297–1001–525

DMS–100 FAMILY
Data Packet Controller
Reference Manual

BASE03   Standard 03.01   February 1998

NORTEL
NORTHERN TELECOM

DMS–100 FAMILY

Data Packet Controller

Reference Manual

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Contents

About this document

How to check the version and issue of this document

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

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

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

This document is written for all DMS-100 Family offices. More than one version of this document may exist. To determine whether you have the latest version of this document and how documentation for your product is organized, check the release information in *Product Documentation Directory*, 297-8991-001.

References in this document

The following documents are referred to in this document:

- *Device Indepenedent Recording Package (DIRP) User guide*, 297-1001-312

- *DMS-100 Family Commands Reference Manual*, 297-1001-822

- *Input/Output System Maintenance Guide*, 297-1001-590

- *Input/Output System Reference Manual*, 297-1001-129

- *Maintenance System Man-Machine Interface Description*, 297-1001-520

- *Menu Commands Reference Manual*, 297-1001-821

- *Non-menu Commands Reference Manual*, 297-1001-820

- *Product Documentation Directory*, 297-8991-001

- *Provisioning Guide*, PLN-8991-104

- *Remote Data Polling System Description and User Interface*, 297–1001–524

- *SL-10 Description*, 240-4061-100

- *SL-10 Implementation of CCITT Recommendation X.25 1980*, 240-4061-184

- *SL-10 Operation and Procedures*, 240-4061-300

- *SL-10 System Specification*, 240-4061-180

- *SuperNode Technical Specification*, PLN-5001-104

What precautionary messages mean

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

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

Examples of the precautionary messages follow.

ATTENTION Information needed to perform a task

ATTENTION

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

DANGER   Possibility of personal injury

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

WARNING   Possibility of equipment damage

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

CAUTION   Possibility of service interruption or degradation

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

How commands, parameters, and responses are represented

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

Input prompt (>)

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

>BSY

Commands and fixed parameters

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

>BSY CTRL

Variables

Variables are shown in lowercase letters:

>BSY CTRL ctrl_no

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

Responses

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

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

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

1   Manually busy the CTRL on the inactive plane by typing

   >BSY CTRL ctrl_no
   and pressing the Enter key.

   where

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

   Example of a MAP response:

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

Introduction

Scope

This document describes the software interface to the data packet controller (DPC) card. The DPC card provides data channels for use in a packet data network.

DPC interface software provides MAP displays, commands, and responses that are used to monitor and control the DPC utility.

For information on the MAP, refer to the following documents:

- *DMS-100 Family Commands Reference Manual*, 297-1001-822
- *Input/Output System Maintenance Guide*, 297-1001-590
- *Input/Output System Reference Manual*, 297-1001-129
- *Maintenance System Man-Machine Interface Description*, 297-1001-520
- *Menu Commands Reference Manual*, 297-1001-821
- *Non-menu Commands Reference Manual*, 297-1001-820

Applicability

The information in this document applies to offices with BASE03 or later software loads.

Software support for DPC

Software support for DPC provides a generic interface for multiple protocols on a per-device basis.

The following standard network link–access procedures used by DPC are provided:

- link–access procedure (LAP)
- link–access procedure, balanced mode (LAPB)

Software support for DPC includes 3101 service for remote login, under the restrictions of Closed User Groups (CUG).

Software identification

The product computing module load (PCL) release and the Northern Telecom (Nortel) functionality codes identify the software that applies to a DMS-100 office. *Provisioning Guide*, PLN-8991-104 explains the meaning of the PCL number and the functionlity codes.

The loadname identifies the software load for a DMS-100 office. To display the loadname for your office, enter the following command at a MAP terminal:

> **>PRSM;SELECT INFORMLOAD;QUIT**

Command format and conventions

In this document, commands and responses are shown in a repeated format. The following table describes this format.

Command format

Format	Description
Uppercase characters, special fonts	Used to represent fixed commands, constants, or keywords
Lower case characters	Used to represent user- or system-defined command parameters. Parameter descriptions are provided.
Brackets { } or [ ]	Used to enclose optional command parameters.
Underscore connecting words	Underscoring between words indicates that the connected words are a single item. This format represents variable command parameters. For example, pm_type represents the command parameter peripheral module (PM) type.
Underlined parameters	An underlined parameter is a default parameter. If you do not enter a parameter, the system uses the underlined parameter.
***(asterisks)	Asterisks indicate repeated steps or items.
n	A lower case "n" represents a single-digit variable number (0 to 9).
—continued—	

Command format (continued)

Format	Description
a	A lower case "a" represents an alphabetical character (A to Z) .
h	A lower case "h" represents a single-digit hexadecimal number (0 to F).
—end—	

References

The references identified as "Required" are essential for understanding this document. The references identified as "Informative" are not essential.

Required references

Document number	Document title
240-4061-100	SL-10 Description
PLN-5001-001	SuperNode Technical Specification

Informative references

Document number	Document title
240–4061–180	SL-10 System Specification
240–4061–184	SL-10 Implementation of CCITT Recommendation X.25 1980
240–4061–300	SL-10 Operation and Procedures
297-8991-001	Product Documentation Directory
297-1001-129	Input/Output System Reference Manual
297–1001–312	Device Independent Recording Package (DIRP) User Guide
297-1001-820	Nonmenu Commands Reference Manual
297-1001-821	Menu Commands Reference Manual
297-1001-822	DMS-100 Family Commands Reference Manual
—continued—	

Informative references(continued)

297-1001-520	Maintenance System Man-Machine Interface Description
297-1001-524	Remote Data Polling System Description and User Interface
—end—	

DPC description

General

The data packet controller (DPC) card provides the data terminating equipment (DTE) function in the DMS switch. DTE must transmit and receive data through a data packet network in a number of different data transmission protocols.

Data packet controller software, known as DPAC or DATAPAC, uses the high-level data link control (HDLC) protocol. HDLC is based on the X.25 standard established by the International Consultative Committee for Telephones and Telegraphs (CCITT).

Data packet controller software provides data channels for transmission of data through switched virtual circuits (SVC) in the data packet network. For more information on packet data networks, refer to *SL-10 implementation of CCITT Recommendation X.25 1980*, 240-4061-184.

Feature package NTX059AB contains additional application software and the basic DATAPAC software found in NTX058AA. Feature package NTX560AA contains other DATAPAC application software. For more information on application of the DPC and DATAPAC, refer to *Remote Data Polling System Description and User Interface*, 297-1001-524.

Hardware

Figure 2-1 shows how two DMS offices connect to a packet switching network through their DPC cards.

Figure 2-1
Connection to the data network through DPC
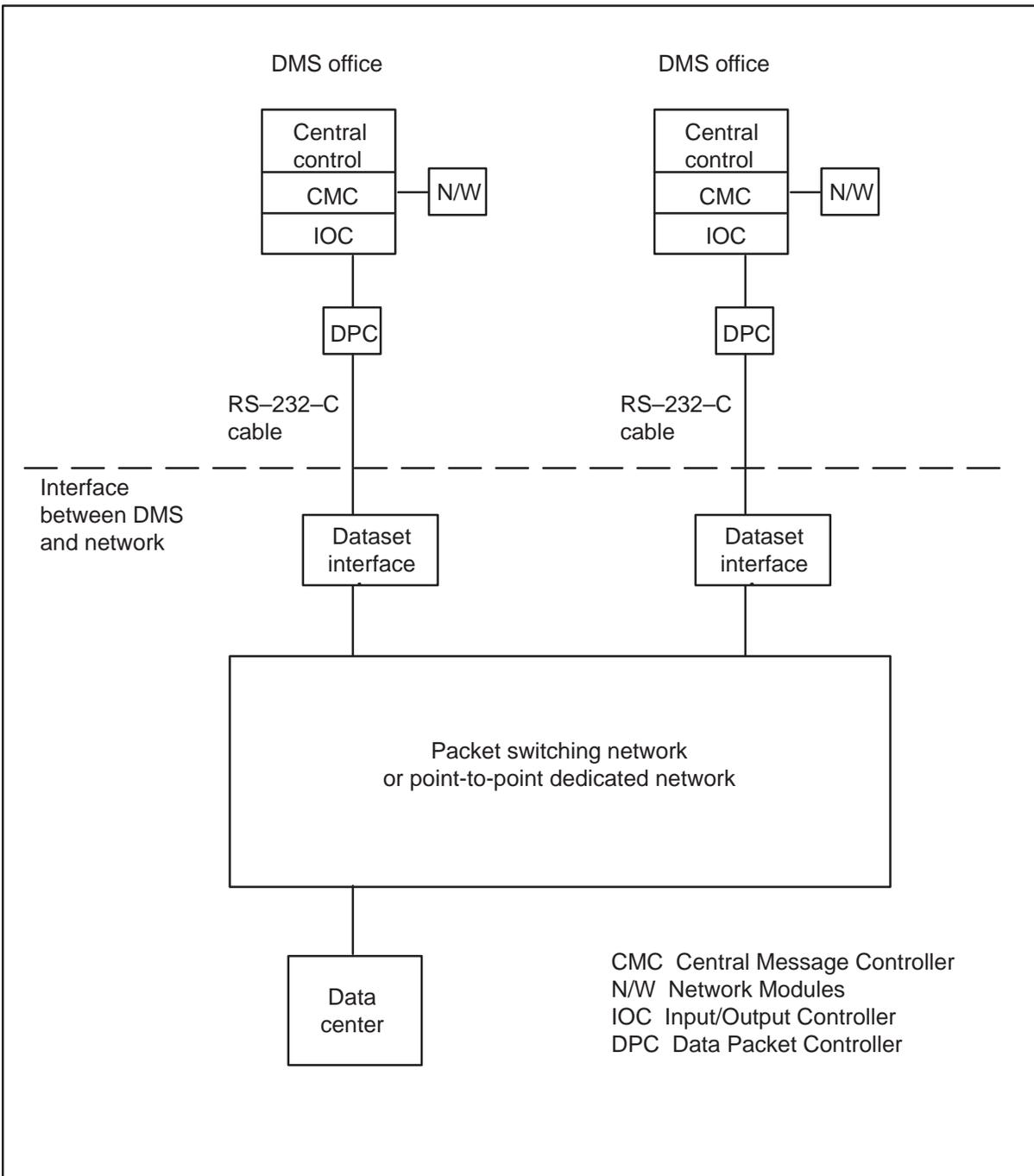
Each DPC (NT1X67BB or NT1X67DB) is on the input/output controller (IOC) shelf of the DMS central control (CC). The central message controller (CMC) of the CC interprets messages it receives from the DPC

and other input/output devices in the IOC, and relays instructions back to the devices for execution.

