODE		see subfields	*NODE*. This field consists of subfields for the entries in field NODENAME.
		—end—	

The following tables must be datafilled before datafilling table IPHOST:

- LIMINV
- IPNETWRK
- SMNINV (only if AP or FP nodes are datafilled in IPHOST)

Figure 3-26 provides an example datafill for table IPHOST.

Figure 3-26
Example datafill for table IPHOST

```
TABLE:IPHOST
INDEX NODENAME NODEINFO
-----------------------
0 CM 0 16 2 2
1 EIU 102 47 96 192 67 47 177 75 4 8 2 2
2 EIU 208 47 96 192 68 47 177 75 5 15 0 0
3 EIU 109 47 96 192 69 47 177 75 6 8 2 2
```

Datafilling table IPROUTER

Table IPROUTER (Internet Protocol Subnet Router Table) contains the list of EIUs and corresponding parameters. This table is required for configuring an EIU as an Internet node.

Table IPNETWRK must be datafilled before table IPROUTER. IPHOST and IPROUTER are dependent on each other, as well as on table IPNETWRK. Whenever a tuple in IPHOST is modified, the corresponding tuple, if any for the same EIU, is also modified and automatically configured in table IPROUTER. The changes to both tables are propagated immediately to all in-service nodes. Similarly, changes made to the IP address component in table IPNETWRK force automatic reconfiguration of the IP address components of all nodes listed in tables IPHOST and IPROUTER.

Table 3-5 describes the fields in table IPROUTER.

Table 3-5
Table IPROUTER field descriptions

Field	Subfield or refinement	Entry	Explanation and action
RKEY		0 to 63	*ROUTER KEY.* Enter the identification number of the Internet protocol router. This is the key into the table.
ROUTER		see subfields	*ROUTER*. This field consists of subfields WORD_EIU and EIU_RNG.
	WORD_EIU	EIU	*ETHERNET INTERFACE UNIT.* Enter EIU (Ethernet interface unit). Entries outside this range are invalid.

—continued—

Table 3-5
Table IPROUTER field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
	EIU_RNG	0 to 750	*ETHERNET INTERFACE UNIT RANGE*. Enter the specific EIU to be accessed for the router index.
SNIPADR		table of 4 digits (0 to 255)	*SUPERNODE SIDE INTERNET PROTOCOL ADDRESS*. Enter the SuperNode side Internet protocol (IP) address.
ETHIPADR		table of 4 digits (0 to 255)	*ETHERNET SIDE INTERNET PROTOCOL ADDRESS*. Enter the Ethernet side IP address.
ETHARP		YES or NO	*ETHERNET ADDRESS RESOLUTION PROTOCOL*. Enter YES if the EIU engages in address resolution protocol (ARP) activity within the Ethernet subnet. Otherwise, enter NO. The default value for this field is YES.
ETHPARP		YES or NO	*ETHERNET PROXY ADDRESS RESOLUTION PROTOCOL*. Enter YES if the EIU engages in proxy address resolution protocol (PARP) activity on behalf of the SuperNode within the Ethernet. Otherwise, enter NO. The default value for this field is YES.
—end—			

The following tables must be datafilled before datafilling table IPROUTER:

- LIMINV
- IPNETWRK

Note: The corresponding EIUs referred to in the datafill must be offline before table IPROUTER can be datafilled.

Figure 3-27 provides an example datafill for table IPROUTER.

Figure 3-27
Example datafill for table IPROUTER

```
TABLE:IPROUTER
RKEY ROUTER SNIPADR ETHIPADR ETHARP ETHPARP
-------------------------------------------
0 EIU 102 47 96 192 67 47 177 75 4 YES YES
1 EIU 208 47 96 192 68 47 177 75 5 YES YES
2 EIU 109 47 96 192 69 47 177 75 6 YES YES
```

Datafilling table IPTHRON

Table IPTHRON (Internet Protocol Throttling Numbers Table) contains IP throttling numbers. The IP message flow from UCS DMS-250 hosts requires throttling to control message congestion in the bandwidth-limited shared communication resources between the local message switch (LMS) and the message switch (MS). The level of throttling to and from each of the IP DMS-250 hosts derives from the IP throttling numbers datafilled in this table.

An application running on an LPP (Link Peripheral Processor) constitutes a load. Loads must be engineered in such a manner that overloading of shared resources (FBus, TBus, and DS30 links) is prevented. It is especially important to avoid overloading where CCS7 traffic is present because an overload of shared resources can cause an outage of the LPP and all applications running on it.

Throttling is a control mechanism for TCP/IP traffic across the DS30s between the MS and the LMS of the LPP. The throttling algorithm keeps track of the number of bytes to be transmitted during any 12.5-millisecond window. There is no credit accumulated from one window to another. This traffic is throttled to values (in kbyte/s) set in table IPTHRON for both the Transmit (Tx) and the Receive (Rx) directions. Traffic from one Application Service Unit to another on the same LPP is not throttled. The IPOMSCI OM group indicates when throttling begins.

The EIU must first be datafilled in table LIUINV before it is allowed in table IPTHRON. This is because as EIUs are automatically datafilled in table LIUINV, a tuple with default values is automatically entered into table IPTHRON.

> **CAUTION**
> **Throttling capacity fields should not be zeros**
> The IP throttling numbers default to zero (100% throttling) for all EIUs datafilled in table LIUINV. If the throttling capacity numbers are not datafilled to non-zero values, the EIU cannot communicate to destination nodes across DS30 links.

The default IPTHRON tuple contains zeros for the transmit and receive capacity fields. Features that use the IP protocol via the EIU require correct datafill with non-zero values. The numbers must be changed to be greater than zero so the EIU can communicate properly.

The EIU is automatically deleted from table IPTHRON if it is deleted from table LIUINV. The values for the fields in this table must be determined carefully with consideration to LPP engineering rules.

Table 3-6 describes the pertinent fields in table IPTHRON. by means of table control.

Table 3-6
Table IPTHRON field descriptions

Field	Subfield or refinement	Entry	Explanation and action
LMSNODE		see subfields	*LOCAL MESSAGE SWITCH NODE*. This is the first and key field of the table and consists of subfields LIUNAME and LIUNO.
	LIUNAME	APU or EIU	*LINK INTERFACE UNIT NAME*. Enter the link interface unit (LIU) name. This field indicates an Internet protocol (IP) capable node connected to the local message switch. The node datafilled here must first be datafilled in table LIUINV. Enter APU for application processor unit. Enter EIU for Ethernet interface unit.

—continued—

Table 3-6
Table IPTHRON field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
	LIUNO	0 to 750	*LINK INTERFACE UNIT NUMBER*. Enter the node index.
TXCAPCT		0 to 32767	*TRANSMIT CAPACITY*. Enter the total IP transmission rate in kilobits per second from the node to all other SuperNode IP nodes.
RXCAPCT		0 to 32767	*RECEIVE CAPACITY*. Enter the total IP receive rate in kilobits per second from all other SuperNode nodes to the node.
OPTION		see subfield	*OPTION*. This field consists of subfield SNNODE.
	SNNODE	AP, APU, CM, EIU, ELIU, FP, or MS	*SUPERNODE NODE*. Enter the name of the SuperNode node. The node must first be datafilled in its inventory table, for example, FP must be datafilled in table APINV. Up to eight nodes can be entered. If less than eight are required, end the list with a $ (dollar sign). Enter AP (application processor) and datafill refinement SMNINDEX. Enter APU and datafill refinement APUINDEX. Enter CM (computing module) and go to refinement TXCAPCT. Enter EIU and datafill refinement EIUINDEX. Enter ELIU and datafill refinement ELIUINDEX. Enter FP (file processor) and datafill refinement SMNINDEX. Enter MS (message switch) and datafill refinement MSINDEX.

—continued—

Table 3-6
Table IPTHRON field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
	SMNINDEX	0 to 99	*SYNCHRONIZED AND MATCHED NODE INDEX*. If the entry in field SNNODE is AP or FP, enter the synchronized and matched node (SMN) index. Go to refinement TXCAPCT.
	APUINDEX	0 to 750	*APPLICATION PROCESSOR UNIT INDEX*. If the entry in field SNNODE is APU, enter the APU index. Go to refinement TXCAPCT.
	EIUINDEX	0 to 750	*ETHERNET INTERFACE UNIT INDEX*. If the entry in field SNNODE is EIU, enter the EIU index. Go to refinement TXCAPCT.
	ELIUINDEX	0 to 750	*ETHERNET LINK INTERFACE UNIT INDEX*. If the entry in field SNNODE is ELIU, enter the ELIU index. Go to refinement TXCAPCT.
	MSINDEX	0 to 1	*MESSAGE SWITCH INDEX.* If the entry in field SNNODE is MS, enter the MS index. Go to refinement TXCAPCT.
	TXCAPCT	0 to 32767	*TRANSMIT CAPACITY.* Enter the total IP transmission rate in kilobits per second from node to node. The node name and number are specified as a key to this tuple.

—end—

Figure 3-28 provides an example datafill for table IPTHRON.

Figure 3-28
Example datafill for table IPTHRON

```
TABLE:IPTHRON
LMSNODE TXCAPCT RXCAPCT OPTION
------------------------------
EIU 102 32000 32000 $
EIU 109 32000 32000 $
EIU 208 32000 32000 $
```

Datafilling table RMCONFIG

Table RMCONFIG (Remote Access Configuration Table) allows you to configure the number of simultaneous Telnet sessions on the UCS DMS-250 switch.

Table 3-7 describes the fields in table RMCONFIG.

Table 3-7
Table RMCONFIG field descriptions

Field	Subfield or refinement	Entry	Explanation and action
INDEX		see subfield	*INDEX*. This field consists of subfield TABLE_KEY.
	TABLE_KEY	0 to 31	*TABLE KEY*. This is the key field of the table. Enter the index to the table.
NODE		CM or EIU	*NODE*. Enter the name of the node, CM (computing module) or EIU (Ethernet interface unit). ***Note:*** If the entry in field NODE is CM, the entry in field TABLE_KEY must be 0 (zero).
SESSIONS		see subfield	*SESSIONS*. This field consists of subfield NODE_NAME.

—continued—

Table 3-7
Table RMCONFIG field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
	NODE_NAME	see refinements	*NODE NAME*. This subfield consists of refinements for field NODE. If the entry in field NODE is CM, datafill refinement RMAPCONN. If the entry in field NODE is EIU, datafill refinements EIUINDEX and TELNCONN.
	RMAPCONN	0 to 32	*REMOTE MAP CONNECTIONS*. If the entry in field NODE is CM, datafill this refinement. Enter a value to specify the maximum number of remote MAP (maintenance and administration position) (RMAP) processes.
	EIUINDEX	0 to 4095	*ETHERNET INTERFACE UNIT INDEX*. If the entry in field NODE is EIU, datafill this refinement. Enter a value to specify the EIU number.
	TELNCONN	0 to 32	*TELNET CONNECTIONS*. If the entry in field NODE is EIU, datafill this refinement. Enter a value to specify the maximum number of telnet processes.
		—end—	

Figure 3-29 provides an example datafill for table RMCONFIG.

Figure 3-29
Example datafill for table RMCONFIG

```
TABLE:RMCONFIG
INDEX NODE SESSIONS
------------------
0 CM 30
1 EIU 102 30
2 EIU 109 30
3 EIU 208 30
```

Datafilling table ENSITES

Table ENSITES (External Node Sites Table) contains a complete list of all the sites in table EXNDINV with which a UCS DMS-250 switch may communicate. If the screening flag in table IPNETWRK is set to NO, the switch disregards this table.

Table ENSITES must be datafilled before table EXNDINV.

Table 3-8 describes the fields in table ENSITES.

Table 3-8
Table ENSITES field descriptions

Field	Entry	Description
ENSITE	1–12 alphanumeric characters	*EXTERNAL NODE SITE*. This is a character string, maximum 12 letters, naming the location (usually a building) in which the node is housed.
	—end—	

Figure 3-30 provides an example datafill for table ENSITES.

Figure 3-30
Example datafill for table ENSITES

```
TABLE:ENSITES
ENSITE
------
RICH
```

Datafilling table ENTYPES

Table ENTYPES (External Node Types Table) contains a complete list of all the types referenced in table EXNDINV with which a UCS DMS-250 switch is allowed to communicate. If the screening flag in table IPNETWRK is set to NO, this table is disregarded.

Table ENTYPES must be datafilled before table EXNDINV.

Table 3-9 describes the fields in table ENTYPES.

Table 3-9
Table ENTYPES field descriptions

Field	Subfield or refinement	Entry	Explanation and action
ENTYPE		alphanumeric (1 to 12 characters)	*EXTERNAL NODE TYPE*. Enter the type of external node (for example, SUN or HP).

Figure 3-31 provides an example datafill for table ENTYPES.

Figure 3-31
Example datafill for table ENTYPES

```
TABLE:ENTYPES
ENTYPE
------
NCD_WS
```

Datafilling table EXNDINV

Table EXNDINV (External Node Inventory Table) contains information about external nodes connected to the UCS DMS-250 switch by way of an EIU. Each tuple in the table contains node name, address, protocol, and other information about a node.

This table must be datafilled last.

Table 3-10 describes the fields in table EXNDINV.

Table 3-10
Table EXNDINV field descriptions

Field	Subfield or refinement	Entry	Explanation and action
EXNDKEY		see subfields	*EXTERNAL NODE KEY*. This key field consists of subfields ENPMTYPE and ENNODENO.
	ENPMTYPE	EXND or SDM	*EXTERNAL NODE PERIPHERAL MODULE TYPE*. Enter the peripheral module (PM) type as follows: • EXND (external node) • SDM (SuperNode Data Manager, simplex platform only) ***Note:*** These nodes are defined for all products. A product may define additional types of nodes that are valid only for that product.
	ENNODENO	0 to 31	*EXTERNAL NODE NUMBER*. Enter a number to identify the external node number of the external node PM type. If the entry in subfield ENPMTYPE is SDM, enter 0.
ENNAME		alphanumeric (vector of up to 12 characters)	*EXTERNAL NODE NAME*. Enter an external node name. If the external node runs the UNIX operating system, a suggested value for the field is the UNIX hostname of the node, however, this is not enforced.
ENADDR		vector of up to 2 elements	*EXTERNAL NODE ADDRESS*. This field is a vector of addresses for the external node. Each element of the vector contains an address type and an address. The address is either IPADDRESS or X25ADDRESS, depending on the entry in field ADDRTYPE.

—continued—

Table 3-10
Table EXNDINV field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
	ADDRTYPE	ENIP ENX25 or ENMAC	*ADDRESS TYPE* . If the external node is an Ethernet node that has an internet protocol (IP) address and responds to internet control message protocol (ICMP), or if the entry in subfield ENPMTYPE is SDM, enter ENIP and datafill refinement IPADDRESS. If the external node communicates using the X.25 communication protocol, enter ENX25 and datafill refinement X25ADDRESS.
	IPADDRESS	0 to 255 (table of 4)	*INTERNET PROTOCOL ADDRESS*. If the entry in field ADDRTYPE is equal to ENIP, enter the IP address of the node. An IP address consists of 4 bytes, each with a value in the range 0 to 255. The IP address is usually expressed in the form 255.255.255.255.
	X25ADDRESS	0 to 9 (4 to 15 digits)	*X.25 PROTOCOL ADDRESS*. If the entry in field ADDRTYPE is equal to ENX25, enter the X25 protocol address of the node. Any entry outside the range indicated for this field is invalid.
	MACADDRESS	table of 12 hex digits	*MACHINE ADDRESS*. If the entry in the field ADDRTYPE is equal to ENMAC, enter the MAC address that is associated with the Ethernet interface. This subfield consists of a machine address and an indication as to whether the DMS switch provides boot protocol (BOOTP) capability to the node. The MAC address consists of 12 bytes, each with a hex digit value in the range of {0, 1, 2, 3, 4, 5, 6, 7, 8, 9, a, b, c, d, e, f}.
	DMSBOOTP	no, yes	*DMS BOOT PROTOCOL*. The DMSBOOTP support is limited to providing an IP address to the external node. It does not provide full BOOTP protocol support. As a result, the external node is booted from the DMS.

—continued—

Table 3-10
Table EXNDINV field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
ENFNAME		alphanumeric (vector of up to 8 characters)	*EXTERNAL NODE LOAD FILE NAME*. Enter the default load file name used for the command LOADPM. See table PMLOADS. Enter $ for a nil file name. If ENPMTYPE is SDM, enter $.
ENSITE		alphanumeric (vector of up to 12 characters)	*EXTERNAL NODE SITE*. Enter the name of the site (usually a building) in which the node is housed. This value must first be datafilled in table ENSITES.
ENLOCN		see subfields	*External node location*. This field defines the location of the node within a building and consists of subfields FLOOR, ROW, and POSITION.
	FLOOR	0 to 99	*FLOOR NUMBER*. Enter the number of the floor on which the node is located.
	ROW	A to Z or AA to ZZ (excluding I, O, II, and OO)	*ROW*. Enter the row on the floor in which the node is located.
	POSITION	0 to 99	*BAY POSITION*. Enter the position of the bay in the row where the node is located.
ENTYPE		alphanumeric (vector of up to 12 characters)	*EXTERNAL NODE TYPE*. Enter the type of the node, for example, SUN or HP, or SDM for the SDM. This value must first be datafilled in table ENTYPES.
ENINFO		alphanumeric (table of up to 20 characters)	*EXTERNAL NODE INFORMATION*. Enter a string containing any additional information about the node. Character strings that contain blank characters must be entered with three single quotation marks at the start of the string and three single quotation marks at the end of the string.

—continued—

Table 3-10
Table EXNDINV field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
ENPROCSR		ALL CORE EIU NONE	*EXTERNAL NODE PROCESSOR CLASS*. Enter the set of SuperNode processor types with which the external node is allowed to communicate. Table control provides the user with the capability of entering ALL or NONE. If ALL is entered, values CORE and EIU are automatically datafilled by table control. If the ENPMTYPE is SDM, enter ALL.
ENPROTCL		ALL ICMP TCP UDP NONE	*EXTERNAL NODE PROTOCOL*. Enter the set of protocols with which the external node can communicate with the SuperNode. Table control provides the user with the capability of entering ALL or NONE. If ALL is entered, values ICMP, UDP, and TCP are automatically datafilled by table control. If the ENPMTYPE is SDM, enter ALL.
EN0LKALM		CR MJ MN NA	*EXTERNAL NODE NO-LINK ALARM*. Enter the type of alarm to be raised if no links are available to the external node: • CR (critical alarm) • MJ (major alarm) • MN (minor alarm) • NA (no alarm) For the SDM, enter MJ to raise a PM SDM major alarm when the SDM node state is SysB.
EN1LKALM		CR MJ MN NA	*EXTERNAL NODE ONE-LINK ALARM*. Enter the type of alarm to be raised if only one link is available to the external node. For the SDM, enter NA.

—continued—

Table 3-10
Table EXNDINV field descriptions (continued)

Field	Subfield or refinement	Entry	Explanation and action
ENALMSPT		Y or N	*EXTERNAL NODE ALARM SCAN POINTS*. This is a vector of up to two multiples. Enter Y (yes) if scan points are to be assigned to the node for alarm purposes and datafill refinements SCTMTYPE, SCTMNO, SCTMCTNO, CRITSCPT, MAJSCPT, MINSCPT, and SCCARDCD. Otherwise, enter N (no). No further datafill is required.
	SCTMTYPE	MTM or OAU	*SCAN CIRCUIT TRUNK MODULE TYPE*. Enter MTM if the scan circuit resides on the maintenance trunk module (MTM). Enter OAU if the scan circuit resides on the office alarm unit (OAU).
	SCTMNO	0 to 2047	*SCAN CIRCUIT TRUNK MODULE NUMBER*. Enter the trunk module (TM) of the MTM where the scan circuit resides.
	SCTMCTNO	0 to 29	*SCAN CIRCUIT TRUNK MODULE CIRCUIT NUMBER*. Enter the circuit number on the MTM of the scan circuit.
	CRITSCPT	0 to 6	*CRITICAL ALARM SCAN POINT*. Enter the scan point associated with the critical alarm for the node.
	MAJSCPT	0 to 6	*MAJOR ALARM SCAN POINT*. Enter the scan point associated with the major alarm for the node.
	MINSCPT	0 to 6	*MINOR ALARM SCAN POINT*. Enter the scan point associated with the minor alarm for the node.
	SCCARDCD	0X10XX	*SCAN CIRCUIT CARD CODE*. Enter the card code of the scan circuit, 0X10XX (where XX is the latest version of the 0X10 card).
—end—			

Figure 3-32 provides an example datafill for table EXNDINV.

Figure 3-32
Example datafill for table EXNDINV

```
TABLE:EXNDINV
EXNDKEY ENNAME ENADDR ENFNAME ENSITE ENLOCN ENTYPE ENINFO
ENPOCSR ENPROTCL EN0LKALM EN1LKALM ENALMSPT
-------------------------------------------
EXND 0 JOHN1 (ENIP 47 122 71 118) $ JOHN2 RICH 2 A 21 NCD_WS
'GREAT' ALLTCP ICMP UDP $ MM NA Y OAU 0 24 0 1 2 DSISIG
```

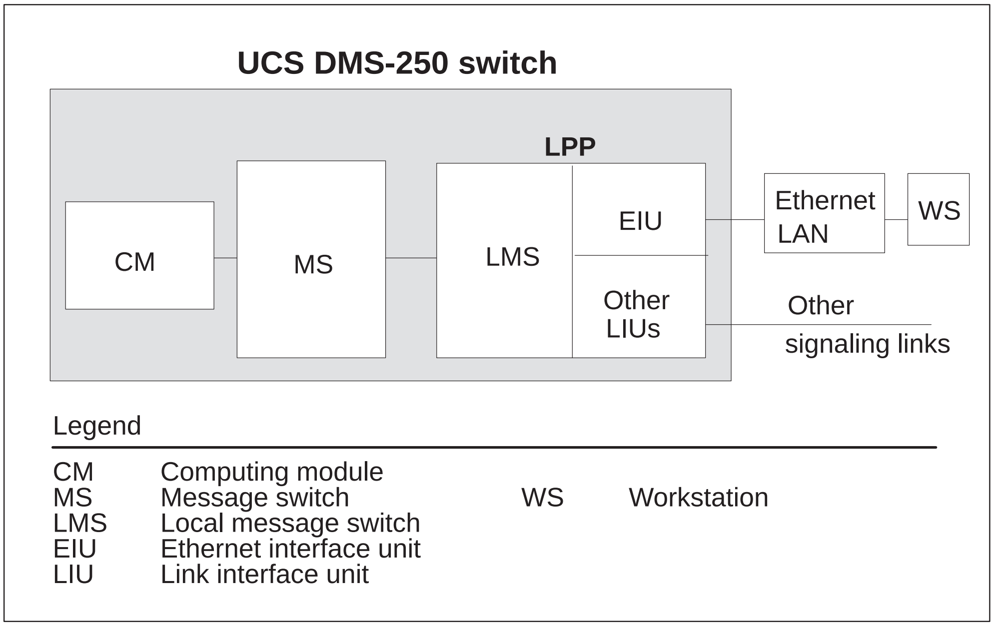
Ethernet Interface Unit (EIU)

The Ethernet interface unit (EIU) functionality comprises hardware, software, and table datafill that includes IP addresses and specific Nortel-assigned Ethernet addresses for each EIU. This section describes how Ethernet LAN connectivity is established, lists the required software and hardware, and discusses address allocation. It presents the IP and Media Access Control (MAC) addressing schemes. This section also summarizes EIU maintenance features. For details on table datafill, see Section 6, “Table datafill.”

Ethernet connectivity

A link peripheral processor (LPP) containing an EIU is deployed in a UCS DMS-250 switch to establish Ethernet connectivity via TCP/IP. This is illustrated in Figure 3-33.

Figure 3-33
EIU on the UCS DMS-250 switch



An LPP is a frame that can hold up 36 double slot link interface units (LIU).

LIUs are devices that serve as termination points for a variety of signaling links such Ethernet, CCS7, and frame relay.

There are a maximum of four EIU cards allowed per switch; this reduces the number of LIUs available because the EIUs are installed in LIU slots.

Ethernet connectivity is considered sufficient connection for messaging between the UCS DMS-250 switch and any external node or hardware that has an address and responds to a standard communications protocol. An Ethernet node responds to Internet Control Message Protocol (ICMP) Echo Request messages and has an IP address.

EIU software

The ETCxxxx, EIU Telnet customer load EIU software load is required.

The following tables require datafill:

- LIUINV
- IPNETWRK
- IPHOST
- IPROUTER

- IPPROTO
- IPTHRON
- RMCONFIG
- ENSITES
- ENTYPES
- EXNDINV

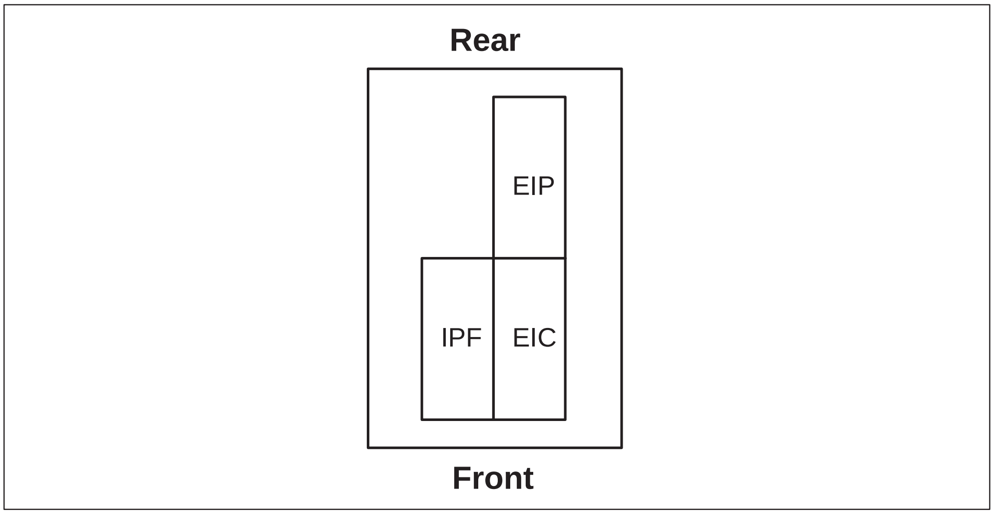
EIU hardware

EIU hardware consists of the following two circuit packs and a paddleboard. An EIU application user interface (AUI) cable is also needed.

- NTEX22BB card—Integrated PBus and FBus card (IPF)
- NT9X84AA card—Ethernet Interface Card (EIC)
- NT9X85AA card—Ethernet Interface Paddleboard (EIP) card

The cards are shown in Figure 3-34 and described in the following paragraphs.

Figure 3-34
EIU hardware on an LPP



Integrated PBus and FBus card

The NTEX22BB IPF card is a processor board that contains the Motorola M68030 and 8 Mbyte of RAM. It also contains the PBus to FBus interface, which connects the processor bus (PBus) with the frame bus (FBus), which in turn connects to the local message switch (LMS) through a rate adaptor. The IPF card is a common processor card used in most LIUs. It runs the Support Operating System.

Ethernet Interface Card

The NT9X84AA EIC card implements most of the MAC layer on a single chip. It has 384 kbytes of high-speed buffer for holding Ethernet packets.

Ethernet Interface Paddleboard card

The NT9X85AA EIP card provides the physical link to the LAN. The paddleboard implements an unshielded twisted pair AUI interface.

Address allocation

Within a single SuperNode switch, multiple hosts and multiple applications within a single host may simultaneously request TCP/IP services. To provide for application address uniqueness across the network, the switch uses the following TCP/IP address allocation scheme.

- TCP provides individual port numbers to distinguish between applications in the same host.
- Each host processor in the internet SuperNode switch is assigned a unique IP address. This is a logical address and, when concatenated with a TCP port number, forms a unique network end-point or “socket.”
- Within the network, each node is physically identified by its own unique subnetwork address. The logical IP address is translated to subnetwork address prior to datagram delivery to the destination node.
- Within the network, each node such as DMS-Core, file processor (FP), and EIU has a unique frame transport address (FTA) that uniquely identifies the subnetwork node on the SuperNode. The EIU also has a MAC address (also called Ethernet address) that uniquely identifies it on the Ethernet LAN.

The IP and MAC addressing schemes are described in detail in the following paragraphs. Both addressing schemes are needed. The MAC addressing scheme is needed to handle addressing for the Subnet; the IP addressing scheme, to handle addressing on the Network layer.

IP addresses

IP addresses are the means by which each host is uniquely identified, much like a street address. Composed of a network designation and a host designation, IP addresses are 32 bits long, but are typically displayed as four fields, one byte (0–255) each, separated by a period.

These four fields are interpreted differently based on which of three distinct network classification types the address represents.

Networks are classified as either class A, B, or C.

- Class A indicates a large number of hosts on a few networks.

- Class B indicates a balance between host and networks, both medium in number.
- Class C indicates a few hosts on many networks.

Note: The switch does not support class D and E addressing schemes.

Accordingly, the most significant byte of the IP address for class A can take on the values 0–127, class B values 128–191, and class C values 192–223. For example, 47.192.45.8 is a class A address.

Table 3-11 shows further details about IP address class structure.

Table 3-11
IP address class structure

Class	Initial binary bits (first byte)	Number of net bits	Number of host bits	32-bit hex net mask
A	0	7	24	FF000000
B	10	14	16	FFFF0000
C	110	21	8	FFFFFF00
—end—				

For example, given a site class A IP address 47.64.64.11 and an internal subnetwork with addresses 12 bits long, the network ID is 47, the subnet ID is 1028, and the host ID is 11. See the interpretation column in Table 3-12 and see Figure 3-35 for more detail.

