297-8063-200

DMS-100 Family

1-Meg Modem Service

Network Implementation Manual

XDSL/DBIC0001 and up   Standard   03.01   September 2000

NORTEL NETWORKS™

DMS-100 Family

1-Meg Modem Service

Network Implementation Manual

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Standard 02.02. NA010. Added information on the effects of ringing, hook, status and SWACT during an off-hook condition. Added information on interface between the DMS and xEMS during SERVORD provisioning. Changed workstation-specific path names to symbolic path names. Added steps to change the hostname and IP address of HP and Sun workstations. Added trademark references to the chapter “About this document” and throughout document. Added information on VLAN provisioning. Added information on selectability of dual MAC addresses. Added information on Star Remote Hub. Added information on the bulk download of CPE firmware. Added information on NTEX17DA and NTEX54CA. Revised table on 1-Meg Modem LEDs in “Troubleshooting.” Revised software baseline to support patch JCM12BC8. Removed chapter “Transport networks” and moved information to “Introduction,” “Configuration management,” and “Network model” chapters. Moved modem connection information from “Installation” to “Introduction.” Moved information on Multi-PC Networking from “Introduction” to “Installation.”

April 1999

Standard 02.01. NA010. Revised figures in card replacement procedures. Added information on troubleshooting subscriber and 1-Meg Modem issues. Revised menu options for provisionable HSTP fields in procedure “Add an HSTP object to an xEMS submap”. Added information on NTEX54BA DBIC and support for 100BaseT Ethernet. Added information on NTEX17CA xLC and increased fill of LCM line drawer. Changed NT6X51 baseline to NT6X51AB. Revised table on available functionality. Revised parts list for hardware and software. Revised steps to configure Macintosh communication software for 1-Meg Modem Service. Revised information in “Subscriber service” to activate new service. Revised xEMS troubleshooting information. Added information on flow-through provisioning with SERVORD. Added information on default global parameters. Added information on batch provisioning.

December 1998

Standard 01.06. NA008. Added chapter on network offers. Added Xylan information to NTEX54 card replacement procedure. Changed the term *service provider* to *data service provider* throughout document. Changed the acronym *1MM* to *1-Meg Modem* throughout document. Changed the acronym *1MMS* to *1-Meg Modem Service* throughout document.

November 1998

Standard 01.05. NA008. Added information on MAC addresses. Changed the names of modem LEDs. Added information on new xLC (NTEX17BA). Added information on new filters (NTEX38BA and NTEX39BA). Added information on new DBIC (NTEX54AB). Revised the tables of parts lists in “Introduction.” Added steps to select the card in the card replacement procedures. Revised recommendation on global cutoff on disconnect. Added information on forward error correction and off-hook detection control. Added information on CPE firmware downloads. Added information on 802.1Q tagging. Added compatibility table. Revised information on upstream and downstream data rates. Added recommendations on system performance and resource maintenance. Added DMS-10 steps to NTEX17 and NTEX54 card replacement procedures. Changed the name of the document to *1-Meg Modem Service Network Implementation Manual*.

September 1998

Standard 01.04. NA008. Changed references of kilobits per second to kilobit per second. Changed references of kbps to kbit/s. Changed command syntax for command-line provisioning in “Configuration Management”. Changed naming conventions and examples for symbols in “xEMS”. Added support for Sun workstations. Added information on straight-through and cross-over cables. Changed information on xEMS events to support LAC and LC. Revised information on deleting symbols and objects. Added red status for HSTP-Network and DMS objects. Added support for ALCM, ELCM, ILCM, and LCE. Changed information on Delete selection in xEMS pop-up menus.

Changed xEMS screen captures throughout document. Changed name of document to *1-Meg Modem Service Network Implementation Guide*.

August 1998

Standard 01.03. NA008. Added information on support for multi-PC networking.

July 1998

Standard 01.02. NA008. Added “Transport networks” chapter. Added information on support for remote PMs. Revised procedures to replace NTEX17AA and NTEX54AA. Revised information on command-line provisioning. Added information on command-line maintenance. Reorganized information in “Troubleshooting” chapter.

June 1998

Preliminary 01.01. NA008. First release of document.

Contents

Figures

Tables

About this document

When to use this document

This document describes the technical requirements, functionality, and implementation guidelines for the 1-Meg Modem Service.

How to use this document

> **ATTENTION**
> This document requires a working knowledge of TCP/IP and basic UNIX commands.

Use this document to implement and support the 1-Meg Modem Service in an existing DMS-10, MSL-100, DMS-100, or DMS-500 office. The following groups can use this document:

- operating company personnel in network management centers, support centers and end offices
- Nortel personnel in support centers, engineering groups, and installation groups

Do not use this document to support the 1-Meg Modem Service in an S/DMS AccessNode office. Use the *AccessNode Express 1 Meg Modem Reference and Troubleshooting Guide*, P0887770, to support the 1-Meg Modem Service on an S/DMS AccessNode.

This document consists of the following chapters:

- “Introduction” describes the 1-Meg Modem Service and its components.
- “xEMS” describes the operations of the xDSL Element Management System (xEMS).
- “Installation” describes the installation process at the office and subscriber's location.
- “Configuration management and provisioning” describes how to configure the xEMS workstation and provision 1-Meg Modem Service.

- “Subscriber service” summarizes the steps to activate and change 1-Meg Modem Service service for a subscriber.
- “Performance management” provides specifications for subscriber loops and describes how to use management information base (MIB) variables to monitor performance.
- “Fault management” describes the status indicators at the modem, status indicators at the xEMS, and events.
- “Troubleshooting” describes how to troubleshoot common 1-Meg Modem Service problems.
- “Card replacement” provides information on replacing 1-Meg Modem Service cards at the DMS.
- “Logs” provides 1-Meg Modem Service information found in log PM181.
- “Translations and data schema” provides information on DMS translations for the 1-Meg Modem Service.
- “Network model” describes the network models for the 1-Meg Modem Service.

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.

To determine which version of this document applies to the software in your office and how documentation for your product is organized, check the release information in *Product Documentation Directory*, 297-8991-001.

This document is written for all DMS-100 Family offices. More than one version of this document can 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

This section lists the documents that are referred in this document.

Nortel Networks documents

This document refers to the Nortel Networks documents that follow:

- *1-Meg Modem Service Throughput Testing at the DMS*, Installation Method 35-5545
- *1-Meg Modem Service DBIC Release Notes*
- *1-Meg Modem Service xEMS Release Notes*
- *1-Meg Modem User Guide*, AO688537
- *AccessNode Express 1-Meg Modem Reference and Troubleshooting Guide* P0905280
- *Adding 1-Meg Modem Service at the DMS*, Installation Method 35-5544
- *Card Replacement Procedures*
- *Customer Data Schema Reference Manual*
- *Lines Maintenance Guide*, 297-1001-594
- *Log Reports Reference Manual*
- *Product Documentation Directory*, 297-8991-001
- *Servord Reference Manual*
- *Translations Guide*
- *xEMS Workstation for 1-Meg Modem*, Installation Method 35-5543

Other documents

This document refers to the other documents that follow:

- Hewlett-Packard Company, *Using Network Node Manager HP OpenView*

What precautionary messages mean

The types of precautionary messages used in Nortel Networks 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

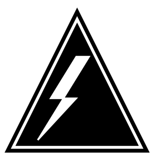
ATTENTION

Contact your network administrator if you do not know the IP address.

DANGER - Possibility of personal injury

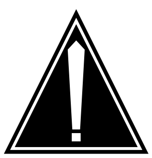
DANGER
Risk of electrocution
Do not open the front panel of the inverter unless fuses F1, F2, and F3 are removed. The inverter contains high-voltage lines. Until the fuses are removed, the high-voltage lines are active, and you risk being electrocuted.