Note: DPC cards NT1X67BB and NT1X67DB are identical except for the electrostatic discharge (ESD) shielding on the NT1X67DB.

The DPC utility connects to the dataset interface of the packet switching network through an Electronics Interface Association (EIA) RS–232–C interface cable. The dataset then connects to a packet switching network data circuit. From a data center, a DMS office can transmit and receive data through the packet switching network.

If the network contains point-to-point equipment and the far-end functions as data circuit terminating equipment (DCE), the DMS functions as data terminal equipment.

The DPC card must be datafilled in the correct tables. For more information on DPC datafill, refer to Chapter 4 of this document.

Software

Description

DPC interface software contains two modules: DPCOMSUB and DPACSUB. DPCOMSUB controls common device-dependent operations. DPACSUB controls protocol-dependent operations for the DATAPAC network.

Data packet controller software supports only the DATAPAC packet switching network. Other network configurations must function the same as DATAPAC. Module DPACSUB implements protocol for the DATAPAC network.

DPC interface software provides DMS packet network applications like Remote Polling (XFER) and Network Operations System (NOS). These applications, which are the primary functions of the DPC card, are described in *Remote Data Polling System Description and User Interface*, 297-1001-524.

DPC software also provides the following capabilities, that are covered in this document:

- monitor and test DPC interface software and the DATAPAC network

- transfer files through the packet data network between two offices equipped with DPC. Refer to "Manual File Transfer" in Chapter 3 for more information on file transfer.

- under restrictions imposed by the Closed User Group (CUG) feature, to use the DATAPAC 3101 service to log into the DMS switch from a remote site. For more information on the DATAPAC 3101 service, refer to "Closed User Group remote login in Chapter 3.

Refer to Chapter 6 for more information on

- MAP commands to monitor and test the DPC software and the DATAPAC network
- file transfer with the DPAC feature package

Detailed information on the MAP is in *Maintenance System Man-Machine Interface Description*, 297-1001-520.

Except for framing and the cyclical redundancy check (CRC), computing module (CM) software performs all formatting and data preparation for the X.25 network protocol.. The N1X67BB/DB card performs the framing and the cyclical redundancy check (CRC).

Module DPCOMSUB, which contains the operating software for DPC cards, can support up to 16 DPC cards connected to an IOC shelf. Each DPC card can support up to 15 logical channels. Module DPCOMSUB also provides a data packet queueing mechanism.

DPACSUB software performs only X.25 protocol functions on the DPC card. Module DPACSUB performs common maintenance and I/O functions.

DPC interface software implements the following:

- CCITT standard Link Access Protocol (LAP), 1976
- Link Access Protocol, Balanced Mode (LAPB), 1980

Modules DPCOMSUB and DPACSUB combine to form an interface to the Device Independent Recording Package (DIRP). Figure 2-2 shows this interface. For more information on DIRP, refer to *Device Independent Recording Package User Guide*, 297–1001–312.

DIRP manages DATAPAC application data in Support Operating System (SOS) files. Disks or tapes store this data. (See Figure 2-2)

Figure 2-2
DPC interface software configuration
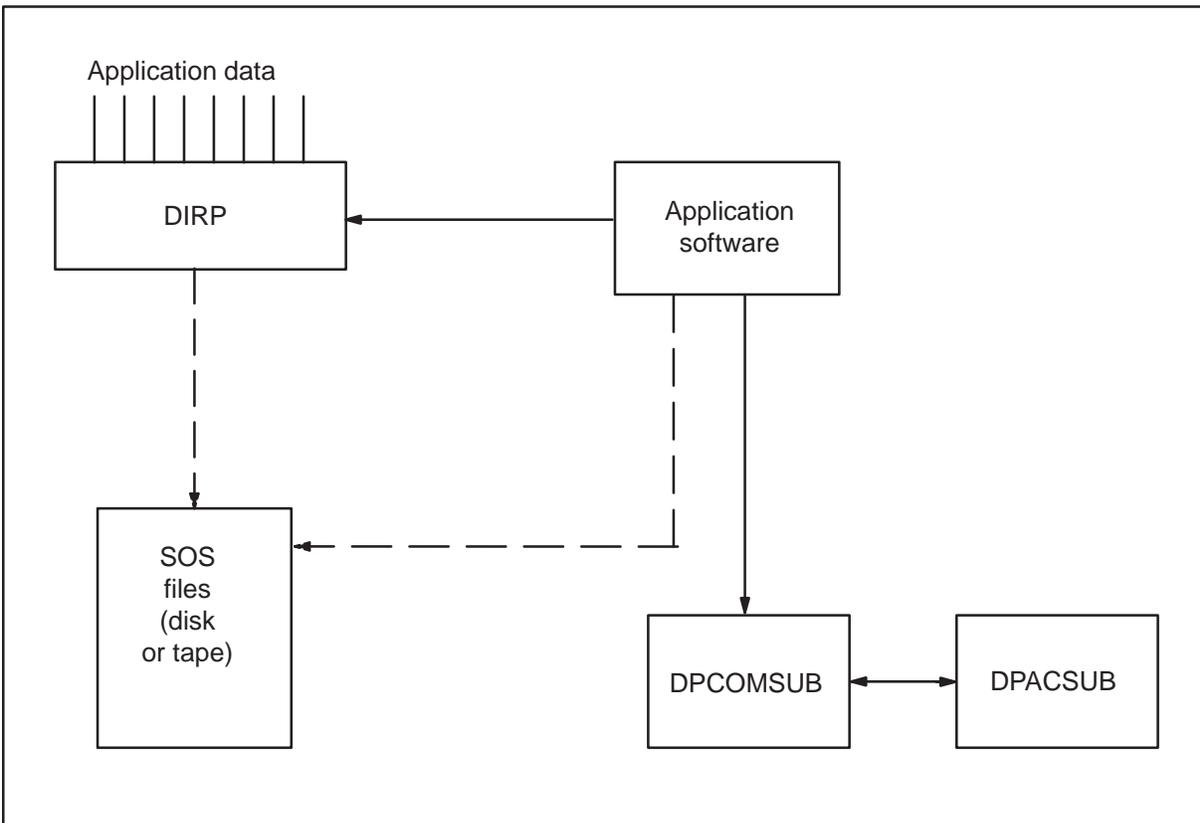
Limitations

The software configuration shown allows the addition of other protocol interfaces, with module DPCOMSUB as a controller. The only packet network supported is DATAPAC or an equivalent to DATAPAC.

Because Central Control (CC) implements control of DPAC, NTX058AD software can use between 3 and 5 percent of CPU real time. Application software can use a much greater quantity of CPU real time.

During peak CPU activity periods, call processing activities can degrade DPC card capability. The affect on polling activity reduces if the system performs data polling during low CPU activity periods.

DPAC software operates only through SVC.

System operation

Software module DPCOMSUB

The DPC software module DPCOMSUB functions as an interface only. DPCOMSUB, without other software, cannot support any data transmission application. The load must contain protocol support software to support a data transmission application. For example, DPACSUB uses switched virtual circuits (SVC) to support the DATAPAC network.

Software module DPACSUB

The DPACSUB software module implements the X.25 HDLC protocol for the DATAPAC network. The DMS-100 switch

- prepares and sends data packets, including their control information

- processes incoming packets received complete

- performs the following network functions:

    — call setup and clearing

    — link and channel resets

    — transmission of control information

    — transmission of packet information

    — packet queueing

    — error detection and requests for retransmission.

When the system creates a logical channel through a packet network, the system adds an entry to an internal user directory. The system records both the channel name and the channel number. The system creates channel name and number entries for incoming channels created with the query connection (QCON) command by other packet network subscribers. These directory entries allow the use of the reset connection (RCON) and disconnect (DCON) commands. These commands are described in Chapter 6 of this document.

DPAC commands

In DMS-100 switches with the DPC interface, you use the MAP terminal to monitor and test network connections. To perform this function, you use commands grouped into a command interface (CI) called DPAC. The DPAC CI contains the following types commands:

- Maintenance commands that are
  - displayed in the DPAC MAP level menu area
  - used to test DPC line cards
- Diagnostic commands that are
  - displayed when you use PRINT DPACMDIR command to request a list
  - divided into commands that monitor the state of traffic on the packet network connection (plus commands for device and protocol activity) and commands that test the associated virtual connection
- Control commands are displayed when you use PRINT DPACMDIR command to request a list. You use these control commands to perform local operator controlled file exchanges.

DPAC commands are described in more detail in Chapter 6 of this document.

Network connection monitoring

DPC interface software generates the DPAC100 log to report the types and quantities of packets that are sent and received by the DMS-100 switch. You use the MTR, CSTATS, and DSTATS commands to record and display this data The MTR, CSTATS, and DSTATS commands are described in more detail in Chapter 6.

Table 3-1 lists different frame types and their functions. These frame types are described in more detail in *SL-10 System Specification*, 240-4061-180.