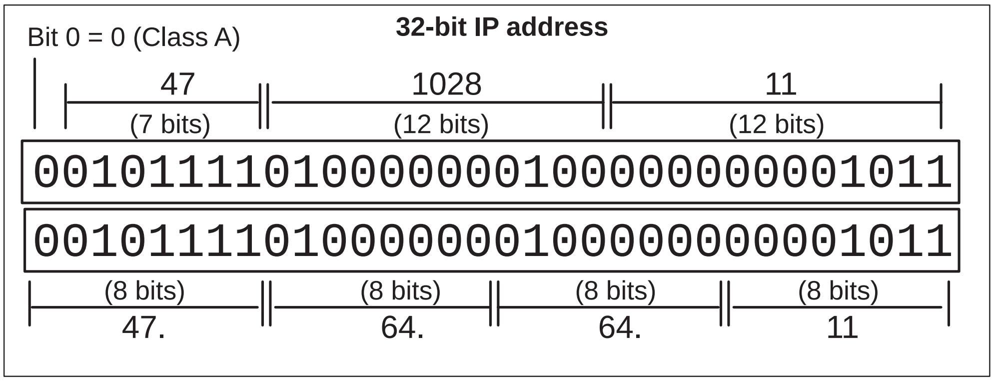
Table 3-12
Example IP address interpretation

Decimal numbers	Number in binary bits	32 bits rearranged per number of subnet bits		Interpretation
47	00101111	(8 bits)	00101111	Network ID: 47
64	01000000	(12 bits)	010000000100	Subnet ID: 1028
—end—				

Table 3-12
Example IP address interpretation (continued)

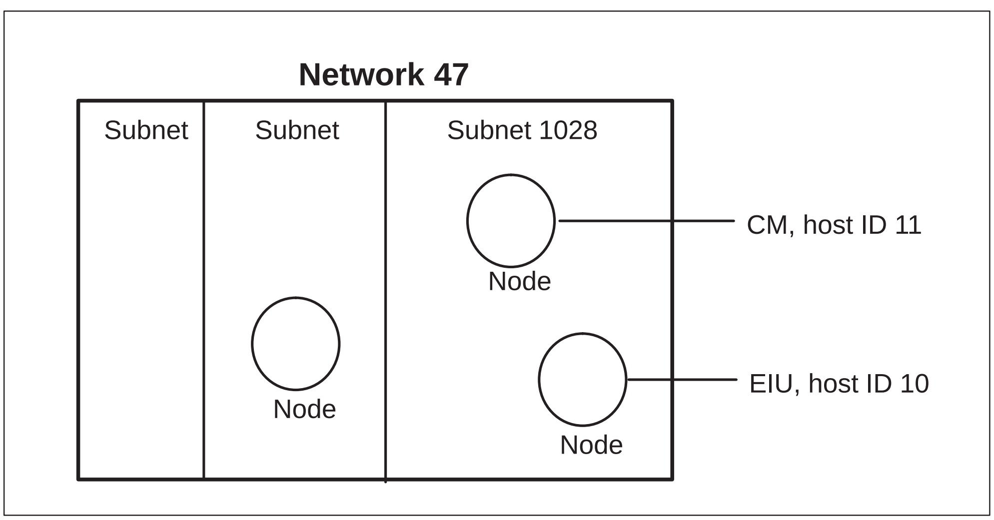
Decimal numbers	Number in binary bits	32 bits rearranged per number of subnet bits	Interpretation
64	01000000	(12 bits) 000000001011	Host ID: 11
11	00001011		
—end—			

Figure 3-35
Detail example IP address 47.64.64.11



An example of the physical mapping of IP addresses is shown in Figure 3-36.

Figure 3-36
Example physical mapping of IP address



IP addresses are supplied by the customer. IP addresses for all UCS DMS-250 hosts are assigned via datafill in tables IPNETWRK, IPROUTER, and IPHOST.

An EIU is assigned two IP addresses, one to address the switch side subnet and the other to address the Ethernet LAN side subnet. The EIU host application is addressed from within the switch or from external LAN workstations by addressing the EIU switch side IP address. However, the Routing Information Protocol (RIP) application addresses the EIU host application via the LAN side IP address.

IP addresses are datafilled entities on the UCS DMS-250 switch. A number of methods are available for determining IP addresses on the switch. Three methods of IP address assignment are described in the following paragraphs.

IP address assignment method 1

CMIPADDR, the second field in table IPNETWRK, lists the computing module (CM) IP address. In the following example, the CM IP address is 47.76.137.82.

```
TABLE: IPNETWRK
KEYREF CMIPADDR SUBNET OPTION PARMAREA
--------------------------------------
0 47 76 137 82 19 (EIU 208) (EIU 102) $ (SCRNFLAG N) $
```

IP address assignment method 2

Table IPHOST, the third field, NODEINFO–subfield SNADDR, lists the EIU IP address. In the following example, the switch side IP address for EIU 208 is 47.96.192.68.

```
TABLE: IPHOST
INDEX NODENAME NODEINFO
-----------------------
0 CM 0 16 2 2
1 EIU 102 47 96 192 67 47 177 75 4 8 2 2
2 EIU 208 47 96 192 68 47 177 75 5 15 0 0
3 EIU 109 47 96 192 69 47 177 75 6 8 2 2
```

IP address assignment method 3

Table IPROUTER, the third field SNIPADR lists the EIU IP address. In the following example, the switch side IP address for EIU 109 is 47.96.192.69.

```
TABLE: IPROUTER
RKEY ROUTER SNIPADR ETHIPADR ETHARP ETHPARP
-------------------------------------------
0 EIU 102 47 96 192 67 47 177 75 4 YES YES
1 EIU 208 47 96 192 68 47 177 75 5 YES YES
2 EIU 109 47 96 192 69 47 177 75 6 YES YES
```

Media Access Control addresses

Each EIU has a Media Access Control (MAC) address (also called the Ethernet address) that uniquely identifies it on the Ethernet LAN on the UCS DMS-250 switch. MAC addresses are 48 bits long. (For example, 000075F00254 in hex). The fields for the Ethernet address are shown in Table 3-13.

Table 3-13
Ethernet address format

Bit 0	Bit 1	Bits 2–23	Bits 28–31	Bits 24–27 and 32–47
I/G	U/L	Nortel’s vendor ID (in bits)	System (in bits)	System-dependent field
IEEE assigned	IEEE assigned	00 0000 0000 0000 1010 1110 IEEE assigned	1111 (NT selected)	

—end—

The MAC addresses are administered by Nortel. Nortel assigns its addresses via datafill in table LIUINV.

CAUTION
Obtain an assigned EIU address from Nortel
Before connecting the cable to the EIU circuit board, you must obtain the unique Ethernet address that Nortel assigned to it.

Nortel installs the EIU boards, the site provides the connecting cables, and the site administrator assigns the EIU address before connection. Do not assign arbitrary Ethernet addresses to EIUs. It is the responsibility of Nortel to distribute blocks of Ethernet addresses to its customers.

EIU maintenance

EIU maintenance is available through generic LIU maintenance which is CM resident. It provides for access to a MAP screen, logs, OMs, table control, EIU Manager, and messaging to the EIU- resident local maintenance.

Local maintenance is split into node maintenance and EIC MAC layer maintenance. The MAC layer, a sublayer of the Data Link layer, dictates how a medium is shared by multiple nodes. Local maintenance principally ensures EIU operability despite CM failure.

Configuration-specific data is stored in table LIUINV.

Summary of EIU features

The features below are grouped into central and local maintenance, MAC layer services, maintenance Fault Insertion Test (FIT), Data Communications processor (DCP) central control, EIU protocols, IP throttling, Internet dynamic routing, LAN maintenance, LAN management from IOC MAP, and live office network datafill changes.

Central and local maintenance

The EIU features listed below pertain to with central and local maintenance and the MAC layer services of the EIU, (formerly DCP). These features provide

- CM-resident maintenance for
  - — loading and initialization of the EIU
  - — manual command and control of EIU
  - — interface to local maintenance
  - — fault detection and handling
  - — EIU manager
  - — inventory table control
  - — MAP display and commands by adding an EIU sub-level to the peripheral module (PM) level
- EIU resident local maintenance for
  - — the processing of CM maintenance requests and queries
  - — support of all restarts
  - — interface to MAC layer
  - — EIC initialization
  - — EIC interrupt handlers

MAC layer services

The MAC layer services include

- interrupt handling
- message buffering

- providing messaging services
- message byte ordering
- Ethernet address allocation scheme for the UCS DMS-250 switch
- enhancement of
  - — table LIUINV
  - — MAP commands
  - — CM-to-local maintenance interface
  - — EIC initialization
  - — EIC interrupt handlers

Maintenance Fault Insertion Test

The EIU maintenance Fault Insertion Test (FIT) features provide

- diagnostics to increase FIT coverage for detecting, isolating, and recovering from faults in the EIC
- I/O interrupt throttling
- EIU overload controls
- internal data loopback
- inservice audits
- reports of excessive LAN faults to local maintenance
- migration to two card LIU NEX22AA

DCP central control

The DCP central control feature enhances EIU maintenance to allow the raising of INServ trouble conditions for thresholded LAN transmissions and reception errors. The name EIU refers to the physical transmission media the peripheral employs: Ethernet. It replaces the old DCP.

EIU protocols

The EIU protocols feature provides

- ICMP echo request and reply messages. It also provides some error message generation for bad or undeliverable datagrams
- Remote Log System (RLS), which resides on the CM as a log server and on the CM or a remote node as a log client, to offload the DMS log system
- LOG group, ITN (InTerNet), which generates LOG messages for all protocol layers
- support to local applications

- improved performance, reliability, and recovery mechanism

Internet protocol throttling

The IP throttling feature implements a mechanism to avoid congestion on the DS30 links between the MS and the LMS caused by IP traffic to and from EIUs.

This feature ensures that non-IP traffic, such as CCS7 messaging, through the DS30 links does not experience message loss caused by an overload of IP traffic.

Internet dynamic routing

The Internet dynamic routing feature provides

- Enhancement of the UCS DMS-250 switch’s ability to handle faults due to routing failures, by dynamic routing
- RIP, which allows EIUs to exchange routing information with third-party internet gateways
- ICMP in the area pertaining to message routing

LAN maintenance

The LAN maintenance feature provides the MAP operator with the ability to datafill and manipulate configuration data for external nodes reachable by way of the EIU. This feature provides:

- detailed information about external nodes as viewed from Table Control
- configuration of external nodes as components of the system from the MAP terminal
- preparation work for later datafill

LAN management from IOC MAP

This feature enhances the MAP monitoring and control capabilities for External Nodes (EXNDs). This feature

- provides an additional EXND sub-level to the PM MAP level
- raises a minor alarm when an EXND fails
- provides expandable base components to support other LAN technologies for future development

Live office network datafill changes

Functionality for allowing live office network datafill changes provides the

- ability to alter the following tables
  - — LIUINV

- — IPNETWRK
- — IPHOST
- — IPROUTER
- — IPPROTO
- — IPTHRON
- — RMCONFIG
- — ENSITES
- — ENTYPES
- — EXNDINV

- notification to appropriate applications when table data is modified
- transfer of control to applications, supporting the latter in order to determine consequences due to changed data, and taking necessary actions to comply with changes
- download of instantly modified data to all nodes without waiting for restarts

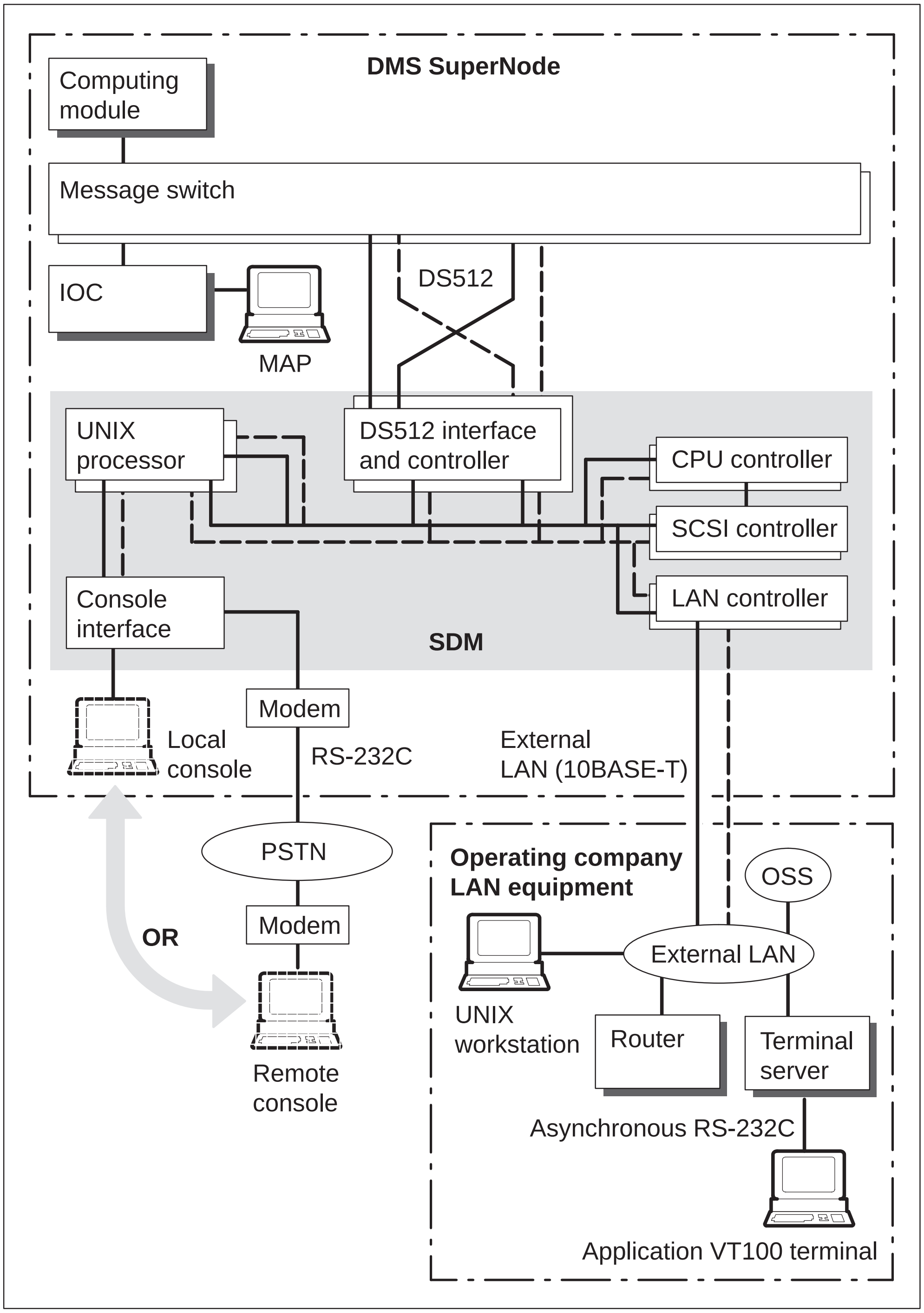
SuperNode Data Manager (SDM)

The SuperNode Data Manager (SDM)/Fault Tolerant (FT) platform is comprised of a redundant fault tolerant computing core (the Motorola FX-Series platform) and redundant I/O and disk storage. This unit is equipped with a CM interface module that provides redundant DS512 links to the SuperNode MS.

Physical location

Figure 3-37 shows the position of the SDM within the DMS SuperNode system. The fault-tolerant SDM is connected to the message switch using four DS512 fiber links from two DS512 controller modules. Each DS512 controller module is equipped with two ports that connect over separate links to the two message switch planes. These links maintain communication to the message switch if a link fails or if one side of the message switch is unavailable. External hardware is connected to the SDM through modems using serial ports or through the operating company LAN using a built-in Ethernet interface.

Figure 3-37
SDM position in the DMS SuperNode system



SDM Datafill requirements on the DMS switch

The following DMS data schema tables require datafill, in the order listed, to establish connectivity between the CM and the SDM.

- MSCDINV
- IPNETWRK
- IPHOST
- SDMINV

Table MSCDINV defines cards on the DMS message switch, including those that support communication to the DS512 modules on the SDM. Table MSCDINV datafill defines the characteristics of the DS512 link to the message switch (MS). Two ports on each DS512 personality module are defined to each support a subrate of 128.

Table IPNETWRK defines the IP address of the CM, allowing the SDM to communicate with the CM. The SDM cannot communicate with the CM, if the CM IP address is not defined.

Table IPHOST assigns IP addresses to CM end hosts, and in particular, defines the number of transmission control protocol (TCP) endpoints (0 to 50) in the CM. TCP allows virtual connections between a program running on the SDM, and a program running on the CM. A physical connection is not necessary for communication to occur between two such programs.

Table SDMINV contains configuration information specific to the SDM, including MS port definitions, locations, and IP addresses. Table SDMINV defines the DS512 communication between the SDM and the CM. DS512 communication cannot occur without datafilling table SDMINV.

For detailed information on SDM-related datafill of these tables, refer to the customer data schema NTP for your switching system.

Asynchronous interfaces

Overview

Input/output (I/O) hardware consists of various types of controllers and terminal devices that enable operation company personnel to properly maintain, operate, and administer the UCS DMS-250 switch. The I/O hardware is located in the maintenance and administration area.

Asynchronous terminal device includes disk and magnetic tape recording devices, used for storage and retrieval of data; printers, for MMI and for printed copies of reports; modems, for remote interface connections into the UCS DMS-250; switch, and terminal devices, for Maintenance and Administration Position (MAP) access to the UCS DMS-250 switch.

Asynchronous terminal device

Interface between the UCS DMS-250 switch and asynchronous terminal devices is provided by the terminal device subsystem. Typical asynchronous terminal devices and brief descriptions of their purpose are provided in the following paragraphs.

Disk drive unit (DDU)

The terminal device uses a disk drive unit for the storage and retrieval of DMS information such as office image data, call detail record (CDR) data, journal file (JF) data, and operational measurements (OM) data. Data can be transferred to or from tape or any other medium to or from the DDU where the data can be stored.

Magnetic tape drive (MTD)

The terminal device uses a magnetic tape drive (MTD) to allow transfer of DMS information to a permanent memory tape, which can be external and transportable. The terminal device uses the MTD for the storage and retrieval of the same type of information as the DDU. The MTD enables physical transportation of data using magnetic tape, and also serves as the backup for the DDU. A UCS DMS-250 office requires at least one MTD.

Modem

A modem is an external device that allows computers to send compatible information over telephone lines.

Printer

A printer provides paper copies of system-generated reports for maintenance and administration.

Maintenance and Administration Position (MAP) terminal

Maintenance and Administration Position (MAP) terminals serve as the main entry point for maintenance and administration commands. The MAP provides a man-machine interface between operating company personnel and the UCS DMS-250 switch, and can be ran on a VT220 terminal, or on a workstation running a VT220 emulator. Details of MAP operation is described in the following chapter, "DMS-250 switch access."

Asynchronous input/output hardware

The input/output controller (IOC) is the main component of the terminal device subsystem. The IOC contains device controller (DC) cards that control the activity of each terminal device and allow the terminal device to communicate with the rest of the switch. The IOC is an equipment shelf in the input/output equipment (IOE) frame in the maintenance and administration area.

The IOC contains device controller (DC) cards that control the activity of each terminal device and allows the terminal device to communicate with the rest of the UCS DMS-250 switch. Each IOC can contain a maximum of nine DC cards, each of which has four ports.

Information is provided in this chapter for the following major UCS DMS-250 terminal device subsystem components:

- input/output controller (IOC) shelf—NT1X61AB and NT1X61AD
- IOC SCSI DDU circuit pack—NT1X55FA
- magnetic tape controller (MTC) card—NT1X68 series
- terminal controller (TC) card—NT1X67BD

Note: Information on the NT1X89BB enhanced multiprotocol controller (EMPC) card is provided in Chapter 2; *X.25 interface*.

Input/output controller (IOC)

The descriptions in this section reference the IOC shelf as NT1X61. The information applies, except where noted, to the following Nortel IOC units:

- NT1X61AB—IOC shelf

- NT1X61AD—IOC shelf

The IOC provides an interface between a pair of message switches and up to nine microprocessor-based device controllers (DC). The IOC relays messages generated by the central control (CC), via the message switch, to input/output (I/O) DCs. The IOC also accepts messages from DCs for transmission to the CC.

Two IOCs are a minimum compliment in any switch. This is to ensure that the loss of an IOC will not prevent access to the switch from a MAP or TTY terminal. Additional IOCs may be added to the switch one IOC at a time.

Each IOC is capable of receiving and transmitting messages on a 2.56-Mbps serial port to a pair of message switches (MS-0 and MS-1). Only one IOC port is used at any point in time. Although identical messages are sent over both IOC ports simultaneously, only the port associated with one plane of the MS is used. The other link is a redundant “hot standby.”

The IOC performs serial-to-parallel and parallel-to-serial conversions on the data to and from DCs, respectively. The IOC executes the standard DMS serial transmission protocol on the serial ports. The IOC serves as interface for the DCs on an eight-bit parallel bus.

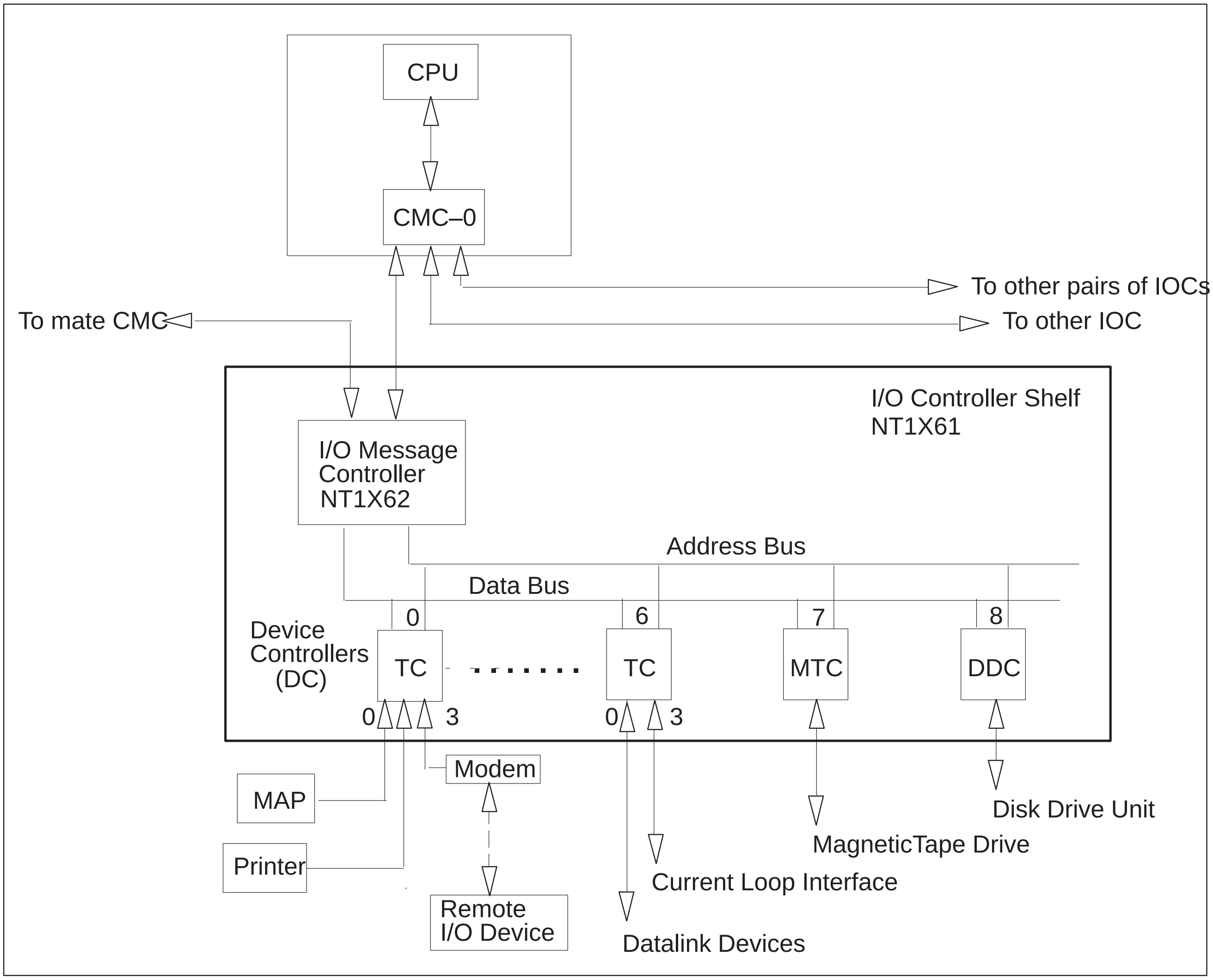
In its idle state, the IOC continuously monitors its serial ports for message transmission requests and checks the DCs for transmission requests, sanity timeouts, and error flag indicators on incorrectly received messages.

Messages transmitted between the DCs and central processor via the message switch and the IOC are limited to 256 bytes.

The NT1X61 IOC has the following characteristics:

- employs one common control card, using low-power Schottky logic
- transmits messages from the IOC to the DC is asynchronously
- performs checksum integrity checks on all data transfers
- uses a selective reset capability for all DCs
- can receive and transmit maintenance messages itself using its internal 256-byte memory

Figure 4-1
Functions of the NT1X61 IOC



IOC components

The NT1X61 IOC consists of DC cards: the NT1X67AB and a combination of the following components:

- NT0X50AA—filler faceplate 0.875
- NT0X50AF—filler faceplate 1.75
- NT0X67AA—IOC terminator
- NT1X55FA—IOC SCSI DDU circuit pack
- NT1X62AB—I/O controller
- NT1X67—data link controller

- NT1X68BC—magnetic tape unit controller (for Cook MTDs)
- NT1X68BD—magnetic tape unit controller (for HP MTDs)
- NT1X89BB—enhanced multiprotocol controller
- NT2X70AA—power converter, ±5 V/12 V
- NT6X91AA/AB—mobile telephone exchange link controller

IOC layout

Table 4-1 provides descriptions of the components that make up the NT1X61 shelf.

Table 4-1
NT1X61 IOC shelf components

PEC	Slot	Description
NT0X50AA	1F, 5F, 7F, 9F, 11F, 13F, 15F, 17F, 19F, 21F	*Filler faceplate .875.* The NT0X50AA is used to fill in unused circuit pack (CP) slots.
NT0X50AF	23F	*Filler faceplate 1.75.* The NT0X50AF is used to fill in slot 23F on the IOC shelf.
NT0X67AA	22F	*INPUT/OUTPUT CONTROL TERMINATOR CIRCUIT PACK*. The NT0X67AA provides terminating resistors for the IOC’s parallel bus.
NT1X62AB	2F	*I/O MESSAGE CONTROLLER CIRCUIT PACK*. The NT1X62AB performs the principal activities of the IOC shelf: transmits and receives messages on two 2.56-Mbps serial ports, one to each message switch and one parallel port to the DCs; and performs serial-to-parallel and parallel-to-serial conversions on data and executes the transmission protocol on the serial ports.
NT1X67	Provisionable: 4F, 6F, 8F,10F, 12F, 14F,16F, 18F, 20F	*DATA LINK CONTROLLER CIRCUIT PACK*. The NT1X67 provides an interface between the CC and the corresponding I/O device.
NT1X68BD	Provisionable: 4F, 6F, 8F,10F, 12F, 14F,16F, 18F, 20F	*MAGNETIC TAPE UNIT CONTROLLER CIRCUIT PACK*. The NT1X68BD provides an interface between the CC and the corresponding magnetic tape unit.

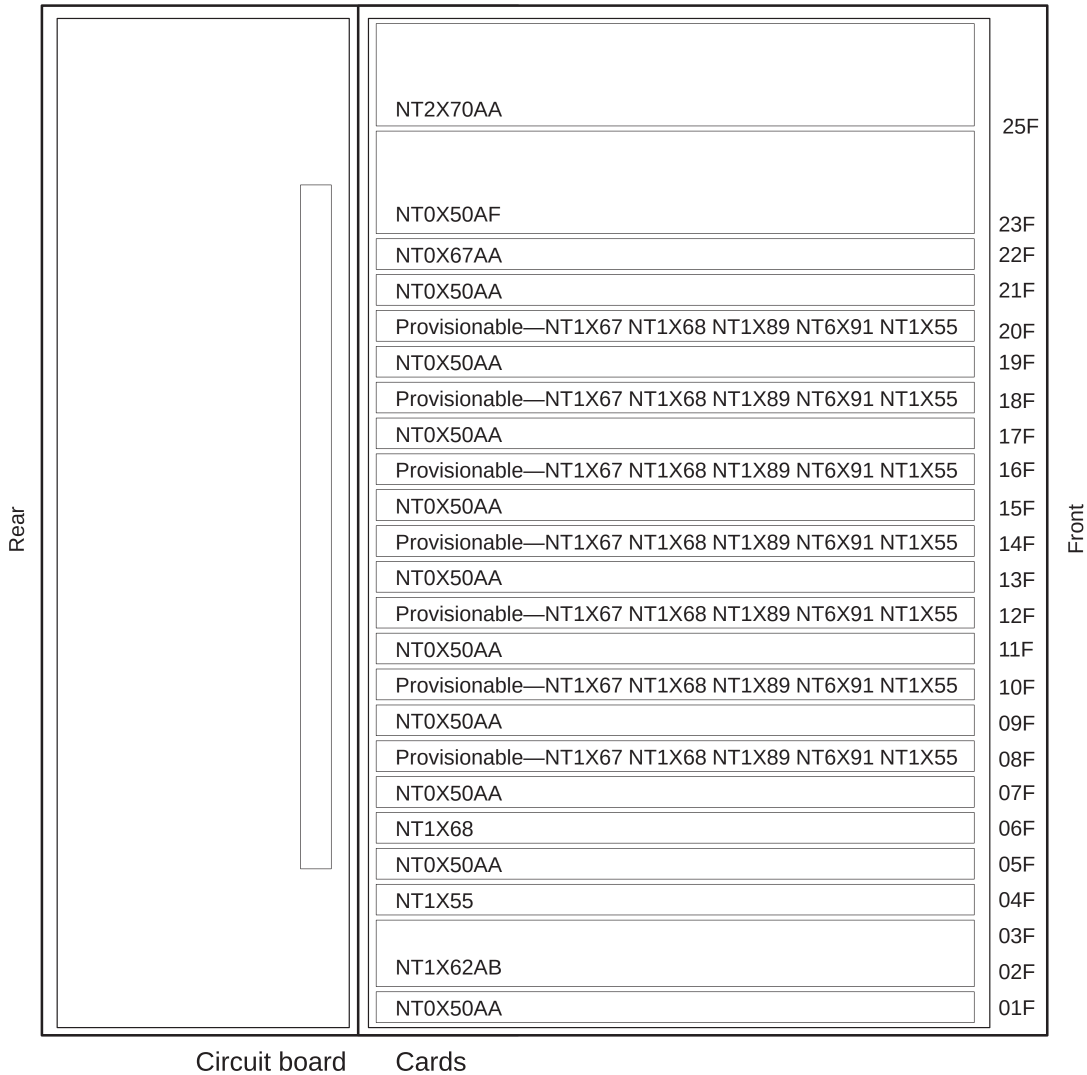
—continued—

Table 4-1
NT1X61 IOC shelf components (continued)

PEC	Slot	Description
NT1X89BB	Provisionable: 4F, 6F, 8F,10F, 12F, 14F,16F, 18F, 20F	*ENHANCED MULTIPROTOCOL CONTROLLER CIRCUIT PACK*. The NT1X89BB is a general purpose data communications board.
NT2X70AA	25F	*POWER CONVERTER, ±5 V/12 V.* The NT2X70AA provides to the IOC shelf a regulated dc power supply with an output of ±5 V or 12 V, 40 A. Input to the converter comes from a nominal –48V dc office battery.
NT6X91AA or AB	Provisionable: 4F, 6F, 8F,10F, 12F, 14F,16F, 18F, 20F	*Mobile telephone exchange link controller circuit pack.* The NT6X91 provides a mobile telephone exchange link between the CC and the corresponding peripheral unit.
—end—		

Figure 4-2 shows the layout of the NT1X61 IOC shelf.