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. 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 UNIX command are case-sensitive. The commands are shown in uppercase and lowercase letters:

```
>setenv DISPLAY 47.158.0.15
```

Variables

Variables are shown in brackets:

```
>cd <directory_name>
```

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.
```

How measurements are described

The following table lists measurement abbreviations used in this document.

Table 1 Measurement abbreviations

Abbreviation	Description
dB	decibel
dBm	decibel above one milliwatt
Gbyte	gigabyte
Hz	hertz
kbaud	kilobaud
kbit/s	kilobit per second
kHz	kilohertz
Mbyte	megabyte
V	volt

How trademarks are represented

An asterisk (*) after a name denotes a trademarked item. The title page and back cover acknowledge all trademarked items.

1 Introduction

This chapter introduces the 1-Meg Modem Service. The chapter describes the following:

- 1-Meg Modem Service components
- the protocols in the 1-Meg Modem Service
- the data path in the 1-Meg Modem Service
- available functionality across 1-Meg Modem Service releases and hardware configurations
- software baselines

1-Meg Modem Service

The 1-Meg Modem Service provides high-speed, data-over-voice communications over standard telephone lines to the home or small-office subscriber. The service provides the following functionality:

- high bandwidth with line transport rates up to 1280 kilobits per second (kbit/s) downstream and 320 kbit/s upstream
- simultaneous data and voice connection
- continuous data connection
- data traffic routed to data networks, which reduces congestion on the voice switch

The 1-Meg Modem Service uses digital subscriber line (DSL) technology to provide the increased bandwidth with current office equipment and the subscriber loop.

Note: In this document, the term xDSL refers to all the DSL technologies.

Components

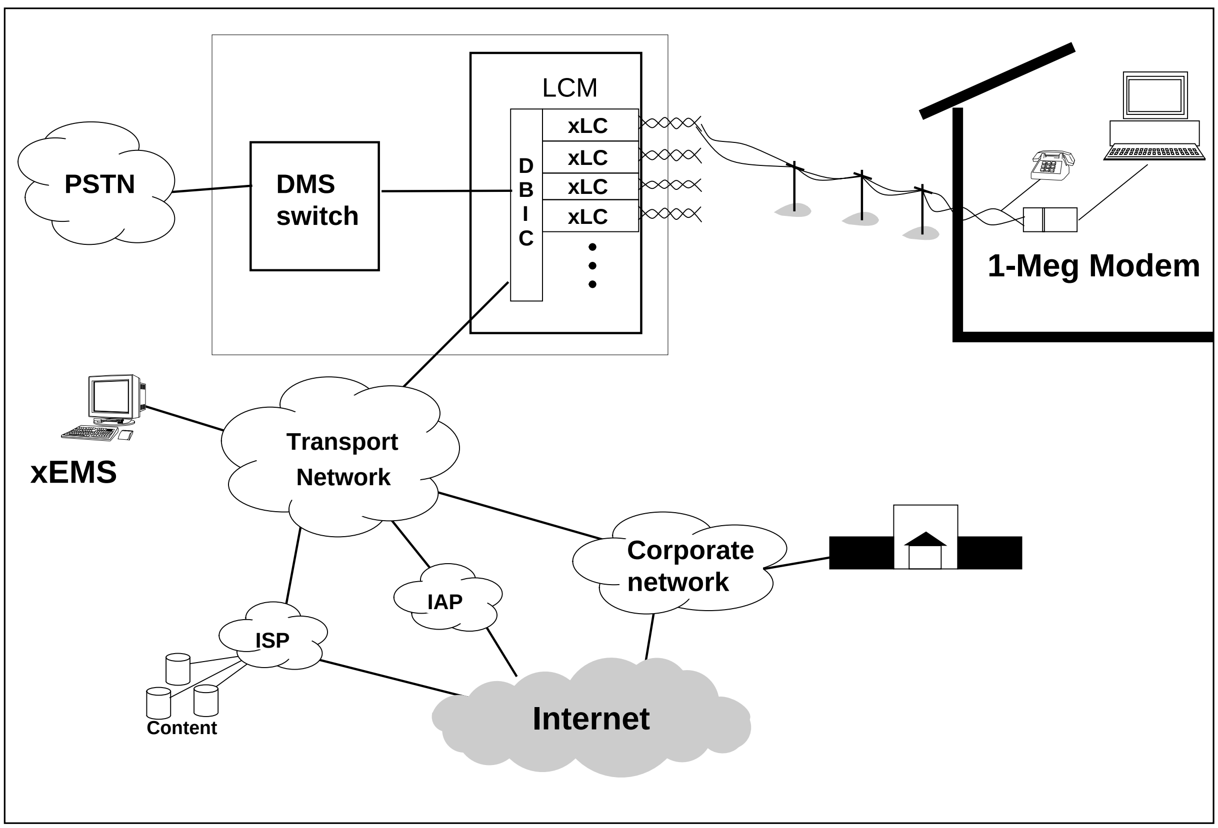
The 1-Meg Modem Service includes the following components:

- The 1-Meg Modem is customer-premise equipment (CPE) that connects the subscriber’s telephone line, extension telephone and computer. To the subscriber, the modem installs like a voice band modem, except the modem uses a 10BaseT Ethernet connection to the computer.

- A new xDSL line card (xLC) replaces the subscriber's line card in a line concentrating module (LCM) drawer. The card provides full voice service in parallel with high speed data communication with the 1-Meg Modem.
- A new data-enhanced bus interface card (DBIC) replaces the existing bus interface card (BIC) in the LCM drawer. The card is as a concentrator for the voice and data connections within a single LCM drawer. The card also separates the voice and data traffic for routing to the correct networks.
- The transport network is one or more Ethernet devices that provide the connection to the data service providers.
- The xDSL Element Management System (xEMS) provides operations, administration, maintenance, and provisioning (OAM&P) functions for the 1-Meg Modem Service. The xEMS is a graphical user interface (GUI) based on HP* OpenView* that runs on a Hewlett-Packard* (HP) or Sun* workstation.

Figure 1-1 shows an overview of the 1-Meg Modem Service

Figure 1-1 Overview of 1-Meg Modem Service



The configuration of the transport network can require the Ethernet interfaces to connect to a mix of network components. The flexibility of the 1-Meg Modem Service allows you to change the interface to public and private wide area networks (WAN) to meet your requirements. Examples of WANs are Internet access providers (IAP), Internet service providers (ISP), and corporate networks.

Potential applications

Potential applications of the 1-Meg Modem Service include the following:

- work-at-home

  The subscriber uses the 1-Meg Modem Service, including the transport network, to connect to their corporate network.

- Internet access

  The subscriber uses the 1-Meg Modem Service, including the transport network, to connect to their ISP.

- small office communications

  The subscriber uses the 1-Meg Modem Service, including the transport network, to connect to their corporate network. Two small offices can communicate through the 1-Meg Modem Service and depend on the transport network for interconnection.

Availability

The 1-Meg Modem Service is available on the following frame-based and cabinet-based peripheral modules (PM) in DMS-10[*], DMS-100[*], DMS-500[*], and SL-100[*] offices:

- host LCMs
- remote LCMs
- Austrian LCMs (ALCM)
- Autovon LCM (ELCM)
- international LCM (ILCM)
- remote switching center (RSC) or remote cluster controller (RCC)
- remote switching center with SONET (RSC-S) or remote cluster controller 2 (RCC2)
- Star Remote Hub

The 1-Meg Modem Service is also available for the S/DMS AccessNode[*] office. Refer to the *AccessNode Express 1 Meg Modem Reference and Troubleshooting Guide*, P0887770, for information on the 1-Meg Modem Service in S/DMS AccessNode.

Compatibility with other networks

This section describes compatibility between the 1-Meg Modem Service and other networks.

Voice network

The 1-Meg Modem Service shares many components with the existing voice network. Some of these components follow:

- LCM hardware, including power supplies and distribution
- the line drawer and the cards in the line drawer
- the subscriber's copper loop

Other data services

The 1-Meg Modem Service can function with the following data services in the same binder group:

- integrated services digital network (ISDN) basic rate interface (BRI)
- asymmetric digital subscriber line (ADSL)
- high bit rate digital subscriber line (HDSL) services

The 1-Meg Modem Service can function with T1 services in adjacent binder groups.

1-Meg Modem Service components

The following section describes the following components in the 1-Meg Modem Service.

- 1-Meg Modem
- xLC
- DBIC
- LCM line drawer
- transport network

> ***Note:*** Refer to the chapter “xEMS” for information on xEMS.

1-Meg Modem

The 1-Meg Modem is a plug-and-play modem that connects to a subscriber's telephone line, an extension telephone, and a computer.

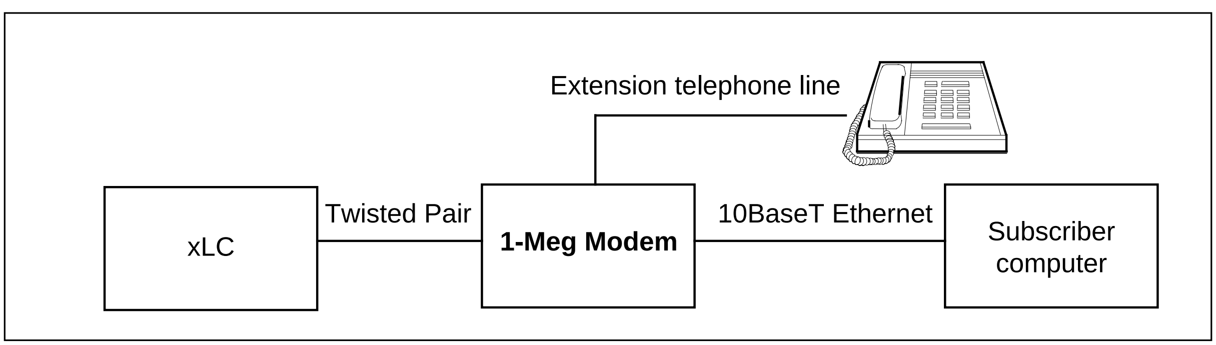
The 1-Meg Modem has the following features:

- a 10BaseT Ethernet/IEEE 802.3 connection for the subscriber to home computer
- connection to any Ethernet-device, such as a personal computer (PC) or workstation
- connection to existing copper twisted pair in the subscriber's home
- transport line rates of 320/240/160/120/80/40 kbit/s upstream and 1280/960/640/320/240/160/80 kbit/s downstream for home computer Ethernet port
- 16V power supply that plugs into a wall outlet
- no additional software required
- standard RJ-11 jack, so the subscriber can connect the unit to any existing jack in the home
- pass-through RJ-11 jack for local connection to a fax, analog modem, answering machine, or telephone
- RJ-45 jack for standard 10BaseT Ethernet connection to a computer

The 1-Meg Modem measures 1.82 inches x 6.5 inches x 9.15 inches. The 1-Meg Modem is a plug and play device that the subscriber installs without a service call. The subscriber can install the 1-Meg Modem horizontally or vertically. However, the modem must be at least 12 inches from the monitor and central processing unit. The modem must also be away from direct sunlight.

Figure 1-2 shows the 1-Meg Modem in the 1-Meg Modem Service.

Figure 1-2 1-Meg Modem in 1-Meg Modem Service



Types of 1-Meg Modem

The 1-Meg Modem Service supports two 1-Meg Modems: NTEX35AA and NTEX35BA. The NTEX35AA has a power switch on the back of the modem. The NTEX35BA does not have a power switch.

The 1-Meg Modem Service supports different types of each 1-Meg Modem. The modems have identical functions and different colors. Table 1-1 lists each type of modem.

Table 1-1 Types of 1-Meg Modem

PEC	Power switch	Description
NTEX35AA	Yes	Generic NTEX35AA 1-Meg Modem
NTEX35AAAB	Yes	Grey modem
NTEX35AAAC	Yes	Grey modem for Bell Canada subscribers
NTEX35AAAD	Yes	Red modem for Transwire subscribers
NTEX35BA	No	Generic NEX35BA 1-Meg Modem
NTEX35BAAB	No	Grey modem
NTEX35BAAC	No	Grey modem for Bell Canada subscribers
NTEX35BAAD	No	Red modem for Transwire subscribers

Note: In this document, NTEX35AA refers to all versions of the NTEX35AA 1-Meg Modem. NTEX35BA refers to all versions of the NTEX35BA 1-Meg Modem.

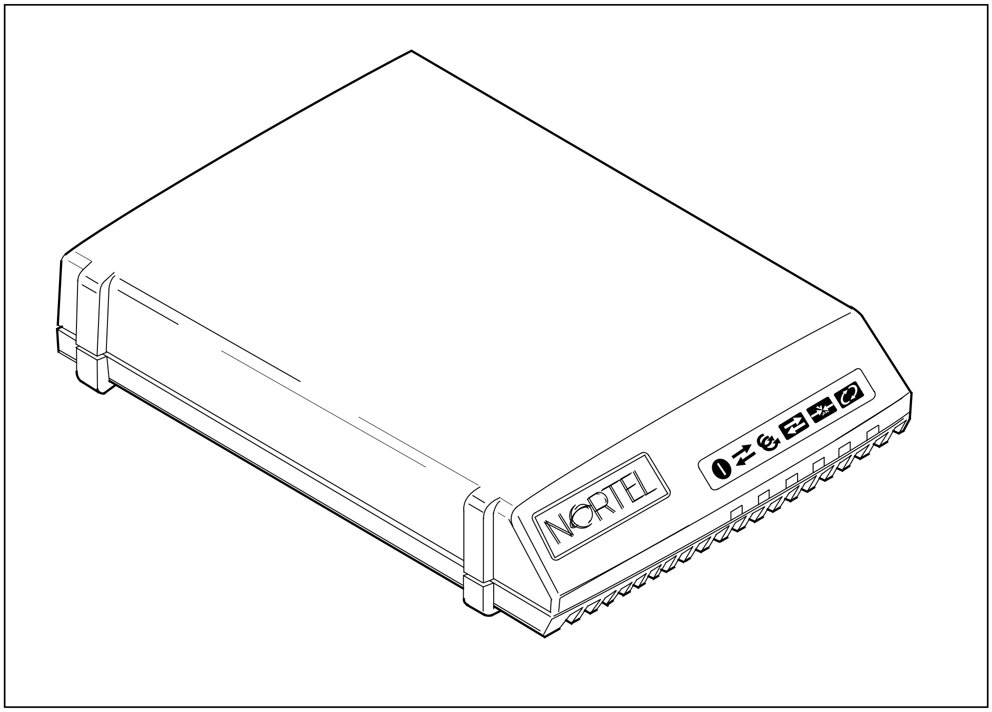
Other differences in available functionality depend on the version of DBIC and xLC that supports the 1-Meg Modem. Refer to Table 1-11 in this chapter for more information.

Some customers can offer an internal PCI card to its subscribers as a modem. The internal PCI card is the Diamond Multimedia Suprasonic 1-Meg Modem.

Physical description

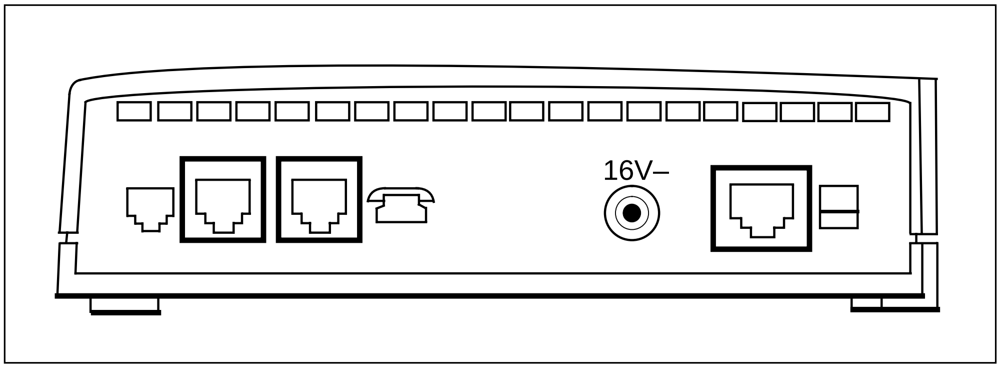
LEDs on the front of the modem indicate status and activity. Figure 1-3 shows a front view of a horizontal 1-Meg Modem.

Figure 1-3 Front view of 1-Meg Modem



Connectors on the back of the modem connect the modem to the computer or hub, power supply, telephone jack, and extension telephone. Figure 1-4 shows a back view of a horizontal 1-Meg Modem.

Figure 1-4 Back view of 1-Meg Modem

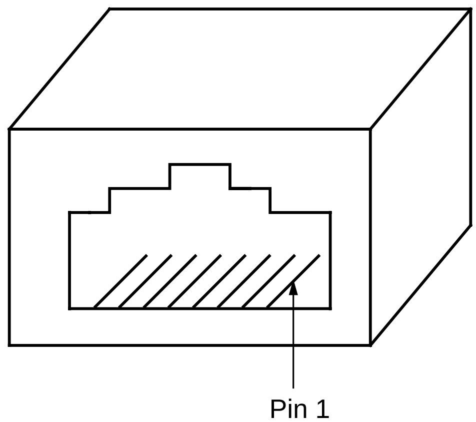


Note: The previous figure shows an NTEX35BA.

Rear connections

Figure 1-5 shows the RJ45 jack on the 1-Meg Modem and the jack pinouts.

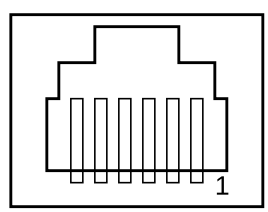
Figure 1-5 RJ45 jack and pinouts



PIN	Signal
1	RXIN+
2	RXIN-
3	TXOUT+
6	TXOUT-

Figure 1-6 shows the RJ11 jack on the 1-Meg Modem and the jack pinouts.

Figure 1-6 RJ11 jack and pinouts



	1	2	3	4	5	6
4 wire	PT1	PT2	Tip	Ring	PT3	PT4

Telephone filters

Telephone filters separate telephones and the 1-Meg Modem, allowing the devices to operate under best conditions. The telephone filter is a low pass frequency (LPF) filter with corner frequency of approximately 10kHz. The filter prevents xDSL signals from reaching the telephone set, which ensures that the xDSL signals do not affect telephone set performance in the VF band

(200Hz to 4kHz). The filter also ensures the extension telephones do not load TIP/RING conductors in the xDSL frequency range of 46kHz to 320kHz.

The 1-Meg Modem Service has only a minor affect on voice service. Subscribers can notice the following changes in voice service:

- audible noise in a telephone when the modem is on
- an interruption or degradation in data throughput when a telephone goes off-hook or on-hook