Table 3-1
Frame types recorded in the DPAC100 log

Frame type	Description
CMDR	Command Reject. This frame type reports an error condition that cannot be corrected by retransmission of the same frame. This frame type applies to link access protocol (LAP) only.
—continued—	

Table 3-1
Frame types recorded in the DPAC100 log (continued)

Frame type	Description
DISC	Disconnect. This frame type terminates the previously-set mode (suspends operation).
DM	Disconnected Mode. This frame type reports disconnection of the data terminal equipment (DTE)/data circuit terminating equipment (DCE) from the link. This frame type applies to link access procedure. balanced mode (LAPB) only.
FRMR	Frame Reject. This frame type reports an error condition that cannot be corrected by retransmission of the original frame. This frame type applies to LAPB only.
INFO	This frame type transfers a sequentially numbered frame containing an information field (I frame) across a data link.
REJ	Reject. This frame type requests the transmission of I frames.
RNR	Receive Not Ready. This frame type indicates a busy condition (a temporary inability to accept additional incoming I frames).
RR	Receive Ready. This frame type indicates the DTE/DCE is ready to receive an I frame or acknowledges receipt of one or more I frames.
SABM	Set Asynchronous Balanced Mode. This frame type places the addressed DTE/DCE in asynchronous balanced mode (ABM), where all command and response control fields are one octet in length. This frame type applies to LAPB only.
SARM	Set Asynchronous Response Mode. This frame type places the addressed DTE/DCE in asynchronous response mode (ARM), where all commands and responses are one octet in length. This frame type applies to LAP only.
UA	Unnumbered Acknowledgement. This frame type acknowledges receipt and acceptance of mode setting commands.
—end—	

The types of packets reported in the DPAC100 log report are

- CALL ACCEPT
- CALL CONNECT

- CALL REQUEST
- CLEAR INDICATION
- CLEAR REQUEST
- CLEAR CONFIRM
- DATA PACKET
- INCOMING CALL
- INTERRUPT
- INTERRUPT CONFIRM
- RECEIVE READY
- RECEIVE NOT READY
- REJECT
- RESET INDICATION
- RESET REQUEST
- RESET CONFIRM
- RESTART INDICATION
- RESTART REQUEST
- RESTART CONFIRM.

For information on the previously listed packet types, refer to *SL-10 System Specification*, 240-4061-180.

Manual file transfer

File transfers between DMS-100 switches through network interfaces are performed using the manual file transfer commands in the DPAC CI.

The use of DPAC commands for file transfer requires the participation of operating company personnel in the originating and the receiving offices. File transfer commands are described in "Application Commands" in Chapter 6.

You use the following procedure to perform file transfer using DPAC commands:

1   Operating company personnel in the originating office notify personnel in the receiving office that the originating office wants to transfer a file.

2   The receiving office waits for a virtual circuit connection (channel) through the packet network.

3   When there is a virtual connection, operating company personnel in the originating office make the file available on the created channel.

4   The file is sent to the receiving office.

You use the same procedure to send a file in the opposite direction.

Network security

The protocol used ensures the security of the files during the file transfer. The following activities ensure security during file transfer:

1   A telephone voice connection between operating company personnel in the two DMS offices involved in the file transfer.

2   Personnel in the terminating office are given information, including the network address of the originating office and detailed information on the file to be transferred.

3   The originating office uses WCON command to instruct the terminating office to wait for an incoming call. The data network address identifies the originating office.

4   When the system makes a virtual channel connection and the receiving office receives the call, the receiving office uses the SFILE and GFILE commands to transfer the file.. This process ensures that the system sends only the specified file through the packet network.

Closed User Group remote login

At a remote ASCII terminal connected by 3101 service to the DATAPAC network, a member of a restricted Closed User Group (CUG) can log into the DMS switch in scroll mode.

The login procedure is as follows:

1   With a telephone set connected to a modem, the operator at the remote VDU terminal accesses the DATAPAC network. The user uses the eight-digit network address to place a call to the DMS-100 switch, following the normal network protocol described in *SL-10 Operation and Procedures*, 240-4061-300.

2   When the remote terminal receives confirmation of the connection to the DMS switch, the operator uses the normal DMS MAP login procedure described in *Maintenance System Man-Machine Interface Description*, *Input/Output System Reference Manual*, 297-1001-520 to access the MAP.

3   The operator has access to all MAP commands, subject to the restrictions imposed by command screening (refer to *Input/Output System Reference Manual*, 297-1001-129). Inputs and system responses are line-by-line, like MAP operation in CI/NODISP mode. The full screen MAP function is not available.

4   If DATAPAC network errors occur, error messages are generated, as described in *SL-10 Operation and Procedures*, 240-4061-300.

5   At the end of the session, the operator enters the MAP logout command to end the DATAPAC login. The user presses the BREAK key and enters the CLEAR command to end the DATAPAC call.

Datafilling DPC

Data Tables

Data packet controller (DPC) interface software uses table DPACDEV. Table DPACDEV allows up to 16 DPC cards per office.

Datafill sequence

Table IOC must be datafilled before table DPACDEV. Table DPACDEV must be datafilled before DATAPAC application tables, like XFERADDR (for the XFER utility).

Table DPACDEV

For more information on table DPACDEVS, refer to *Translations Guide*.

Field descriptions

Table 4-1 describes the fields in table DPACDEV. To change a tuple in table DPACDEV, delete the tuple and then add the changed tuple, with the DPC offline. Table DPACDEV has no default datafill.

Table 4-1
Field Descriptions for table DPACDEV

Field	Entry	Explanation and action
DPACNUM	0 to 15	*Data packet controller device number.* Enter the device number of the DPC card.
IOCNO	0 to 19	*Input/output controller number* Enter the number of the input/output controller (IOC) the DPC is assigned to.
IOCCKTNO	0, 4, 8, 12, 16, 20, 24, 28, or 32	*Input/output controller circuit number* Enter the number of the IOC circuit the DPC is assigned to. The entry must be a multiple of four.
—continued—		

Table 4-1
Field Descriptions for table DPACDEV (continued)

Field	Entry	Explanation and action
NODENUM	00000000 to 99999999	*Node number* Enter the node number of the DPC circuit card. The data packet network vendor provides the node number. Entries outside the range are invalid.
MAXLCHAN	1 to 15	*Maximum number of logical channels (calls)* Enter the number of logical channels (switched virtual circuits [SVC]) requested from the data packet network vendor at time of subscription. Entries outside the range are invalid. **Note:** The value must be at least 3 (to allow for loopback and other testing capacities).
PKWINDOW	2 to 7	*Packet window width* Enter the number of packets that can be sent before sending an acknowledgement. The data packet network vendor provides the packet window width.
EQPEC	1X67BB or 1X67DB	*Equipment product engineering code* Enter the product engineering code (PEC) of the DPC card.
		—continued—

Table 4-1
Field Descriptions for table DPACDEV (continued)

Field	Entry	Explanation and action
PROTOCOL	DATAPAC or DATAPACB	*Protocol* Enter the identifier for the X.25–modeled protocol the DPC uses. Entry DATAPAC corresponds to link access procedure (LAP) mode and entry DATAPACB to link access procedure balanced (LAPB) mode. Entries outside the range are invalid.
DMSMODE	DTE or DCE	*Data switching mode* Specify whether the DPC operates as data terminal equipment (DTE) or data circuit terminating equipment (DCE) in a point-to-point connection. ***Note:*** Only DTE is supported.
		—end—

Memory requirements

The system automatically allocates memory for 16 DPC cards.

Table DPACDEV requires

- 512 words of static data store and 256 words of dynamic data store per DPC card
- up to 40 000 words dynamic data store per DPC card (for queues)

Note: Based on a queue allocation algorithm, a maximum is 40 000 words. If PKWINDOW = 2 and MAXLCHAN = 3, approximately 7500 words is a typical requirement for queue storage.

The following is an allocation algorithm used to compute the amount of storage needed:

number of words = $(32 + [2 \times \{PKWINDOW + 2\} \times MAXLCHAN] \times 134)$

Dump and restore

Dump and restore requires datafill in fields PROTOCOL and DMSMODE. Contact the data packet network vendor or the next level of support for information on proper datafill of these fields.

MAP levels and displays

MAP levels

The user interface for the data packet controller (DPC) is the IOC sublevel of the IOD level of the MAPl. Figure 5-1 shows the path to the IOC MAP level. At the IOC MAP level, DPC cards can be posted to determine their state and to perform DPC maintenance.

Figure 5-1
IOD MAP menu levels
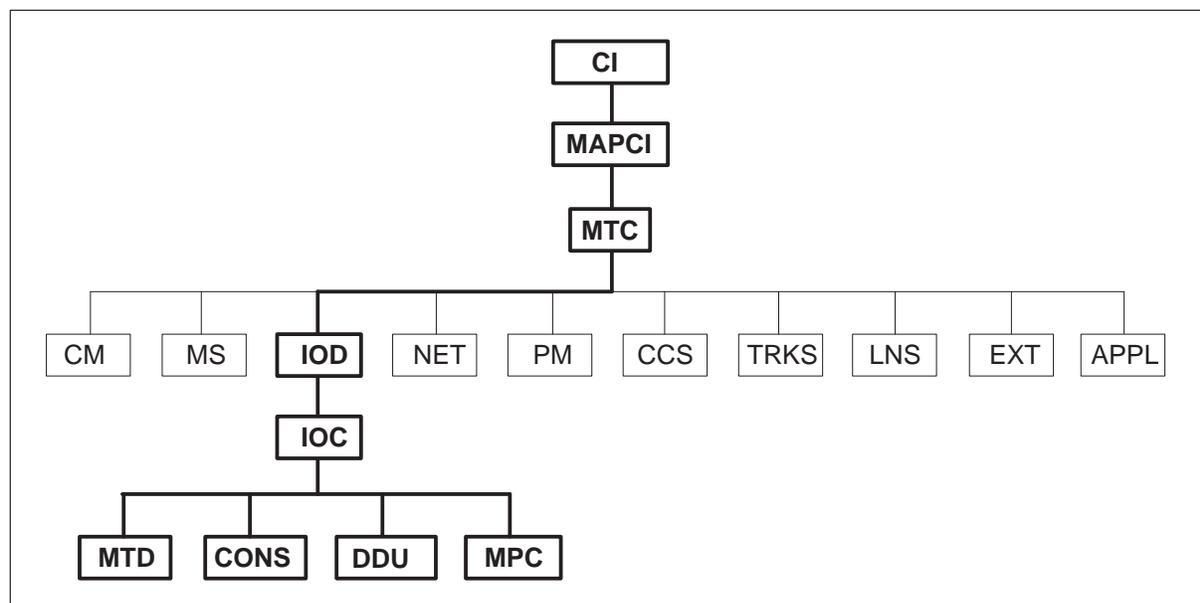
See *DMS-100 Family Commands Reference Manual*, 297-1001-822 for more information on commands.