Figure 4-2
NT1X61 IOC shelf layout



Typical configuration for IOC-0 and IOC-1.

Magnetic tape controller (MTC)

The magnetic tape controller is the interface between the magnetic tape drive (MTD) to the IOC data bus. The MTC enables the MTD to be controlled by commands input at the MAP, and provides read/write facilities for retrieval and storage of data on magnetic tapes.

The descriptions in this section reference the MTC card as NT1X68. The information provided applies, except where noted, to the following Nortel MTC cards:

- NT1X68AD—MTC card for HP MTD
- NT1X68BC—MTC card for Cook MTD
- NT1X68BD—MTC card for HP7079E 9-track MTD

The NT1X68BC MTC card interfaces between the IOC and a Cook magnetic tape drive, used predominantly in the U.S. market.. The NT1X68BD MTC card provides an interface between the IOC and an HP7079E nine-track magnetic tape drive, used predominantly in the Canadian market.

The NT1X68 occupies one card position in the IOC shelf and plugs into the IOC backplane connector.

MTC functional description

The MTC card connects to the IOC bus by means of 16 address lines, 8 data lines, and 4 control lines. The card accepts data and address information from the bus; it sends the data or commands to the tape drive through the microprocessor and memory. The card also accepts data from the tape drive, notifies the IOC of the data, and sends the data over the bus to the IOC.

Functional blocks

The NT1X68 consists of the following functional blocks:

- address decoder
- read buffer and register
- write buffer and register
- microprocessor
- memory
- flag generator
- interface buffer

Writing data to tape

When the NT1X68 is ready to accept messages from the IOC, the card sets a ready-to-receive flag that the IOC checks through the IOC bus. The IOC sends the messages on the data lines and the address of the MTC to which the messagesare sent, on the address lines. If the address from the IOC matches the card’s address (strapped on the hardware backpanel), the MTC can process the message. All other MTCs ignore the message. The messages from the IOC are 256 bytes long and are sent at a rate of 1 byte every 3.9 µs.

When the MTC recognizes an address match, the microprocessor reads the message out of the read buffer and decodes the message. If the message is a command message, the microprocessor executes the command immediately. If the message contains data to be written to tape, the microprocessor stores the data in the 2048-byte memory.

The microprocessor continues to store the data in the memory until it has received a complete tape record (maximum of 2048 bytes). When the tape record is complete, the MTC encodes the data and writes it to the tape through the interface buffers.

Recording data from tape

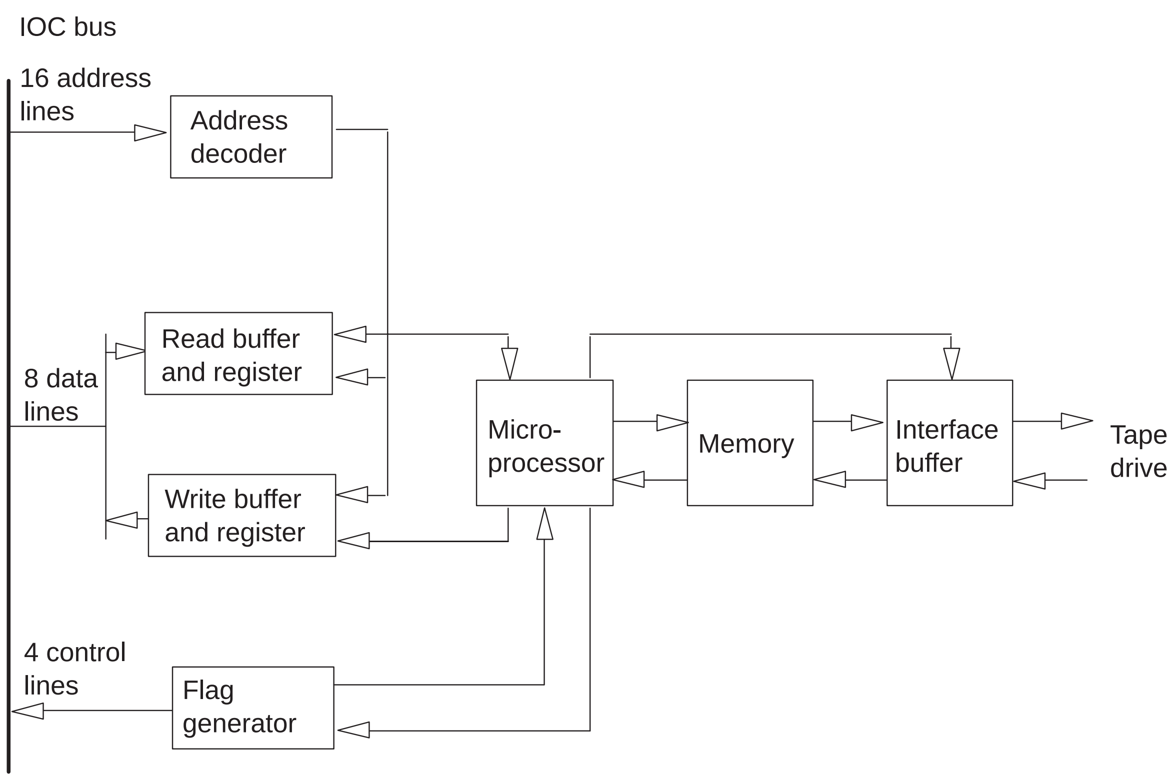
When the IOC requests data from the tape, the CPU sends the MTC a message to transfer a tape record from the tape to the memory. When the data is loaded into memory, the MTC sets a ready-to-send flag to indicate that the data are ready to be sent to the IOC. The IOC recognizes the flag and issues a READ signal to the MTC.

The MTC transfers a byte of the data from the memory to the write register, then sets a DUNIT control signal to indicate that data are available to be read. The IOC reads the data and resets the READ signal. When the MTC recognizes that the READ signal has been reset, it resets the DUNIT signal, which the IOC recognizes. The IOC then issues another READ signal to restart the process.

After 256 bytes have been transferred, the MTC requests the ready-to-send flag to indicate that it is ready to start a new read cycle.

Figure 4-3 shows the relationship between the functional blocks.

Figure 4-3
NT1X68 functional blocks



Terminal controller (TC)

The terminal controller is a multi-purpose circuit card that is the interface between the IOC data bus and a maximum of four terminal devices. The four terminal device ports on each TC can be configured to match the characteristics of the terminal device connected to the port. The TC card port configurations are programmed by entries in table TERMDEV to one of the following two configurations:

- EIA— for a maximum of four terminal devices located within 50 ft. (15m) of the IOC shelf.
- Current loop—for terminal devices located less than 1200 ft. (366m) from the IOC shelf.

The TC provides local access to the Maintenance and Administration Position (MAP). The MAP provides man-machine interface between operating company personnel and the UCS DMS-250 switch. It is described further in the Chapter 5, “UCS DMS-250 switch access.”

The descriptions in this section reference the terminal controller (TC) card as NT1X67. The information provided applies, except where noted, to the Nortel TC card: NT1X67BD—terminal controller (TC) card.

The NT1X67 controller card interfaces terminal devices, such as visual display units (VDU) and teleprinters, with the central control (CC) of the UCS DMS-250 switch by way of the input/output controller (IOC) and message switch. Messages are transmitted to and received from the CC on the IOC parallel bus.

The TC is an asynchronous controller card. It transmits and receives data to and from the IOD and datalinks through four data ports. Each card occupies one card position in an IOC shelf or in a message switch and IOD controller shelf.

TC functional description

The TC has four separate ports for peripheral terminal devices. The firmware in this card allows the terminals to communicate at higher speeds on all ports. Even though the card specification dictates that no single port shall exceed 2400 bps, the maximum bits per second rate that can be supported by a single port in a special application is 4800 bps. When any single port on a card exceeds 2400 bps, the following conditions must be met:

- The terminal must be able to support the higher baud rates.
- The sum of the baud rates for all ports on a single card must not exceed 4800 bps.

The NT1X67 card should be used in all auto dial back applications and for special editing functions.

The features of the NT1X67 are

- Each of the four data ports can use either current loop or Electronic Industries Association (EIA) interfacing.
- It accepts resets for a single port or resets for all ports.
- The terminal port configurations are programmable from a central processing unit (CPU).
- Each port can be set to active or standby. If a port is on standby, all activity on that port is ignored and input/output messages show errors.
- Data sets are interfaced by way of EIA RS-232C interface.

- Message loopback is available for testing.

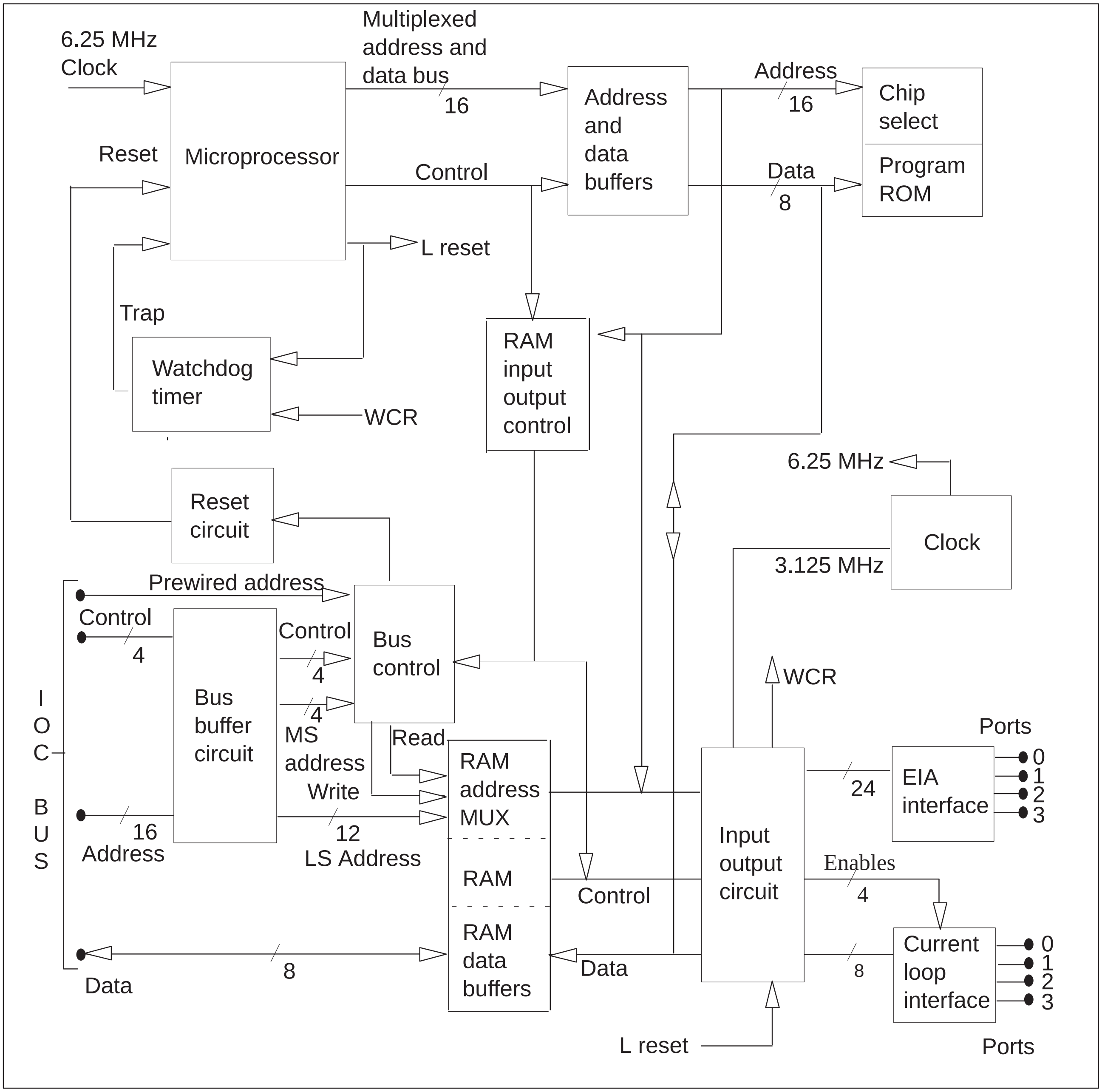
Functional blocks

The NT1X67 comprises of the following functional blocks:

- IOC
- microprocessor
- watchdog timer
- RAM input/output (I/O) control
- bus buffer
- bus control
- system RAM
- program ROM
- asynchronous controllers, firmware
- asynchronous controllers, input/output circuit
- asynchronous controllers, current loop interface circuit
- EIA interface

Figure 4-4 shows the functional relationship between these blocks.

Figure 4-4
NT1X67 functional blocks



Bus buffer

The bus buffer circuit provides appropriate buffering and inversion of IOC address and control signals.

IOC

The IOC bus communicates with the controller. It consists of 16 unidirectional address links, 4 control links, and 8 two-way data lines. The functions of the address lines are:

- Address bits 12 to 15 select a controller or other device on the IOC bus. The signals carried over the lines are matched with a pre-wired backplane address.
- Address bits 10 and 11 on the controller select a peripheral processor associated with a port (0 to 3).
- Address bits 0 to 9 select locations within the controller, such as outgoing (from CC) message buffer, incoming (to CC) message buffer and the associated control and status registers.

The signals on the four control lines control read and write sequences. The eight data lines receive and send messages between the IOC and the controller. Messages conform to the UCS DMS-250 input/output message protocol.

Microprocessor

The microprocessor has a multiplexed address and data bus, which is separated and buffered by the address and data buffers. Firmware instructions in the program ROM block operate the microprocessor at a rate determined by the crystal-controlled clock. The microprocessor can be reset by hardware in the reset circuit (power up or external reset) or by software if a reset message is decoded. The reset is performed by firmware in the program ROM.

Watchdog timer

The watchdog circuit is a timer that restarts each time the microprocessor checks for outgoing messages from the CC. If the microprocessor fails to check for messages for approximately 100 ms, the timer resets.

RAM input/output control

The RAM I/O control circuit provides the read, write, and timing signals for the RAM and I/O. For each new memory or I/O cycle the microprocessor starts, the RAM I/O control circuit generates window access (PCYC) to the RAM for the microprocessor, followed by a window for bus control to access the RAM.

Bus buffer

The bus buffer circuit provides buffering and inversion of IOC address and control signals.

Bus control

The bus control circuit performs the hardware portion of the bus protocol. It matches the four most significant IOC address bus bits with a prewired (on the back panel) address. Upon detection of an address match and the receipt of an IOC bus read or write, a memory cycle initiates . When the internal memory cycle is complete, as indicated by the RAM I/O control circuit signal ENDBC, the bus control circuit produces a bus DUNIT. The cycle completes when the bus read or write drops. The reset circuit receives an external reset signal as a result of an address match and a bus reset.

System RAM

The system RAM block includes the RAM address multiplexer and the RAM data buffers. The address multiplexer gates the microprocessor address bus to the RAM devices when a control signal, PCYC, from the RAM/IO control is high indicating a microprocessor window access. If PCYC is not high, the IOC address bus is gated to the RAM devices. The RAM address multiplexer performs the address translation between the IOC address bus and the local address bus. The RAM data buffers act as multiplexers for write data during a RAM write; separate latches store the read data for the IOC bus and microprocessor so that the data is available until the next window. The RAM data buffers also perform the inversion required by the IOC bus.

Program ROM

The program ROM holds firmware instructions that operate the microprocessor.

Asynchronous controllers (firmware)

The firmware structure provides four independent (virtual) peripheral processors each with one IOD port. Each peripheral processor is activated in sequence and executes a section of firmware code stored in the program ROM before returning control to the supervisor process, which activates the next peripheral processor. The code executed depends on the state the peripheral processor is in when it is activated. After execution the state pointer is changed, if necessary, so that a different set of firmware instructions is executed the next time the peripheral processor is activated. Part of the supervision process is to check for outgoing (from the CC) messages for the peripheral processor. This check prevents the peripheral processor from ignoring outgoing messages as it would if it stayed in a state which does not accept messages. If the message is a control type message, the appropriate firmware code is executed before the peripheral processor is activated, otherwise the message is passed as a parameter.

Typical states that can be activated are

- INPUT—Get a character string from the IOD.
- OUTPUT—Send a character string to the IOD.
- ECHO—Echo a character to the IOD.
- SEND—Wait for an incoming message for CC acceptance.

Asynchronous controllers (input/output circuit)

The I/O circuit controls the input and output of serial data to the IOD ports. Each port has associated with it a USART that performs the serial-to-parallel and parallel-to-serial conversions, and monitors or controls the appropriate EIA interface signals. Each USART has an internal baud rate generator driven by a common crystal-controlled clock. The I/O circuit contains a register (one bit per port) to select individual ports for current loop operation. The circuit also includes a device address decoder that selects the USARTs, the current loop register, or the watchdog circuit reset (WCR) on a microprocessor I/O operation.

EIA interface

The EIA interface circuit provides the appropriate level translations and compatibility with the EIA RS-232C specification.

Asynchronous controllers (current loop interface circuit)

The current loop interface circuit provides translation between the current loop port signals and those required by the I/O circuit. The transmitter is disabled if the current loop circuit is not in use for a given port. Either current loop or EIA interfacing may be used on each port. There is no restriction on which ports are EIA and which use current loop.

IOD datafill requirements

Characteristics of the DC-to-IOD interface, including DC types, port configurations, and baud rates, are assigned by datafill in specific IOD tables. The relationship between different types of IOD and the associated data tables are given in Table 4-2.

Table 4-2
I/O devices and associated datafill tables

I/O device	Datafill tables
Magnetic tape drive (MTD)	MTD
Disk drive unit (DDU)	DDU

Table 4-2
I/O devices and associated datafill tables (continued)

I/O device	Datafill tables
Visual display unit	MAP
Printers	PRT
Modem to a remote printer	TERMDEV
DATAPAC	DPACDEV
Data link controller	DLCDEV

—end—

Input output module (IOM)

The input output module (IOM) user interface provides access to commands that allow operating company personnel to use IODs to enter machine controls, perform tests, and request information.

Maintenance and administrative IODs are in the integrated services module (ISM) shelf. The following sections describe the IOM and the associated IODs. These sections also describe the ISM shelf, integrated services module equipment (ISME) frame, and integrated services module (CISM) cabinet.

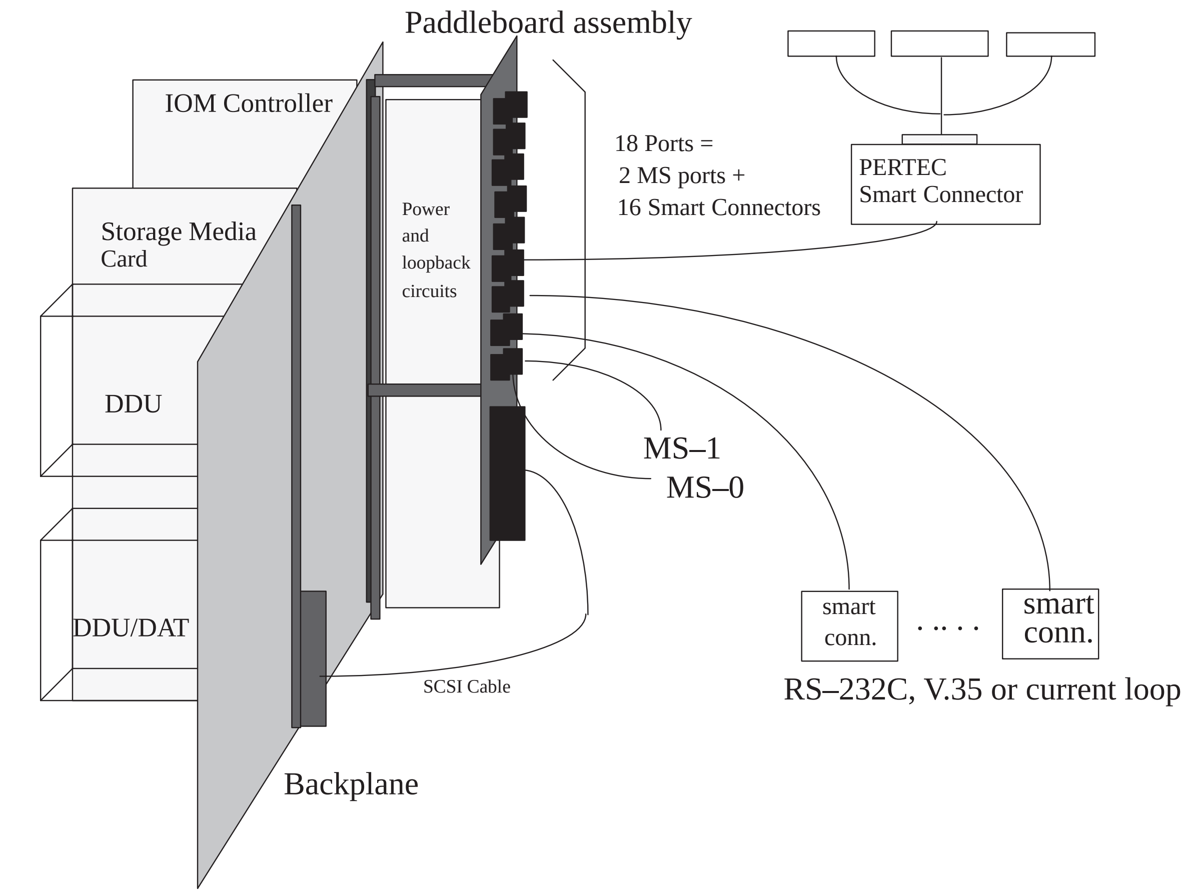
ISM shelf

The ISM is a single shelf unit that replaces the current trunk module (TM) shelf or the maintenance trunk module (MTM) shelf. The ISM shelf is on the cabinetized metallic ISM (CISM), the frame ISM (FISM), or cabinetized metallic test access (CMTA). The CISM, FISM, and CMTA contain a maximum of four ISM shelves. The ISM shelf has the same functionality as the current TM/MTM shelves.

ISME frame

The ISME frame is a standard DMS frame that supports a maximum of four ISM shelves. The modular supervisory panel (MSP) provides power, and control for the frame hardware. Figure 4-5 contains a schematic diagram of the IOM in an ISM positioned in an ISME frame.

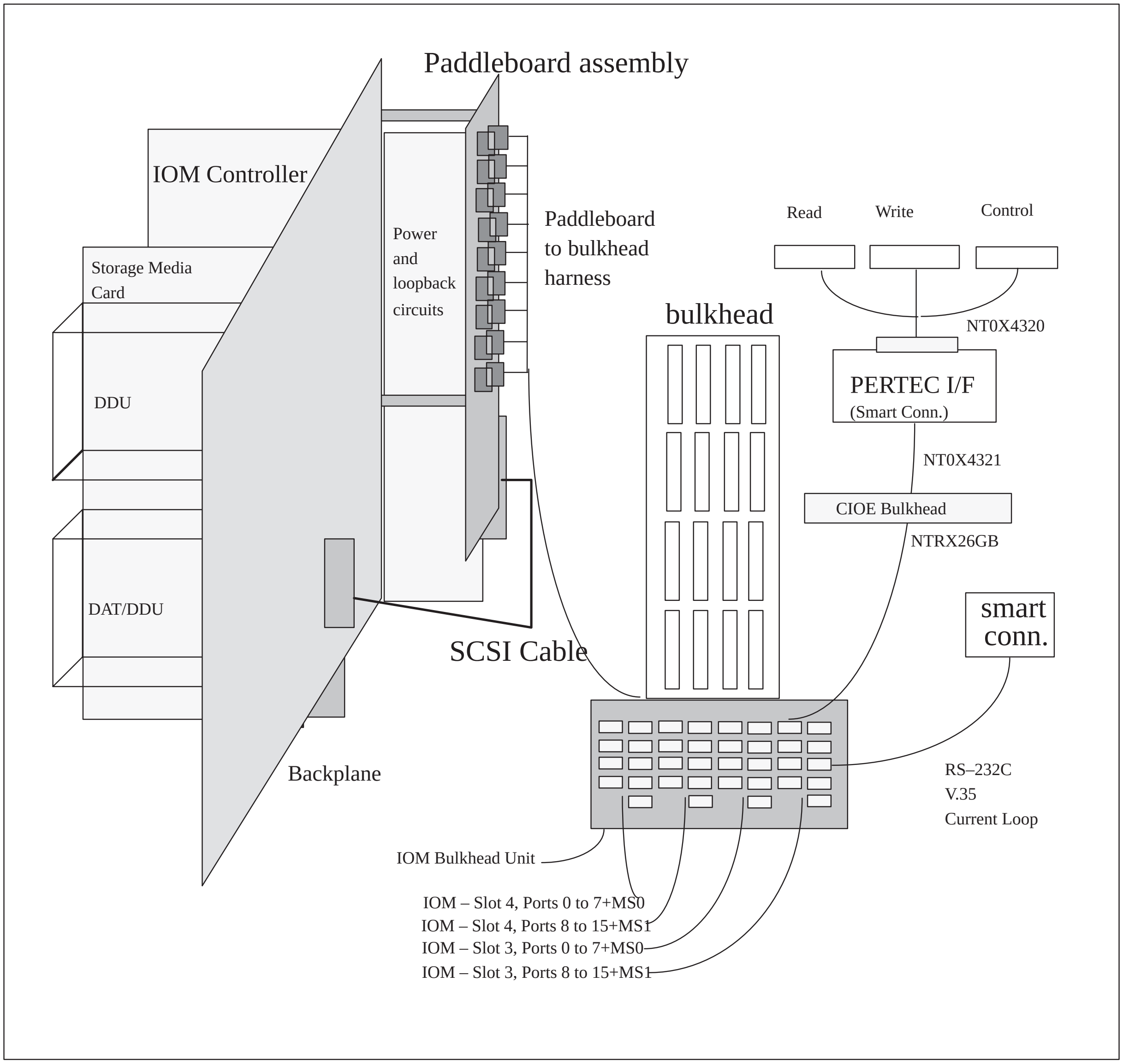
Figure 4-5
IOM equipment in the ISM (ISME frame)



CISM cabinet

The CISM cabinet is a standard DMS cabinet that supports a maximum of four ISM shelves and a cooling unit shelf. The modular supervisory panel (MSP) provides power and control for the frame hardware. Figure 4-6 show a schematic diagram of the IOM in an ISM positioned in a CISM cabinet.

Figure 4-6
IOM equipment in the ISM (CISM cabinet)



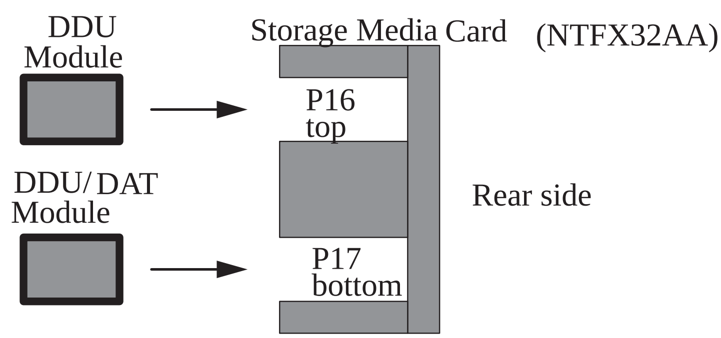
IOM

The IOM is a direct replacement for the IOC shelf. The IOM provides all the functionality of current IOC cards, with the exception of the HDLC controller NT6X91, the SMDI controller NT1X67FA and DPAC/DLC controllers NT1X67DA/B. The IOM with a digital audio tape (DAT) and a disk drive unit (DDU) replace the IOC and magnetic tape drive (MTD). The IOM occupies three shelf slots. If a DAT is not required, the IOM controller cards provide 9-track MTD support.

The IOM supports all peripheral equipment that a completely provisioned IOC shelf supports.

The main IOM controller card (NTFX30) is in slot 3 of the integrated servies module (ISM). This card has all the communication ports and controller circuits for the Storage Media card. Together, the controller card and the Storage Media card provide all the communications and storage functions of a completely provisioned IOC shelf. Figure 4-7 shows the Storage Media contruction.

Figure 4-7
Storage media card construction



The Storage Media card (NTFX32AA) occupies 2 slots (4 and 5) of the ISM shelf. This card has plug-in DAT (NTFX32CA) and DDU (NTFX32BA) units. The plug-in design provides maximum flexiability. The plug-in design does not require card replacement for upgrades and repairs. The paddle board (NTFX31AA) mounted on the rear of the backplane supplies power to the IOM.

The main controller card provides the interface between the IOM and the IODs. The main controller card has 20 DS-30 communication ports. Sixteen of these ports are general purpose input/output ports providing RS-232C, V.35, current loop, or PERTEC interfaces with a Smart Connector at the end of the cable to perform the protocol conversion. Two IOM ports are used for communication with the message switch and are true DS-30 ports. The remaining 2 are not used. The general purpose ports can be configured to provide any previously specified existing IOC functionality as required.

The Smart Connectors have a 6-pin teledapt connector on the IOM side and a 25-pin D-type connector on the user side. Labels on the Smart Connectors identify them as individual PEC codes.

The PERTEC interface connects to the IOM through a 6-pin teledapt connector on the IOM side. The interface also connects to the IOM through a 50-pin connector on the user side. The PERTEC conversion box is on the Cook magnetic tape drive (MTD) in a vertical position. The cables from the box connect to the MTD or DPP.

IOM subsystem components

The IOM controller card (NTFX30AA) and the associated paddle board (NTFX31AA) are the main components of the IOM. The following sections describe the IOM cards.