These changes normally occur if you bridge telephones on the same loop as the 1-Meg Modem. In most instances, the subscriber does not notice these changes. If these changes become a concern, the subscriber can install telephone filters on the telephone sets to reduce the problem.

Many user telephones do not require filters. However, Nortel Networks* provides two types of filters: a desk mount model and a wall mount model. The subscriber connects the filter between the voice telephone and the wall outlet.

Figure 1-7 shows a desk mount filter.

Figure 1-7 Desk mount telephone filter

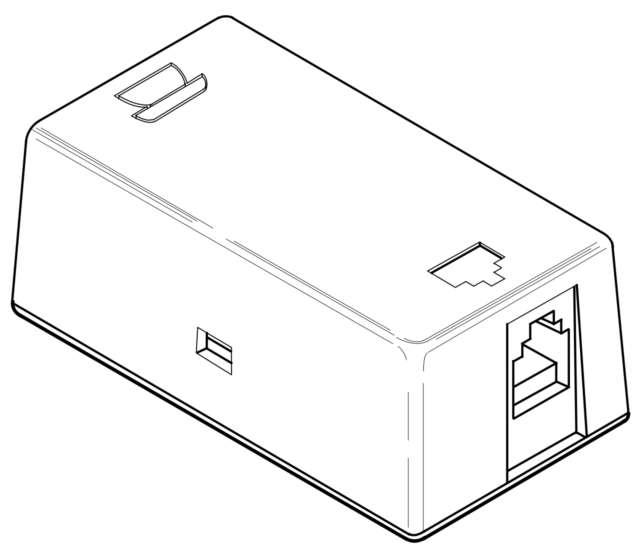
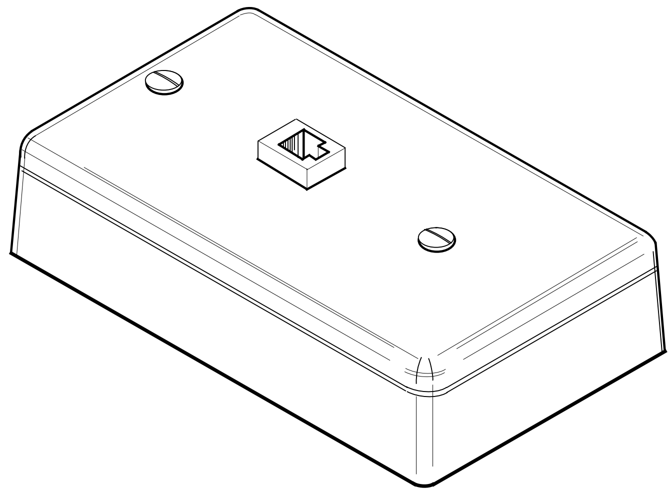


Figure 1-8 shows a wall mount telephone filter.

Figure 1-8 Wall mount telephone filter



Nortel Networks has released two versions of each type of filter. Table 1-2 lists each version of each type of filter and the functional differences in the filters.

Table 1-2 Telephone filters

PEC	Name	Description
NTEX38AA	Wall mount filter	Basic wall mount filter
NTEX38BA	Wall mount filter	Wall mount filter with improved noise isolation over NTEX38AA
NTEX39AA	Desk mount filter	Desk mount filter with unique telephone and RJ-11 jacks
NTEX39BA	Desk mount filter	Desk mount filter with interchangeable telephone and RJ-11 jacks

xLC

The xDSL line card (xLC) provides full voice service and high speed data communication with a subscriber's 1-Meg Modem.

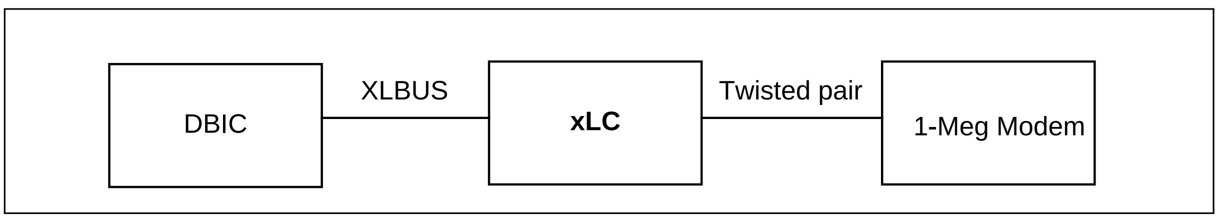
The xLC has the following features:

- located in a standard LCM line drawer with 1-Meg Modem Service capability
- provides standard voice service using the world line card (WLC)
- provides xDSL modem function over loops up to 19,500 feet on 26 American wire gauge (AWG)

- rate-adaptable in both downstream (DS) and upstream (US) directions
- quadrature amplitude modulation (QAM) in both DS and US directions
- forward error correction (FEC) in both DS and US directions
- interleaving in DS direction for enhanced impulse noise immunity at 256 QAM wideband rate
- supports both narrowband and wideband DS spectra
- raw transport downstream data rates of 1280 kbit/s to 80 kbit/s
- raw transport upstream transport data rates of 320 kbit/s to 40 kbit/s
- provides an XLBUS interface to backplane
- -48V power to data part of card
- self-identifying to DBIC on installation
- out-of-service data loopback capability for OAM
- low power design

The xLC terminates the subscriber's line and transmits the call to the DBIC for multiplexing. Figure 1-9 shows the xLC in the 1-Meg Modem Service.

Figure 1-9 xLC in 1-Meg Modem Service



Types of xLCs

WARNING
Possible equipment damage
Thermal constraints and power distribution determine the type and number of line cards in the LCM line drawer. Refer the “Installation” chapter of this document for additional information.

The 1-Meg Modem Service supports four types of xLCs. Each xLC supports different transmission rates, LCM drawer fill requirements, and PMs. Table 1-3 lists the xLCs that the 1-Meg Modem Service supports.

Table 1-3 Types of xLCs

PEC	Maximum US/DS rates (kbit/s)	Maximum LCM drawer fill	PMs
NTEX17AA	960/120	16	All host LCMs
NTEX17BA	1280/320	16	All host LCMs
NTEX17CA	1280/320	31	All host LCMs
NTEX17DA	1280/320	31	• RLCM • Star Remote Hub

Note: The section “Availability” in this chapter lists all the PMs that the 1-Meg Modem Service supports.

The version of DBIC and 1-Meg Modem in the subscriber loop determines other types of functionality. Refer to Table 1-11 in this chapter for more information.

DBIC

The DBIC replaces the existing BIC in each LCM drawer with an xLC. The DBIC separates the voice and data traffic. The card multiplexes the voice traffic to standard DS-30A interfaces to the existing circuit switched voice network. The card multiplexes the data traffic to one 10BaseT Ethernet or 100BaseT connection to the transport network.

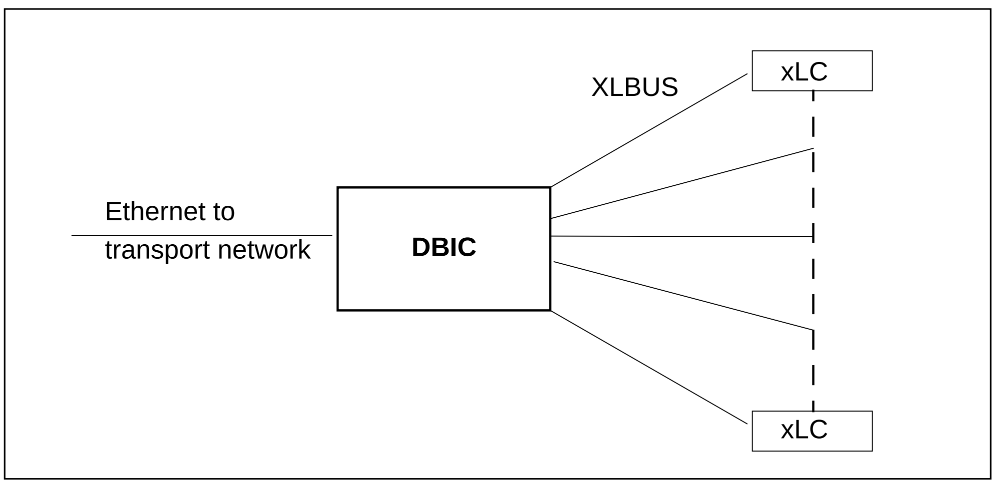
The DBIC has the following features:

- half duplex, standard compliant Ethernet interface
- auto-sensing features allows DBIC to connect at 10BaseT or 100BaseT
- connected to all line card slots through XLBUS

- backwards compatible with all POTS line cards compatible with the NT6X54AA
- discovers xLCs automatically to allow for plug and play setup
- different media access control (MAC) addresses for each xLC and DBIC
- demultiplex 64 voice channels from receive data (RD) links to XLBUS links
- multiplex 64 voice channels from XLBUS links to transmit data (TD) links
- +12.7v CODEC reference to all 64 line positions
- controls ring bus and automatic number ID (ANI)/COIN voltages using relays

Any LCM line drawer that contains xLCs must have a DBIC. Figure 1-10 shows the DBIC in the 1-Meg Modem Service.

Figure 1-10 DBIC in 1-Meg Modem Service



Types of DBICs

The 1-Meg Modem Service supports four types of DBICs. Each DBIC supports different transmission rates, Ethernet interfaces, and PMs. Table 1-4 lists the types of DBICs that the 1-Meg Modem Service supports.

Table 1-4 Types of DBICs

PEC	Maximum US/DS rates (kbit/s)	Ethernet interface	PMs
NTEX54AA	960/120	10BaseT	All host PMs
NTEX54AB	1280/320	10BaseT	All host PMs
NTEX54BA	1280/320	10BaseT or 100BaseT	All host PMs