MAP displays

In the MAP display example in Figure 5-2, the DPC card is on IOC shelf 1, position 3. The command MAPCI;MTC;IOD;IOC 1;CARD 3 generated the

MAP display shown in the example. To access the MAP level for a DPC card (post the card), enter the following command:

>MAPCI;MTC;IOD;IOC ioc_no;DPC dpc_no

where
ioc_no   is the number of the IOC the DPC card connects to
dpc_no   is the number of the DPC card

Figure 5-2
DPC card MAP display

```
CC     CMC    IOD    Net     PM     CCS    LNS    Trks    Ext
 .      .      .      .       .      .      .      .       .
DPAC
0 Quit      IOD  IOC   0   1    2    3
2 Reset          STAT  .   .    .    O
3 Disc_
4 ListDev_   DIRP:    .      XFER:    .
5
6 Ts
7 Bsy_      IOC   CARD      0     1     2     3     4     5     6     7
8 Rts        1         PORT  0123  0123  0123  0123  0123  0123  0123  0123
9 Offl                 STAT  .---  .---  .P..  .---  ----  ----  ----  ----
10 Qnode                TYPE  MTD   DDU   CONS  DPAC
11
12 Mtr_
13 Dstats_  Card 3    Unit      0
14 Cstats_            User      System
15 Qcon_              Status    Ready
16
17 _Force
18
```

Card states and state changes

The IOC level of the MAP shows the state of input/output controller (IOC) cards like the DPC card. In Figure 5-2, the state of the DPC card is Ready.

Figure 5-3 shows the states and state changes for the DPC card.

Figure 5-3
State changes in DPC cards
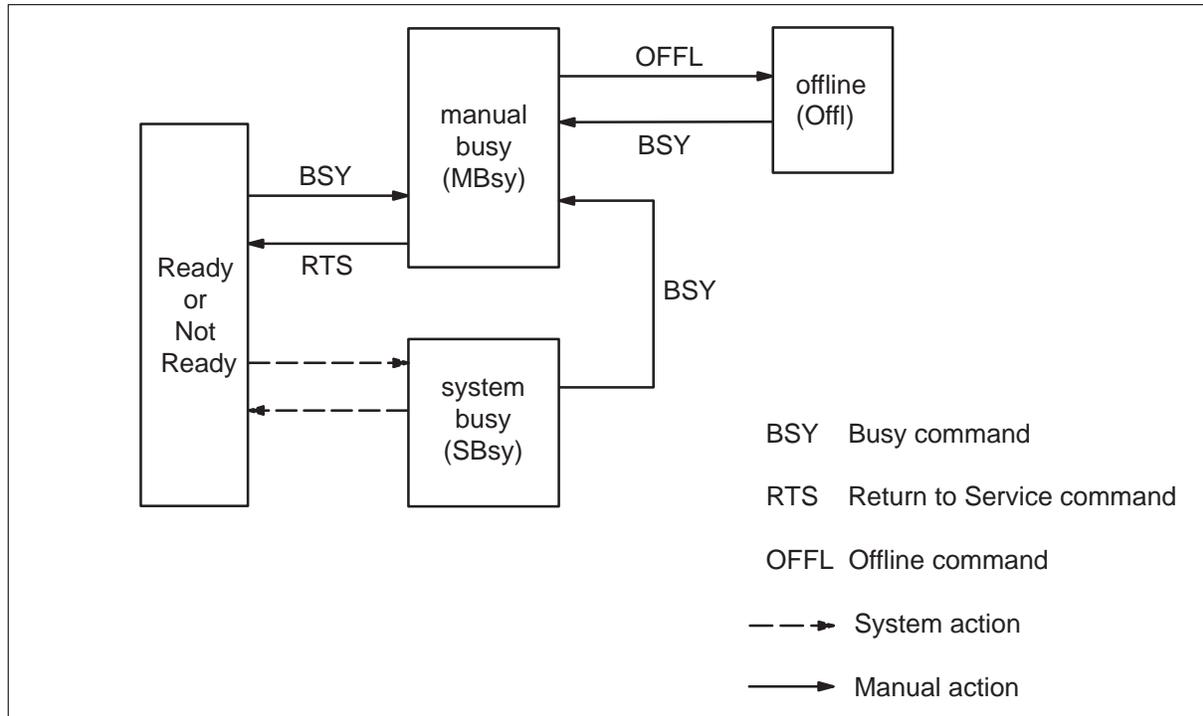
Table 5-1 describes DPC card states.

Table 5-1
DPC card states

Indicator	State	Description
Offl	offline	The DPC is offline. There is no traffic on the DPC.
MBsy	manual busy	The DPC is manual busy. There is no traffic on the DPC. A manual action has taken the DPC from service or from the offline state to the manual busy state. Only manual requests for additional action are allowed, except in a cold reload. During a cold reload or restart, the system tries to return to service (RTS) the manual-busy DPC.

The DPC is put in the manual busy state to allow maintenance testing. |
| | | **—continued—** |

Table 5-1
DPC card states (continued)

Indicator	State	Description
SBsy	system busy	The system has taken the DPC from service because of a fault. There is no traffic on the DPC. System and manual requests for additional action are allowed. The system does a return-to-service audit for system-busy cards every five minutes.
Ready	ready	The DPC is fully functional and available for normal service. The DPC connects to the packet data network and the link functions.
Not Ready	not ready	The system has successfuly completed maintenance testing of the DPC, but the necessary logical (level 2) link to the packet switching network is not established. If this condition is not temporary, there is a network failure or line failure (carrier or dataset).
—end—		

User interface commands

Introduction

The DPC Interface feature includes a group of DPAC (data packet) commands that you use to monitor and test the packet network. These commands are described later in this chapter. DPAC commands are both menu and nonmenu.

The DPAC menu commands are accessed from the IOD level of the MAP. You enter menu commands as the number indicated on the menu or as the text string indicated on the menu. You enter nonmenu commands as text strings. Uppercase or lowercase letters are used for both menu and nonmenu commands.

The commands in this chapter are shown in the format described on page 1-2. This chapter also uses the following format:

- Commands and their parameters are enclosed in a box.

- There is a brief description of the function of the command immediately below the box.

- The command description includes parameter definitions, if applicable.

- The common responses to the commands are described. The required user actions for the responses are described. Before you attempt the indicated user action, the commands should re-entered to determine if you can duplicate the failure.

Note: Except for DPAC and LISTDEV, the commands in this chapter are entered at the DPAC or (DPC) Card level of the MAP. The commands in this chapter affect only the DPC card for the data packet network.

Monitor and test commands

This section contains DPC monitor and test commands.

DPAC

DPAC	[dpc_no]

where
dpc_no   is the number of the DPC card, as datafilled in table DPACDEV

The DPAC command enters the DPAC level of the MAP. All DPC maintenance, diagnostic, and control commands for the specified DPC card are made available. The system displays a command menu. Use this command only at the IOC or Card levels of the MAP.

Note: You can specify a DPC card on any IOC shelf, even an IOC shelf different from the shelf shown in the MAP display.

Response
The system displays the DPAC level of the MAP.

LISTDEV

LISTDEV	[ioc_no] DPAC

where
ioc_no   is the IOC number
DPAC   specifies DPC cards

The DPAC command displays device state and configuration information for DPC cards.

Response
The system displays information on the specified DPC card(s).

Parameter descriptions

MTR	PART
	FULL
	OFF

MTR with no additional parameter queries the existing DPAC100 log recording mode. MTR with a parameter sets the mode for DPAC100 log recording (packet monitor).

PART   sets DPAC100 log recording to the partial mode, which records only information for the following packet types:

- Incoming calls

- call requests (outgoing)

- call clears

- clear requests

- network restarts.

at installation the setting is PART

FULL   sets DPAC100 log recording to the full mode, which monitors and records all transmission

OFF   sets DPAC recording to the off mode, which disables all recording

Note 1: DPAC100 logs record only X.25 frame and packet activity.

Note 2: Normally, you use MTR PART. You use MTR FULL only for fault isolation and clearing purposes, because the FULL parameter can overload the log system. You use MTR OFF when the log system is overloaded.

Response
```
Monitor mode is off – Recording inactive.
```

Explanation
DPAC100 log recording does not function. The system does not monitors packets, which disables all recording.

Response
```
Monitor mode is set for full recording.
```

Explanation
DPAC100 logs are set to the full monitoring mode. The system monitors and records all transmission.

Response
```
Monitor mode is set for partial recording.
```

Explanation
DPAC100 logs are set to the partial monitoring mode. The system records only information for the following packet types:

- Incoming calls

- call requests (outgoing)

- call clears

- clear requests
- network restarts

CSTATS

CSTATS	

The CSTATS command clears the internal frame and packet data counts. The system sets all counts to zero. After the counts are set to zero, network activity increments the counts. Internal frame and packet counts are cleared during restarts.

Response

```
Statistics have been cleared.
```

Explanation

You have successfully entered the CSTATS command. The system has set all counts to zero.

DSTATS

DSTATS	FRAME
	PACKET
	QUEUE
	LCHAN

DSTATS with no additional parameter displays the counts for all frames and packets transmitted since the last clearing of the counts, for all parameters except LCHAN. The parameters display specific counts.

Note: You can use the CSTATS command to verify transmission and to monitor packet data traffic.

Parameter descriptions

FRAME   displays the number of frames transmitted since the last clearing (see command CSTATS)

PACKET   displays the number of packets transmitted since the last clearing (see command CSTATS)

QUEUE   displays the current buffer counts by queue type

LCHAN   displays the outstanding input buffer count per logical channel

Response
```
Current buffer counts by queue type: L2_in  L3_in  L3_out
L2_out  L2_fre  L2_ifre  L3_ifre
```

Explanation
You have successfully entered the DSTATS QUEUE command. The
variables indicate queue types as shown in the following list:

L2_in   level two incoming

L3_in   level three incoming

L3_out   level three outgoing

L2_out   level two outgoing

L2_fre   level two free buffer

L2_ifre   level two incoming free buffer

L3_ifre   level three incoming free buffer

Only counts for the last three buffer types are shown when there is no
activity on the link.

System Action
The system displays current buffer counts by queue type.

User Action
Review the counts and take action if necessary.