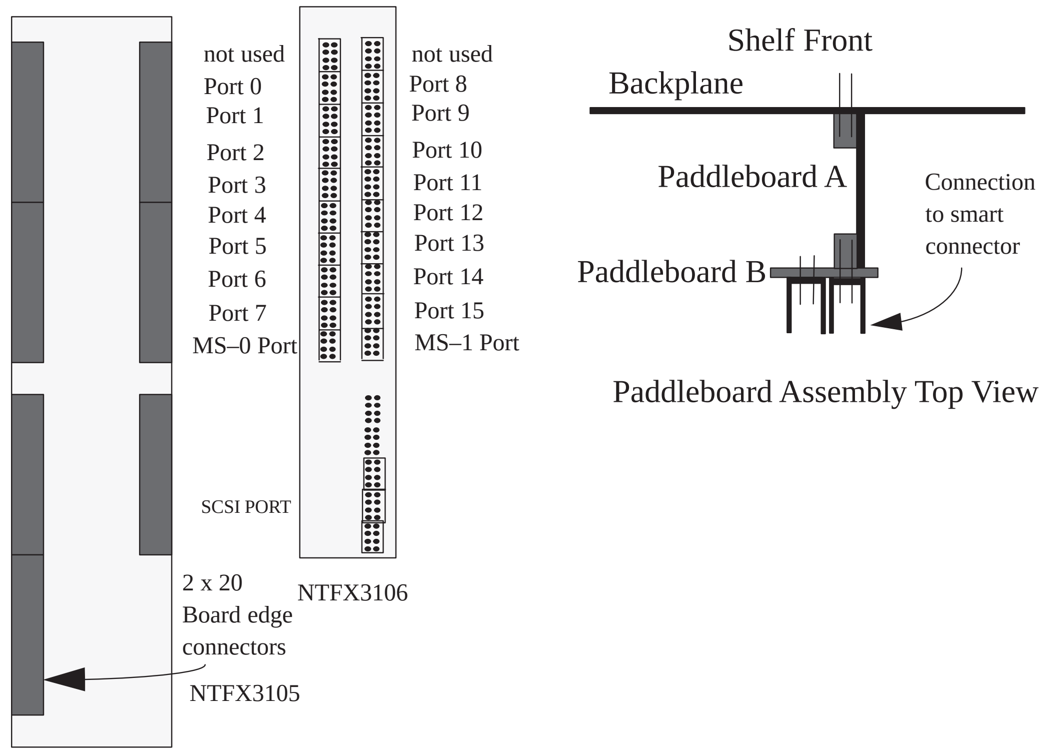
IOM controller card (NTFX30)

The IOM controller card (NTFX30) contains hardware and firmware to support 16 general purpose ports. These ports include RS–232C, V.35, current loop and PERTEC; two DS-30 links to the message switch, and two optional external SCSI devices on the Storage Media Card (NTFX32AA). The card occupies a single shelf slot and can be placed in slot 3 or 4 in the ISM shelf. If a NTFX30AA is provided in slot 3 of an ISM with slot 4 unoccupied, then slot 4 is reserved for a future NTFX30AA or NTFX32AA. The NTFX30 controls the entire operation of the IOM.

IOM paddle board (NTFX31)

The IOM paddle board (NTFX31) contains the power feed circuitry to a maximum of 16 smart connectors and circuitry to implement local loopback for diagnostic purposes. It is mounted on the rear side of the backplane in the same slot position as the provisioned IOM controller card. A metal bracket which is a part of the NTFX31AA assembly secures the paddleboard onto the backplane. The paddleboard assembly has 20 connectors of which 18 ports are distributed to the bulkhead if in CISM or directly to their destinations if in ISME. Sixteen of the ports provide power along with the signal to the smart connector at the end of the cable. 4 ports do not have any power associated with them. Two of these ports are for connection to the message switch and the last two are left unused. The paddleboard assembly contains an additional connector that provides a SCSI bus link between the IOM controller card and the Storage Media Card. The paddleboard assembly consists of two PCBs. They are connected to each other at 90 degrees. The assembled and exploded views of the paddleboard assembly is shown below in Figure 4-8. NTFX3105 contains all the power feed and loopback circuitry and NTFX3106 contains only compliant pins and plastic shrouds for cable connections to the smart connectors.

Figure 4-8
IOM paddleboard assembly



IOM storage media card (NTFX32)

The storage media card is an optional unit for the IOM. It can hold up to 2 modular, plug–in DDU and/or DAT units. Functionally, with these units installed, it is equivalent to the DDU and /or 9 track MTD. It can be used in all applications that require a DDU and/or 9 track MTD. This card can only be inserted in slot 4 in the ISM shelf. It is connected to the IOM controller card residing in slot 3 using a special SCSI cable (NTFX40HB). This card occupies 2 slots, hence once it is inserted in slot 4, no other card can use slot 5.

Disk drive unit (NTFX32BA)

This is a 1 Gbyte (min.) 3.5 inch SCSI disk drive. The Storage Media Card can hold a maximum 2 disk drives. If one disk drive is provisioned, it is inserted in the P16 (top) port of the Storage Media Card.

Digital audio tape (NTFX32CA)

This is a 1.3 Gbyte (min.) SCSI DAT drive. It plugs into the P17 (bottom) port of the Storage Media Card. The recommended DAT tapes to be used with NTFX32CA are A0648771 (Sony DG–60M) for data tapes, and A0627875 (Sony DG5CLAA) for cleaning cartridges.

Bulkhead splitter unit (NTFX39)

CISM Bulkhead one–to–nine cable splitter unit – NTFX39AA. This is a connection unit that is mounted on the CISM bulkhead, covering the bottom four D–sub connector positions (C05 to C08). One side of the bulkhead connects to a harness consisting of four cables bundled together. The NTFX39AA has four 37 pin female connectors that mate with four 37 pin male connectors on the harness. Each 37 pin connector carrying 36 signals are split into 9 groups of 4 signals that goes to the NTFX31AA. The other side of the bulkhead has a total of 36 1x4 connectors for smart connector and message switch cable connections. A CISM shelf can accommodate up to two IOM boards each with a maximum of 18 ports (2 message switch and 16 external connections). Hence, one NTFX39AA can accomodate up to two IOM boards on a CISM shelf. As a provisioning rule, consideration should be made at the time of initial provisioning of a CISM that the bottom row of the bulkhead connectors shall be used for IOM connectivity and the corresponding slots 5, 6, 7, and 8 in the CISM shelf shall be used by circuit packs that need only DS–30 network connections and circuit packs that do not require external connections if there are plans to provision IOMs in the future. At the moment this is restricted to the following classifications: TTU (NT2X47xx), TTT (NT1X90xx/NT2X96xx), DT/MF Receivers (NT2X48xx), Conference Circuits (NT1X31AA/NT3X67xx), DMODEMs (NT3X02/03xx combination), EDRAM (NT1X80AA), and CTM (NT1X81AA). This rule does not apply to ISME since slots 3, 4, 5, 6, 7 and 8 all have their external connectivity on the backplane. The NTFX39AA includes the EMI filtering elements and eliminates the current bulkhead filter adapters for those bulkhead positions that are used for IOM connections.

ISM harness (NTFX40HC)

A modified ISM harness (NTFX40HC) in a CISM is to connect two IOM paddleboards to the bulkhead. The harness replaces the existing ISM harness to allow for IOM (one or two IOMs). NTFX40HA is part of a retrofit kit to modify existing CISMs to accommodate one or two IOMs. The changes in the harness are only for the bottom 4 connectors on the bulkhead personality plate.

RS-232 smart connector (NTFX34AA)

RS–232C smart connector – NTFX34AA containing RS–232C to IOM message protocol conversion circuit.

V.35 smart connector (NTFX35AA)

V.35 smart connector – NTFX35AA containing DS–30 and V.35 to IOM message protocol conversion circuit.

- 512 Kbps smart connector – NTFX35BA containing DS–30 and V.35 to IOM message protocol conversion circuitry. The 512 Kbps interface capability is introduced as a new optional smart connector to the IOM communication port and requires a different firmware load running on the IOM. This configuration allows the IOM to support X.25 links at 512 Kbps synchronous speed for up to a maximum of 2 links per IOM (one of which is standby). Additional IO devices cannot be deployed on an IOM with 512 Kbps interface, that is, DDU, TC, MTD, DAT, or regular MPC.
- PERTEC smart connector – NTFX36AA containing PERTEC to IOM interface circuit for the 9 track Cook MTD and DPP support.
- Current Loop smart connector.–NTFX38AA, providing a 20 mA current loop to the FSP Portable VDU jacks on each FSP or MSP.
- Cables for bulkhead/paddleboard to smart connector connections.
- Cables for bulkhead or paddleboard to message switch connections.

ISM shelves for CISM or for ISME are IOM ready. In CISM a new cable is provided to connect the provisionable IOM paddleboards to the bulkhead. These cables replace the four cables connected to C05, C06, C07, C08 in the current CISM bulkhead. The NTFX39AA (IOM bulkhead unit) is mounted in positions C05, C06,C07,C08. The existing ISM, CISM and ISME codes are modified accordingly.

In the case of a 9 track Cook tape drive, the IOM port terminates at a PERTEC smart connector mounted close to the tape drive (within 2 ft.) in the IOE or CIOE. For CIOE the existing blank bulkhead panel is replaced with a provisionable bulkhead panel (P0821302) to allow for IOM backward compatibility. Inside the CIOE cabinet, a 9 pin D–sub to 6 pin teledapt cable connects the bulkhead to the PERTEC smart connector which is mounted on the right–rear cabinet upright.

The existing IOC can have many different configurations depending on the mix of the application packs provisioned in the 9 available slots. In terms of number of ports, the current maximum for the IOC is 36 ports (4 ports per 1X67 card) each operating at 2.4 kBaud rate. If a 1X89 card is used it can provide 2 ports, either both asynchronous up to 19.2 or both synchronous with one port at 19.2 kBaud and the second one at 64 kBaud rates.

The IOM provides 16 ports where each port can be programmed to operate at any of the following Baud rates: Synchronous or asynchronous at – 300,600, 1200, 2400,4800,9600,14400,19200, 28800 and synchronous at

56000, 64000 and 512000. The terminal controller is further limited to a maximum of 19200 bps.

Where the customer does not require DAT but needs a 9 track tape, one of the general purpose ports of the IOM can provide the interface and controls for a 9 track Cook tape drive. Similarly the IOM can provide the PERTEC and the RS–232C interfaces to the DPP or the BMC as provided by the current IOC.

The ports provide RS–232C interfaces at the above mentioned rates as well as V.35 interfaces to the user at the synchronous rates of 56, 64 and 512 Kbps. All ports can operate at their maximum rates.

Any port can be configured as a V.35, RS–232C, current loop, or a PERTEC interface by proper data fill and using the appropriate smart connector at the end of the cable. The PERTEC smart connector is mounted near the DPP/BMC shelf or the 9 track Cook Magnetic Tape Drive. It is connected to the tape drive by the NT0X4320 cable (with read, write, and control connectors).

The IOM can occupy one slot (without the Storage Media Card) or three slots (max. 16 ports + 2 SCSI devices) in an ISM shelf.

The IOM introduces a new approach for the user interface. The ports on the board are all identical electrically, each using two twisted pairs one for transmission and the other for reception. The communication over the cable is electrically identical to DS–30 links but using a different protocol at higher levels. The conversion from DS–30 to RS–232C, V.35, current loop, or PERTEC is implemented in smart connectors which contain the necessary circuitry.

The smart connector concept has the advantage of reducing cable congestion, increasing cable distance from 50 feet to 750 feet and providing grounding isolation (ISG).

Operations, Administration, and Maintenance

The Operation, Administration and Maintenance of the IOM is similar to the existing IOC. The main differences are:

IOC shelf is eliminated and IOM resides in the ISM shelf, slot 3 or slot 4.

Eighteen (18) ports appear on the MAP corresponding to each IOM. Sixteen (16) are communication ports, the other two (2) ports indicate SCSI devices on the Storage Media Card. A 9 track Cook MTD, DPP, and/or BMC will continue to be supported through any one of the 16 communication ports.

Each IOM is given an IOC number but is identified as an IOM at the MAP IOC level, that is. IOC xx(iom). This is consistent with earlier DMS product developments such as ISM.

The fault list and board positions refer to only one IOM board in the ISM and to ports connected to the IOM. Each port on the IOM is busied, tested and returned to service at one level below the IOC level on the MAP. The paddleboard is treated as part of the IOM but in diagnostic messages faults on the paddleboard are differentiated from the main IOM board.

IOM supports Digital Audio Tape (DAT) as well as the 9 track Cook MTD. DAT is provisioned on a separate board. In case of a DAT failure the IOM main board and Storage Media Card do not need to be replaced. The DAT port can be busied, and the DAT unit itself can be replaced and returned to service. The same arrangement is true for DDU(s). This increases the overall MTBF substantially since the DAT and DDU are the lowest MTBF components of the IOM.

The smart connector which is an integral part of the IOM port is connected to the cable by means of a 6 pin teledapt connector. Hence the smart connector at the user end of the cable can be replaced very easily without affecting the rest of the system.

User Perspective

In addition to increased async communications speed (Up to 28.8 Kbps.), the main difference from a user perspective between the IOM and the existing IOC is the programmability of each port for any of the IOC port functions through table datafill. All ports are associated with the same pack. The smart connector provides the flexibility to implement various interfaces easily and in minimum space and cabling density.

Interactions

The IOM can coexist with existing IOCs. It supports all types of peripheral equipments (i.e. printers, VDU, MODEMs, DPP, 9 track Cook MTD etc.) that work with the current IOC. Its connectivity with the CM is through the message switch using DS–30 links. Two other IOM links are available on the IOM in addition to the message switch links and the 16 ports.

Note: The supported IOM OEM devices are limited to those in MSFX4101.

Limitations and Restrictions

The IOM has 16 configurable ports but usage is limited by the provisioning rules. Each of the 16 ports can be programmed to operate at any of the following Baud rates: Synchronous or asynchronous at 300, 600, 1200, 2400, 4800, 14400, 19200, 28800 and synchronous at 56000, 64000, and 512K. (Subject to the application configuration limits.)

IOM can support up to two 512Kbps interfaces with one used as a traffic bearing mode and the second one acting as a standby requiring application switch over upon failure of the first.

Since manufacturers of terminals, printers, etc. no longer provide CL interfaces, and that IOM functionality allows for ISG and increased loop length the product plan is that NTFX38AA Current Loop smart connectors will only be provisioned for the DMS Alarm subsystem Portable VDUs.

RS232, V.35, and V.35–512Kbps smart connectors when operating in synchronous modes with external clock, select the RxClk to receive Rx data and generate Tx data. Hence the DCE must set the Tx and Rx bit rates to be the same value and its RxClk and TxClk must be derived from the same clock source.

IOM does not support the HDLC controller NT6X91, the SMDI controller NT1X67FA and DPAC/DLC controllers NT1X67DA/B functionality.

Failure of the main IOM card will result in down time for all connected ports until the IOM card is replaced. Failure of a single port whether it is on the main board, paddleboard or the smart connector, will result in a very short down time of approximately 5 minutes for the failing port. Hardware failure of a single port on IOM can be replaced by other spare ports without replacing the IOM.

Administration and Maintenance

The procedures for the IOM are similar to the current IOC. The basic MAP user interface is maintained with some new screens added to the MAP hierarchy. These are explained in the human-machine interface section.

The main changes in maintenance and administration are the testing and replacement of the boards, disk drive, tape drive and smart connectors. The components of the IOM are the main board, paddleboard and the Storage Media Card, backplane (shared by other boards in the ISM shelf) connections, paddleboard on the backplane, cables, bulkhead connections (for the cabinetized ISM) and the smart connectors. Hence the maintenance operations cover these components in testing, busying, returning to service and fault isolation.

The new IOM has the DDU and the DAT (on a separate card) as integral parts of the system. In case of drive failure the related controller circuit pack does not have to be replaced. Replacing the drive unit should suffice.

Human-Machine Interface

A new MAP display for the IOC is introduced since both the current IOC and IOM may coexist. This new MAP display deals exclusively with the

IOM functionality and is designed to provide consistency with the existing IOC MAP level.

At the IOC level when an IOM is displayed, 18 ports are visible with each port type identified with a 3 letter acronym. These are MPC (Multi–Protocol Controller), MTD (9 track Cook Magnetic Tape Drive or DPP), CON (Terminal Controller), and SCS for the SCSI interface to the DAT (Digital Audio Tape) and/or DDU (disk drive unit). Each port has a corresponding lower MAP level display. Functions performed on each port is very similar to those on the current IOC. For ports identified as SCSI, this Port level of the MAP defines the device as a DAT by a “Dev Type” line on the screen or as a DDU by a “Drive State . . . “ line on the screen.

Recovery Management

In case of failures detected by the CM, the CM treats the IOM as the current IOC controller and several virtual controllers tied to the main controller. The CM can thus try to recover and reset the main controller or a virtual controller. The IOM firmware maintains this structure and tries to recover its virtual controllers in cases of reset instructions from the CM. The out of band reset feature of the 1X62 card is also implemented on the IOM in which case the IOM goes through a warm restart where the load and the configuration remains intact.

The following are the major IOM components that could have an impact on the system downtime. Recovery methods are given in each case.

- The main controller—A failure in the main IOM card that affects the overall IOM functionality is the highest level of severity. In such a case the CM would try to reset the IOM using out–of–band reset (OOBR). In this case the reset line of the processor is activated by the two FPGAs on the board (as long as they are programmed correctly and are sane), and all processes will be reinitialized. Some currently processed messages may be lost but the load (if sane) will not be lost and the IOM does not need to be reloaded. If reloading is not required recovery will be completed within seconds. If the failure is a hard one and cannot be recovered even after a power down–power up sequence then the IOM main card must be replaced. OOBR and power cycling have different effects on the IOM recovery. With OOBR the load will not be lost but with power cycling the application load will be lost and the base load will be rebooted from FLASH. This allows the IOC, DDU, TC, MTD, and DAT to function without downloading. Loading from a provisioned IOM DDU after power cycling will not be implemented in this phase of IOM development.

- DDU and DAT failure—Failure of the DDU/DAT or any of the components in the SCSI control chain is a hard failure. The card replacement may be a scheduled replacement depending on the application.
- Virtual controller failure—This would be equivalent to a port failure since each virtual controller would function with one port only. If the failure is a soft one recovery will be accomplished with a virtual controller reset. A hard failure would involve hardware related to one of the ports. This could happen in one of several locations:
- The main IOM board—In this case the port can be physically moved to another connector on the paddleboard (or on the bulkhead in the case of CISM) designated as a spare port until a scheduled IOM replacement.
- The paddleboard—The recovery procedure would be the same as a port failure on the main board. A spare port could be used until the scheduled replacement. If a paddleboard failure occurs that affect the whole IOM, the paddleboard needs to be changed.
- Bulkhead or harness failure—A spare port should be used and the failed component should be replaced.
- Smart connector failure—Smart connector is separable from the cable and its replacement is required in case of failure.
- PERTEC interface failure—The PERTEC smart connector will have to be replaced.

UCS DMS-250 switch access

Overview

This chapter describes the command syntax required to execute I/O functions and the responses to the commands. The primary man-machine interface between operating company personnel and the UCS DMS-250 switch is is provided by the Maintenance and Administration Position (MAP).

Man-machine interface (MMI) is defined as the series of commands and responses used by operating company personnel to communicate with the UCS DMS-250 switch. Communications takes place through the MAP terminal and other terminal devices.

I/O user classes

Organizing I/O users into classes which define the specific set of functions they are required to perform, allows the definition of the terminal device requirements for each user class.

The organization of I/O user classes is flexible to meet operating company operational requirements. The general principle is that the division of tasks serves the purpose of each user class, yet ensures that the users do not interfere with each other’s functions.

The selection of the type and quantity of terminal devices for each user class function depend on operating company requirements and form part of the office engineering process. The paragraphs that follow describe some hypothetical I/O user classes.

Administration (ADMIN)

The administration (ADMIN) user class has unlimited access from any terminal device to all command classes (see PRIVCLAS). It is assigned the highest priority level (see PERMIT). The password associated with ADMIN cannot be displayed, and cannot be changed by any other user (see the section entitled “Command screening,” later in this chapter.)

Switch maintenance (SMtc)

The switch maintenance (SMtc) user class enables the user to maintain the UCS DMS-250 switch by performing regular maintenance and fault correction for the following components:

- computing module (CM)
- message switch (MS)
- terminal devices
- network modules (ENET)
- peripheral modules (PM)

The SMtc user can also perform all database modifications necessary to administer the switch, monitor the switch status, run diagnostic programs, and replace equipment. The user can execute all input commands associated with the table editor and the Support Operating System (SOS).

Trunk maintenance (TMtc)

The trunk maintenance (TMtc) user class permits the user to perform regular maintenance and fault correction for trunk circuits and trunk facilities. The user monitors the trunk status, runs diagnostic programs, and performs hardware tests.

The TMtc user is limited to commands for testing and maintaining trunks and trunk facility. This user has access to the table editor commands but is restricted in the manipulation of tables. The TMtc functions are performed from a trunk test position (TTP).

Network management (NWM)

The network management (NWM) user class enables the user to make optimum use of available facilities and equipment by exercising routing controls over traffic-oriented switch resources. The user monitors traffic levels, applies manual controls, adjusts automatic controls, and receives traffic reports.

The user has data table query capabilities, but is restricted to changes to specific data tables.

Dial administration (DAdm)

The dial administration (DAdm) user class enables the user to monitor traffic reports and operational measurements (OM) of the switching unit. The user also has the ability to alter OM scheduling, assignments, and thresholds.

The DAdm user can alter OM data. The user also has full data table query capabilities, specifically traffic register assignment and readings.

Service analysis (SA)

The service analysis (SA) user class enables the user to randomly monitor customer dialed and operator assisted toll calls to obtain information on the quality of service provided by the operation company equipment and personnel.

The SA user is limited to only those data tables directly associated with this class.

Technical Assistance Center (TAC)

The Technical Assistance Center (TAC) user class enables the user to monitor unattended switch systems and provide technical assistance to switching center personnel. TAC is a centralized operating company plant maintenance group.

This user class can execute all input commands applicable to switch maintenance (SMtc).

Emergency Technical Assistance Service (ETAS)

The Emergency Technical Assistance Service (ETAS) user class provides assistance to switch maintenance or TAC personnel when they cannot correct switching problems. ETAS is a service provided by Nortel.

ETAS users have a user class of ALL.

Line maintenance (LMtc)

The line maintenance (LMtc) user class enables the user to monitor the status of line cards, run diagnostics on line cards, sectionalize troubles, test and diagnose troubles within the office, query and change subscriber data, and schedule automatic line card diagnostics.

Repair service bureau (RSB)

The repair service bureau (RSB) user class enables the user to sectionalize troubles, test and diagnose facility troubles, schedule automatic line insulation testing (ALIT), receive ALIT outputs, and query or change subscriber data.

Traffic administration (TA)

The traffic administration (TA) user class enables the user to receive automatic periodic summary reports of traffic statistics accumulated by the switching system. These reports show traffic peg counts, overflow, and usage of the switching unit. The TA user also can modify the schedule and the output routing of these reports.

Input control software

Input control software resides in the central control complex (CCC) and performs the following functions:

- security and access control by means of passwords and user identifications
- remote access security control capability by means of automatic dialback protocol
- command screening by assigning selected commands to classes of I/O users, appropriate to their tasks
- dumpsafe state restricts entry of commands during office image production
- priority MAP terminal enables ADMIN class user to logon at any authorized terminal with improved terminal response
- show-password option enables a user to view his own password

Security and access control

The use of passwords ensures only authorized users have access to the I/O system. The methods of controlling the validity and assignment of passwords depend on whether the enhanced security package software is present and active.

Enhanced security active

Application of the enhanced security feature is controlled by the ENHANCED_PASSWORD_CONTROL field in table OFCOPT. To be active, this field is set to TRUE at the time of office datafill; it cannot be changed by the operating company.

The password entered at a terminal device is compared with entries in table OFCENG to ensure that it complies with the minimum password length, the password lifetime (not expired), and if the password has expired, the grace period before password renewal has been exceeded. Password changes must be made with the PASSWORD command.

The LOGINCONTROL command is part of the enhanced security package, and is active only when the ENHANCED_ACCESS_CONTROL field in table OFCOPT is to TRUE at the time of office datafill. LOGINCONTROL sets the conditions under which designated terminals are permitted to log in. Terminals can be enabled or disabled, manually or automatically, for specified periods or indefinitely.

When a LOGIN attempt meets all the enhanced security package criteria, access is given to the command interpreter (CI) level. Violations of any of the security criteria, and automatic enabling or dialing, are recorded in the security (SECU) log subsystem. SECU logs are classified SECRET, and are displayed only to users authorized to use the OPENSECRET command.

Enhanced security inactive

When the ENHANCED_PASSWORD_CONTROL field in table OFCOPT is set to FALSE, the enhanced password control feature, with its associated parameter in OFCENG and the PASSWORD command, is not present. In addition, the ENHANCED_ACCESS_CONTROL field is set to FALSE, and the LOGINCONTROL command is not present. These fields are set to FALSE at the time of office datafill and cannot be changed, except by consultation with Nortel.

When the unenhanced LOGIN scheme is active LOGIN requires only the user name and password. There is an automatic check to ensure the user name and password are valid. If valid, access is given to the CI level.

Automatic log in

The AUTOLOGIN feature allows users who are permanently associated with a terminal, or who use the terminal frequently, to log in quickly without the necessity for entering a password. AUTOLOGIN is applied to a terminal when the device name entered in the TERMDES field of table TERMDEV is the same as the user name. When the user name is entered, the terminal is automatically logged in.

AUTOLOGIN is usually assigned to local terminals, not to dial-up or remote terminals. The operating company should ensure that none of the device names at non-local terminals match a valid user name.

Automatic log out

The AUTOLOGOUT feature increases security by automatically logging-out idle logged-on terminals, after a preset period of idleness. This reduces the likelihood of unauthorized users misusing legally logged-in, but unattended, terminals.

AUTOLOGOUT is active when the AUTO_LOGOUT field in table OFCOPT is set to TRUE. The idle period for each terminal device is set by entering the time until timeout, in minutes, in the IDLETIMEOUT field in table TERMDEV. If zero minutes is entered against a terminal, AUTOLOGOUT does not affect that terminal. Otherwise, the minimum period is five minutes.

AUTOLOGOUT is inactive for all terminals when the AUTO_LOGOUT field in table OFCOPT is set to FALSE.

Remote access security control

Security methods controlling remote access to the I/O system depend on whether the automatic dialback feature is present and active.

Automatic dialback active

The automatic dialback feature is controlled by the MODEM_DIALBACK_CONTROL field in table OFCOPT. To activate this feature, the field is set to Y at the time of office datafill; it cannot be changed by the operating company.

When a remote user logs in, the system initiates a request for dialback ID and password, then disconnects the modem and attempts a callback to the remote user. The elapsed time between the modem disconnect and the completion of the return call may vary from 40 to 120 seconds, depending on the length of the directory number and the type of modem used for the callback.

If the callback is successful, the user is required to log in again. The BREAK key should not be used at this time. From this point on, access to the I/O system is the same as that from an on-site terminal. The final login requirements depend on whether the enhanced security feature is active.

Command screening

Command screening ensures that terminals are used only for their assigned tasks. For example, a terminal assigned to service orders does not need access to the commands used by a network management terminal.

Each command is associated with one or more of 31 command class numbers, ranging from 0 to 30, assigned by the operating company management using the PRIVCLAS command. The command class numbers are then assigned to terminals and users through the PERMIT command. The permissible command classes numbers for each terminal are entered in the COMCLASS field of table TERMDEV. One command class, usually zero (0), is reserved as a default for the introduction of a new command to the DMS CI.

Note: New commands that may arise with new system loads will be assigned a default command class as part of dump and restore. The default is specified in table OFCENG, field DEFAULT_COMMANDCLASS. Use caution when applying this command class to restricted users.

The effective command class of a user is the intersection of the user’s command classes and that of the terminal. The user’s command classes are set by the PERMIT command while the command class of the terminal is determined by the field COMCLASS in table TERMDEV. If the effective command class is empty, the user is not allowed to log the terminal.

The command classes of users and terminals can be set up so that users may log in, but are not allowed to log out because their effective command class does not permit them to do so. Such users would have to be logged out by a user such as ADMIN who is authorized to use the FORCE logout command in order to force their logout. To avoid situations where users can log in but not log out, provide all users and all terminals with the command class of the logout command.

Only authorized users can use designated classes of commands on designated terminals. Commands that have no assigned class numbers are unrestricted. Changes to command class assignments can be entered at any time, but are not effective immediately. Changes are acknowledged in the response to PRIVCLAS and implemented at the next restart (warm, reload, cold).

Note: New commands that may arise with new system loads will be assigned a default command class as part of dump and restore. The default is specified in table OFCENG, field DEFAULT_COMMANDCLASS. Use caution when applying this command class to restricted users.

In order to use command screening, the system must have the enhanced security package (NTX292) software, and the enhanced command screening feature active.

Enhanced command screening active

The enhanced command screening feature is controlled by the ENHANCED_COMMAND_SCREENING field in table OFCOPT. Setting this field to TRUE at the time of datafill makes the feature active. Once this field is set, it cannot be changed by the operating company. The effect on the command screening scheme is as follows:

- PRIVCLAS—can assign up to 31 class numbers (0 to 30) per command
- PERMIT—cannot change passwords, but can create new passwords
- PASSWORD—must be used to change passwords

Enhanced command screening inactive

When the ENHANCED_COMMAND_SCREENING field in table OFCOPT is set to FALSE, the enhanced command screening feature is inactive; the standard command screening is active. The purpose of command screening is the same, but the usage is affected as follows:

- PRIVCLAS—can only assign one class number per command
- PERMIT—can change passwords and create new passwords
- PASSWORD—not present

Admin user screening immunity

The ADMIN user class is not subject to command screening. It always has access through any terminal and it cannot be denied the use of any commands. The password assigned to ADMIN can only be displayed to or changed by the ADMIN user. It is recommended that the ADMIN password be changed periodically, and always after a new switch software load. The ADMIN password should be verified, recorded, and securely stored by representatives of at least two managers.

Dumpsafe state

Command screening is also used to restrict the entry of commands during office image production (DUMP) which could overwrite and change protected data store. Commands that can be entered during office image production are designated DUMPSAFE. Commands that cannot be entered during office image production are designated DUMPUNSAFE.

The DUMPSAFE state for each command is set with the PRIVCLAS commands, using the parameters DUMPSAFE or DUMPUNSAFE. The DUMPSAFE states are defined by the operating company before the office goes into service. A DUMPUNSAFE command cannot be executed while DUMP is in progress.

If an office has ENHANCED_COMMAND_SCREENING feature active, the DUMPSAFE states of all commands are in table CMDS. Otherwise, entering PRIVCLAS ALL displays commands, modules and their DUMPSAFE states.

Priority MAP terminal

The priority MAP terminal feature enables the ADMIN class user to log on at any authorized MAP with the ADMIN password, and to have improved terminal response. This feature is used to perform diagnostic and corrective procedures in situations where a high call processing occupancy of 60 percent or more could reduce terminal response time.