NTEX54CA	1280/320	10BaseT or 100BaseT	• RLCM • Star Remote Hub
Note: The section “Availability” in this chapter lists all the PMs that the 1-Meg Modem Service supports.			

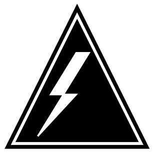
The version of xLC and 1-Meg Modem in the subscriber loop determines other types of functionality. Refer to Table 1-11 in this chapter for more information.

DBIC MAC address

The MAC address is a unique 12-digit hexadecimal number that identifies the DBIC in the network. Nortel Networks programs the MAC address into the DBIC at the factory. The first six digits of the DBIC MAC address identify the address as a Nortel Networks MAC address.

Barcode and numeric characters on the DBIC display the MAC address. To provision a DBIC, a maintenance technician must read the MAC address on the DBIC and datafill the number in the xEMS and the MAP terminal.

LCM line drawer



WARNING
Possible equipment damage
Thermal constraints and power distribution determine the type and number of line cards in the LCM line drawer. Refer the “Installation” chapter of this document for additional information.

An LCM line drawer that supports 1-Meg Modem Service contains the components that follow:

- one DBIC that provides one 10BaseT or 100BaseT Ethernet connection to the transport network
- one xLC for each 1-Meg Modem Service subscriber

Table 1-5 lists the types of LCM line drawers that the 1-Meg Modem Service supports.

Table 1-5 Types of LCM line drawers

PEC	Description	Use
NT6X05AA	Standard POTS line drawer	LCE
NT6X05EA	Standard POTS line drawer with provisionable BIC	LCE
NT6X05HA	Standard POTS line drawer with provisionable BIC for cabinetized line concentrating equipment (CLCE)	CLCE

The LCM line drawer can contain a mix of xLCs and plain old telephone service (POTS) line cards. The LCM line drawer has only one Ethernet connection, but each line drawer in the LCM can have a different Ethernet connection.

Transport network

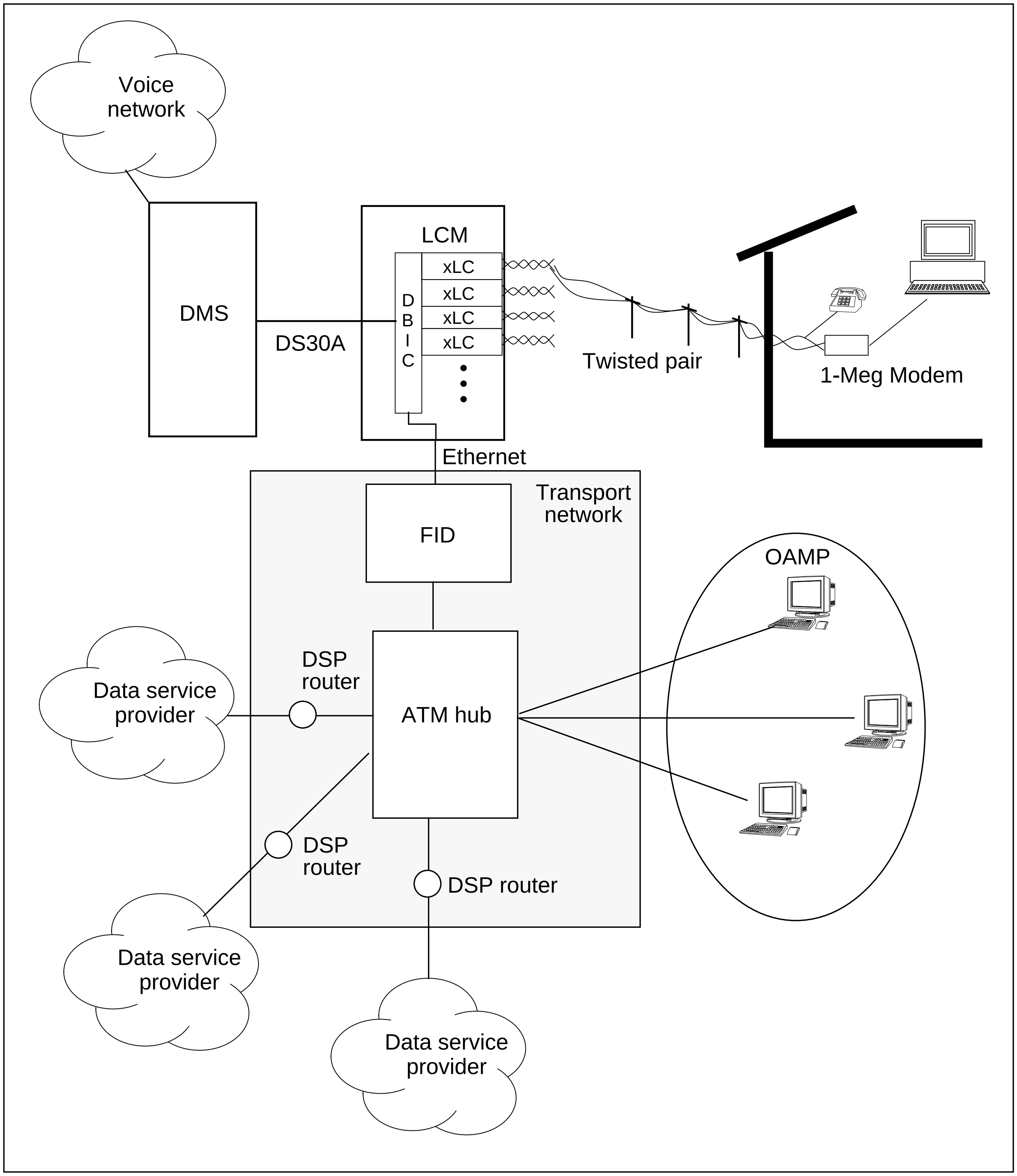
The transport network is one or more Ethernet devices that connect the 1-Meg Modem Service to data service providers. The types of devices in the transport network follow:

- a fan-in device (FID) that provides the functions that follow:
  - — consolidates wire center traffic to one or more WAN links to transport
  - — maps a loop to a virtual LAN (VLAN) and a permanent virtual circuit (PVC) for a service network
  - — isolates OAM&P traffic from user data
- an asynchronous transfer mode (ATM) switch that serves as a hub to the data network and provides the functions that follows:
  - — consolidates traffic from various locations in the network
  - — provides fan-out to data service providers (DSP) and corporate networks
  - — provides interface to OAM&P systems
- DSP routers

Note: Some devices require additional OAM&P workstations on the network.

Figure 1-11 shows these devices in the 1-Meg Modem Service network.

Figure 1-11 Transport network in 1-Meg Modem Service



Some characteristics of the transport network follow:

- The transport network does not require special software on the subscriber's computer.
- The data service provider controls billing, access, and authentication.
- The transport network allows the subscriber to remain connected to the data service provider.
- The subscriber uses an easy procedure to configure the PC for service access.
- The DBIC has broadcast control.
- The transport network supports a half-duplex Ethernet interface to the DBIC.
- The data service provider assigns the Internet Protocol (IP) address. If assignment is dynamic, the data service provider uses BOOTP and Dynamic Host Control Protocol (DHCP).
- The transport network does not support multicast traffic.
- The 1-Meg Modem Service passes only IP traffic to the transport network.
- Each subscriber has a single data service provider.
- The data service provider controls downstream broadcasts.
- If the data service provider has multiple ports to the transport network, the data service provider must route the traffic between ports.
- The transport network supports VLAN functionality. For security purposes, each 1-Meg Modem Service subscriber may have a VLAN between the subscriber and the data service provider.

Note: Refer to “Network model” in this document for information on the models and devices for the transport network.

Supported protocols

This section describes the protocols that the 1-Meg Modem Service uses to carry data from the subscriber to the data service provider.

DBIC

This section describes the protocols that the DBIC uses.

Ethernet

The DBIC has a half-duplex Ethernet interface on the network side. The DBIC stores downstream frames and sends frames with MAC addresses that match the MAC addresses of the active users. Similarly, the DBIC stores frames from the user side. The DBIC sends these frames to the network when it receives the whole frame. The DBIC also sends address resolution protocol (ARP) frames and broadcast frames to the user.

The DBIC sends all user traffic out at the Ethernet port. This method has the following advantages:

- makes sure that all traffic goes to the correct data service provider
- reduces the bandwidth overhead for broadcasts
- improves network security

XLBUS