Response
`Frame counts since last cleared` followed by a list of frame types and
counts

Explanation
You have successfully entered the command DSTATS FRAME. The system
displays the counts of frames transmitted since the counts were last cleared.

User Action
Review the counts and take action if necessary.

Response
`Outstanding input buffer count per logical channel has n
buffers.` (n represents a number)

Explanation

You have successfully entered the DSTATS LCHAN command. The system displays the outstanding input buffer count per logical channel.

User Action

Review the counts and take action if necessary.

Response

`Packet counts since last cleared` followed by a list of packet types and counts

Explanation

You have successfully entered the DSTATS PACKET command. The system displays the counts of packets transmitted since the counts were last cleared.

User Action:

Review the counts and take action if necessary.

QNODE

QNODE	

The QNODE command shows the state of a DPC device.

Responses

```
DPAC n is    MBsy

             SBBsy

             Offl

             REeady

             Not Ready
```

Explanation

This response indicates the state of the DPC card with index number n in table DPACDEV.

QUIT

QUIT	

The QUIT command quits the DPAC MAP level and returns to the previous level.

Response
The system displays the previous MAP level.

Maintenance commands

This section contains DPC maintenance commands.

BSY

BSY	[FORCE]

where
FORCE   is a command option that forces the DPC into the manual busy
state. If the BSY command is entered without this option while
channels are active, the command is cancelled and the system
displays a message concerning the FORCE option.

The BSY command attempts to change the state of the DPC card to manual
busy (MBsy). The card must be in service (InSv), offline (OffL), or system
busy (SBsy) before you enter the command.

Response
```
Device is currently handling active channel(s).  Do you wish
to busy anyway?  Yes (Y) or No (N)
```

Explanation
You attempted the BSY command while the system data calls were being
processed. The system suspends execution of the command until the user
enters a confirmation.

User Action
Enter Y to confirm the command or N to cancel the command.

Response
```
Request failed.
```

Explanation
There has been an support operating system (SOS) mailbox failure. The
system cancels the command.

User Action
Check recent DPAC102 log reports for diagnostic information.

Response
```
Request passed.
```

Explanation

The state of the DPC card has been changed to manual busy. The system makes DPC card inactive except for maintenance functions.

Response

```
Request was aborted
```

Explanation

The system does not know the state of the DPC card or does not recognize the type of request. The system cancels the command.

User Action

Contact the next level of support.

Response

```
Request was not valid.
```

Explanation

The command cannot be performed because of state of the card. The system cancels the command.

User Action

Verify the datafill for the DPC card. Determine if the DPC card is in the correct state.

OFFL

OFFL	

The OFFL command changes the state of the specified DPC to offline. To offline the card, the state of the card must be manual busy. In the offline state, the you can delete datafill for the DPC card from table DPACDEV.

Response

```
Request aborted.
```

Explanation:

The system cannot execute the command. The system cancels command.

User Action

Check recent DPAC102 log reports for diagnostic information.

Response

```
Request failed.
```

Explanation
The system cannot execute command. The system cancels the command.

User Action:
Check recent DPAC102 log reports for diagnostic information.

Response
```
Request passed.
```

Explanation
The system changed the state of the DPC card to offline.

Response
```
Request was not valid.
```

Explanation
The command cannot be performed because of state of the card. The system cancels the command.

User Action:
Verify that the DPC is in the manual-busy state. If necessary, change the state of the DPC to manual busy.

RESET

RESET	

The RESET command performs a hardware node reset on the specified device. You enter this command if the input handler designates a device as a "babbling idiot" and the system fails to reset the device. A "babbling idiot" is any input/output device (IOD), such as the DPC card, that constantly interrupts the host processor.

Note: The system normally detects the out-of-control device and attempts an automatic reset.

> **CAUTION**
>
> The RESET command stops all activity on the posted DPC card. Use RESET command only when the DPC is offline.

REVIVE

REVIVE	ALL
	process

where

ALL   indicates all processes must be restored to the normal, active state if devastating traps occur

process   is the name of the process to be recreated following traps by that process

The REVIVE command instructs the parent process to return a child process to the normal, active state if software errors occur.

Note: You usually don't require the REVIVE command. Use the REVIVE command only after a DPAC problem has been documented and corrected.

Response
```
ALLOCMBX failure code was n.
```

Explanation
An SOS mailbox is not available. (n represents a return code number) The system does not recreate the requested process.

User Action:
Enter the REVIVE command again. Record the return code if the problem can be reproduced, and contact the next level of support.

Response
```
Both protocol sons are running.
```

Explanation
You entered the REVIVE ALL command while protocol processes were active. Revival is in progress.

Response
```
Done!
```

Explanation
The requested revival processesare now active. The system has recreated the requested process.

Response
```
Neither protocol sons were recreated.
```

Explanation

You entered the REVIVE ALL command and the level 2 and 3 requests failed. The system did not recreate the requested level 2 and 3 processes.

User Action

Enter the REVIVE command again. Check recent DPAC102 log reports for diagnostic information.

Response

```
Only the level 2 son process is running.
```

Explanation

You entered the REVIVE ALL command and the level 3 processes failed. The system did recreate the requested level 3 processes.

User Action

Enter the REVIVE command again. Check recent DPAC102 log reports for diagnostic information.

Response

```
Requested process was not created.
```

Explanation

The requested process requested was not recreated.

User Action

Enter the REVIVE command again. Check recent DPAC102 log reports for diagnostic information.

Response

```
Send failure code was n.
```

Explanation

The message could not be sent to the DPC parent process. (`n` is a return code number) The system does not recreate the requested process.

User Action

Enter the REVIVE command again. If you can reproduce the problem, record the return code and contact the next level of support.

Response

```
WAITX failure code was n.
```

Explanation

The message was not received from DPC parent process. (`n` is a return code number) The system does not recreate the requested process.

User Action

Enter the REVIVE command again. If you can reproduce the problem, record the return code and contact the next level of support.

Response

```
xxxxx was created.
```

Explanation

The requested process (represented by `xxxxx`) was recreated in the normal, active state.

User Action

Use the CSTATS and DSTATS commands to verify that the DPC functions. The state of DPC should be ready after the return to service.

RTS

RTS	

The RTS command attempts to return the DPC to service. Before you enter the RTS command, the state of the DPC card must be manual busy. The system always performs profile, memory, and loopback tests. The system displays pass or fail messages at the MAP terminal.

Response

```
Request aborted.
```

Explanation

The system could not perform the return to service. The system cancels the command.

User Action

Check the IOC and other IOD for problems.

Response

```
Request failed.
```

Explanation

A test process has failed. The system cancels the command.

User Action

Enter the RTS command again. If the problem occurs again, check recent DPAC102 log reports for diagnostic information.

Response

```
Request passed.
```

Explanation

The DPC has been returned to service. The system performs profile, memory, and loopback tests and then returns the DPC to service. The state of the DPC should change to ready.

User Action

Check that the state of the DPC changes to ready state. If it does not, contact the next level of support.

Response

```
Request was not valid.
```

Explanation

The RTS command cannot be performed because of state of the card. The system cancels the command. The message is sometimes accompanied by a DPC status message.

User Action:

Verify that the state of the DPC is manual busy. If necessary, change the state of the DPC to manual busy.

TST

TST	

The TST command tests the posted DPC card. The state of the card must be manual busy state before you enter the TST command.

The TST command performs the following tests:

- a profile test ensures that the DPC connects to the IOC and that its microprocessor works

- a memory test checks the memory on the DPC card

- a loopback test ensures that there is a dataset interface to the network and that the system transmits the synchronizing clock signal

Response

```
Request aborted.
```

Explanation
The system could not execute the TST command. The system cancels the command.

User Action:
Verify that the state of the DPC is manual busy. If the failure occurs during installation, verify the IOC number and card slot against datafill. Check the IOC and other IOD for problems.

Response
```
Request failed.
Loopback test failed.
```

Explanation
The loopback test failed. The dataset interface is not properly connected and there is no synchronizing clock signal in the DPC system. The cables could be faulty.

User Action:
Check recent DPAC101 controller status logs for indications of noise on the line. Check the dataset and cables.

Response
```
Request failed.
Memory test failed.
```

Explanation
The memory test failed.

System Action
There may be DPC memory problems. The microprocessor probably cannot handle the tasks assigned to it.

User Action
Check recent DPAC101 controller status log reports for indications of noise on the line. If there is no noise, there may be a fault on the DPC card. Replace the card if necessary.

Response
```
Request failed.
Profile test failed.
```

Explanation
The profile test failed.

System Action

The DPC may be disconnected (unplugged) or the microprocessor may not be operating. There may be problems with DPC datafill.

User Action

Check recent DPAC101 controller status log reports for indications of noise on the line. Verify that the IOC state is OK. If the failure occurs during installation, verify the IOC number and card slot against datafill. If the datafill is correct, there may be a fault on the DPC card.

Response

```
Request passed.
```

Explanation

The TST command has been executed. The system performs the profile, memory, and loopback tests.

Note: Successful completion of these tests reflects only the status of the DPC card and the related connections. Successful completion does not reflect the status of the packet network.

Response

```
Request was not valid.
```

Explanation

The command cannot be performed because of state of the card. The system cancels the command.

User Action

Verify that the state of the DPC is manual busy. If necessary, change the state of the DPC to manual busy.

Application commands

A channel name parameter is used in many DPAC–level application commands. If the system generates the channel name, it has the format DPCxxCyy, where xx is the DPC card number and yy is the channel (0 to 15) on the card.

CON

CON	dpancode	channame

where

dpancode   is an eight-digit number preceded by an N, for example, N12345678, representing the network address of the called network subscriber.

channame   is up to 12 characters that represent the name of the virtual channel chosen by the operator.

The CON command creates an outgoing data call by specifying a network address and channel name. With the local network address, you can use the WCON command to test a DPC circuit with a loopback call.

The DMS switch generates a channel name with the format DPCxxCyy, where xx is the device number in table DPACDEV and yy is the channel number. You can use the QCON command to determine the channel name. You can refer to the channel name in other commands only after you use the CON or WCONcommands to establish a channel.

Response

```
Access to the far end is barred.
```

Explanation

The equipment you directed the data call to is accessible only for a Closed User Group (CUG). The system cancels the call.