Show-password feature

The show-password (SHOWPW) feature enables any user view password associated with that user’s name by using the PASSWORD or PERMIT commands. SHOWPW is available when the PASSWORD_ENCRYPTED field in table OFCOPT is set to FALSE. If the SHOWPW feature is not provisioned, the PASSWORD_ENCRYPTED field is set to TRUE, and the SHOWPW command is not available. Only the ADMIN user can change another users’ password without knowledge of the original password. The PASSWORD_ENCRYPTED field is set at the time of office datafill; it cannot be changed by the operating company, except by consultation with

Nortel. SHOWPW is an independent feature, and does not depend on the presence of any other features.

Output control software

Output control software operates through the log utility module (LOGUTIL), which provides the mechanism for implementing the log system commands. These commands perform the following functions:

- reporting to selected terminal devices, temporarily superseding the permanent assignments in the data tables LOGCLASS and LOGDEV
- interrogating and searching all reports in the log subsystems
- enabling operating company personnel to add, change, or delete reports, and to apply threshold value to limit which reports are output

In addition to LOGUTIL, there are a number of optional software packages through which special logging features can be applied.

Log system interface

Output reports created by DMS subsystem software are transmitted to a history file: LOGS. The LOG system in turn stores this report information in a log buffer dedicated to that subsystem. In addition to being logged, the output report may also be forwarded to an output device. The routing of reports is controlled by the report routing subsystem. All current log reports are listed and describe in detail in the *UCS DMS-250 Logs Reference Manual*.

There are several commands, referred to as “browse” commands, that allow operating company personnel to view the contents of the reports in the log buffers. The function of these commands include

- selecting a particular log subsystem (OPEN) for display
- displaying the newest or the oldest log report (LAST, FIRST)
- displaying the newer (BACK) or older (FORWARD) entries in a log buffer
- deleting the reports in a particular log buffer (CLEAR)
- displaying the log names currently defined in the LOG system (LISTREPS)
- selecting either the normal or an abbreviated form of a report for display (FORMAT)

SYSLOG

The SYSLOG feature allows the operating company to designate selected log reports for recovery after an office reload has been performed. The designated reports are written into the SYSLOG buffer as well as the

LOGUTIL buffer. In the event of a reload, the LOGUTIL buffers are overwritten, but the designated reports remain in SYSLOG.

The log report in SYSLOG, plus the SWERR and TRAP logs, contain information about the state of the system prior to the last reload. This information is useful as a troubleshooting aid if there is a problem after reload.

SYSLOG is activated by entering LOGUTIL, and then using the SYSLOG command. After SYSLOG is turned ON, the most recent entry in SYSLOG prior to the restart is printed first, then OPEN and other “browse” commands can be used to print the SYSLOG entries.

Critical message prioritization

The critical message prioritization feature is controlled by the LOG_PRIORITIZATION field in table OFCENG. The feature is active when this field is set to Y, and inactive when set to N.

This feature provides an additional method of setting the order in which log reports are output to a specified log device. When this feature is inactive (LOG_ PRIORITIZATION field is set to N), only normal log operation is in effect, and reports are stored chronologically in the log buffers.

When this feature is active (LOG_PRIORITIZATION field is set to Y), four log prioritization buffers are present, in addition to the normal log buffers, each representing a log alarm (critical, major, minor, and no alarm). Reports are categorized by their alarm levels and stored chronologically in the appropriate buffer.

To apply the critical message prioritization feature to specific log devices, table LOGDEV contains the field PRIORITY, which is present when the feature is active. When the PRIORITY field contains Y on the same line as a device named in the DEV field, reports are sent to that device from the log prioritization buffers, so that the reports with the highest alarm level are output first. Reports with the same alarm level are output chronologically from the appropriate buffer. Any device named in the DEV field that has N on the same line in the PRIORITY field outputs reports in normal chronological order only.

The most recent log reports in both the normal and prioritization buffers, which have associated alarm levels, are copied into a special log buffer called SAVLOG. Critical data containing the alarm level information is saved in SAVLOG from the instant of restart, and is preserved until three minutes after the restart has taken effect.

Guaranteed background schedule

Of the thousands of tasks performed within the system, hundreds are grouped together as background tasks, including all terminal functions, control of logs, system audits, maintenance audits, and MAP control. The accumilation of all of these background processes causes increased delay in terminal response under heavy load conditions.

Guaranteed background schedule is part of feature package NTX000. It assures that some tasks be limited in number so that they will be run more frequently than others.

The tasks to be guaranteed are assigned by the operating company through the GUAR parameter in tables TERMDEV and LOGDEV. Guaranteed tasks may be only one of the following:

- network management MAP or port
- switching control center system (SCCS) MAP
- local MAP,
- service analysis (SA) position or interface
- Emergency Technical Assistance Service (ETAS) reserved device
- log device

Secret logs

A SECRET log is one that is accessible through the OPENSECRET command, not the OPEN command. OPENSECRET is usable only by command classes such as ADMIN,or privileged classes defined by the PRIVCLAS command, and entered in the CMDS table.

The main purpose of the SECRET log is to keep track of security-related events, while ensuring that details of these events can be viewed only by authorized users. Such events are entered in the series of security logs, SECU and TABL, which provide reports on the following items:

- valid use of LOGIN and LOGOUT (SECU101, SECU109)
- invalid LOGIN attempts, such as improper or expired password, or unauthorized user class (SECU102, SECU110)
- force-out of users (SECU103)
- change of password (SECU105)
- addition of a user_name with the PERMIT command, identifies new user_name (SECU112)
- use of PRIVCLAS command to change the parameters associated with a command_name, or that automatic logging of command use/abuse has changed (SECU111, SECU104)

- privilege violations (improper privilege class) when using commands (SECU107, SECU108)
- valid use of commands (SECU106)
- authorized use accesses a table, reads and displays the first horizontal row of the table (TABL100)
- authorized use accesses a table and writes to a horizontal row of the table (TABL101)
- unauthorized user attempts access to a table (TABL102)
- unauthorized user accesses a table and attempts to write to a horizontal row of the table (TABL103)

SECRET logs are accessible only by use of the OPENSECRET command. They cannot be printed. An authorized OPENSECRET user can display SECRET logs on the MAP using all of LOGUTIL commands, except CLEAR and SUPPRESS. Command class screening controls the authorization of OPENSECRET users.

Even though SECRET logs are not visible to unauthorized users, each log report can have an alarm of a specified level associated with it. Table AUDALARM contains the lognames and report numbers in field LOGREP and the alarm levels associated to each specific report in field ALARM. Secret alarms are not printed by log devices. When a secret report causes an alarm, a non-secret log (EXT series) is generated by the alarm system. This non-secret log records only that an alarmed secret report has been logged.

Log EXT 106 is output for minor SECRET alarms; EXT 107 for major alarms; and EXT 108 for critical alarms.

Report routing

The routing and reporting subsystem routes reports from the log system buffers to a terminal device, where they are printed, displayed, or stored. This subsystem is controlled by three data tables, which provide basic permanent routing, and by LOGUTIL commands, which can temporarily change the basic routing.

Basic routing is established by entries in data tables LOGCLASS, LOGDEV, and TERMDEV. (These tables have several other fields that are not connected with basic reporting routing.) Basic routing can be changed only with the table editor.

LOGCLASS

Every log report is assigned a report class number through table LOGCLASS. For example, to assign log report CMC112 to report class 7, enter CMC112 in the the REPNAME field and the number 7 in the CLASS field. All other reports in the log system are similarly assigned report class numbers.

Assigning log reports to report classes, prevents operating groups with different responsibilities within the operating company organization from interfering with each other. Consult representatives from all concerned operating groups to ensure that the assignment of report classes meets the requirements of each group.

The operating company initially gives Nortel the assignment of reports to classes by means of Input forms 2320, the Log Device Table Record, and 2321, the Log Class Table Record.

Note: Backup devices should be on a different IOC/IOM than the main device.

LOGDEV

Field DEV in table LOGDEV contains every terminal device connected to the IOC, indicating its availability for use as a log device. The ALT field contains the names of all terminal devices which are available for backup use if the primary device is not in service. For example, entering PRT1 in the DEV field assigns that printer to primary service. Entering PRT2 in field ALT assigns it to backup duties. Field CLASSES in table LOGDEV contains the same class number assigned to the report in table LOGCLASS. Following our example, any report belonging to the class specified in the CLASSES field routes to PRT1, under normal conditions, or PRT2 under backup conditions. If a device has to handle a large number of reports, changing the office parameter LOG_DEVICE_BUFFER_SIZE in table OFCVAR, allows the system to accommodate the larger number of reports.

TERMDEV

The names of all the terminal devices connected to the UCS DMS-250 system are entered in the TERMDEV field. On the same line, against each device name, are entered the IOCNO and the IOCKTNO physically controlling the device. Thus, PRT1 and PRT2 are controlled by IOC-0 and IOCKT 20 and 21. Other terminal devices, such as the MAP and MTD, are also assigned to their IOC circuits through entries in this table.

Temporary routing commands

Temporary routing changes are made by means of the routing commands, which supersede the permanent entries in LOGCLASS and TERMDEV that govern routing. Permanent routing can be restored manually by the RESETROUTE command, or automatically at system restart. The routing commands, and the entries they affect are as follows:

- ADDREP—adds a report to those already routed to a specified terminal device.
- DELREP—deletes a report from those already routed to a specified terminal device.
- ADDCLASS—adds a report class to those already assigned to a specified terminal device.
- DELCLASS—deletes a report class from those already assigned to a specified terminal device.
- CLASS—sets the class number for selected reports.
- DELDEVICE—deletes a specified terminal device from use in the log system.
- REROUTE—routes all reports to a specified primary terminal device to their backup devices. For example, REROUTE PRT1 sends CMC112 to PRT2 instead of PRT1.
- RESET ROUTE—deletes all temporary routing and returns to the permanent routing data in the LOGCLASS and LOGDEV tables.

Report thresholding

Thresholding controls the number of reports actually sent to a terminal device. Permanent values, which select the type of thresholding and the disposition of unprinted reports, are set by entries in office parameter table OFCVAR, as described in the following paragraphs.

Thresholding types

Two types of thresholds can be applied to the printing of reports: “high water mark” and “sampling.” The threshold types are by the THRESHOLD_IS_SAMPLING field in table OFCVAR, as follows:

- High water mark—Active when THRESHOLD_IS_SAMPLING is set to N. When the threshold value is reached, all subsequent instances of specified reports are printed. For example, if the threshold number is 5, only the sixth, seventh, eighth, and following reports are printed.

- Sampling—Active when THRESHOLD_IS_SAMPLING is set to Y. The report prints when the threshold value is reached. The count then returns to zero and starts again. As an example, if the threshold number is 5 then every fifth report will be printed; the 5th, the 10th, the 15th, and so on.

Threshold values

The THRESHOLD and TUNITS values are applied to individual reports by entering the values on the same line, opposite the report name under the REPNAME field. Values can be changed by means of the table editor.

The threshold values used for high water mark and sampling purposes are set in the THRESHOLD and TUNITS fields of table LOGCLASS:

- THRESHOLD—The count sets the threshold value for the number of reports that are not printed. The range of values is 0 to 255. In the preceding examples the value was 5.
- TUNITS—A time in minutes that determines when the THRESHOLD counter is reset. The timing period can be used to determine whether the rate of report generation is excessive. For example, assume TUNITS are 15 minutes and the threshold is a high water mark with a THRESHOLD value of 5. If more than five instances of the report are received in 15 minutes, all subsequent instances of that report are printed; otherwise, no reports are output during the 15 minutes. If TUNITS is set to zero, the THRESHOLD counter resets whenever its count number is reached.

Disposition of unprinted thresholded reports

Reports that are not printed as a result of thresholding action can be kept in their log buffer or can be discarded. The disposition of thresholded logs is controlled by the BUFFER_THRESHOLDED_ REPORTS field in table OFCVAR. If this field contains Y, the thresholded reports are retained in the log buffer, and are accessible through the LOGUTIL commands. If this field contains N, the reports are discarded. Any report, whether thresholded or not, can be withheld from printing when Y is entered in the SUPPRESS field of table LOGCLASS opposite the REPNAME. When N is entered, the N has no effect.

Temporary thresholding

The LOGUTIL commands, THRESHOLD, TIMERESET, and SUPPRESS set temporary thresholds. The permanent entries are not changed by the temporary entries, and remain available for a version to permanent thresholding.

The value range for the THRESHOLD command is the same (0 to 255) as that of the THRESHOLD field in table LOGCLASS. The TIMERESET command has the same effect as the TUNITS field in LOGCLASS, but its range is limited to 0 to 9999. The SUPPRESS command can suppress any report not already suppressed by the SUPPRESS field in table LOGCLASS.

Permanent thresholding is restored manually by the RESET command, or automatically at system restart. RESET also returns all values applied by THRESHOLD and TIMERESET to zero, and resumes the generation of reports suppressed by the SUPPRESS command.

Thresholding for INIT and TRAP logs

Thresholding for the INIT and TRAP logs is controlled by four fixed parameters in table OFCSTD. The values for these parameters are set at the time of office datafill. They cannot be changed except by consultation with Nortel. These logs contain information that Nortel personnel need for fault analysis and debugging.

Log format for offices with enhanced core

The switch identification portion of the log headers of all logs generated in offices equipped with enhanced core has been expanded to include a three character node name and a three digit node number. This makes it easier to identify the source of the logs when logs from different nodes are printed onto the same output device. Refer to parameter ECORE_FORMAT of table OFCVAR in the *UCS DMS-250 Logs Reference Manual.*.

Man-machine interface (MMI)

Man-machine interface (MMI) is the set of commands and responses the operating company personnel uses to communicate with the UCS DMS-250 switch. Communications takes place through the MAP terminal and other terminal devices.

Bilingual MMI (BMMI)

Bilingual man-machine interface (BMMI) is a feature that enables a user to select a default language for commands, displays, and printouts.

The default language is specified in the DEFAULT_LANGUAGE field of table OFCENG.The valid values are ENGLISH, FRENCH, or GERMAN; the default value is ENGLISH.

If MMI is required in a language other than the default, the “lang” parameter of the PERMIT, STARTDEV, and REROUTE commands is set to the value for the desired alternative language.

Data required to specify the output language are entered by commands associated with the BMMI command interpreter (BMMICI). Enter EMMICMDS to obtain access to these commands.

Parameters and responses

Parameters and responses applicable to more than one command are listed by item number in tables, and referenced by that number in the description of their associated commands. The text of common parameters is presented in Table 5-1; the text of common responses is presented in Table 5-2.

Table 5-1 contains the text of common MMI parameters used with the UCS DMS-250 switch.

Table 5-1
Common MMI parameters

Parameter	Description
logname	The name of a log subsystem that resides in the LOGS system. Maximum of four characters. A list of all the lognames (except SECRET) can be displayed by using LISTLOGS.
repnum	The number of a specific log report within a log subsystem. Values range from 100 to 999.
repname	Consists of logname and repnum, and identifies a specific output report. All repnames are listed in the *UCS DMS-250 Logs Reference Manual*. The same names are also entered in the REPNAME field of data schema table LOGCLASS. Use LISTREPS to display a list of all repnames.
repclass	The report class number (0 to 31) associated with a specified repname (in table LOGCLASS) for the purpose of routing to a terminal device.
io_dev	The name of any terminal device in the office that is designated (in the DEV field of data schema table TERMDEV) as a primary terminal device.
—end—	

Table 5-2 contains the text of common MMI responses expected from the UCS DMS-250 switch.

Table 5-2
Common MMI responses

Response	Explanation
NAME BACKUP CURRENT INUSE xxxx xxxx xxxx xxx xxxx xxxx xxxx xxx END OF DEVICES	Lists all terminal devices and their backup devices. Shows which device is in use and its current status.
LOG logname NOT FOUND	An incorrect log report (repname) parameter has been entered.
x REPORTS PRINTED	Displays the number of reports printed as a result of using LISTREPS or LISTROUTE.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
DONE	The command has been successfully executed.
NOT FOUND or EITHER INCORRECT OPTIONAL PARAMETER(S) OR TOO MANY PARAMETERS	An invalid parameter has been entered. Check common syntax and reenter.
LOG EMPTY	The specified logname does not contain any log reports.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	A non-existent repname and/or repnum parameter has been entered.
INCORRECT CLASS NUMBER AT PAR #:n	An out-of-range class number has been entered as the repclass parameter.
REPORT logname repnum NOT FOUND	The log report is not on the LISTLOGS display. An out-of-range repnum may have been entered.
DEVICE io_dev NOT FOUND	An incorrect terminal device name has been entered as the io_dev parameter. Enter LISTDEVS for a display of all current terminal devices.

—end—

Common commands

The following common commands enable the user to obtain information about I/O command syntax, or to cancel an entry and start again.

- HELP—used with the name of a command; displays the command syntax and parameters.
- ABORT—used if difficulty is experienced when entering a command, enter ABORT and reenter the original command.
- QUIT—used to change from the current display to the previous command directory.

Prompting

The prompt character > appears before each response to a command. If parameters have been omitted or improperly entered the response prompts the user about the type of error, or lists the proper parameters to enter.

Types of MMI

The MMI used in the I/O system performs the following group of functions:

- security and access control
- command screening
- report routing
- search and display (“browse”)

MMI security and access control

The MMI security and access control group consists of the following commands:

- LOGINCONTROL
- PASSWORD

The following sections describe the security and access control commands, including samples of system responses and examples of command usage.

LOGINCONTROL command

The LOGINCONTROL command controls LOGIN access to the UCS DMS-250 switch, defines which terminal devices can be used for LOGIN, and sets the conditions under which a terminal device cannot be used for LOGIN.

The LOGINCONTROL command is defined in Table 5-3.

Examples of LOGINCONTROL command follow table 5-3.

Table 5-3
LOGINCONTROL command

Command	Device	Operation	Parameter	Explanation
LOGINCONTROL				Controls LOGIN access. Defines which terminal device can be used for LOGIN, sets conditions under which devices cannot be used for LOGIN. ***Note:*** LOGINCONTROL is available with the enhanced security software option. To enable, set the ENHANCED_ ACCESS_CONTROL and ENHANCED_PASSWORD_ CONTROL fields in OFCENG to TRUE. ***Note:*** The LOGINCONTROL command affects terminal device data in table LGINCTRL. Although this table data may be changed directly, it is recommended that you change the terminal device data only with LOGINCONTROL.
	io_dev			The name of any terminal device in the office designated as primary in the DEV field of data schema table TERMDEV.
	ALL			When the I/O device is defined as ALL, the command is simultaneously applied to all terminal devices. ***Note:*** Currently logged-on devices cannot be disabled.
		QUERY		Displays the current settings for LOGINCONTROL and the state of the terminal device.
			BRIEF	Displays only the current enable state of the terminal device and the names of logged-in users.
			FULL	Displays the state of all LOGINCONTROL parameters.

—continued—

Table 5-3
LOGINCONTROL command (continued)

Command	Device	Operation	Parameter	Explanation
LOGINCONTROL (continued)		ENABLE		Allows LOGIN attempts from the specified devices to be accepted. ***Note:*** It is suggested that devices in the immediate vicinity of the maintenance and administration area of the UCS DMS-250 switch are set to ENABLE. ***Note:*** Log SECU113 is generated when an attempt is made to login on a disable device. Log SECU114 is output when a device is manually enabled or disabled.
		DISABLE		Sets a disable period (disabtime) during which LOGIN attempts from the specified devices are refused.
		DISABLE (continued)	disabtime	Specifies in minutes how long the disabled device will be refused LOGIN. The default is FOREVER. ***Note:*** Remote and dial-up devices should have MAXIDLE TIME applied. Devices that are not remote, but are not in the immediate vicinity of the maintenance and administration area, should have DISABLE applied when not in use. ***Note:*** Log SECU113 is generated when an attempt is made to login on a disable device. Log SECU114 is output when a device is manually enabled or disabled. ***Note:*** Currently logged-on devices cannot be disabled.

—continued—

Table 5-3
LOGINCONTROL command (continued)

Command	Device	Operation	Parameter	Explanation
LOGINCONTROL (continued)		AUTODISAB LETIME		Sets a disable period (disabtime) to device(s) that were automatically disabled by the system. Does not apply to devices disabled immediately after a restart. ***Note:*** Log SECU117 is generated when a device is automatically enabled.
			disabtime	Specifies in minutes how long the disabled device(s) will be refused LOGIN. The default is FOREVER.
		MAXLOGIN TIME		Sets a limit (logintime) to the time the specified device user can take to LOGIN. If the limit is exceeded, the device is disabled. ***Note:*** Log SECU115 is generated when a device is disabled because MAXLOGINTIME was exceeded.
			logintime	Specifies the limit, in seconds, for MAXLOGINTIME. The default is 60 seconds.

—continued—

Table 5-3
LOGINCONTROL command (continued)

Command	Device	Operation	Parameter	Explanation
LOGINCONTROL (continued)		MAXIDLE TIME		Sets a limit (idletime) to the time the specified device can be left logged on and unused. If the limit is exceeded, the user is automatically logged off.
				Note: Remote and dial-up devices should have MAXIDLETIME applied. Nortel recommends that the devices that are not remote, but are not in the immediate vicinity of the maintenance and administration area have DISABLE applied when not in use.
				Note: Log SECU118 is generated when a device is logged off or disabled because MAXIDLETIME was exceeded.
			idletime	Specifies the limit, in minutes, for MAXIDLETIME. The default is FOREVER.
		LOGINRE TRIES		Sets a limit to the number of times (numretry) a user can attempt to enter a correct username and password. If the limit is exceeded, the user's device is disabled.
				Note: Log SECU116 is generated when a device is disabled because MAXIDLETIME was exceeded.
			numretry	Specifies the number of retries. The default is 4 retries.
		OPENFORC EOUT		Causes the activation (true) or the deactivation (false) of logout of the specified terminal device in the event of an inadvertent physical disconnect.

—continued—

Table 5-3
LOGINCONTROL command (continued)

Command	Device	Operation	Parameter	Explanation
LOGINCONTROL (continued)			TRUE	Enables OPENFORCEOUT logout.
			FALSE	Disables OPENFORCEOUT logout.
		DIALBACK		Specifies whether the device has dialback disabled, or is treated as a dial-out or an answer modem.
			OFF	Disables DIALBACK for the device.
			ANSWER	Enables the device as an answer modem.
			DIAL	Enables the device as a dial modem.
		DIALOUT		Sets a limit to the number of attempted dial-back calls (numcalls), before the call aborts, and specifies the line type (dialtype) associated with the modem.
		DIALOUT (continued)	numcalls	Specifies the number of dialback attempts. Values = 1 to 7.
			dialtype	Specifies the line type associated with the modem. Values = AUTO, PULSE, or TONE.
		DISABLEON		Specifies which event causes the specified device to be automatically disabled.

—continued—

Table 5-3
LOGINCONTROL command (continued)

Command	Device	Operation	Parameter	Explanation
LOGINCONTROL (continued)			parm 1	Specifies how the events listed by parm 2 are to be applied. Must be one of the following values: • ADD—adds the DISABLEON events specified by parm 2 to the device’s current DISABLEON events. • SET—changes the former DISABLEON event settings to exactly those specified by parm 2. • REMOVE—deletes the DISABLEON events specified by parm 2.

—continued—

Table 5-3
LOGINCONTROL command (continued)

Command	Device	Operation	Parameter	Explanation
LOGINCONTROL (continued)		DISABLEON (continued)	parm 2	Selects the DISABLEON events to be added, changed, or deleted. May be any number of the following values: • LOGINFAIL—disables the device if the user fails to enter a valid username and password within the maximum number of retries specified by numretry. • LOGINTIMEOUT—prevents the device from being logged on if the user does not log on within the time specified by logintime. • IDLETIMEOUT—disables the device if the user is automatically logged off, because idletime is exceeded. • LOGOUT—any log-off event disables the specified device. • OPENCOND—disables the device to all users if previously logged out by OPENFORCEOUT. • DIALBACKLOGINFAIL—disables the device in the event of a failed dialback call login. • DIALBACKCALLFAIL—disables the device in the event of a failed dialback call.
—end—				

LOGINCONTROL command responses

Table 5-4 shows sample responses to the LOGINCONTROL command.

Table 5-4
LOGINCONTROL command responses

Response	Explanation
DONE	Response to a LOGINCONTROL command, correctly entered and executed.
DONE Num calls set to 1 for all ports	Possible response to a LOGINCONTROL ALL DIALOUT 1 command.
DONE Some ports were not changed	Possible response to a LOGINCONTROL ALL DIALOUT 1 command.
DONE Numb calls set to 1 and dialtype to PULSE for this port	Possible response to a LOGINCONTROL RMT1 DIALOUT 1 PULSE command.
Flags have no meaning for this port	Possible response to LOGINCONTROL RMT1 DIALOUT 1 PULSE command.
THE LOGINCONTROL COMMAND IS NOT AVAILABLE	The enhanced access control feature is inactive or has not been provisioned. ***Note:*** LOGINCONTROL is available with the enhanced security software option. To enable, set ENHANCED_ACCESS_CONTROL and ENHANCED_PASSWORD_CONTROL fields in table OFCENG to TRUE.
io_dev...HAVE BEEN ENABLED	Possible response to a LOGINCONTROL command enabling a terminal device.
io_dev...HAVE BEEN DISABLED	Possible response to a LOGINCONTROL command disabling a terminal device.
CANNOT DISABLE, THAT CONSOLE IS LOGGED IN	An attempt has been made to disable an io_dev (console) that is logged in.
—end—	

LOGINCONTROL command examples

Figure 5-1 illustrates use of the LOGINCONTROL QUERY command to view the status of a device named DIALUP2, used by Emergency Technical Assistance Service (ETAS).

Figure 5-1
Example of LOGINCONTROL QUERY command

```
>logincontrol dialup2 query full

CONSOLE DIALUP2 ENABLED
USER: ETAS1
AUTODISABLE TIME 10 MIN
LOGIN TIMEOUT 60 SECS
MAX IDLE TIME FOREVER
LOGIN RETRIES 2
SET TO DISABLE ON: LOGIN FAILURE, IDLE TIMEOUT, LOGOUT
>
```

Figure 5-2 illustrates setting the LOGINRETRIES parameter for DIALUP2.

Figure 5-2
Example of LOGINCONTROL set LOGINRETRIES

```
>logincontrol dialup2 loginretries 2

DONE
>
```

Figure 5-3 illustrates setting the disable options for DIALUP2.

Figure 5-3
Example of LOGINCONTROL set DISABLEON options

```
>logincontrol dialup2 disableon set loginfail idletimeout
logout

DONE
>
```

Figure 5-4 illustrates an example deleting all the disable options for DIALUP2 (Figure 5-3).

Figure 5-4
Example of LOGINCONTROL delete all DISABLEON options

```
>logincontrol dialup2 disableon remove

DONE
>
```

PASSWORD command

Users change their passwords with the PASSWORD command. The ADMIN user can change any user's password; other users can change only their own.

Users must periodically change their passwords. Users are automatically reminded to change passwords if PASSWORD_LIFETIME has expired. The new password must be different from the old password.

Table 5-5 describes the PASSWORD command.

Table 5-5
PASSWORD command

Command	Username	Password	Explanation
PASSWORD			The PASSWORD command changes a user's own password. Only the ADMIN user can change another user's password. ***Note:*** The PASSWORD command is enabled if ENHANCED_PASSWORD_CONTROL in table OFCENG is TRUE.
	[username]		An 8-character (maximum) name, defined by the operating company. Required only when ADMIN user is changing another user's password. Use the command, SHOW USERS to display a list of current usernames.
		newpw	The new password. Password characteristics are controlled by the following parameters in table OFCENG: • MIN_PASSWORD_LENGTH (default = 6 characters) • PASSWORD_LIFETIME (default = 30 days) • EXPIRED_PASSWORD_GRACE
—end—			

PASSWORD command responses

Table 5-6 shows sample system responses to the PASSWORD command.

Table 5-6
PASSWORD command responses

Response	Explanation
PASSWORD: ENTER NEW LOGON PASSWORD	Normal system prompting before newpw is entered.
PASSWORD: ENTER YOUR CURRENT PASSWORD TO VERIFY	Normal system prompting after valid newpw is entered.
—end—	

Table 5-6
PASSWORD command responses (continued)

Response	Explanation
PASSWORD FOR OPERATOR HAS BEEN CHANGED IT MUST BE CHANGED AGAIN WITHIN 30 DAYS	Normal response when the new password has replaced the old password.
PASSWORD: SORRY THAT PASSWORD SHOULD BE AT LEAST 6 CHARACTERS LONG	A newpw has been entered that does not conform to the MIN_PASSWORD_LENGTH office parameter. Select a proper password and enter it.
* * * * * WARNING * * * * * YOUR LOGON PASSWORD HAS NOT BEEN CHANGED IN 30 DAYS. YOU HAVE 3 MORE LOGON SESSIONS TO CHANGE YOUR PASSWORD AFTER WHICH YOU WILL *NOT* BE ABLE TO LOGON	Reminder to a user at LOGIN time that the office parameter PASSWORD_LIFETIME has been exceeded, and that the EXPIRED_PASSWORD_GRACE parameter is in effect

—end—

Enhanced password control

The enhanced password control feature is active only when the proper software is present and the ENHANCED_PASSWORD_CONTROL field in table OFCOPT is set to TRUE. This field, which is set at the time of data-fill, cannot be changed.

Enhanced password control active

When the enhanced password control feature is active (table OFCOPT ENHANCED_PASSWORD_CONTROL is TRUE), the following access control conditions apply:

- The PASSWORD command must be used for changing passwords.
- Table OFENG parameters affecting password characteristics take effect:
  - MIN_PASSWORD_LENGTH—1 to 16 characters (default is 6)
  - PASSWORD_LIFETIME—1 to 32767 days (default is 30)
  - EXPIRED_PASSWORD_GRACE—0 to 9 LOGONS (default is 3)
- The PERMIT command must be used to define new users and their passwords, and to change any parameters other than password.

Enhanced password control inactive

When the enhanced password control feature is not active (table OFCOPT ENHANCED_PASSWORD_CONTROL is FALSE), the following access control conditions apply:

- The PASSWORD command does not appear and cannot be used.
- Table OFENG parameters for password characteristics do not appear.
- The password length is limited to a maximum of 8 characters.
- No expiration time can be assigned for passwords.
- In addition to its other functions, the PERMIT command may also be used to change passwords.

MMI command screening

The MMI command screening group comprises the following commands:

- PERMIT
- PRIORITY
- PRIVCLAS
- SETPRIV
- SHOW
- UNPERMIT

The following pages provide information about the command screening commands, including definitions of the commands, samples of system responses, and examples of command usage.

PERMIT command

The PERMIT command assigns command classes (previously defined by PRIVCLAS) to specific users, alters a user's assignment, and defines new users.