The DBIC uses a point-to-point connection to each line card to exchange voice and data with the xLCs. The extended LBUS (XLBUS) is bidirectional with a total capacity of approximately 1.8 M/bits for data traffic. Upstream data, downstream data, and control data share this capacity. The XLBUS carries user data, synchronization and xLC control and status information. The control data carried over the XLBUS allows the DBIC processor to access registers in the xLC. User frames passed by the XLBUS have special Start Of Frame (SOF) and End Of Frame (EOF) control bytes.

xLC and loop

The xLC and subscriber loop use the following protocols.

XDLC

The user data in the xLC is encapsulated into the XNET Data Link Control (XDLC) protocol, which is based on High Level Data Link Control (HDLC) protocol.

XLINK

The XLINK frame has a fixed length for robust framing.

XLOOP

The XLOOP includes the details that relate to the modulation used to carry data over the copper loop. In the downstream direction, 256/64/16/4-QAM can be used over narrowband or wideband spectrums providing 1280, 960, 640, 320, 240, 160 or 80 kbit/s of raw data throughput. In the upstream direction, 256/64/16/4-QAM are also used providing 320, 240, 160, 120, 80 or 40 kbit/s of raw data throughput.

1-Meg Modem

The Ethernet interface at the 1-Meg Modem provides a half-duplex 10BaseT or 100BaseT connection. The interface does not filter local traffic and passes all traffic upstream.

Data paths

The following section describes the data path of IP and ARP messages between the subscriber and the data service provider.

Subscriber to data service provider

Figure 1-12 shows the data path between the subscriber and the data service provider.

Figure 1-12 Data path between subscriber and data service provider

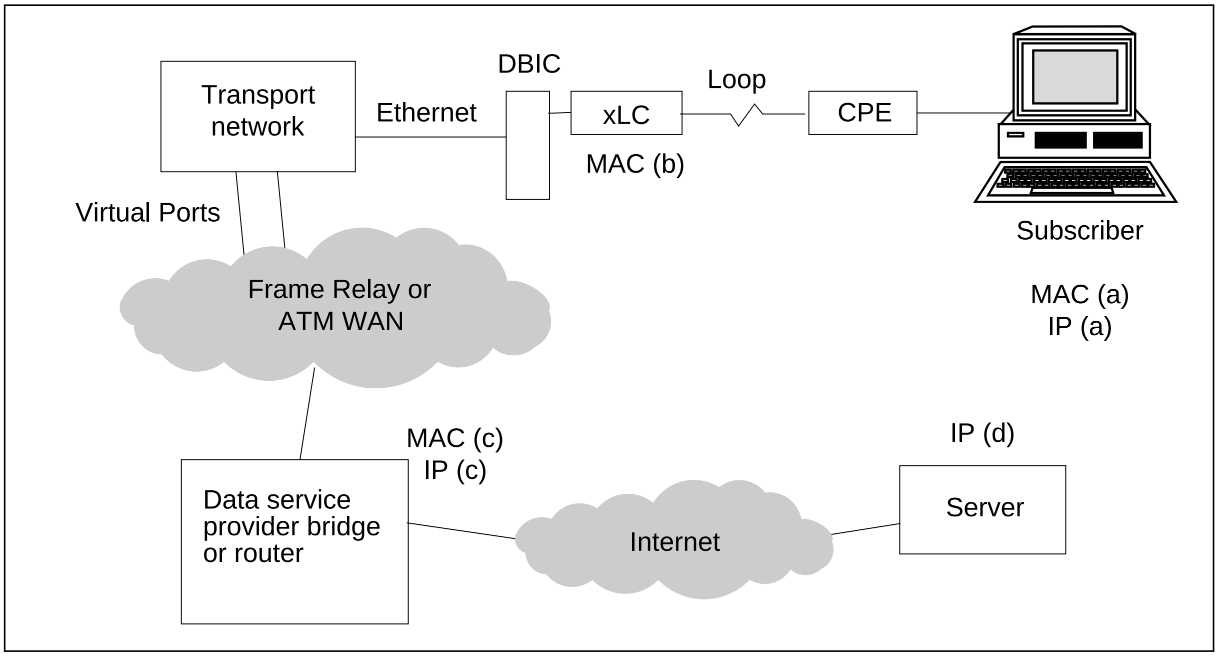
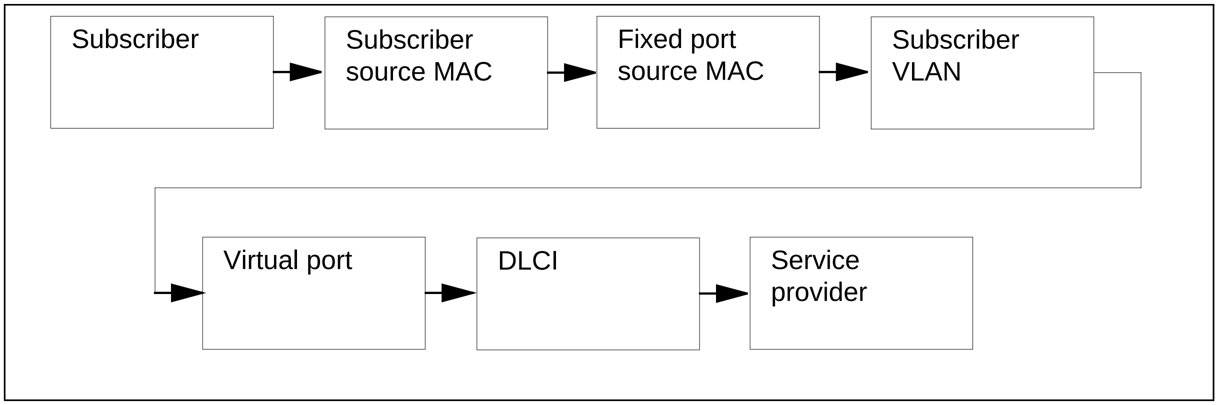


Figure 1-13 shows the data path from the subscriber to the data service provider.

Figure 1-13 Data path from subscriber to data service provider



The following list describes the steps in the data path from the subscriber to data service provider.

1. **Upstream broadcast** The subscriber starts an IP application, such as a web browser, and enters a URL to connect to a server. This entry sends an ARP request message.

Figure 1-14 ARP request

Ethernet header		Ethernet payload					
Destination Broadcast MAC	Source MAC (a)			Sender MAC (a)	Sender IP (a)	Target MAC (?)	Target IP (d)

2. The DBIC identifies the source MAC (MAC(a)) when it performs the following tasks:
   a. examines the source MAC of every message received upstream
   b. enters the source MAC into the translation table

   The MAC address stays valid and locked in the translation table for a configured time limit. The DBIC replaces the source MAC address of Ethernet frame with the pre-configured MAC address supplied with the DBIC. The DBIC assigns a different MAC to each xLC port. If the message is an ARP message, the DBIC updates the payload of the ARP message with the DBICs pre-configured MAC address.

Figure 1-15 Translated ARP request

Ethernet header		Ethernet payload					
Destination Broadcast MAC	Source MAC (b)			Sender MAC (b)	Sender IP (a)	Target MAC (?)	Target IP (d)

3. The switch receives the broadcast or unicast message and transmits the message to the data service provider's virtual port. The switch encapsulates the message in a frame relay frame or in an ATM cell. In ATM, the switch divides Ethernet frames into many ATM cells.

Figure 1-16 Encapsulated ARP request

Frame relay or ATM header		Payload		
Q.922 (DLCI) or VPI/VCI		Destination Broadcast MAC	Source MAC (b)	Ethernet payload

4. The data service provider decapsulates the Ethernet frame and bridges the frame to the data service provider router. The router routes the frame to either the destination or to the ARP process which will issue an ARP reply. The data service provider must not return the broadcast back to the switch.

5. **Downstream unicast** If the message is an ARP reply, the data service provider router sends an ARP reply unicast to the switch over the WAN.

Figure 1-17 Encapsulated ARP reply

Frame relay or ATM header		Payload		
Q.922 (DLCI) or VPI/VCI		Destination MAC (b)	Source MAC (c)	Ethernet payload

6. The switch decapsulates the message and sends the message to the destination port identified by MAC(b).

Figure 1-18 Decapsulated ARP reply

Ethernet header		Ethernet payload					
Destination MAC (b)	Source MAC (c)			Sender MAC (c)	Sender IP (d)	Target MAC (b)	Target IP (a)

7. The switch transmits the Ethernet message to the DBIC. The DBIC locates the MAC in the translation table and translates the message.

Figure 1-19 Translated ARP reply

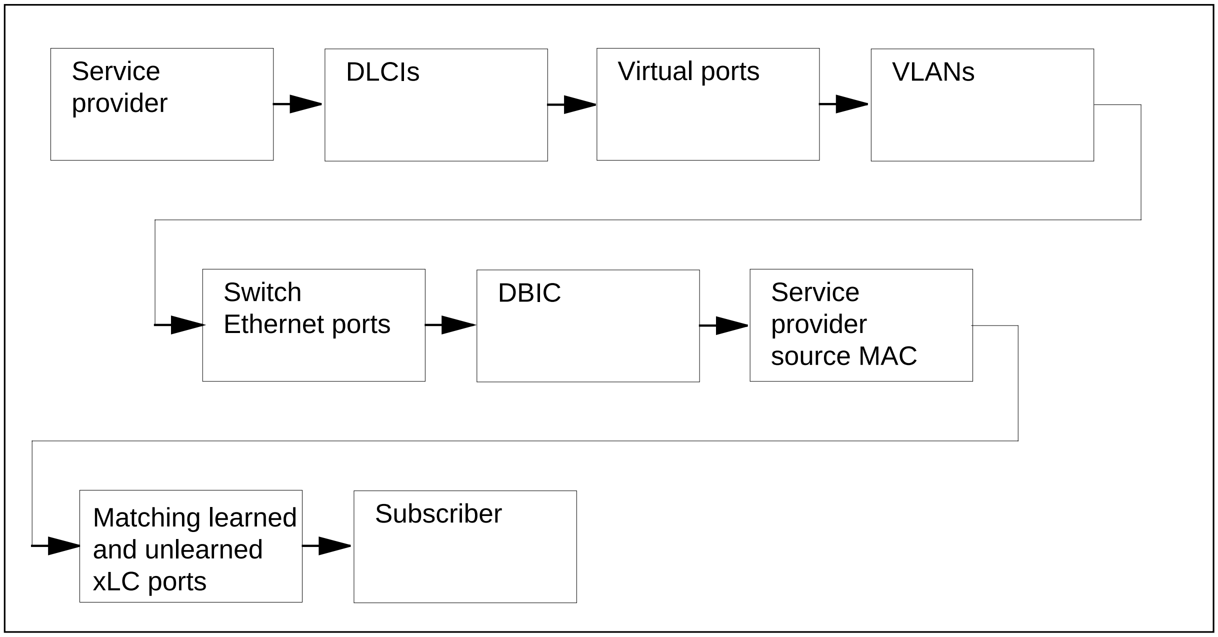
Ethernet header		Ethernet payload					
Destination MAC (a)	Source MAC (c)			Sender MAC (c)	Sender IP (d)	Target MAC (a)	Target IP (a)

8. The DBIC transmits the translated ARP reply to the subscriber. The subscriber stores the MAC address MAC(c) in its ARP cache.

Data service provider to subscriber

Figure 1-20 shows the data path from the data service provider to the subscriber.

Figure 1-20 Data path from data service provider to subscriber