User Action

Choose a different network address for the data call.

Response

```
An SOS mailbox could not be created/used.
```

Explanation

Check recent DPAC102 log reports for diagnostic information.

System Action

The system response depends on the error code in the DPAC102 log.

User Action

The user action depends on the error code in the DPAC102 log. Contact the next level of support.

Response

```
Error by a remote procedure.
```

Explanation

An remote equipment error has been detected.

User Action

If you can reproduce the problem, enter the MTR FULL command and document the error. Review recent DPAC100 log reports. Contact network carrier personnel or the next level of support.

Response

```
Error detected in local protocol handler.
```

Explanation

The system has detected a problem in DATAPAC software. The system cancels the call.

User Action

If you can reproduce the problem, enter the MTR FULL command to document the error.

Response

```
Error in the Call_Request facilities field.
```

Explanation

There is a parameter incompatibility in the user's network subscription. The system cancels the call.

User Action

Contact the network vendor or use the PMIST command to document the error. Contact the next level of support.

Response

```
Given channel name is already in the symbol table.
```

Explanation

The channel name is already in use . The system does not set up the data requested call.

User Action

Choose a different channel name and enter the CON command again. or remove the channel name you want to use.

Response

```
Maximum resources were exceeded/inoperative.
```

Explanation

All channels may be active or system busy. The system does not set up the requested call.

User Action:

Verify that the card has been returned to service. Enter the CON command again. Use QCON command to check channels. If QCON = 0, disconnect the link and try again. If the problem occurs again, check recent DPAC102 log reports for diagnostics information and contact the next level of support.

Response

```
Network address digits should be preceeded by an N.>
```

Explanation

You entered the network address without an initial N. The system cancels the command.

User Action:

Enter the CON command again with an N in the network address.

Response

```
The far end address is unknown.
```

Explanation

The far end network address does not exist in the network. The system cancels the call.

User Action

Verify the far end address and try the command again.

Response

```
The far end cleared the call.
```

Explanation

There is no remote waiter at the far end of the call. The system does not set up the call.

User Action:

Either correct the network address or contact with the far end office to set up a remote waiter.

Response

```
The far end is out of order.
```

Explanation

The equipment you directed the call to cannot receive the call. The system cancels the call.

User Action

Wait and try the call again or contact personnel at the remote equipment location.

Response

```
The far end number was busy.
```

Explanation

The equipment you directed the call to is busy. The system cancels the call.

User Action

Wait and try the call again. If the problem occurs again, contact the next level of support.

Response

```
The far end refused the collect call.
```

Explanation

The remote equipment did not accept parameter. The system cancels the call.

User Action

Check the network address and subscription parameters.

Response

```
The fast select facility is not subscribed.
```

Explanation

There is a parameter incompatibility with the far end. The system cancels the call.

User Action

Check the subscription and try again. If the problem occurs again, contact the next level of support.

Response

```
The packet network is congested.
```

Explanation
The data network carrier is overloaded. The system cancels the call.

User Action
Wait and try the call again. If the problem occurs again, contact the next level of support.

DCON

DCON	channame

where

channame   is a string of up to 12 characters that represents the name of the desired virtual channel.

The DCON command disconnects or clears a call on the specified channel.

Note: Refer to the QCON command description for more information.

The channel name format usually is DPCxxCyy, where xx is the device number in table DPACDEV and yy is the channel number.

Response
```
Maximum resources were exceeded/inoperative.
```

Explanation
The action requested cannot be performed in the present operating environment. The system cancels the command.

User Action
Check to see if the state of the DPC card is ready. Use QCON and QNODE commands to verify that the specified channel is open and the card is in the desired state.

Response
```
The request was invalid/unsupported.
```

Explanation
The system cannot find the channel name entered with the command. The system attempts to remove the associated channel name symbol from the user directory.

User Action

Recreate the directory symbol used by the command. Use QCON to verify the directory symbol. Try the command again with the recreated name in the format DPCxxCyy.

Response

```
The request was successful.
```

Explanation

You successfuly entered the command. The system disconnects the channel with the specified name.

Response

```
Link disconnect has been requested.
```

Explanation

The (DCON command) FORCE option was used with calls in progress. The system cancels the calls.

User Action

Wait for for the MAP terminal to display a DPC state of `Not ready`, then `Ready.`.

DISC

DISC	[FORCE]

The DISC command disconnects the data links on the posted DPC. Enter DISC command with the DPC in the ready state only to clear problems on the link, or to exercise the link process. The display should read `Not ready`, and then `Ready.`.

where
FORCE   disconnects all active calls on the data links.

Response

```
Card is not in service.
```

Explanation

The command cannot be executed unless the state of the DPC is OK. The system cancels the command.

User Action

Return the DPC to service before you enter the command.

Response

`Frame-level link is already down.`

Explanation

The link process has already detected a disconnected status. The system cancels the command.

User Action

Check for a hardware or network fault. The MAP display should have indicated that the link was out of service (`Not ready`) before you entered the DISC command.

Response

`Link disconnect has been requested.`

Explanation

You enterd the DISC FORCE command with calls in progress. The system cancels the calls and the MAP display indicates the DPC links are disconnected.

User Action

Wait for for the MAP terminal to display a link state of `Not ready`, then `Ready`.

Response

`Link has been disconnected.`

Explanation

you have successfully entered the command. The system disconnects, then reconnects the logical link.

User Action

Wait for for the MAP terminal to display a link state of `Not ready`, then `Ready`., then enter the next command.

Response

`Request failed due to send failure.`

Explanation:

There is a problem with the SOS mailbox of the network process. The system cancels the command.

User Action

Check for an SOS software error. Review recent DPAC102 log reports for related messages and return codes. If you can reproduce the problem, document the erro and contact the next level of support.

Response

```
The request cannot be honored due to active channels.
Do you wish to force all activity down?
Please enter yes or no
```

Explanation

Data calls are in progress, proceed with caution. The system suspends execution of the command until the user enters a confirmation.

User Action

Enter YES to confirm the command or NO to cancel the command.

GFILE

GFILE	filename	device	channame

The GFILE command instructs the system to obtain the specified file (sent by another DMS) from the specified virtual channel and to record the file on the specified storage device.

where
filename   is an alphanumeric string that specifies the file to be obtained from the virtual channel.
device   specifies the recording device by volume name,for example, T0, D010XXXX, or SFDEV, to which the file is sent
channame   is a string of up to 12 characters representing a symbolic virtual channel name. The virtual channel name usually has the format the DPCxxCyy.

Response

```
Abort due to file system error
```

Explanation

You identify file system errors according to the codes listed in File system return codes on page 6-29.

System Action

The system response depends on the error code. Refer to File system return codes on page 6-29.

User Action:

The required user action depends on the error code. Refer to File system return codes on page 6-29.

Response

```
Abort due to link error.
```

Explanation

The command failed due to a link failure. The system cancels the call.

User Action

Enter the GFILE command again. Review recent DPAC101 and DPAC102 log reports for link failure information.

Response

```
Abort due to software error.
```

Explanation

Data store is not available. The system cancels the call.

User Action

Check the memory configuration.

Response

```
Transferal completed successfully.
```

Explanation

You have successfully entered the command. The system sends the file specified on the channel specified and waits for confirmation from the far end.

QCON

QCON	

The QCON command directs the system to include in the user directory an entry for every virtual channel that exists for the posted DPC card. The system records entry records (the virtual channel name and the virtual channel number). The MAP terminal displays a message indicating the total number of virtual channels in the directory.

Note 1: To display your user directory with channel names, enter the command PRINT USERS.user_id. For example, enter PRINT USERS.B if you are user B.

Note 2: You require this command for references to channel names in other channel commands. The command adds the names to a symbol table.

Response
```
The number of active channels is n.
```

Explanation
The user directory includes all virtual channels on the posted DPC card. (n represents the number of channels)

System Action
The system updates the directory of the user to include listings for all currently defined channels for the posted DPC card.

RCON

WARNING

You should not be perform this X.25 operation unless you are testing a channel that is not involved in active data transfer. Use of the RCON command on an active channel can result in the loss of data.

RCON	channame

where
channame   specifies a virtual channel for the reset operation.

The RCON command resets the network sequence numbers for the specified channel.

The channel name is a string of up to 12 characters. The format of the channel name usually is DPCxxCyy, where xx is the DPC number and yy is the channel of the DPC.

Response
```
Maximum resources were exceeded/inoperative.
```

Explanation
The requested action could not be performed in the present operating environment. The system cancels the command.

User Action
Verify that the state of the DPC card is not ready. Use QCON and QNODE commands to verify that the channel is clear and that the state of the card is appropriate.

Response
```
The request was invalid or unsupported.
```

Explanation
The system cannot find the channel name used. The system cancels the command.

User Action
Use the QCON command to verify that the channel exists and the enter RCON command again.

Response
```
The request was successful.
```

Explanation
You have successfully entered the command. The system resets X.25 module counters. Transmission on the channel can now start or continue.

User Action
Enter the next command.

SFILE

SFILE	filename channname

where

filename   identifies the file to be transferred to the remote location. Filenames are determined with the LIST, DSKUT LISTVOL, or LISTSF commands. Refer to the 297–1001–520 for more details concerning these commands.

channname   is a string of up to 12 characters that specifies the virtual channel. The channel name usually has the format DPCxxCyy, where xx is the DPC number and yy is the channel on the DPC.

The SFILE command makes the specified file available to the node at the terminating end of the specified virtual channel.

Note: You use the SFILE command for manual file transfer across a network. Before you enter the SFILE command, personnel at the receiving location must enter the GFILE command.

Response
```
Abort due to file system error.
```

Explanation
The command cannot be executed because of a file system error. You identify file system errors according to the codes listed in File system return codes on page 6-29.

System Action
The system response depends upon the error code. Refer to File system return codes on page 6-29.

User Action
The required user action depends upon the error code. Refer to File system return codes on page 6-29.

Response
```
Abort due to link error.
```

Explanation
The command failed because of a link failure. The system cancels the call.

User Action:
Enter the SFILE command again. Review recent DPAC102 and DPAC101 log reports for link failure information.