Table 5-7 describes the PERMIT command.

Table 5-7
PERMIT command

Command	Username	Password	Parameters	Explanation
PERMIT				Assigns command classes, previously defined by PRIVCLAS, to specified users. Also alters a user's previous assignments and defines new users.
	username			An 8-character (maximum) name for a user class, defined by the operating company. Use SHOW USERS command to display a list of current usernames.
		password		The DMS user password that is to be associated with the username. Required when a user initially logs on. Passwords are defined by the operating company. When the enhanced password control feature is turned on, the number of characters allowed exist within a given range.
			priority	Sets the priority level of the user's processes. The range is 1 to 4. The default is 4.
			stksize	Sets the number of words of memory are assigned to the user's processes at log on. Range is 1500 to 8000. (Default is 4000)
PERMIT (continued)			lang	Selects the language of input commands and system outputs, if MMI is required in a language other than the default set in the DEFAULTLANGUAGE field of table OFCENG. Values are ENGLISH, FRENCH, or GERMAN. The default value is ENGLISH.
			cmd_clas	Command class numbers—Terminal designations associated with each of the 31 class numbers, assigned by the operating company and entered in the COMCLASS field of table TERMDEV. The range is 0 to 30, or ALL.

—end—

When it is necessary to change cmd_clas to a value that is also a priority value, (such as 1, 2, 3, or 4), the command SHOW USERS can be used to determine the existing priority level and cmd_clas value.

The cmd_clas parameter is used to assign a privilege class to a user for access to command, and to assign a privilege class for access to one or more system data tables.

The operating company administrator should exercise caution while defining command classes in table TERMDEV with the PRIVCLAS command, and while defining classes of access to tables in table CUSTPROT, so that each class is used only once. This oversight could inadvertently permit a user to have access to a table or a command to which the user would ordinarily be denied access.

PERMIT command responses

Table 5-8 offers sample responses to the PERMIT command.

Table 5-8
PERMIT command responses

Response	Explanation
YOU MUST SUPPLY A PASSWORD WHEN CREATING NEW USERS	User has omitted the password parameter. No action taken.
PERMIT – – USE THE PASSWORD COMMAND TO CHANGE PASSWORDS	In a system having enhanced password control, user has attempted to change password using the PERMIT command.
NOT FOUND	User has entered an invalid parameter.

—end—

PERMIT command examples

Figure 5-5 illustrates the way to use the PERMIT command to create a new username or password, and to assign a priority of 3 and a stacksize of 5000.

Figure 5-5
Example of PERMIT command to create new user name

```
>permit user1 fred 3 5000

DONE
>
```

Figure 5-6 illustrates the way to change the priority assigned in the previous example from 3 to 4. The password need not be repeated if the username remains the same.

Figure 5-6
Example of PERMIT command to change user priority

```
>permit user1 4 5000

DONE
>
```

PRIORITY command

The ADMIN user may enter the PRIORITY command to improve terminal response of the MAP at which PRIORITY was entered when call processing occupancy exceeds 60 percent.

This command should be used only in emergency situations that require current switch information. Nortel recommends that all terminals, except for designated MAP positions and ETAS dial-up ports, be password secure to regulate the use of this command.

PRIORITYCLEAR gives precedence to the ADMIN user when the available ports have become full with other users. The number of guaranteed background processes can be displayed by entering the QPRIO command.

Table 5-9 describes the PRIORITYcommand.

Table 5-9
PRIORITY command

Command	Operation	Explanation
PRIORITY	ON	Improves the terminal response for the authorized user.
	CLEAR	Gives user priority over all other current processes that have previously been assigned priority through the priority MAP. ***Note:*** The normal prompt character > changes to PREF> when PRIORITY ON is in effect.
	OFF	Resumes normal operation.
Note: Log SOS102 is output whenever PRIORITY ON, CLEAR, or OFF is used.		
—end—		

PRIORITY command responses

Table 5-10 offers sample responses to the PRIORITY command.

Table 5-10
PRIORITY command responses

Response	Explanation
USER HAS PRIORITY	PRIORITY ON command has been entered for the first time.
PRIORITY EXTENDED	PRIORITY ON command has been entered for the second or subsequent time.
PRIORITY HAS ALREADY BEEN STARTED	Another user is operating a priority MAP.
PRIORITY CLEARED FROM ALL PROCESSES EXCEPT THE USER’S	PRIORITY CLEAR has been entered, following PRIORITY ON, and has been successfully executed.
PRIORITY CLEAR MUST BE DONE FROM THE PRIORITY USER	PRIORITY CLEAR has been entered without previously entering PRIORITY ON or entered by another user.
NORMAL OPERATION RESUMED	Response follows the entry and successful execution of PRIORITY OFF.
—end—	

Table 5-10
PRIORITY command responses (continued)

Response	Explanation
COMMAND FAILED	An error in PRIORITY command syntax has been made, or SETPRIV command has not been entered. ***Note:*** Use HELP <command_name> to check proper syntax. Enter the command and the parameter.
UNABLE TO ALLOCATE MAILBOX FOR COMMAND RESPONSE	Temporary software condition. ***Note:*** Enter the command and parameter after a short period of time.
—end—	

PRIVCLAS command

The PRIVCLAS command is used to add, change, or delete the privilege class for specified commands or program modules. The PRIVCLAS command can list all current privilege commands and their classes, and may be used to set the DUMPSAFE state for specified commands or modules.

Note: The operating company administrator should exercise care while defining command classes in table TERMDEV with the PRIVCLAS command, and defining classes of access to tables in table CUSTPROT, so that each class is used only once. If a class were listed more than once, this could permit a user to have access to a table or a command to which the user would ordinarily have been denied.

The enhanced command screening feature permits the first of up to 31 command classes to be entered per command name. This feature is active with proper software and when ENHANCED_COMMAND_SCREENING field in data table OFCOPT is set to TRUE. Using PRIVCLAS when this feature is active automatically enters the command names and the associated command classes in data table CMDS. The ENHANCED_ COMMAND_ SCREENING field is set initially at time of data fill, and cannot be changed thereafter.

The PRIVCLAS command is defined in Table 5-11.

Table 5-11
PRIVCLAS command

Command	Name	Module	Parameter	Explanation
PRIVCLAS				Adds, changes, or deletes the privilege class for specified commands or program modules. Lists all current privilege commands and their associated classes. Used to set DUMPSAFE state for specified commands or modules.
	cmd_name			The name of any valid UCS DMS-250 command. Specifies which command name is to be assigned privilege classes and DUMPSAFE state.
PRIVCLAS (continued)	ALL			Displays all command and module names, with their assigned command classes and DUMPSAFE states. Unrestricted commands are not listed. Default value if PRIVCLAS only is entered.
		mod_name		The name of the program module that is to be assigned a privilege class, or the name of the module in which the specified cmd_name resides. Also referred to as “increment” (INCR). ***Note:*** The cmd_name and mod_name (increment) are used together when the command name is not unique, such as: cmd_name mod_name HOLD TTP HOLD LTP

—continued—

Table 5-11
PRIVCLAS command (continued)

Command	Name	Module	Parameter	Explanation
PRIVCLAS (continued)			cmd_clas	Specifies the class number to be assigned to a cmd_name and/or mod_name. Also used to set DUMPSAFE state. Values are defined: 0 to 30—terminal designation associated with each of the 31 class numbers are entered in COMCLASS field of table TERMDEV, and are assigned by the operating company. DUMPSAFE—set the specified cmd_name, or commands associated with a specified mod_name, to DUMPSAFE. DUMPUNSAFE—sets specified cmd_name or mod_name to DUMPUNSAFE, meaning the command cannot be executed during office image production.
			cmcl_lst	Used only when the enhanced command screening feature is turned on. Specifies a list of command classes to be assigned to a cmd_name and/or mod_name. Also sets DUMPSAFE state for the specified command classes. Syntax is defined: DUMPSAFE cmd_clas DUMPUNSAFE ALL ALL may be used in place of the cmd_clas value (0 to 30) to clear all previously assigned command classes; it makes the associated command unrestricted for all command classes.

—end—

PRIVCLAS command responses

Table 5-12 offers sample responses to the PRIVCLAS command.

Table 5-12
PRIVCLAS command responses

Response	Explanation
COMMAND DOES NOT HAVE A PRIVILEGE CLASS or COMMAND cmd_name IS UNKNOWN TO CMDS TABLE	PRIVCLAS cmd_name has been entered. Indicates that the specified command has not been assigned a cmd_clas.
COMMAND_PRIVILEGE MUST BE BETWEEN 0 AND 30	An out-of-range value for cmd_clas has been entered.
ILLEGAL PRIVILEGE CLASS	No terminal assigned to the command class number entered.
cmd_name IN mod_name HAS PRIVILEGE CLASS (umber 0 to 30) AND IS DUMPSAFE	PRIVCLAS cmd_name mod_name has been entered. Display shows the status of the specified command.
cmd_name IN symbol_table HAS NO PRIVILEGE CLASS (0 to 30) AND IS DUMPUNSAFE	PRIVCLAS cmd_name symbol_ table has been entered. Display shows the status of the specified command.
COMMAND NAME INCREMENT DUMPSAFE PRIVSET cmd_name mod_name Y/N cmd_clas . . . . cmd_name mod_name Y/N cmd_clas	PRIVCLAS ALL entered manually or as default. List shows all current privileged commands/increments (modules), their classes, and their DUMPSAFE states.
PRIVCLAS – – ONLY A SINGLE COMMAND CLASS MAY BE ENTERED	The system has regular command screening, and PRIVCLAS has been entered with cmd_clas parameters. This response does not appear if the system has enhanced command screening.

—continued—

Table 5-12
PRIVCLAS command responses (continued)

Response	Explanation
PARAMETER MUST BE A CLASS NUMBER, DUMPSAFE OR DUMPUNSAFE	Prompts the user to select the proper values when entering a cmd_clas parameter.
PRIVCLAS – – WRONG NUMBER OF PARAMETERS	A syntax error has been made. Also appears if more than one command is entered when enhanced command screening is not present.

—end—

PRIVCLAS command examples

Figure 5-7 illustrates querying the privilege class assigned to the CLEAR command.

Figure 5-7
Example of PRIVCLAS CLEAR command

```
>privclas clear

CLEAR HAS PRIVILEGE CLASS 6 AND IS DUMPUNSAFE
>
```

Figure 5-8 illustrates setting the command classes of the TYPE command to 0, 2, 3, 4.

Figure 5-8
Example of PRIVCLAS TYPE command

```
>privclas type 0 2 3 4

>                  (No response if command is executed)
```

Changes to command class assignments are acknowledged, but are not immediately implemented. Changes are stored until a restart (warm, reload, or cold) occurs, and are then implemented together.

Figure 5-9 illustrates how to clear all previously assigned command classes from TYPE and how to set them to DUMPSAFE state.

Figure 5-9
Example of PRIVCLAS clearing TYPE command

```
>privclas type dumpsafe all

>                    (No response if command is executed)
```

Figure 5-10 illustrates the way to set the STARTDEV command in LOGUTIL to DUMPUNSAFE and the way to assign command classes 0, 3, 4, 15.

Figure 5-10
Example of PRIVCLAS LOGUTIL command

```
>privclas logutil startdev dumpunsafe 0 3 4 15

>                    (No response if command is executed)
```

Figure 5-11 illustrates the listing of all commands that have been assigned privilege classes. The CLEAR and STARTDEV commands (among others) are listed because their command classes were already assigned in previous examples (Figures 5-7 and 5-10). TYPE is not listed because it became unrestricted in the previous example (Figure 5-9) when its cmd_lst parameter contained the value ALL.

Figure 5-11
Example of PRIVCLAS ALL command

```
>privclas all

COMMAND NAME    INCREMENT    DUMPSAFE       PRIVSET
CLEAR           LOGUTIL         N           6
STARTDEV        LOGUTIL         N           0 3 4 15
>
```

Command class assignment changes are acknowledged, but not immediately implemented. The changes are stored until a restart (warm, reload, or cold) occurs, and are then implemented together.

SETPRIV command

The SETPRIV command provides access to the priority MAP terminal feature, when used with the proper password. This command may be required to make the PRIORITY command available to the ADMIN user. The ADMIN user is also given access to all classes of LOGUTIL commands. Normal command class assignments are restored at LOGOUT.

The SETPRIV command is defined in Table 5-13.

Table 5-13
SETPRIV command

Command	Operation	Explanation
SETPRIV		Provides access to the priority MAP terminal feature when used with the proper password. This command may be required to make the PRIORITY command available to the ADMIN user.
	adminpw	The password assigned to the ADMIN class of user.
	—end—	

SETPRIV command responses

Table 5-14 shows sample SETPRIV command responses.

Table 5-14
SETPRIV command responses

Response	Explanation
(no response)	The user has access to the PRIORITY command.
COMMAND FAILED, ONLY ADMIN'S PASSWORD IS ACCEPTED	Improper adminpw parameter was entered.
—end—	

SHOW command

The SHOW command displays a list of users and associated information, or a list of the current command modules. The SHOW command is defined in Table 5-15.

Table 5-15
SHOW command

Command	Operation	Explanation
SHOW		Displays a list of users and associated information, or displays the current command modules (increments).
	USERS	Displays a list of all user's names with their currently assigned stack sizes and non-resident device names. Passwords are not displayed.
	INCRS	Displays a list of current command modules (increments).
	—end—	

SHOW command examples

Figure 5-12 illustrates the listing of user names and associated parameters assigned by the PERMIT command.

Figure 5-12
Example of SHOW USERS command

```
>show users

NAME          PRIO  STACK  NRDEV  LANGUAGE  PRIV  CLASSES
user_name1     .     .       .        .      .       .
user_name2     .     .       .        .      .       .
>
```

Figure 5-13 illustrates the response to the SHOW INCRS command.

Figure 5-13
Example of SHOW INCS command

```
>show incrs

>INCR NAME
>
```

UNPERMIT command

The UNPERMIT command deletes a user's name from the list of users. A user's name can only be deleted by another user. Users cannot delete their own names. The UNPERMIT command is defined in Table 5-16.

Table 5-16
UNPERMIT command

Command	Username	Password	Explanation
UNPERMIT			Deletes a user's name from the list of users. Users cannot delete their own names.
	username		An 8-character (maximum) name defined by the operating company. Use SHOW USERS command to display a list of current usernames.
		[password]	Required only if the enhanced password control feature is active. Passwords are defined by the operating company.
—end—			

UNPERMIT command responses

Table 5-17 lists examples of responses to the UNPERMIT command.

Table 5-17
UNPERMIT command responses

Response	Explanation
UNPERMIT: username HAS BEEN DELETED	Normal response from the system when enhanced password control feature is not active.
UNPERMIT: ENTER PASSWORD	Response from the system when UNPERMIT username has been entered and enhanced password control is active. After a valid password is entered, the response is: UNPERMIT: username HAS BEEN DELETED.
USER DOES NOT EXIST	Invalid user_name parameter has been entered. User SHOW USERS for display of valid user_names.
—end—	

MMI report routing

MMI report routing is operable after the log system has been accessed, using the LOGUTIL command. This group consists of the following commands:

- ADDCLASS
- ADDREP

- BACKUP
- CLASS
- DELCLASS
- DELDEVICE
- DELREP
- LISTDEVS
- LISTREPS
- LISTROUTE
- LISTTIME
- REROUTE
- RESET
- RESETROUTE
- RESUME
- STARTDEV
- STOPDEV
- SUPPRESS
- SYSLOG
- THRESHOLD
- TIMERESET

ADDCLASS command

The ADDCLASS command addsoutput report classes to the specified primary terminal device. The ADDCLASS command is defined in Table 5-18.

Table 5-18
ADDCLASS command

Command	Device	Report	Explanation
ADDCLASS			Adds an output report class.
	io_dev		Name of any terminal device in the office designated as a primary terminal device (in the DEV field of data schema table TERMDEV).
		repclass	Indicates the report class number (0 to 31) that is associated with a specified repname (in table LOGCLASS) for the purpose of routing to a terminal device.
—end—			

ADDCLASS command responses

Table 5-19 shows sample responses to the ADDCLASS command.

Table 5-19
ADDCLASS command responses

Response	Explanation
CLASSES ADDED	The specified classes have been added.
INCORRECT CLASS NUMBER AT PAR #:n	An out-of-range class number has been used as the repclass parameter with the associated command.
DEVICE io_dev NOT FOUND	An incorrect terminal device name has been entered as the io_dev parameter. Enter LISTDEVS for a display of all current terminal devices.
—end—	

ADDREP command

The ADDREP command adds reports to those already routed to the specified primary terminal device. The ADDREP command is defined in Table 5-20.

Table 5-20
ADDREP command

Command	Device	Report	Explanation
ADDREP			Adds more reports to those already routed to the primary terminal device.
	io_dev		Name of any terminal device in the office designated as a primary terminal device (in the DEV field of data schema table TERMDEV).
		repname	Consists of logname and repnum, identifies a specific output report. All repnames are listed in the *UCS DMS-250 Logs Reference Manual*. The same names are also entered in the REPNAME field of data schema table LOGCLASS. Use LISTREPS to display a list of all repnames.

—end—

ADDREP command responses

Table 5-21 shows sample responses to the ADDREP command.

Table 5-21
ADDREP command responses

Response	Explanation
ADDED	The specified report has been added.
REPORTS ADDED	The reports specified by repname have been added.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	The repname and/or repnum parameter is invalid.

—end—

Table 5-21
ADDREP command responses

Response	Explanation
REPORT logname repnum NOT FOUND	The log report specified is not on the LISTLOGS display. The repnum may be out of range.
DEVICE io_dev NOT FOUND	The terminal device name has incorrectly been entered as the io_dev parameter. Enter LISTDEVS for a display of all current terminal devices.
—end—	

BACKUP command

The BACKUP command assigns a terminal device to back up a primary terminal device. If the primary device fails, all reports routed to the primary device are rerouted to the backup terminal device. The BACKUP command is defined in Table 5-22.

Table 5-22
BACKUP command

Command	Device	Device	Explanation
BACKUP			Assigns a terminal device to back up the specified primary terminal device. If the primary terminal device fails, all reports routed to the primary terminal device are rerouted to the specified backup terminal device.
	io_dev		The primary terminal device. A primary terminal device must be designated in the DEV field of data schema table TERMDEV.
—end—			

Table 5-22
BACKUP command

Command	Device	Device	Explanation
		BY	Indicates that the device name following is the back-up device.
		alt_device	Name of the device used for back up. Temporarily supersedes the device entered in the ALT field of data table TERMDEV.
		—end—	

BACKUP command responses

Table 5-23 shows sample responses to the BACKUP command.

Table 5-23
BACKUP command responses

Response	Explanation
(no response)	There is no response if command is successfully executed.
DEVICE io_dev NOT FOUND	The io_dev parameter is not a valid terminal device name. Enter LISTDEVS for a display of all current terminal devices.
—end—	

CLASS command

The CLASS command assigns report class numbers to output reports. The CLASS command is defined in Table 5-24.

Table 5-24
CLASS command

Command	Class	Report	Explanation
CLASS			Assigns report class numbers to the specified output reports.
	repclass		Indicates the report class number (0 to 31) associated with a specified repname (in table LOGCLASS) for the purpose of routing to an terminal device.
		repname	Name of the device to be used as back up. Temporarily supersedes the device entered in the ALT field of data table TERMDEV.
—end—			

CLASS command responses

Table 5-25 shows sample responses to the CLASS command.

Table 5-25
CLASS command responses

Response	Explanation
REPORTS RECLASSED	The reports specified by repname has been reclassed.
LOG logname NOT FOUND	An incorrect log report (repname) parameter has been entered.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	A non-existent repname and/or repnum parameter has been entered.
INCORRECT CLASS NUMBER AT PAR #:n	An out-of-range class number has been used as the repclass parameter with the associated command.
—end—	

DELCLASS command

The DELCLASS command deletes report classes associated with the specified terminal device. The DELCLASS command is defined in Table 5-26.

Table 5-26
DELCLASS command

Command	Device	Class	Explanation
DELCLASS			Deletes the specified report classes associated with the specified terminal device.
	io_dev		The io_dev parameter is not a valid terminal device name. Enter LISTDEVS for a display of all current terminal device.
		repclass	Indicates the report class number (0 to 31) associated with a specified repname (in table LOGCLASS) for the purpose of routing to an terminal device.
—end—			

DELCLASS command responses

Table 5-27 shows sample responses to the DELCLASS command.

Table 5-27
DELCLASS command responses

Response	Explanation
CLASSES DELETED	The report classes specified by repclass have been deleted.
INCORRECT CLASS NUMBER AT PAR #:n	An out-of-range class number has been used as the repclass parameter with the associated command.
DEVICE io_dev NOT FOUND	The io_dev parameter is not a valid terminal device name. Enter LISTDEVS for a display of all current terminal device.
—end—	

DELDEVICE command

The DELDEVICE command deletes an terminal device from the list of devices receiving log reports. Use the STOPDEV command prior to using the DELDEVICE command. Table 5-28 describes the DELDEVICE command.

Table 5-28
DELDEVICE command

Command	Device	Explanation
DELDEVICE		Deletes the specified terminal device from the list of devices receiving log reports. Use the STOPDEV command first.
	io_dev	The primary terminal device. A primary terminal device must be designated in the DEV field of data schema table TERMDEV.
	—end—	

DELDEVICE command responses

Table 5-29 provides example of responses to the DELDEVICE command.

Table 5-29
DELDEVICE command responses

Response	Explanation
(no response)	No response received if command is successfully executed
DEVICE IS STARTED	STOPDEV was not entered before DELDEVICE.
DEVICE io_dev NOT FOUND	The io_dev parameter is not a valid terminal device name. Enter LISTDEVS for a display of all current terminal device.
—end—	

DELREP command

The DELREP command deletes specified report(s) that are presently output to the specified terminal device. The DELREP command is defined in Table 5-30.

Table 5-30
DELREP command

Command	Device	Report	Explanation
DELREP			Deletes the specified reports that are output to the specified terminal device.
	io_dev		The primary terminal device. A primary terminal device must be designated in the DEV field of data schema table TERMDEV.
		repname	Consists of logname and repnum, identifies a specific output report. All repnames are listed in the *UCS DMS-250 Logs Reference Manual*. The same names are also entered in the REPNAME field of data schema table LOGCLASS. Use LISTREPS to display a list of all repnames.
—end—			

DELREP command responses

Table 5-31 shows sample responses to the DELREP command.

Table 5-31
DELREP command responses

Response	Explanation
DELETED	The report has been deleted.
REPORTS DELETED	The reports specified by repname have been deleted.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	A non-existent repname and/or repnum parameter has been entered.
—end—	

Table 5-31
DELREP command responses

Response	Explanation
REPORT logname repnum NOT FOUND	The log report specified is not on the LISTLOGS display. The repnum may be out of range.
DEVICE io_dev NOT FOUND	The io_dev parameter is not a valid terminal device name. Enter LISTDEVS for a display of all current terminal device.
—end—	

LISTDEVS command

The LISTDEVS command displays the status of each terminal device currently associated with the log system. The LISTDEVS command is defined in Table 5-32.

Table 5-32
LISTDEVS command

Command	Explanation
LISTDEVS	Displays the status of each terminal device currently associated with the log system.
—end—	

LISTDEVS command response

Figure 5-14 illustrates the system response to the LISTDEVS command. The system lists all terminal devices and their backup devices, and shows which devices are in use, and shows their current status. Table 5-33 provides details of the fields displayed in response to the LISTDEVS command.

Figure 5-14
Example of response to LISTDEVS command

```
>listdevs

NO. DEVICE STATUS REROUTED ALTERNATE FORMAT OUTPUT LANGUAGE
0    PRT1  Inactive  No     Nil      SCC2   ASCII   English
– End of devices –
>
```

Table 5-33 explains each of the fields displayed in response to the LISTDEVS command.

Table 5-33
LISTDEVS response explanations

Response field	Explanation
NO.	Log device number. There can be a maximum of 32 log devices, designated 0 to 31.
DEVICE	Device type, where device falls into one of the following categories: • device is listed in table TERMDEV • device is temporarily assigned in table SFDEV • device is a disk or tape drive
STATUS	Indicates one of the following: • process started—log device is trying unsuccessfully to send logs to its file or device • outputting logs—logs are successfully being output to the log device • inactive—the log device is inactive
REROUTED	Indicates by YES or NO whether the log output has been rerouted from the primary device to its alternate device.
ALTERNATE	Indicates the other devices available for log outputs.
FORMAT	Indicates whether the output is in standard (STD) log format or Switching Control Center No. 2 (SCC2) log format.
OUTPUT	Indicates whether the output is ASCII or EBCDIC.
LANGUAGE	Indicates the MMI language in which logs are being output on that device. Language is listed as one of the following: • ENGLISH • GERMAN • FRENCH

—end—

LISTREPS command

The LISTREPS command displays details of SPECIAL log reports or of all log reports in a specified log class. A list of repnames (except SECRET) displays when you enter LISTREPS without parameters.

The displays resulting from LISTREPS include a SYSLOG field if SYSLOG ON has been applied to the specified repname. Table 5-34 describes the LISTREPS command.

Table 5-34
LISTREPS command

Command	Operation	Parameter	Explanation
LISTREPS			Displays details of SPECIAL log reports or of all log reports in a specified log class. ***Note:*** If LISTREPS is entered without options or parameters, a list of all repnames (except SECRET) is displayed.
	SPECIAL		Indicates that a list of “special” log reports is required. Special log reports are those that have special routing or thresholding, those that are suppressed, and those that have been designated by SYSLOG ON.
		repname	Consists of logname and repnum, and identifies a specific output report. The same names are also entered in the REPNAME field of data schema table LOGCLASS. Use LISTREPS to display a list of all repnames.
	CLASS		Indicates that a list of reports by log class is required.
		repclass	Indicates the report class number (0 to 31) that is associated with a specified repname (in table LOGCLASS) for the purpose of routing to an terminal device.

—end—

LISTREPS command responses

The following details are displayed in response to the LISTREPS command:

- repname
- repclass
- report event type
- report event identification
- terminal devices to which report is routed
- report suppressed and/or thresholded.

Table 5-35 provides example responses to the LISTREPS command.

Table 5-35
LISTREPS command responses

Response	Explanation
LOG logname NOT FOUND	The logname is invalid.
x REPORTS PRINTED	Displays the number of reports printed as a result of using LISTREPS or LISTROUTE.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	The repname and/or repnum parameter is invalid.
INCORRECT CLASS NUMBER AT PAR #:n	An out-of-range class number has been used as the repclass parameter with the associated command.
REPORT logname repnum NOT FOUND	The log report specified is not on the LISTLOGS display. The repnum may be out of range.
—end—	

LISTROUTE command

The LISTROUTE command displays the mutual associations between specified report classes, terminal device, and report names by CLASS, DEVICE, or REPORT. The LISTROUTE command is defined in Table 5-36.

Table 5-36
LISTROUTE command

Command	Operation	Parameter	Explanation
LISTROUTE			Displays the mutual associations between specified report classes, terminal device, and report names by CLASS, DEVICE, or REPORT.
	CLASS		Lists all output reports associated with the specified report classes and the terminal device to which these classes are routed.
		[repclass]	Specifies the required report classes for which data is requested. ***Note:*** If repclass is not entered, the default is all classes.
	DEVICE		Lists all the report classes, including temporary classes, associated with the specified terminal device.
		[io_dev]	Specifies the terminal device that information is requested. ***Note:*** If io_dev is not entered, information on all devices is displays.
	REPORT		Lists the routing associated with specific report names.
		[repname]	Specifies the required reports. ***Note:*** If repname is not entered, information on all reports displays.
—end—			

LISTROUTE command responses

Table 5-37 shows sample responses to the LISTROUTE command.

Table 5-37
LISTROUTE command responses

Response	Explanation
CLASS repclass —> io_dev alt_dev	Response to LISTROUTE CLASS. Displays the primary and backup terminal device to which the specified report classes are routed.
DEVICE io_dev PRINTS CLASSES: n.. ADD REPORTS; DELETE REPORTS:	Response to LISTROUTE DEVICE. Displays the report class numbers associated with the specified terminal device. Also displays report class numbers temporarily added or deleted by ADDCLASS or DELCLASS.
REPORT repname IS CLASS: n.. ADDED: DELETED:	Response to LISTROUTE REPORT. Displays the report class number associated with the specified report names. Also displays the quantity of reports temporarily added or deleted by ADDREP or DELREP.
INVALID OPTION	A parameter other than CLASS, DEVICE, or REPORT has been entered.
LOG logname NOT FOUND	The log report (repname) parameter is invalid.
x REPORTS PRINTED	Displays the number of reports printed as a result of using LISTREPS or LISTROUTE.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	The repname and/or repnum parameter is invalid.
INCORRECT CLASS NUMBER AT PAR #:n	An out-of-range class number has been used as the repclass parameter with the associated command.
REPORT logname repnum NOT FOUND	The log report specified is not on the LISTLOGS display. The repnum may be out of range.
DEVICE io_dev NOT FOUND	The io_dev parameter is not a valid terminal device name. Enter LISTDEVS for a display of all current terminal device.

—end—

LISTTIME command

The LISTTIME command displays a list of all log reports that are on a threshold reset schedule. The command is defined in Table 5-38.

Table 5-38
LISTTIME command

Command	Explanation
LISTTIME	Displays a list of all log reports on a threshold reset schedule. ***Note:*** Reset threshold parameters are set to default values in the data table OFCENG, for normal office operations. These values are not normally variable, but they can be changed to suit operating company requirements. Consult Nortel for details.
—end—	

LISTTIME command response

Table 5-39 shows sample responses to the LISTTIME command.

Table 5-39
LISTTIME command responses

Response	Explanation
NOTHING ON RESET LIST	There are no log reports are on the reset list.
LOG NUM MINUTES LEFT aaa nnn nnnn nnnn . . . . aaa nnn nnnn nnnn – END	Displays the log name and report number of all reports that have had a time value applied by TIMERESET. Also lists the number of minutes originally set and the number of minutes remaining to reset.
—end—	

REROUTE command

The REROUTE command reroutes all reports associated with the specified primary terminal device to their respective backup terminal device. The REROUTE command is defined in Table 5-40.

Table 5-40
REROUTE command

Command	Language	Device	Explanation
REROUTE			Reroutes all reports associated with the specified primary terminal device to their respective backup terminal device.
	[language]		Optional parameter used if the language of the MMI is other than the default of ENGLISH. Alternate values are FRENCH or GERMAN. *See* PERMIT command.
		io_dev	The primary terminal device. A primary terminal device must be designated in the DEV field of data schema table TERMDEV.
—end—			

REROUTE command responses

Table 5-41 shows sample responses to the REROUTE command.