The following list describes the steps in the data path from the data service provider to the subscriber.

1. **Downstream broadcast** The data service provider issues an ARP request to a subnet to determine the destination MAC address for an IP packet. The data service provider transmits the request over frame relay or the ATM network to the switch.

Figure 1-21 Encapsulated ARP request

Frame relay or ATM header		Payload		
Q.922 (DLCI) or VPI/VCI		Destination Broadcast MAC	Source MAC (c)	Ethernet payload

2. The switch decapsulates the message and sends the message to the Ethernet port of the DBIC in the group for that virtual port.

Figure 1-22 ARP request

Ethernet header		Ethernet payload					
Destination MAC (a)	Source MAC (c)			Sender MAC (c)	Sender IP (c)	Target MAC (?)	Target IP (a)

3. The DBIC matches the source MAC(c) to the learned data service provider MAC for each subscriber and transmits the ARP request message to each subscriber. The DBIC can forward the ARP request message when the data service provider MAC is unknown. The DBIC maintains a table that maps a data service provider MAC address to each subscriber. This table helps to limit downstream broadcast traffic.

4. **Upstream unicast** The subscriber with the IP address (a) sends an ARP reply to the data service provider. If the data service provider receives multiple replies, the data service provider examines the source MAC address of the ARP reply to identify the incorrect IP address.

Figure 1-23 ARP reply

Ethernet header		Ethernet payload					
Destination MAC (c)	Source MAC (a)			Sender MAC (a)	Sender IP (a)	Target MAC (?)	Target IP (c)

5. The DBIC translates the ARP reply from the subscriber and transmits the reply to the switch.

Figure 1-24 Translated ARP reply

Ethernet header		Ethernet payload					
Destination MAC (c)	Source MAC (b)			Sender MAC (a)	Sender IP (a)	Target MAC (c)	Target IP (c)

6. The switch encapsulates the ARP reply and transmits the reply to the data service provider. The switch performs VLAN checking, which prevents unicast from going to other data service providers.

Figure 1-25 Encapsulated ARP reply

Frame relay or ATM header		Payload		
Q.922 (DLCI) or VPI/VCI		Destination Broadcast MAC (c)	Source MAC (b)	Ethernet payload

7. The data service provider receives the ARP reply. The data service provider decapsulates the reply and bridges the reply to the router. The router stores the entry in its ARP cache for later unicast traffic.

Local switching

Local switching allows the DBIC to pass traffic between subscribers within the DBIC and reduce network traffic. You can use local switching in a campus network, where subscribers often communicate with one another in the network.

When local switching is enabled, downstream provider MAC learning is disabled. The local switching setting supports hubbed or bridged LANs that have no local restrictions on available services.

If you disable local switching, subscribers cannot communicate directly with one another. The DBIC learns the downstream MAC address and prevents the subscriber from receiving all downstream broadcast traffic from other devices.

For this reason, do not disable local switching when the 1-Meg Modem Service supports hubbed or bridged LANs. A hubbed LAN indicates that multiple source MAC addresses can communicate with subscribers. The local switch disabled setting supports VLANs and other controlled networks that provide security and simple transport to a data service provider.

Normally Ethernet LANs function as broadcast media. However, if you disable local switching, the DBIC no longer performs like a hub. The DBIC passes traffic like a channelized point-to-point network. Ethernet frames received from a subscriber line are only passed to the Ethernet port on the DBIC. Once the DBIC learns the data service provider's MAC address, the DBIC does not send broadcast traffic from other data service providers or devices to the subscriber. The DBIC examines the source MAC address of the broadcast message to determine which messages to send to the subscriber. Frames received from the Ethernet section of the DBIC will only pass to the subscriber. The destination MAC address determines the subscriber that receives the frame. The assigned MAC address or the learned MAC address determines the destination subscriber line, regardless of whether MAC translation is enabled or disabled.

Local switching provides flexibility for the DBIC to operate in different network environments.

If you disable local switching and enable MAC translation, you will affect communications between subscribers. If the office is at Release 4 or lower, subscribers on the same DBIC cannot communicate with each other. If the office is at Release 5 or higher, subscribers on the same DBIC or different DBICs cannot communicate with each other.

MAC translation

When enabled, MAC translation supports special handling of ARP and BOOTP/DHCP messages. The MAC address is swapped inside the ARP or BOOTP/DHCP message.

MAC translation is useful in a transport network with a VLAN MAC configuration. The MAC address is known before the subscriber connects, so the operating company can pre-configure the VLAN.