Response
```
Abort due to software error.
```

Explanation
Data store is not available. The system cancelled the call.

User Action:
Check the memory configuration.

Response
```
Transferal completed successfully.
```

Explanation
You have successfully entered the command. The system sends the specified file on the specified channel and receives confirmation from the location the file was sent to.

WCON

WCON	dpacnode [minutes]

where

dpacnode   is an eight-digit number preceded by N (for example, N12345678), that identifies the network address of the calling network subscriber.

minutes   specifies the number of minutes the system waits for the incoming call. The range is 0 to 255, where each whole number represents a minute.

The WCON command instructs the DMS switch to wait for an incoming call from the specified network address.

The maximum time to wait for the call can be specified in minutes. If you do not enter specific wait time in minutes, the system waits indefinitely or until you press the BREAK key, which aborts the command.

Note: You require this command as security measure prior to a manual file transfer. The MAP is unavailable for the specified period or until the call is accepted.

Response
```
Network address digits should be preceded by an N..
```

Explanation
You entered the network address without an initial N. The system cancelled the command.

User Action
Enter the WCON command again with the correct network address.

Response
```
The action took longer than was requested.
```

Explanation
Within the specified time, no incoming call was received from the specified network address. The system stopped waiting for the call from the specified address.

Response
```
The request was successful.
```

Explanation

You successfully entered the command. You can enter the QCON command to confirm the channel activation. The system accepted a call from the specified network address.

Response

```
Wait time must be 0 to 255 or forever.
```

Explanation:

The specified time is not in the required range (0 to 255). The system does not wait for the call on the specified channel.

User Action:

Enter the WCON command again with the correct time.

File system return codes

When you perform a manual file transfer, a numeric return code or text string can appear with the message `Abort due to file system error..` Table 6-1 lists these numeric return codes and text strings and their meanings.

Table 6-1
File system error return codes

Number	Text	Meaning
2	LONGREC	The amount of data was too large for the buffer and has been segmented.
4	IOERR	Device error
5	BADOOPT	The file cannot be opened in requested access mode.
6	BADFID	The file does not exist.
8	UNAVAIL	The device is not available.
9	BADCOPT	The file cannot be closed as requested.
12	NOROOM	The file is full.
13	BADFATTR	You attempted to create a file with invalid attributes.
14	BADFRN.	The file is not open.
15	BADREQ.	An illegal file system operation was requested.
16	OUTOFSERVICE	The device is out of service.
19	DEVINUSE	The device is already in use.
21	NOTREADY	The device is not ready.
22	MEDIUMERROR	Medium error: The I/O operation has failed.
23	BADBUFF	the user-supplied buffer is invalid.

Each of the following messages can occur during standard maintenance activities (TST, BSY, RTS, and OFFL commands).

Response
`ALLOCMBX failure code was n.` (n is a return code number)

Explanation
An SOS mailbox is not available. The system cancelled the command.

User Action:
The failure code can identify the cause of the mailbox problem. Document the failure code. Contact the next level of support.

Response
`Failure to send to mtce process – Try again.`

Explanation
There is a system problem with the maintenance son mailbox. The system failed to read the maintenance command.

User Action
Enter the command again.

Response
`Request failed.`

Explanation
The system rejected command.

User Action
Enter the command again. If the `Request failed` response occurs repeatedly, check for a hardware failure or lack of a carrier on the modem.

Response
`Request passed.`

Explanation
You have successfully entered the command.

Response
`Request was aborted.`

Explanation

There is a system problem, possibly an IOC failure. The system cancelled the command.

User Action:

Check the state of the IOC. Check for other maintenance problems.

Response

`Request was not valid.`

Explanation

The device state does not permit the command. The system cancelled the command.

User Action:

Change the state of the device, for example, to manual busy.

Response

`WAITX failure code was n.` (n is a return code number)

Explanation

The reply from the maintenance child took longer than 15 seconds, or some other mailbox problem occurred. The system cancelled the command.

User Action

If you can reproduce the problem, document the problem and the contact next level of support.

List of terms

Abortive Disconnect

Immediate disconnection of first data packet level.

Alphanumeric

A–Z, 0–9. Pertaining to a character set that contains letters and digits.

ASCII

American Standard Code for Information Interchange. Coded character set used for the interchange of information among information–processing systems, communications systems and associated equipment. ASCII defines one format in which data is exchanged between an Input/Output Device (IOD) and the Device Controllers of the DMS–100 Family of switches.

Asynchronous Transmission

Data transmission in which each information character, word, or small block, is individually synchronized, usually by the use of start and stop elements. The gap between each character or word is not necessarily of a fixed length. Asynchronous transmission is also known as Start–Stop Transmission. Contrast with Synchronous Transmission.

Audit

Process of verifying the integrity of the system and attempting to correct errors when detected.

Babbling Idiot

Peripheral that, due to a fault, keeps sending messages as fast as it can, operating in a loop. Formally known as Intermittent Message Overflow (IMO).

Block

String of records, words, or characters formed for technical or logical reasons to be treated as an entity. Set of things, such as words, characters, or digits, handled as a unit. Collection of continuous records recorded as a unit. Blocks are separated by interblock gaps and each block may contain

one or more records. A group of bits, or n-ary digits, transmitted as a unit. An encoding

procedure is generally applied to the group of bits or n-ary digits for error control purposes.

CCC

Central Control Complex. The controlling part of the DMS, consisting of the Central Processing Unit (CPU), the Central Message Controller (CMC), Program Store and Data Store.

CCITT

International Telegraph and Telephone Consultative Committee. One of four parts of the International Telecommunications Union (ITU). The duties of the CCITT are to study technical, operating, and tariff questions and issue recommendations relating to telegraphy and telephony, including data and program services.

CO

Central Office. Switching office arranged for terminating customer lines and provided with trunks and switching equipment for establishing connections to and from other switching offices. Also called Local Office, End Office, Class 5 Office, Exchange and Local Central Office.

Channel

Path for electrical transmission between two or more points without common-carrier-provided terminal equipment. Also called circuit, line, link, path or facility. In CCITT standards, a means of one-way transmission. See Circuit.

Character

Member of a set of elements, upon which agreement has been reached, used for the organization, control or representation of data. Characters may be letters, digits, punctuation marks, or other symbols often represented in the form of a spatial arrangement of adjacent or connected strokes, or in the form of other physical conditions in data media. See ASCII.

Circuit

In data communication, a means of two-way communication between two data terminal installations. Contrast with Channel.

Circuit Switching

Temporary direct electrical connection of two or more channels between two or more points in order to provide the user with exclusive use of an open

channel with which to exchange information. Also called line switching.
Contrast with Packet Switching.

Cold Restart

Initialization phase during which temporary storage is deallocated and
cleared to some known default value. All calls are dropped and the
peripheral processors clear all channel assignments.

Command

A control signal, or, in man-machine language, the specification of an
expected action or function by the system. In DMS, a function invoked
from a Man-Machine Interface by means of the Command Interpreter (CI).

Communications Driver

The part of the DPC device that controls the three basic X.25 packet data
levels (1, 2 and 3).

CI

Command Interpreter. Support Operating System (SOS) component that
functions as the main interface between the machine and the user. Its main
function is to read lines from a user terminal, analyze them, recognize
command items on input lines and invoke these commands.

CRC

Cyclic Redundancy Check. Check using a modified cyclic code for error
detection and correction. In data communication, a system of error checking
performed at both the sending and receiving station after a block check
character has been accumulated.

The CRC for X.25 packet switching is called a Frame Check Sequence
(FCS). The FCS is a two-byte value calculated against data using a
polynomial formula and appears between the end of every X.25 frame and
the next flag.

CSR

Customer Service Report. Northern Telecom term referring to a problem
report from the field. Formerly known as a Master Trouble File.

Daddy Process

Process that creates and controls other processes (known as child processes).
Daddy processes often are maintained by the Support Operating System
(SOS).

Daddy processes may eliminate the need for human intervention to restart
processes that stop on an error condition, eliminate the need to reinitialize

the system after process trap, and preserve the integrity of the DMS system in case of errors.

Data Link

Assembly of parts of two data terminals and their interconnecting data circuit that enables data to be transferred from a data source to a data sink.

Physical connection and the connection protocols between the DMS and data collector through the DMS data channel.

Data Network

Assembly of functional units that establishes data circuits between data terminals. Interconnection of a number of locations through communication facilities, such as telephone or telegraph lines, or microwave transmitters, for the purpose of transmitting and receiving data.

DATAPAC

Packet data communications network of Telecom Canada.

Data Schema

Format of data for a particular DMS data table.

DCE

Data Circuit Terminating Equipment. "Receiving" end of virtual packet data network connection.

Digit

Graphic character that represents an integer (for example, one of the 0 to 9). Synonymous with Numeric Character.

Discrete

Pertaining to distinct elements or to representation of data by distinct elements such as characters, or to physical quantities only having distinct values. Contrast with Analog.

Disk Drive

Mechanism for moving a disk pack or a magnetic disk and controlling its movements. Older term for Magnetic Disk Unit (MDU).

DMS

Digital Multiplex System. A central office switching system where all external signals are converted to digital data and stored in assigned time-slots. Switching is performed by re-assigning the original time slots.

DMS-100 Family

A family of digital multiplexed switching systems, which includes the DMS-100 Local, DMS-100/200 Toll, DMS-100/200 Local/Toll, DMS-250 Private Toll, and DMS-300 International.

Document Index

List of job-related documents provided as part of the standard documentation package for a DMS-100 Family office.

DPC

Data Packet Controller. General purpose data communications circuit pack connecting to a DMS-100 Family switch through an IOC shelf. The DPC provides an interface between the DMS and data packet switching networks such as DATAPAC.

DTE

Data Terminal Equipment. "Sending" end of virtual packet data network connection.

Enable

Timing signal that activates one or more of a number of circuits sharing a common bus, enabling data on the bus to be directed to a specific circuit or group of circuits.

Error Message

Indication that an error has been detected.

ETAS

Emergency Technical Assistance Service. Service provided by Northern Telecom to assist in switch maintenance

Filename

Arbitrary name given to a file by its creator, by which the file may be referenced by any user.