Table 5-41
REROUTE command responses

Response	Explanation
DEVICE io_dev ALREADY REROUTED	No action taken. The backup device for the specified io_dev is already in use.
DEVICE io_dev CANNOT BE REROUTED	No action taken. Either no backup device has been assigned for the specified io_dev, or the assigned backup device is out of service. Use LISTDEVS to check the status of the specified io_dev and its backup. If necessary, use BACKUP to assign an alternative terminal device.
—end—	

Table 5-41
REROUTE command responses

Response	Explanation
NUMBER OF DEVICES REROUTED: n	REROUTE successfully executed. Shows the number of terminal device that were switched to their backup devices.
DEVICE io_dev NOT FOUND	The io_dev parameter is not a valid terminal device name. Enter LISTDEVS for a display of all current terminal device.
—end—	

RESET command

The RESET command resets to zero all threshold values that were applied by the THRESHOLD command, and resumes the generation of all reports suppressed by the SUPPRESS command. No parameters are required with this command. The RESET command is defined in Table 5-42.

Table 5-42
RESET command

Command	Explanation
RESET	Resets to zero all threshold values that were applied by the THRESHOLD command, and resumes the generation of all reports suppressed by the SUPPRESS command. No parameters are required.
—end—	

RESET command response

Table 5-43 shows a sample response to the RESET command.

Table 5-43
RESET command responses

Response	Explanation
NUMBER OF LOG REPORTS RESET: n	RESET has been successfully executed. Indicates the number of reports whose threshold values were reset.
—end—	

RESETROUTE command

The RESETROUTE command restores the temporary routing of output reports on all output devices to the original routing defined in data tables LOGCLASS and TERMDEV. No parameters are required with this command.

The RESETROUTE command is defined in Table 5-44.

Table 5-44
RESETROUTE command

Command	Explanation
RESETROUTE	Restores the temporary routing of output reports on all output devices to the original routing as defined in data tables LOGCLASS and TERMDEV. No parameters are required. ***Note:*** Temporary routing consists of routing changes applied by any of the following commands: • ADDCLASS • ADDREP • DELCLASS • DELREP • DELDEVICE • REROUTE
—end—	

RESETROUTE command response

Table 5-45 shows a sample response to the RESETROUTE command.

Table 5-45
RESETROUTE command responses

Response	Explanation
NOTE THAT ALL TEMPORARY ROUTING IS LOST	RESETROUTE has been successfully executed. Warns that all terminal device have reverted back to their original routing.
—end—	

RESUME command

The RESUME command resumes the generation of specified output reports previously suppressed by the SUPPRESS command. The RESUME command is defined in Table 5-46.

Table 5-46
RESUME command

Command	Report	Explanation
RESUME		Resumes the generation of specified output reports previously suppressed by the SUPPRESS command.
	repname	Consists of logname and repnum, and identifies a specific output report. The same names are also entered in the REPNAME field of data table LOGCLASS. Use LISTREPS to display all repnames.
—end—		

RESUME command responses

Table 5-47shows sample responses to the RESUME command.

Table 5-47
RESUME command responses

Response	Explanation
n.. REPORTS RESUMED	RESUME has been successfully executed. Shows the number of reports from which suppression has been removed.
LOG logname NOT FOUND	The log report (repname) parameter is invalid.

Table 5-47
RESUME command responses

Response	Explanation
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	The repname and/or repnum parameter is invalid.
—end—	

STARTDEV command

The STARTDEV command activates the output of reports, in a specified format and language, to the specified terminal device using the original routing.

Table 5-48 describes the STARTDEV command.

Table 5-48
STARTDEV command

Command	Format	Language	Device	Explanation
STARTDEV				Activates the output of reports, in a specified format and language, to the specified terminal device using the original routing.
	ASCII			A format in which data is exchanged between and terminal device and and device controllers.
	EBCDIC			A format in which data is recorded onto a magnetic tape unit by the device controllers.
—end—				

Table 5-48
STARTDEV command

Command	Format	Language	Device	Explanation
		[language]		Optional parameter used if the language of the MMI is other than the default of ENGLISH. Optional values are FRENCH or GERMAN. *See* PERMIT command.
			io_dev	The primary terminal device. A primary terminal device must be designated in the DEV field of data schema table TERMDEV.
		—end—		

STARTDEV command responses

Table 5-49 shows sample responses to the STARTDEV command.

Table 5-49
STARTDEV command responses

Response	Explanation
CANNOT FIND THIS DEVICE	The terminal device name is invalid. Enter LISTDEVS for a display of all current terminal device.
COULD NOT START LOG DEVICE io_dev	The system is unable to start the log device due to a problem with the io_dev. A message preceding this response explains the problem encountered.
io_dev IS ALREADY STARTED	The specified device is active.
LOG DEVICE io_dev HAS BEEN STARTED	STARTDEV has already been applied to the specified io_dev.
NUMBER OF DEVICES STARTED: n	STARTDEV is successfully executed. Shows the number of devices activated.
THIS COULD TAKE UP TO 15 MINUTES (FOR TAPE REWIND)	STARTDEV is delayed for the reason shown in parentheses ( ).
—end—	

STOPDEV command

The STOPDEV command stops the output of reports on the specified devices. Reports continue to be logged to the log buffers, so they can be browsed using the appropriate LOGUTIL commands.

The STOPDEV command is defined in Table 5-50.

Table 5-50
STOPDEV command

Command	Device	Explanation
STOPDEV		Stops the output of reports on the specified devices. Reports continue to be logged to the log buffers and may be browsed using the appropriate LOGUTIL commands.
	io_dev	The primary terminal device. A primary terminal device must be designated in the DEV field of data schema table TERMDEV.
	—end—	

STOPDEV command responses

Table 5-51 shows sample responses to the STOPDEV command.

Table 5-51
STOPDEV command responses

Response	Explanation
io_dev IS ALREADY STOPPED	The specified io_dev is not active. No action taken.
LOG DEVICE io_dev HAS BEEN STOPPED	The specified device has been deactivated.
NUMBER OF DEVICES STOPPED: nn	STOPDEV is successfully executed. Shows the number of devices deactivated, ranging from 1 to 32.
UNABLE TO STOP LOG DEVICE	The specified io_dev failed to respond to STOPDEV. No action taken.
—end—	

SUPPRESS command

The SUPPRESS command suppresses the specified output reports. Suppressed reports are not entered in the log buffers. The SUPPRESS command is defined in Table 5-52.

Table 5-52
SUPPRESS command

Command	Report	Explanation
SUPPRESS		Suppresses the specified output reports. Suppressed reports are not entered in the log buffers.
	repname	Consists of logname and repnum, and identifies a specific output report. The same names are also entered in the REPNAME field of data table LOGCLASS. Use LISTREPS to display all repnames.
	—end—	

SUPPRESS command responses

Table 5-53 shows sample responses to the SUPPRESS command.

Table 5-53
SUPPRESS command responses

Response	Explanation
n.. REPORTS SUPPRESSED	SUPPRESS has been successfully executed. Shows the number of reports suppressed.
LOG logname NOT FOUND	The log report (repname) parameter is invalid.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
REPORT logname repnum NOT FOUND	The log report specified with the associated command is not on the LISTLOGS display. The repnum may be out-of-range.
—end—	

SYSLOG command

The SYSLOG command designates selected log reports to be added to or deleted from the SYSLOG buffer, which preserves the last report prior to an office image or restart reload.

Table 5-54 describes the SYSLOG command..

Table 5-54
SYSLOG command

Command	Select	Log	Report	Explanation
SYSLOG				Designates selected log reports to be added to or deleted from the SYSLOG buffer, which preserves the last report prior to an office image or restart reload.
	ON			Adds the selected reports to SYSLOG.
	OFF			Deletes the selected reports from SYSLOG.
		logname		The name of a log subsystem that resides in the LOGS system. Maximum of four characters. Use LISTLOGS to generate a list of the lognames (except SECRET).
			[repnum]	The number of a specific log report within a log subsystem. Values range from 100 to 999. ***Note:*** If you do not enter repnum, you will affect all reports in the specified logname subsystem.

Note 1: The logname can be a SECRET log, as defined in CMDS table, but once in SYSLOG, the contents can be displayed only to users authorized to use the OPENSECRET command.

Note 2: The SWERR and TRAP logs are automatically entered in SYSLOG, and are preserved after reload along with any designated logs.

—end—

SYSLOG command responses

Table 5-55 shows sample responses to the SYSLOG command.

Table 5-55
SYSLOG command responses

Response	Explanation
n.. REPORT(S) SET_SYSLOG ON	SYSLOG ON has been successfully executed. Displays the number of reports added.
n..REPORT(S) SET_SYSLOG OFF	SYSLOG OFF has been successfully executed. Displays the number of reports deleted.
FIRST PARAMETER MUST BE EITHER ON OR OFF	There is an error in command syntax.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	The repname and/or repnum parameter is invalid.
REPORT logname repnum NOT FOUND	The log report specified with the associated command is not on the LISTLOGS display. The repnum may be out of range.
—end—	

SYSLOG command examples

Figure 5-15 illustrates use of the SYSLOG command to preserve log report CMC112 in SYSLOG if a reload is performed.

Figure 5-15
Example of SYSLOG ON command

```
>syslog on cmc 112

>                    (No response if command is executed)
```

Figure 5-16 illustrates use of the SYSLOG command to no longer preserve the LOST subsystem log reports in SYSLOG if a reload is performed.

Figure 5-16
Example of SYSLOG OFF command

```
>syslog off lost

>                    (No response if command is executed)
```

THRESHOLD command

The THRESHOLD command sets a threshold value for the specified reports. Table 5-56 describes the THRESHOLD command.

Table 5-56
THRESHOLD command

Command	Count	Report	Explanation
THRESHOLD			Sets a threshold value for the specified reports.
	n		A counter from 0 to 255. Controls the frequency of output to an terminal device.
		repname	Consists of logname and repnum, and identifies a specific output report. The same names are also entered in the REPNAME field of data table LOGCLASS. Use LISTREPS to display a list of repnames.
Note: THRESHOLD is not applicable to logname INIT and TRAP.			
—end—			

THRESHOLD command responses

Table 5-57 shows sample responses to the THRESHOLD command.

Table 5-57
THRESHOLD command responses

Response	Explanation
n.. REPORTS THRESHOLDED	A threshold value has been applied to the specified reports. Shows the number of reports to which the specified threshold has been applied.
THRESHOLD MUST BE A NUMBER 0 TO 255	The value for the “n” parameter is out of range.
LOG logname NOT FOUND	The log report (repname) parameter is invalid.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	The repname and/or repnum parameter is invalid.

—end—

TIMERESET command

The TIMERESET command sets a threshold, in seconds, after which the counter associated with specified reports automatically resets. Table 5-58 describes the TIMERESET command.

Table 5-58
TIMERESET command

Command	Time	Report	Explanation
TIMERESET			Sets a threshold, in seconds, after which the counter associated with specified reports automatically resets.
	time		A value from 0000 to 9999 minutes. If time = 0, the threshold counter is not subject to a time limit.
		repname	Consists of logname and repnum, and identifies a specific output report. The same names are also entered in the REPNAME field of data table LOGCLASS. Use LISTREPS to display a list of repnames.

—end—

TIMERESET command responses

Table 5-59 shows sample responses to the TIMERESET command.

Table 5-59
TIMERESET command responses

Response	Explanation
FIRST PAR. MUST BE NUMBER OF MINUTES	The parameter syntax is invalid.
n.. REPORT(S) TIMERESET	TIMERESET has been applied to the specified reports. Shows the number of reports affected.

—end—

MMI search and display (browse)

The MMI browse commands become operable when you access the log system with the LOGUTIL command. This group consists of the following commands:

- BACK
- CLEAR
- FIRST
- FORMAT
- FORWARD
- LAST
- LISTLOGS
- LOGTRACE
- OPEN
- OPENSECRET
- RENUMBER
- START
- STOP
- TYPE

Note: You must enter OPEN or OPENSECRET before using the other browse commands.

BACK command

The BACK command displays the next report in the current log buffer that is older than the present display. No parameters are required.

Table 5-60 describes the BACK command..

Table 5-60
BACK command

Command	Explanation
BACK	Displays the next report in the current log buffer that is older than the present display. No parameters are required.
—end—	

BACK command response

A complete report appears on the MAP; the printer output is in NORMAL or SHORT format, as specified by the FORMAT command.

CLEAR command

The CLEAR command deletes all reports from a specified log subsystem buffer. Table 5-61 describes the CLEAR command.

Table 5-61
CLEAR command

Command	Report	Explanation
CLEAR		Deletes all reports from the specified log subsystem buffer.
	logname	The name of any log subsystem that resides in the LOGS system. Maximum of four characters. Use LISTLOGS to display a list of the lognames (except SECRET).
—end—		

CLEAR command responses

Table 5-62 shows sample responses to the CLEAR command.

Table 5-62
CLEAR command responses

Response	Explanation
DONE	CLEAR command was successfully executed.
LOG logname NOT FOUND	The log report (repname) parameter is invalid.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
NOT FOUND or EITHER INCORRECT OPTIONAL PARAMETER(S) OR TOO MANY PARAMETERS	The parameter and its associated command are invalid. Check common syntax and reenter.
LOG EMPTY	The specified logname does not contain any log reports.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	The repname and/or repnum parameter is invalid.
REPORT logname repnum NOT FOUND	The log report specified with the associated command is not on the LISTLOGS display. The repnum may be out-of-range.
—end—	

FIRST command

The FIRST command displays the oldest report in the current log subsystem. No parameters are required. Table 5-63 describes the FIRST command.

Table 5-63
FIRST command

Command	Explanation
FIRST	Displays the oldest report in the current log subsystem.
—end—	

FIRST command responses

A complete report appears on the MAP; the printer output is in NORMAL or SHORT format, as specified by the FORMAT command.

FORMAT command

The FORMAT command selects the format in which output reports are printed. Table 5-64 describes the FORMAT command.

Table 5-64
FORMAT command

Command	Format	Explanation
FORMAT		Selects the format in which output reports are printed.
	NORMAL	Prints the reports in standard, complete log report format. NORMAL format is default.
	SHORT	Prints only the header information of the log reports.
	—end—	

FORMAT command responses

Table 5-65 shows sample responses to the FORMAT command.

Table 5-65
FORMAT command responses

Response	Explanation
(no response)	No response indicates that command has been accepted.
NOT FOUND or EITHER INCORRECT OPTIONAL PARAMETER(S) OR TOO MANY PARAMETERS	The parameter and its associated command are invalid. Check common syntax and reenter.
—end—	

FORWARD command

The FORWARD command displays the next report in the current log that is more recent than the present display. No parameters are required.

Table 5-66 describes the FORWARD command.

Table 5-66
FORWARD command

Command	Explanation
FORWARD	Displays the next report in the current log that is more recent than the present display
—end—	

FORWARD command responses

A complete report appears on the MAP; the printer output is in NORMAL or SHORT format, as specified by the FORMAT command.

LAST command

The LAST command displays the most recent report in the current log subsystem. No parameters are required. Table 5-67 describes the LAST command.

Table 5-67
LAST command

Command	Explanation
LAST	Displays the most recent report in the current log subsystem.
—end—	

LAST command responses

A complete report appears on the MAP; the printer output is in NORMAL or SHORT format, as specified by the FORMAT command.. Displays the same report as OPEN, unless a more recent log report has occurred since OPEN was entered.

LISTLOGS command

The LISTLOGS command lists all lognames (except SECRET lognames) in the system. No parameters are required.

Table 5-68 describes the LISTLOGS command.

Table 5-68
LISTLOGS command

Command	Explanation
LISTLOGS	Lists all lognames in the system, except SECRET lognames.
—end—	

LISTLOGS command responses

The system displays all lognames except SECRET. If a logname does not contain any reports, the message LOG EMPTY is returned.

LOGTRACE command

The LOGTRACE command toggles the traceback feature for the specified reports. Table 5-69 describes the LOGTRACE command.

Table 5-69
LOGTRACE command

Command	Select	Log	Report	Explanation
LOGTRACE				Toggles the traceback feature for specified reports.
	ON			Turns the traceback feature ON.
		logname		The 4-character (maximum) name of a log subsystem that resides in the LOGS system.
				Note: Use LISTLOGS to display a list of the lognames (except SECRET).
			[repnum]	The number of a specific log report within a log subsystem. Values range from 100 to 999.
	OFF			Turns the traceback feature OFF.
—end—				

Table 5-69
LOGTRACE command

Command	Select	Log	Report	Explanation
		logname		The 4-character (maximum) name of a log subsystem that resides in the LOGS system.
			[repnum]	The number of a specific log report within a log subsystem. Values range from 100 to 999. ***Note:*** Omit repnum to terminate traceback on all lognames and repnum.
		—end—		

LOGTRACE command responses

Table 5-70 shows sample responses to the LOGTRACE command.

Table 5-70
LOGTRACE command responses

Response	Explanation
n REPORT(S) LOGTRACE ON	The traceback feature has been turned ON for all of the specified reports.
n REPORT(S) LOGTRACE OFF	The traceback feature has been turned OFF for all of the specified reports.
—end—	

LOGTRACE command examples

Figure 5-17 shows an example of turning the traceback feature ON for all CMC and SA reports.

Figure 5-17
Example of setting LOGTRACE ON by logname

```
>logtrace on cmc sa

18 REPORT(S) LOGTRACE ON
>
```

Figure 5-18 shows an example of turning the traceback feature ON for the CMC 102 and SA 203 reports.

Figure 5-18
Example of setting LOGTRACE ON by logname and repnum

```
>logtrace on cmc 102 sa 203

2 REPORT(S) LOGTRACE ON
>
```

Figure 5-18 shows an example of turning the traceback feature OFF for the CMC 102 and SA 203 reports.

Figure 5-19
Example of setting LOGTRACE OFF by logname and repnum

```
>logtrace off cmc 102 sa 203

2 REPORT(S) LOGTRACE OFF
>
```

OPEN command

The OPEN command provides display access to the specified log subsystem buffers (or the SYSLOG buffers). After entering OPEN, other reports in the specified log subsystem (or SYSLOG) can be displayed with the FIRST, LAST, BACK, FORWARD, or TYPE commands.

The OPEN command is defined in Table 5-71.

Table 5-71
OPEN command

Command	Name	Explanation
OPEN		Provides display access to the specified log subsystem buffers.
	logname	The 4-character (maximum) name of a log subsystem residing in the LOGS system. ***Note:*** Use LISTLOGS to display a list of the lognames (except SECRET).
	SYSLOG	Applies OPEN to log reports routed to the SYSLOG buffers by the SYSLOG command.
—end—		

Only the non-secret lognames are displayed. Secret lognames are accessible only to those authorized to use the OPENSECRET command.

OPEN command responses

Table 5-72 shows sample responses to the OPEN command.

Table 5-72
OPEN command responses

Response	Explanation
(The most recent report in the specified log buffer appears.)	Response to OPEN logname. Displays the most recent report (the current log) in the specified log subsystem.
(The most recent entry in the SYSLOG buffer, prior to the last reload restart appears.)	Response to OPEN SYSLOG.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
DONE	OPEN command has been successfully executed.
—end—	

Table 5-72
OPEN command responses (continued)

Response	Explanation
NOT FOUND or EITHER INCORRECT OPTIONAL PARAMETER(S) OR TOO MANY PARAMETERS	The parameter and its associated command are invalid. Check common syntax and reenter.
LOG EMPTY	The specified logname does not contain any log reports.
PARAMETER parmname IS NOT A LOG NAME OR REPORT NUMBER	The repname and/or repnum parameter is invalid.
REPORT logname repnum NOT FOUND	The log report specified with the associated command is not on the LISTLOGS display. The repnum may be out-of-range.
—end—	

OPEN command example

Figure 5-20 shows an example of accessing reports in log subsystem CMC.

Figure 5-20
Example of OPEN command

```
>open cmc

CMC112 MAR02 16:47:00 7465 INFO PORT_ERROR CMC 0 ...
>
```

In this example, the OPEN command was entered at 1647 hours. Report CMC112 was the most recent report in the CMC log subsystem buffer at that time. The system response is shown in the short report format (*see* FORMAT command).

OPENSECRET command

The OPENSECRET command provides access to log subsystems in the SECRET category. The OPENSECRET command is defined in Table 5-73.

Table 5-73
OPENSECRET command

Command	Subsystem	Explanation
OPENSECRET		Provides access to log subsystems in the SECRET category.
	sec_log	The name of a log subsystem in the SECRET category. SECRET lognames are accessible to the privileged users only, and cannot be displayed by LISTLOGS.
	—end—	

After you enter OPENSECRET, you can select a particular SECRET log report with the FIRST, LAST, BACK, FORWARD, or TYPE commands. All other LOGUTIL commands, except CLEAR and SUPPRESS, can be used on SECRET logs after OPENSECRET. If a SECRET logname is in SYSLOG, CLEAR cannot be used for that logname.

OPENSECRET command responses

Table 5-74 shows sample responses to the OPENSECRET command.

Table 5-74
OPENSECRET command responses

Response	Explanation
LOGUTIL: COMMAND APPLIES ONLY TO SECRET LOGS AND SYSLOG	The logname entered as the sec_log parameter is not a SECRET log.
DONE	OPENSECRET command has been successfully executed.
NOT FOUND or EITHER INCORRECT OPTIONAL PARAMETER(S) OR TOO MANY PARAMETERS	The parameter and its associated command are invalid. Check common syntax and reenter.
LOG EMPTY	The specified logname does not contain any log reports.
—end—	

RENUMBER command

The RENUMBER command assigns a report number to all report types that do not have one. The RENUMBER command is defined in Table 5-75.

Table 5-75
RENUMBER command

Command	Subsystem	Explanation
RENUMBER		Assigns a report number to all report types that do not have one.
	sec_log	The name of a log subsystem in the SECRET category. SECRET lognames are accessible to the privileged users only, and cannot be displayed by LISTLOGS.
		—end—

RENUMBER command responses

There are no responses to the RENUMBER command.

START command

The START command starts the output of log reports to the specified device. The command is used mainly to view reports for maintenance purposes. START does not cancel routings established by ADDCLASS, DELCLASS, or by tables LOGCLASS and LOGDEV.

Table 5-76 describes the START command.

Table 5-76
START command

Command	Time	Class	Code	Explanation
START				Starts the output of log reports to the specified device. Even with logs running to the terminal, the user can continue to enter CI commands.
	polltime			Time interval in milliseconds (ms) between log buffer scans. The range is 10 to 2550 ms. The default is 100 ms.
				—end—

Table 5-76
START command

Command	Time	Class	Code	Explanation
		[repclass]		Indicates the report class number (0 to 31) associated with a specified repname (in table LOGCLASS) for the purpose of routing to an terminal device. ***Note:*** If you do enter a repclass value, all classes are output.
			[ASCII]	Character code for printer or video display unit (VDU). ***Note:*** ASCII is the default.
			[EBCDIC]	Character code for magnetic recording devices.
		—end—		

START command responses

Table 5-77 shows sample responses to the START command.

Table 5-77
START command responses

Response	Explanation
CANNOT FIND THIS DEVICE	The terminal device name is invalid. Enter LISTDEVS for a display of all current terminal device.
COULD NOT START LOG DEVICE io_dev	The system is unable to start the log device due to a problem with the io_dev. A message preceding this response explains the problem encountered.
io_dev IS ALREADY STARTED	START has already been applied at this device to the specified repclass.
THIS COULD TAKE UP TO 15 MINUTES (FOR TAPE REWIND)	START is delayed for the reason specified in parentheses ( ).
—end—	

Table 5-77
START command responses

Response	Explanation
UNABLE TO CREATE LOG DEVICE PROGRESS	The system is encountering a problem. Contact the maintenance support group.
YOU CAN STILL USE THIS TERMINAL FOR ENTERING CI COMMANDS. TO GET RID OF THE CI PROMPT, TYPE “WHILE (true) (sleep 100 mins.)”. TO GET BACK THE CI PROMPT USE “<break> STOP”	The user can continue to enter CI commands while log reports are open. The user can suspend and restore the CI prompt with the SLEEP and <break> STOP commands.
—end—	

STOP command

The STOP command stops the printing of reports on the device from which the command was issued. No parameters are required. Table 5-78 describes the STOP command.

Table 5-78
STOP command

Command	Explanation
STOP	Stops the printing of reports on the device from which the command was issued. No parameters are required.
—end—	

STOP command responses

Table 5-79 shows sample responses to the STOP command.

Table 5-79
STOP command responses

Response	Explanation
CANNOT GET DEVICE OF THIS USER	The system cannot find the device to which the STOP command was issued.
io_dev IS ALREADY STOPPED	STOP has already been applied to the specified io_dev. No action taken.
THIS DEVICE STOPPED	The system has successfully executed the STOP command.
UNABLE TO STOP LOG DEVICE io_dev	The system has found a problem. Check the SWERR log reports

—end—

TYPE command

The TYPE command re-displays the report last displayed by LAST, FIRST, BACK, or FORWARD. No parameters are required.

The TYPE command can be used to restore a display that has cleared or run over as a result of extensive use of LAST, FIRST, BACK, and FORWARD.

Table 5-80 describes the TYPE command.

Table 5-80
TYPE command

Command	Explanation
TYPE	Re-displays the report last displayed by LAST, FIRST, BACK, or FORWARD.

Note: The TYPE command can restore a display that has cleared or run over as a result of extensive use of LAST, FIRST, BACK, and FORWARD.

—end—

TYPE command responses

Table 5-81 shows sample responses to the TYPE command.

Table 5-81
TYPE command responses

Response	Explanation
NO OPEN LOG	The specified logname does not contain any log reports.
NO CURRENT REPORT TRY, ’FIRST’ OR ’LAST’	The specified logname does not contain any log reports.
LOGUTIL: COMMAND DOES NOT APPLY TO SECRET LOGS	Appears if parameter repname is that of a SECRET log. Use OPENSECRET command if authorized to access SECRET logs.
NOT FOUND or EITHER INCORRECT OPTIONAL PARAMETER(S) OR TOO MANY PARAMETERS	An invalid parameter has been entered with the associated command. Check common syntax and reenter.
LOG EMPTY	The specified logname does not contain any log reports.

—end—

Appendix A
Data communications equipment (DCE) parameter matrix

Table 6-1 provides a matrix of parameters for data communications equipment (DCE) used with the UCS DMS-250 switch.

Reference notes follow the table.

Table 6-1
Data communications equipment (DCE) parameter matrix

		NT4 X25 AD	NT4 X25 AF	NT4 X25 AN	NT4 X25 CH	Data-Tel 4201	Data-Tel 4202	Data-Tel 4208	Data-Tel 4212	Data-Tel 4222	Data-Tel 4232	Data-Tel 4296
Level 1 interface	EIA RS232	X	X	X	X	X	X	X	X	X	X	X
	CCITT V.35											
Transmission mode	Half duplex -2W	X(8)	X(8)	X(8)	X(8)	X	X	X				
	Full duplex -2W	X	X	X	X				X	X	X	
	Full duplex -4W					X	X	X			X	X
Timing	Asynchronous	X	X	X	X		X		X	X	X	
	Synchronous	X	X	X	X	X		X	X	X	X	X
Bits/word (async)	7	X(9)	X(9)	X(9)	X(9)		X					
	7.5	X(9)	X(9)	X(9)	X(9)							
	8	X(9)	X(9)	X(9)	X(9)		X		X	X		
	8.5	X(9)	X(9)	X(9)	X(9)							

—continued—

Table 6-1
Data communications equipment (DCE) parameter matrix (continued)

		NT4 X25 AD	NT4 X25 AF	NT4 X25 AN	NT4 X25 CH	Data-Tel 4201	Data-Tel 4202	Data-Tel 4208	Data-Tel 4212	Data-Tel 4222	Data-Tel 4232	Data-Tel 4296
Bits/word (async) (cont)	9	X(9)	X(9)	X(9)	X(9)		X		X	X	X(14)	
	9.5	X(9)	X(9)	X(9)	X(9)							
	10	X(9)	X(9)	X(9)	X(9)		X		X	X	X	
	10.5	X(9)	X(9)	X(9)	X(9)							
	11	X(9)	X(9)	X(9)	X(9)		X		X	X	X(14)	
	11.5	X(9)	X(9)	X(9)	X(9)							
	12	X(9)	X(9)	X(9)	X(9)		X					
Transmit clock source	Internal	X	X	X	X	X		X	X	X	X	X
	Ext. unslaved	X	X	X	X	X		X	X	X	X(14)	X
	Ext. slaved	?	?	?	?	X		X	X	X	X(14)	X
Speed (bits/sec)	110						X		X(5)			
	150						X		X(5)			
	300	X(5)	X(5)	X(5)	X(5)		X		X(5)	X(5)	X(5)	
	600						X					
	1200	X	X	X	X	X(1)	X		X	X	X(14)	
	1800						X(4)					
	2000											
	2400	X	X	X	X	X				X	X(16)	
	3600											
	4800	X	X	X	X			X			X(17)	X
	7200											X
	9600	X	X	X	X						X	X

—continued—

Table 6-1
Data communications equipment (DCE) parameter matrix (continued)

		NT4 X25 AD	NT4 X25 AF	NT4 X25 AN	NT4 X25 CH	Data-Tel 4201	Data-Tel 4202	Data-Tel 4208	Data-Tel 4212	Data-Tel 4222	Data-Tel 4232	Data-Tel 4296
Speed (cont)	12000											
	14400											
	19200	X	X	X	X							
	48000											
	56000											
	64000											
Flow control (Lvl 1 async)	Interface leads										X(14)	
	XOFF/XON									X(14)	X(14)	
Reverse chan speed (bits/sec)	5											
	75											
	150											
Line configuration	PSTN	X(10)	X(10)	X(10)	X(10)	X		X	X	X	X	
	pt-to-pt PLL-2W	X(12)	X(12)	X(12)	X(12)	X	X			X	X(14)	
	multi-pt PLL-2W	?	?	?	?	X	X					
	pt-to-pt PLL-4W					X	X	X			X	X
	multi-pt PLL-4W					X	X	X				X
Protocol and modulation	Bell 103								X(2)	X(2)	X(2)	
	Bell 201					X(2)						
	Bell 202						X(2)					
	Bell 208							X(2)				
	Bell 212								X(2)	X(2)	X(2)	
	Bell 224											

—continued—

Table 6-1
Data communications equipment (DCE) parameter matrix (continued)

		NT4 X25 AD	NT4 X25 AF	NT4 X25 AN	NT4 X25 CH	Data-Tel 4201	Data-Tel 4202	Data-Tel 4208	Data-Tel 4212	Data-Tel 4222	Data-Tel 4232	Data-Tel 4296
Protocol and modulation (cont)	CCITT V.21									?		
	CCITT V.22									?	?	
	CCITT V.22 BIS									X(2)	X(2)	
	CCITT V.23											
	CCITT V.26											
	CCITT V.26 BIS											
	CCITT V.26 TER											
	CCITT V.27											
	CCITT V.29											X(2)
	CCITT V.32										X(2)	
	CCITT V.33											
	Nortel D/P TCM	X	X	X	X							
Auto dialer command language (async)	AT									X(14)	X(14)	
	BN											
	Dowly										X(14)	
	Nortel datapath Kbrd dial	X	X	X	X							
Error detection and correction (async)	MNP class 4										X(14)	
	MNP class 5									X(14)	X(14)	
	CCITT V.42										X(14)	
	Nortel datapath TCM	X(13)	X(13)	X(13)	X(13)							
Other	Auto answer	X	X	X	X	X(6)		X(6)	X	X(6)	X(6)	

—continued—

Table 6-1
Data communications equipment (DCE) parameter matrix (continued)

		NT4 X25 AD	NT4 X25 AF	NT4 X25 AN	NT4 X25 CH	Data-Tel 4201	Data-Tel 4202	Data-Tel 4208	Data-Tel 4212	Data-Tel 4222	Data-Tel 4232	Data-Tel 4296
features	Antistreaming					X(7)		X(7)				
Other	Equalization						X	X(7)			X(14)	X
features	“MI/MIC” leads	X	X	X	X	X(6)		X(6)	X	X(6)	X(6)	
(cont)	Stand-alone		X	X		X	X	X	X	X	X	X
	Rack mount	X			X	X	X	X	X	X	X	X
	Case 4200 829 DAS					X(7)	X	X(7)			X(7)	X
	NT4X25BH rack	X			X							
	Case 4200 rack					X	X	X	X	X	X	X
Nortel	Outbound MP	X	X(8)	X	X				X(3)	X(3)	X(3)	
datapath	Inbound MP	X	X(8)	X	X				X(3)	X(3)	X(3)	
applications	Bidirectional MP		X(8)		X				X(3)	X(3)	X(3)	
	NT1X67BC	X(11)	X(11)	X(11)	X(11)		X(3)		X(3)	X(3)	X(3)	
Compatible	NT1X89AA async (2, 3)	X(11)	X(11)	X(11)	X(11)							
DMS I/O	NT1X89AA sync (2, 3)	X(11)	X(11)	X(11)	X(11)	X(3)		X(3)		X(3)	X(3)	X
ports	NT9X26AA (Remote)	X(11)	X(11)	X(11)	X(11)							
	NT9X26AB (Remote)	X(11)	X(11)	X(11)	X(11)		X(3)		X(3)	X(3)		

—end—

Reference notes for Table 6-1

Note 1: Requires accessory cable adapter.

Note 2: Different manufacturers may design DCE according to specified modulation standards. To avoid possible incompatibility issues, it is recommended that equipment from a single manufacturer be used within a network.

Note 3: Referenced DCE was tested and was found to be compatible with referenced DMS I/O port/application when utilizing certain parameters/options. Refer to the appropriate RTP design technology interface compatibility report for further details.

Note 4: Requires C2 conditions.

Note 5: Asynchronous only.

Note 6: PSTN configuration only.

Note 7: PLL configuration only.

Note 8: Requires profile downloading.

Note 9: 1 start bit; 5, 6, 7, or 8 data bits; even, odd, or no parity; 1, 1.5, or 2 stop bits. Requires profile downloading for all combinations except 1 start bit, 8 data bits, no parity, 1 stop bit.

Note 10: Require datapath line card. Restricted to loop length of 18000 feet (26 AWG wire) on unloaded lines.

Note 11: Referenced DCE was found to be compatible with referenced DMS IO port/application via paper analysis when utilizing certain parameters/options.

Note 12: Restricted to loop length of 18000 feet (26 AWG wire) on unloaded lines.

Note 13: Framed error correction for async and sync transmission tp to 9600 bps.

Note 14: Dialer mode only.

Note 15: Dialer mode and asynchronous only.

Note 16: Dialer mode only when used on PLLs.

Note 17: Dialer mode only when used on the PSTN.

Appendix B
UCS DMS-250 I/O port parameter matrix

Overview

This section defines parameters for the UCS DMS-250 switch input/output (I/O) ports. Parameters for the following I/O devices are presented in the listed tables:

- Table 7-1—NT1X67 series data link controller
- Table 7-2—NT1X89 series multiprotocol controller (MPC) and enhanced MPC
- Table 7-3—NT9X26 series remote terminal interface (RTIF)

Reference notes for information contained in tables 7-1, 7-2, and 7-3 are provided at the end of this section.

Table 7-1 provides the I/O port parameter matrix for the NT1X67 series data link controllers.

Table 7-1
UCS DMS-250 I/O port parameter matrix for NT1X67 data link controllers

		NT1X 67AB ports 0-3	NT1X 67BB port 0	NT1X 67BC ports 0-3	NT1X 67BD ports 0-3	NT1X 67CB ports 0-3	NT1X 67DB port 0	NT1X 67EA port 0	NT1X 67FA port 0
Link protocol support	Level 1	X	X	X	X	X	X	X	X
	Level 2		X				X		
	Level 3		X				X		
Level 1 interface	Serial	X	X	X	X	X	X	X	X
	EIA RS232	X	X	X	X	X	X	X	X

—continued—

Table 7-1
UCS DMS-250 I/O port parameter matrix for NT1X67 data link controllers (continued)

		NT1X 67AB ports 0-3	NT1X 67BB port 0	NT1X 67BC ports 0-3	NT1X 67BD ports 0-3	NT1X 67CB ports 0-3	NT1X 67DB port 0	NT1X 67EA port 0	NT1X 67FA port 0
	EIA RS366								
	EIA RS422								
	EIA RS423								
	EIA RS449								
	CCITT V.35								
	Current loop (20ma)	X		X	X	X			X
	Current loop (40ma)								
	Current loop (60ma)								
	Parallel								
	IEEE 488								
Level 1 device type	DTE	X	?	X	X	X	?	?	X
	DCE		?				?	?	
Current loop send control	Active	X		X	X	X			X
	Passive								
Current loop receive control	Active	X		X	X	X			X
	Passive								
Transmission mode	Simplex output							X	
	Simplex input								
	Half duplex								
	Full duplex	X	X	X	X	X	X		X
Timing	Asynchronous	X		X	X	X		X	X

—continued—

Table 7-1
UCS DMS-250 I/O port parameter matrix for NT1X67 data link controllers (continued)

		NT1X 67AB ports 0-3	NT1X 67BB port 0	NT1X 67BC ports 0-3	NT1X 67BD ports 0-3	NT1X 67CB ports 0-3	NT1X 67DB port 0	NT1X 67EA port 0	NT1X 67FA port 0
	Synchronous		X				X		
Bits/word (async)	7							?	
	7.5							?	
	8							?	
	8.5							?	
	9							?	
	9.5							?	
	10	X(6)		X(6)	X(6)	X(6)		?	X(11)
	10.5							?	
	11							?	
	11.5							?	
	12							?	
Transmit clock source (sync)	Internal		?				?		
	External		?				?		
Speed (bits/second)	110	X(1)	X	X(1)	X(1)	X(1)	X	?	
	150	X(1)	X	X(1)	X(1)	X(1)	X	?	
	300	X(1)	X	X(1)	X(1)	X(1)	X	?	
	600	X(1)	X	X(1)	X(1)	X(1)	X	?	
	1200	X(1)	X	X(1)	X(1)	X(1)	X	?	X
	1800	X(1)	X	X(1)	X(1)	X(1)	X	?	
	2000	X(1)	X	X(1)	X(1)	X(1)	X	?	

—continued—

Table 7-1
UCS DMS-250 I/O port parameter matrix for NT1X67 data link controllers (continued)

		NT1X 67AB ports 0-3	NT1X 67BB port 0	NT1X 67BC ports 0-3	NT1X 67BD ports 0-3	NT1X 67CB ports 0-3	NT1X 67DB port 0	NT1X 67EA port 0	NT1X 67FA port 0
	2400	X(1)	X	X(1)	X(1)	X(1)	X	?	
	3600	X(1)	X	X(1)	X(1)	X(1)	X	?	
	4800	X(1)	X	X(1)	X(1)	X(1)	X	?	
	7200		X				X	?	
	9600		X				X	X	
	12000								
	14400								
	19200								
	48000								
	56000								
	64000								
Level 1 flow control (async)	Interface leads							?	
	XOFF/XON	X(2)		X(2)	X(2)	X(2)		?	
Reverse channel speed (bits/second)	5								
	75								
	150								
Configurations supported by attached level 1 DCE (modem)	PSTN	X	?	X	X	X	?	?	X
	point-to-point PLL	X	?	X	X	X	?	?	X
	multipoint PLL		?				?		
	Auto dial back				X				
Level 2 (sync)	HDLCLAP		?				?		

—continued—

Table 7-1
UCS DMS-250 I/O port parameter matrix for NT1X67 data link controllers (continued)

		NT1X 67AB ports 0-3	NT1X 67BB port 0	NT1X 67BC ports 0-3	NT1X 67BD ports 0-3	NT1X 67CB ports 0-3	NT1X 67DB port 0	NT1X 67EA port 0	NT1X 67FA port 0
protocol	HDLCLAPB		?				?		
	HDLCLAPD								
	HDLCLAPX								
	HDLCLLC								
	HDLCSDLC								
Level 2 device type	DTE		?				?		
	DCE		?				?		
Level 2 link procedures	Single link		?				?		
	Multi link		?				?		
Level 2 flow control	Module 8 windows		?				?		
	Modulo 128 windows		?				?		
Level 2 error correction technique	Reject (go back n)		?				?		
	Selective reject		?				?		
	Sel. reject/reject		?				?		
Level 3 (sync) protocol	Bellcore BX.25		?				?		
	CCITT X.25 (1976)		?				?		
	CCITT X.25 (1980)		?				?		
	CCITT X.25 (1984)								
	CCITT X.25 (1988)								
Level 3 flow control	Modulo 8 windows		?				?		
	Modulo 128 windows		?				?		

—continued—

Table 7-1
UCS DMS-250 I/O port parameter matrix for NT1X67 data link controllers (continued)

		NT1X 67AB ports 0-3	NT1X 67BB port 0	NT1X 67BC ports 0-3	NT1X 67BD ports 0-3	NT1X 67CB ports 0-3	NT1X 67DB port 0	NT1X 67EA port 0	NT1X 67FA port 0
Level 3	ACCUNET								
data packet	AUTONET								
networks	DATAPAC								
supported	DON								
(SVCs)	LADT								
	NET/1000								
	NTELPAC								
	PACNET								
	TELENET								
	TYMNET								
	UNINET								
CCITT X.25	on line facility registration								
facilities	call redirection								
supported	call redirection notification								
CCITT X.25	abbreviated address calling								
facilities	direct call								
(cont)	incoming calls barred								
	outgoing calls barred								
	called line address modified notification								
	charging information								
	reverse charging								

—continued—

Table 7-1
UCS DMS-250 I/O port parameter matrix for NT1X67 data link controllers (continued)

		NT1X 67AB ports 0-3	NT1X 67BB port 0	NT1X 67BC ports 0-3	NT1X 67BD ports 0-3	NT1X 67CB ports 0-3	NT1X 67DB port 0	NT1X 67EA port 0	NT1X 67FA port 0
CCITT X.25 facilities (cont)	reverse charging acceptance								
	local charging prevention								
	closed user group								
	closed user group selection								
	CUG with outgoing access select								
	CUG with incoming access								
	incoming calls barred within CUG								
	outgoing calls barred within CUG								
	bilateral CUG								
	bilateral CUG selection								
	bilateral CUG with outgoing access								
	fast select								
	fast select acceptance								
	throughput class negotiation								
	default throughput class assignment								
	D-bit modification								
	extended frame sequence number								
	extended packet sequence number								

—continued—

Table 7-1
UCS DMS-250 I/O port parameter matrix for NT1X67 data link controllers (continued)

		NT1X 67AB ports 0-3	NT1X 67BB port 0	NT1X 67BC ports 0-3	NT1X 67BD ports 0-3	NT1X 67CB ports 0-3	NT1X 67DB port 0	NT1X 67EA port 0	NT1X 67FA port 0
	flow control parameter negotiation								
	hunt group								
	multilink procedure								
	network user identification								
	non-std default packet size								
	non-std default word size								
	one-way logical channel outgoing								
	one-way logical channel incoming								
	packet retransmission								
	RPOA selection								
	transit delay select and indication								

—end—

Table 7-2 provides the I/O port parameter matrix for the NT1X89 series multiprotocol controller (MPC) and enhanced MPC.

Table 7-2
UCS DMS-250 I/O port parameter matrix for NT1X89 MPC/enhanced MPC

		NT1X 89AA port 0	NT1X 89AA port 1	NT1X 89AA ports 2-3	NT1X 89BA port 0	NT1X 89BA port 1	NT1X 89BA ports 2	NT1X 89BA ports 3
Link protocol support	Level 1	X	X	X	X	X	X	X
	Level 2			X		X	X	X
	Level 3			X		X	X	X
Level 1 interface	Serial	X	X	X	X	X	X	X
	EIA RS232	X(8)		X	X(8)		X	X(18)
	EIA RS366		X(9)					
	EIA RS422							
	EIA RS423							
	EIA RS449							
	CCITT V.35					X(18)		
	Current loop (20ma)							
	Current loop (40ma)							
	Current loop (60ma)							
	Parallel							
	IEEE 488							
Level 1 device type	DTE			X	X	X	X	X
	DCE							
Current loop send control	Active							
	Passive							
Current loop	Active							

Table 7-2
UCS DMS-250 I/O port parameter matrix for NT1X89 MPC/enhanced MPC (continued)

		NT1X 89AA port 0	NT1X 89AA port 1	NT1X 89AA ports 2-3	NT1X 89BA port 0	NT1X 89BA port 1	NT1X 89BA ports 2	NT1X 89BA ports 3
receive control	Passive							
Transmission mode	Simplex output			X(9)		X(9)	X(9)	X(9)
	Simplex input			X(9)		X(9)	X(9)	X(9)
	Half duplex			X(9)		X(9)	X(9)	X(9)
	Full duplex	X		X	X	X	X	X
Timing	Asynchronous	X		X(13)	X		X(13)	X(13)
	Synchronous			X(3)		X(3)	X(3)	X(3)
Bits/word (async)	7			X(12)			X(12)	X(12)
	7.5			X(12)			X(12)	X(12)
	8			X(12)			X(12)	X(12)
	8.5			X(12)			X(12)	X(12)
	9			X(12)			X(12)	X(12)
	9.5			X(12)			X(12)	X(12)
	10	X(6)		X(12)	X(6)		X(12)	X(12)
	10.5			X(12)			X(12)	X(12)
	11			X(12)			X(12)	X(12)
	11.5			X(12)			X(12)	X(12)
	12			X(12)			X(12)	X(12)
Transmit clock source (sync)	Internal			X(8)			X(8)	X(8)
	External			X		X	X	X
Speed (bits/second)	110			X(10)		X	X(10)	X(10)
	150			X(10)		X	X(10)	X(10)

Table 7-2
UCS DMS-250 I/O port parameter matrix for NT1X89 MPC/enhanced MPC (continued)

		NT1X 89AA port 0	NT1X 89AA port 1	NT1X 89AA ports 2-3	NT1X 89BA port 0	NT1X 89BA port 1	NT1X 89BA ports 2	NT1X 89BA ports 3
	300			X		X	X	X
	600			X		X	X	X
	1200			X		X	X	X
	1800			X(10)		X	X(10)	X(10)
	2000			X(10)		X	X(10)	X(10)
	2400			X		X	X	X
	3600			X(10)		X	X(10)	X(10)
	4800			X		X	X	X
	7200			X(10)		X	X(10)	X(10)
	9600	X		X	X	X	X	X
	12000			X(10)		X	X(10)	X(10)
	14400			X(10)		X	X(10)	X(10)
	19200			X		X	X	X
	48000					X		
	56000					X		
	64000					X		
Level 1 flow control (async)	Interface leads			X(9)			X(9)	X(9)
	XOFF/XON			X(9)			X(9)	X(9)
Reverse channel speed (bits/second)	5							
	75							
	150							
Configurations	PSTN			X(17)		X(19)	X(17)	X(17)

Table 7-2
UCS DMS-250 I/O port parameter matrix for NT1X89 MPC/enhanced MPC (continued)

		NT1X 89AA port 0	NT1X 89AA port 1	NT1X 89AA ports 2-3	NT1X 89BA port 0	NT1X 89BA port 1	NT1X 89BA ports 2	NT1X 89BA ports 3
supported by attached level 1 DCE (modem)	point-to-point PLL			X(17)		X(19)	X(17)	X(17)
	multipoint PLL			?		?	?	?
	Auto dial back							
Level 2 (sync) protocol	HDLCLAP							
	HDLCLAPB			X		X	X	X
	HDLCLAPD							
	HDLCLAPX							
	HDLCLLC							
	HDLCSDLC							
Level 2 device type	DTE			X		X	X	X
	DCE			X		X	X	X
Level 2 link procedures	Single link			X		X	X	X
	Multi link							
Level 2 flow control	Modulo 8 windows			X		X	X	X
	Modulo 128 windows			X(22)		X(22)	X(22)	X(22)
Level 2 error correction technique	Reject (go back n)			X		X	X	X
	Selective reject							
	Sel. reject/reject							
Level 3 (sync) protocol	Bellcore BX.25			X(21)		X(21)	X(21)	X(21)
	CCITT X.25 (1976)			?		?	?	?
	CCITT X.25 (1980)			X(20)		X(20)	X(20)	X(20)
	CCITT X.25 (1984)							

Table 7-2
UCS DMS-250 I/O port parameter matrix for NT1X89 MPC/enhanced MPC (continued)

		NT1X 89AA port 0	NT1X 89AA port 1	NT1X 89AA ports 2-3	NT1X 89BA port 0	NT1X 89BA port 1	NT1X 89BA ports 2	NT1X 89BA ports 3
	CCITT X.25 (1988)							
Level 3 flow control	Modulo 8 windows			X		X	X	X
	Modulo 128 windows			X(20)		X(20)	X(20)	X(20)
Level 3 data packet networks supported (SVCs)	ACCUNET							
	AUTONET							
	DATAPAC			X		X	X	X
	DDN			X		X	X	X
	LADT							
	NET/1000							
	NTELPAC			X		X	X	X
	PACNET							
	TELENET							
	TYMNET							
	UNINET							

List of terms

ACS-CMD
access request message; start of command session

ACS-SFI
access request message; start file incoming

ACS-SFO
access request message; start file outgoing

AFT
See automatic file transfer.

AFT-MNP
See automatic file transfer–multi-network protocol.

ALIT
See automatic line insulation test (ALIT).

ALU
arithmetic and logic unit

AMA
See automatic message accounting.

ANI
See automatic number identification.

ARP
Address Resolution Protocol

ARPANET
Advanced Research Projects Agency Network

ASCII
American Standard Codes for Information Interchange

ASM
alarm and status message

asynchronous
Transmission in which a bit stream is interpreted by means of internal patterns.

AUI
application user interface

automatic file transfer (AFT)
A feature that automatically transfers DIRP files to downstream processors.

automatic file transfer–multi-network protocol
Automatic file transfer–multi-network protocol enables file transfers across up to four 56 kbit/s links.

automatic line insulation test (ALIT)
A test used to check subscriber loops automatically for insulation integrity.

automatic message accounting (AMA)
An automatic recording system that documents all the necessary billing data of subscriber-dialed long distance calls.

automatic number indentification (ANI)
A system whereby a calling number is identified automatically and transmitted to the automatic messag accounting (AMA) office equipment for billing.

BCS
batch change supplement

BEP
burst error processor

bit synchronous
Transmission in which a clocking signal is provided simultaneously with a bit stream.

BMMI
bilingual man-machine interface

BMS
buffer management system

call processing
The software system that handles the processes involved in setting up connections through the DMS-250 switch network between calling and called parties.

CC
See central control.

CCC
central control complex

CCITT
International Telegraph and Telephone Consultative Committee

CCS7
Common Channel Signaling 7

CDR
call detail record

Central Control (CC)
Comprises the data processing functions of the DMS-250 switch network, with associated Data Store and Program Store.

CI
See command interpreter.

CM
computing module for the UCS DMS-250 switch

CNT-ERR
MTP error message

CNT-INT
control interrupt

CNT-PRT
control message; set device to print mode

CNT-RED
control message; set device to read mode

CNT-RNB
control message; request next block

command interpreter (CI)

A support operating system component that functions as the main interface between machine and user. Its principal roles are to read lines entered by a terminal user, to break each line into recognizable units, to analyze the units, to recognize command item-numbers on the input lines, and to invoke these commands.

conversation

The MPC/CC specific term for an application-to-application excange that implies a specific logical channel. There is a CC translation from the channel to the CC conversation number which allows application software to use it as a volume in the DMS file system.

CP

See call processing.

CPU

central processing unit

DAIS

data access/information service

DARPA

Defense Advanced Research Projects Agency

data circuit-terminating equipment

The device that interfaces the computer data port with the telephone circuit or data link.

data communications equipment (DCE)

The device that interfaces the computer data port with the telephone circuit or data link.

data switching network

A switching network, either of the circuit switching type or the packet switched type, that provides the path between the DTEs in a data circuit or conversation.

data terminal equipment (DTE)

Equipment consisting of digital end instruments that convert user information into data signals for transmission, or reconvert the received data signals into user information.

DC

device controller

DCE
See data communications equipment.

DCP
data communications processor

DDC
disk drive controller

DDU
disk drive unit

device independent recording package (DIRP)
Software that directs data from the various administrative and maintenance facilities to the appropriate recording devices. DIRP records information on a per subsystem basis.

DIRP
See device independent recording package.

DIRPHOLD
DIRP table that provides a directory of currently unprocessed DIRP files; that is, a table that records the names of DIRP files to be transferred.

DIRP ROTATE
A rotation of DIRP files in which the active file is closed and given an entry in table DIRPHOLD, and a new file is opened and put into active recording position.

DIRP subsystem
A logical data division. For example, OCC for billing data, JF for journal files, OM for operational measurements.

DMS equipment
Telephone switching equipment, namely, digital switching units, for interconnecting telephone subscribers and control terminals. DMS is a Northern Telecom trademark.

DNA
data network address

DMO
data modification order

DMOPRO
data modification order process

DPN
data packet network

DRAM
See Dynamic Random Access Memory.

DSN
digital switching network

DTC
digital trunk controller

DTE
See data terminal equipment.

Dynamic Random Access Memory (DRAM)
Read/write memory that requires constant refresh to retain its contents.

EIA
Electronic Industries Association

EIC
Ethernet interface card

EIP
Ethernet interface paddleboard

EIU
Ethernet interface unit

EMPC
See enhanced multi-protocol controller.

enhanced multi-protocol controller
The EMPC is a software downloadable peripheral that supports port two at 19.2 kbit/s and port three at 56 kbit/s data rate transfer. The X.25 software is downloaded to the EMPC.

ENSITES
External Node Sites Table

ENTYPES
External Node Types Table

ETAS
Emergency Technical Assistance Service

EXND
External Node

EXNDINV
External Node Inventory Table

FBus
Frame Transport Bus

FIT
Fault Insertion Test

FP
file processor

FTP
File Transfer Protocol

FTS
Frame Transport System

GAS
general application system

GNI
Generic subNet Interface

heartbeat
A special log generated periodically to indicate to NEMAS that the switch is still alive.

IC
integrated circuit

ICMP
Internet Control Message Protocol

input/output (I/O)
A device or medium used to achieve a bi-directional exchange of data. Data exchange in the DMS-250 switch is performed in accordance with the I/O Message System (IMS).

input/output controller (IOC)
An equipment shelf that provides an interface between a maximum of thirty-six input/output devices and the central message controller. The IOC contains a peripheral processor that independently performs local tasks, thus relieving the load on the central processing unit.

International Organization of Standardization (ISO)

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

I/O

See input/output (I/O).

IOC

See input/output controller

IOD

input/output device

IOM

See input/output module

IP

Internet Protocol

IPF

Integrated Processor and Fbus

IPHOST

Internet Protocol SuperNode End Hosts Table

IPNETWRK

Internet Protocol Network Table

IPROUTER

Internet Protocol Subnet Router Table

IPTHRON

Internet Protocol Throttling Numbers Table

ISO

See International Organization of Standardization.

JF

See journal file.

journal file

A facility that preserves (on a recording device) changes made to the data tables of the DMS-250 network systems. The journal file provides a way to restore the tables if the office software needs to be reloaded from a backup image.

LAN
local area network

LBA
last block acknowledged

LED
light-emitting diode

LINS
Long INterval Statistics

LIU
link interface unit

LMS
local message switch

LPP
link peripheral processor

LIUINV
Link Interface Unit Inventory table

LSB
least significant bit

MAC
Media Access Control

Maintenance and Administration Position (MAP)
A group of components that provide a man-machine interface between technicians and the DMS-250 switch. A MAP consists of a visual display unit and keyboard, a voice communications module, test facilities, and MAP furniture. MAP is a trademark of Nortel.

MAP terminal or workstation
See Maintenance and Administration Position.

MAU
Media Access Unit

manual file transfer
Procedure to manually transfer files between the switch and the application processor.

MAPCI

The software subsystem (resident on theUCS DMS-250 switch) that enables real-time switch status and updates.

Message Transfer Protocol

An applications-level protocol for data communications built on top of X.25 level 3. This session protocol enables access and data transfer between two systems.

MFT

See manual file transfer.

MLP

multiple link procedure

MMI

man-machine interface

MNP

See Multi-Network Protocol.

MPC

See multi-protocol controller.

MS

message switch

MSB

most significant bit

MTC

magnetic tape controller

MTD

magnetic tape drive

MTP

See Message Transfer Protocol.

MTP-ERR

MTP error message

Multi-Network Protocol

A modified message transfer protocol (MTP) used by the AFT-MNP feature.

multi-protocol controller (MPC)

MPC is a software downloadable peripheral that supports two ports of 19.2 kbps data rate transfer. The X.25 software is downloaded to the MPC.

NMC

network message controller

NWC

network management control

NWM

network management

OM

See operational measurements (OM).

Open System Interconnection model

A seven-layer protocol model for communications networks developed by the International Standards Organization and adopted by CCITT for ISDN.

operational measurement (OM)

The hardware and software resources of the DMS-250 network systems that control the collection and display of measurements taken on an operating system. OM organizes the measurement data and manages their transfer to displays and records on which maintenance, traffic, accounting, and provisioning decisions are based.

operations systems network

A computer network used by Bellcore for gathering and processing operations-type information on switching systems in the Bell System for use in marketing, planning, engineering, installation, administration, maintenance, billing, and performance.

OSI

See Open System Interconnection model.

OSN

See operations systems network.

OSR

operator services records

Partial file transfer

An algorithm used to recover a transfer that is interrupted by a warm restart or a break in connectivity with a remote processor.

PBus
processor bus

PEC
product engineering code

peripheral processor (PP)
Hardware devices contained in the peripheral modules that perform local processing function independent of the central processing unit. PPs are driven by read-only memory in the PM, thus releasing CPU run-time for higher level activities.

permanent virtual circuit (PVC)
A permanently established, logical end-to-end connection for data communication.

PFS
physical file system

PFT
See partial file transfer.

PM
peripheral module

PP
See peripheral processor.

protocol
A strict procedure required to initiate and maintain communications. Protocols may exist at many levels in one network, such as link-by-link, end-to-end, and subscriber-to-switch.

PPSN
public packet switching network

PRU
protocol data unit

PVC
See permanent virtual circuit.

Random Access Memory (RAM)
A memory system in which information is stored in discrete, individually addressable locations such that access time is independent of location.

RAM
: *See* random access memory.

RASL
: *See* Robust Application Session Layer.

RIP
: Routing Information Protocol

RMAP
: Remote MAP software as implemented in this feature

RMCONFIG
: Remote Access Configuration Table

Robust Application Session Layer
: A generic interface to data communications facilities on the UCS DMS-250 switch. RASL enables any data communications application—such as AFT sessions and MFT sessions—to access any type of link that is supported.

ROM
: read only memory

RTS
: return to service

RTT
: real time transfer

Rx
: receive

SA
: service analysis

Safe Store Tap
: An interface that provides simplified communication with DIRP and the file system.

SCCS
: switching control center system

SINS
: Short INterval Statistics

SLP
: single line procedure

SNAP
subnetwork access point

SOS
See Support Operating System (SOS).

specific override
An AFT feature that enables the remote processor to request a specific file to be transferred.

spontaneous reporting
MTP session that enables the switch to send DMS logs and alarms to a host network management system over the X.25 interface on the NT1X89BA card.

SPR
See spontaneous reporting.

SQE
signal quality error

SST
See Safe Store Tap.

Static Random Access Memory (Static RAM)
Read/write memory that does not require constant refresh to retain its contents.

STS
serving translation scheme

STS-ACK
status message; access request acknowledged

STS-CPL
status message; access complete

STS-EOB
status message; end of block

STS-EOF
status message; end of file

Support Operating System (SOS)
The software that sets up the environment for loading and executing the application software in the DMS-250 switch. The SOS includes the nucleus, file system, command interpreter, and loader.

SVC

See switched virtual circuit.

switched virtual circuit

A logical end-to-end connection between two remote applications using a packet network or point-to-point configuration.

table editor (TE)

In a DMS switch, software that supports an enhanced set of table control functions at the user interface, using data dictionary, formatter, and table control. Operating company personnel can modify or add tuples to a table.

TAC

Technical Assistance Center

TBus

transactor bus

TC

terminal controller

TCP

Transmission Control Protocol

TCP/IP

Transmission Control Protocol/Internet Protocol (suite of protocols)

TE

See table editor (TE).

Telnet

Telecommunications Network (protocol)

TLI

Transport Layer Interface

trunk test position (TTP)

A MAP terminal specially equipped to perform trunk testing.

TTP

See trunk test position (TTP).

Tx

transmit

UCS

Universal Carrier Service

UDP

User Datagram Protocol

user interface

The series of commands and responses that are used by operating company personnel to communicate with the switch. User interface is achieved through the MAP terminal and other input/output devices.

virtual channel

A software link that connects the switch and the host machine. Virtual channels are allocated as they are needed. At any given time, there is a direct mapping between allocated virtual channels and active MTP sessions.

VCI

virtual channel identifier

X.25

CCITT recommendations covering packet switching.

Ordering information

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

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Digital Switching Systems

UCS DMS-250

Operations Support Systems (OSS) Interface Guide

Product Documentation—Dept 3423
Northern Telecom
P.O. Box 13010
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