Format

Arrangement or layout of data on a data medium.

Frame

In packet switching, unit of information sent across a data communications link. There are twelve types of frames, each specific to a single command or response operation. The information frame (I-frame) is the only one that carries user data. The remaining seven are used to control flow across the

link (for example, a Receiver Not Ready frame signals the other side to stop transmitting).

Note: Level 3 control information is transparent to level 2, so packet overhead bytes appear as part of the data to Level 2.

Hardware

Physical equipment used in data processing, as opposed to computer programs, procedures, rules and associated documentation (software).

HDLC

High Level Data Link Control

Heading

In ASCII and data communications, a sequence of characters preceded by a start-of-heading character, used as a machine sensible address or routing information.

HEX

Hexadecimal. Numerical system using base 16. HEX provides a convenient notation for four-bit and larger binary numbers. HEX uses ten numeric digits (0 through 9) and six alphabetic digits (A through F). For example, 1000 1111 in binary notation is 8 F in Hexadecimal notation.

Index

Piece of information by which a particular tuple, or line, in an internal data table is identified. There is no ordering associated with an index and no concept of a used or unused index (all indices in the index range are valid).

INIT

Restart Report. All restarts (warm, cold, reload) are logged here. Each report contains a five to ten line summary of what happened, when and where.

Initial Restart

Restart of a switching unit that occurs when modules are first loaded into the system, not a response to an error. These restarts are on a per module basis. Also known as Initial Program Load (IPL).

Initialize

To set counters, switches, addresses or contents of storage to zero or other starting values at the beginning of, or at prescribed points in, the operation of a computer routine.

IOC

Input/Output Controller. a hardware shelf that provides an interface between up to 36 input/output devices and the Central Message Controller (CMC). The IOC contains a Peripheral Processor (PP) that independently performs logical tasks, thus relieving the load on the Central Processing Unit (CPU).

Interface

Boundary between two pieces of equipment, across which all the signals that pass are carefully defined. A signal definition includes the connector signal levels, impedance, timing, sequence of operation and the meaning of signals. The term Interface has been extended to include the notion of a software interface, in some cases of high complexity.

DPC Interface software provides compatibility between the DPC circuit pack in the DMS and the DATAPAC network. The DPC Interface also provides maintenance and testing capability for the DPC.

Interrupt

A 'jump' out of one program into another due to an external event. A mechanism is usually provided to store the information needed for a return to the interrupted program. In addition to external events, the Input/Output System Interrupts are allowed from clocks and timers for various malfunctions.

I/O

Input/Output. Refers to a device or medium used to achieve a bi-directional exchange of data. Data exchange in the DMS-100 Family of switching systems is performed in accordance with the Input/Output Message System.

Journal File

Backup file that preserves data modification orders from the table editor and service order system on a recording device, so that data tables can be re-executed if the DMS-100 has to be reloaded from this backup image of the data.

Key

Piece of information by which a particular tuple in the logical and customer data may be uniquely identified. Keys have an ordering and a validity property, so one can ask for the first, next, last, etc., key from the set of used keys.

Level 1 (Physical Level)

Part of data circuit that handles the actual hardware interface and controls the physical communication link.

Level 2 (Link Level)

Part of data circuit that Controls the logical handshake over a physical link. Also called frame level.

Level 3 (Packet Level)

Part of data circuit that handles logical channels (LC) or connections between applications that occur over the link monitored by level 2.

Link.

In the DMS, a connection between any two nodes in the system. In packet switching, a conceptual or physical connection between two users of a packet switching network, permitting them to communicate.

Link Protocol

Set of 'rules' for data communication over a data link in terms of a transmission code, a transmission mode, and control and recovery procedures.

Logical Channel (LC)

The virtual connection that data packet level 3 establishes on a per connection basis.

MAP

Maintenance and Administrative Position. Group of components that provide man-machine interface between telephone operating company personnel and the DMS-100. A MAP consists of a Visual Display Unit, a voice communication module, testing facilities and the MAP furniture.

MMI

Man-Machine Interface. The series of commands to the switch and responses from the switch that are used by telephone operating company personnel at the MAP or other Input/Output device to communicate with the DMS-100 Family of switches.

MAPCI

Maintenance and Administrative Position Command Interpreter.

Modem

Modulator-demodulator. Device that modulates and demodulates signals transmitted over communication facilities. The modulator is included for transmission and the demodulator for reception. A modem is used to permit digital signals to be sent over analog lines. Also called a data set.

MORE (M) Bit

Packet data level 3 parameter linking data packets together as part of a logical group. M = 1 indicates the logical group is not complete. M = 0 indicates the logical group is complete. Note that the MORE bit links only "data" packets and thus are used only for the building of data blocks.

Network

Series of points connected by communications channels.

Network Management

Set of facilities that controls operation of the DMS-100 Family network, to make maximum use of available resources in conditions of overload or facility failure.

OM

Operational Measurements. Hardware and software resources of the DMS-100 that control the collection and display of measurements taken on an operating system. OM organizes the measurement data and manages its transfer to displays and recording devices. Maintenance, accounting, traffic and provisioning decisions are made based on this information.

Packet

Group of binary digits including data and call control signals switched as a composite whole. The data, call control signals and possible error control information are arranged in a specified format.

In X.25 protocol, there are 15 packet types. Two packet types contain user data; the remaining 13 packets are used to control information flow.

Packet Sequencing

Process of ensuring that packets are delivered to the receiving data station in the same sequence as they were sent from the sending station.

Packet Switching

Transmission of data by addressed packets, where a transmission channel is only occupied while transmitting the one packet. The channel is then available for use by packets being transferred between different data terminal equipment.

Packet Switching Network

Network designed to carry data in the form of packets. The packet and its format is internal to that network. The external interfaces may handle data in different formats, and conversion is done by an interface computer. Also called a packet data network.

Parameter

Variable given a constant value for a specified application and that may denote the application. Name in a procedure used to refer to an argu- ment passed to that procedure.

PEC

Product Engineering Code. Unique alphanumeric identification for each marketable product manufactured by Northern Telecom. The prefix NT with a basic number identifies the product itself, while other prefixes with the number associate the product with the various types of documents in the Modular Documentation System.

PVC

Permanent Virtual Circuit. Continuously available virtual path between data communication applications. PVC may occur on switched physical links. Not supported on DPC.

Polling

In data communication, The process of inviting data stations to transmit, one at a time or concurrently. The polling process usually involves the sequential interrogation of several data stations. Concurrent polling is supported on the DPC by feature package NTX059AB.

Protocol

Strict procedure required to initiate and maintain data communication. Protocols may exist at many levels in one network, such as link by link, end to end, and subscriber to switch.

Queue

Collection of items that can be thought of as arranged in a sequence, the two ends being the head and tail. New items are added to the tail. Items are removed from the head or tail. The Support Operating System (SOS) queueing primitives provide for ordering of software items in a queue through the use of pointers or indices.

Range

Set of values that a quantity or function may take.

Real Time

In DMS, the performance of computation by the Central Processing Unit (CPU) and measurement of the actual time that the related physical process takes.

Reload Restart

Binary image dump tape is reloaded into the DMS-100. Office configuration and translation data are retained, but all dynamic data is cleared.

SOS

Support Operating System. Software that sets up the environment for loading and executing the application software in the DMS-100 Family system. SOS includes the Nucleus, file system, Command Interpreter (CI), and loader.

SPCS

Stored Program Control Switch. Switching unit in which the call processing is determined by a program stored in a alterable memory.

Start-Stop Transmission

See Asynchronous Transmission.

SVC

Switched Virtual Circuit. Dynamically allocated virtual path between data communication applications, established and disconnected under level 3 control.

Table

In DMS, database tables are used to drive the behavior of the DMS-100. These tables contain such information as digit translation information, which consoles are connected to the switch, etc.

Table Editor

Device that makes use of data dictionary formatter and table control to provide a man-machine interface to the customer data schema, or table control.

Trunk

Cable that contain numerous shared telephone circuits used to intercon- nect telephone switching centers.

Trunk Group

Trunks between two points, both of which are switching centers and/or individual message distribution points, and which employ the same multiplex terminal equipment.

User

Any individual who uses a communication service, as distinguished from a subscriber, who contracts for that service from the telephone operating company.

Virtual Circuit

In packet switching, those facilities provided by the network for transferring data between the end-to-end data stations.

Window

In data communications, number of transmitted information messages that may be outstanding before acknowledgment of their receipt is returned. Both data packet levels 2 and 3 use windows. The sizes of these windows are network parameters. Thus, if level 2 has a window of size 7, then up to 7 frames may be transmitted before the other side must reply to the first frame. Further transmission must be suspended until a reply is received.

X.25

In data communications, a protocol architecture suggested by CCITT. BX.25 is the Bellcore subset specification of X.25. DATAPAC supports X.25 through Switched Virtual Circuits (SVC) only.

DMS–100 FAMILY

Data Packet Controller

Reference Manual

Product Documentation—Dept 3423
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RTP, NC 27709–3010
1–800–684–2273
(1–800–NTI–CARE)

Information is subject to change without notice. Northern
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components as progress in engineering and manufacturing
may warrant.This equipment has been tested and found to
comply with the limits for a Class A digital device pursuant to
Part 15 of the FCC Rules, and the radio interference
regulations of the Canadian Department of Communications.
These limits are designed to provide reasonable protection
against harmful interference when the equipment is operated in
a commercial environment. This equipment generates, uses
and can radiate radio frequency energy and, if not installed and
used in accordance with the instruction manual, may cause
harmful interference to radio communications. Operation of this
equipment in a residential area is likely to cause harmful
interference in which case the user will be required to correct
the interference at the user's own expense
Allowing this equipment to be operated in such a manner as to
not provide for proper answer supervision is a violation of Part
68 of FCC Rules, Docket No. 89-114, 55FR46066
The SL-100 system is certified by the Canadian Standards
Association (CSA) with the Nationally Recognized Testing
Laboratory (NRTL).
This equipment is capable of providing users with access to
interstate providers of operator services through the use of
equal access codes. Modifications by aggregators to alter
these capabilities is a violation of the Telephone Operator
Consumer Service Improvement Act of 1990 and Part 68 of the
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