Table 1-6 shows a DBIC switching table. The ASN.1 MIB documentation, included with each DBIC load and available on-line through xEMS, includes a full description of this table.

Table 1-6 DBIC switching table

Subscriber interface	Valid	Learned subscriber MAC address	Learned provider MAC address	Port static MAC address
1	Valid	000000000001	000000000020	006038000001
2	Invalid	000000002000	000000000020	006038000005
3	Valid	000000002020	000000001025	006038000006
4	Valid	000000003000	000000000020	006038000009

The learned subscriber MAC address, learned by the DBIC, supports translation of frames back to their original addresses when traffic is sent to the subscriber. The learned provider MAC address filters broadcasts sent from other data service providers. The port static MAC address is the MAC address used in MAC translations.

The Valid column indicates if the learned address is valid. An address becomes invalid when no traffic is sent for the configurable switching table time-out time. Learned addresses remain in the table until the DBIC is reset.

Broadcast filtering

Broadcast filtering has an affect on all packets except ARPs and BOOTP/DHCP requests. You can configure downstream broadcast filtering and upstream broadcast filtering separately. A separate configuration can remove unnecessary traffic and reduce network congestion. Enable broadcast filtering unless the network requires the passing of broadcast traffic.

Software releases

The 1-Meg Modem Service is a non-computing module load (NCL) product. To support customer requirements, Nortel Networks releases the product in releases separate from a product computing load (PCL).

Summary of releases

Table 1-7 lists 1-Meg Modem Service releases and a summary of the functionality available with each release. Use this table for reference when you configure and maintain the 1-Meg Modem Service.

> ***Note:*** This table includes releases that may not be generally available to all offices.

Table 1-7 1-Meg Modem Service software releases (Sheet 1 of 2)

Release	New functionality in release
Release 1	• Basic 1-Meg Modem Service functionality • Support for the hardware that follows: — NTEX17AA — NTEX35AA — NTEX54AA — NTEX38AA — NTEX39AA
Release 2	• Support for Sun workstation • Support for 2 PCs connected through a hub • Support for remote PMs
Release 3	• Enhanced rates and performance — up to 1280 kbit/s downstream — up to 320 kbit/s upstream • FEC in upstream and downstream directions, narrowband and wideband operation, all modulation rates • Support for off-hook detection control • Support for CPE firmware downloads • Support for 802.1Q VLANs • Support for interleaving in downstream direction at 256 QAM • Support for the hardware that follows: — NTEX17BA — NTEX35BA — NTEX54AB ***Note:*** Release 3 is not generally available to SL-100 offices.

Table 1-7 1-Meg Modem Service software releases (Sheet 2 of 2)

Release	New functionality in release
Release 4	• Increased fill in line drawer • 100BaseT interface at central office to transport network • xEMS displays information on Ethernet circuits • Support for global parameters for provisioning • Support for batch updates of provisioned data • Use of SERVORD to provision 1-Meg Modem Service from the DMS • xEMS displays subscriber telephone number • Support for DBIC reloads by PEC during xEMS installation • Support for the hardware that follows: — NTEX17CA — NTEX38BA — NTEX39BA — NTEX54BA — NTEX35AAAB — NTEX35AAAC — NTEX35AAAD — NTEX35BAAB — NTEX35BAAC — NTEX35BAAD
Release 5	• Support for selectable MAC addresses • Support for Star Remote Hub • Bulk download of CPE firmware • Support for the hardware that follows: — NTEX17DA — NTEX54CA

EOL releases

The following 1-Meg Modem Service software releases will achieve end of life (EOL) classification in the year 2000.

- Release 1.n
- Release 2.n
- Release 3.n (xEMS software only)

When a software release achieves EOL classification, Nortel Networks does not sell, deliver, or support the software. For Release 3 offices, Nortel Networks will support Release 3 DBIC software to allow offices to continue to use existing hardware.

Hardware configurations

Nortel Networks introduced a mix of hardware over several software releases. To reduce the need for hardware upgrades, the 1-Meg Modem Service supports a broad mix of hardware configurations.

Possible configurations

Table 1-8 lists the possible hardware configurations in the 1-Meg Modem Service.

Table 1-8 Possible hardware configurations (Sheet 1 of 2)

DBIC	xLC	1-Meg Modem
NTEX54AA	NTEX17AA	NTEX35AA
		NTEX35BA
	NTEX17BA	NTEX35AA
		NTEX35BA
	NTEX17CA	NTEX35AA
		NTEX35BA
NTEX54AB	NTEX17AA	NTEX35AA
		NTEX35BA
	NTEX17BA	NTEX35AA
		NTEX35BA
	NTEX17CA	NTEX35AA
		NTEX35BA

Table 1-8 Possible hardware configurations (Sheet 2 of 2)

DBIC	xLC	1-Meg Modem
NTEX54BA	NTEX17AA	NTEX35AA
		NTEX35BA
	NTEX17BA	NTEX35AA
		NTEX35BA
	NTEX17CA	NTEX35AA
		NTEX35BA
NTEX54CA	NTEX17DA	NTEX35AA
		NTEX35BA

Manfacture discontinued hardware

Table 1-9 lists the 1-Meg Modem Service hardware that is scheduled to be manufacture discontinued (MD).

Table 1-9 Hardware scheduled for MD

PEC	Description
NTEX17AA	xDSL line card - up to 16 per drawer
NTEX17BA	xDSL line card - up to 16 per drawer
NTEX35AA	Generic NTEX35AA 1-Meg Modem
NTEX35AAAB	Grey modem
NTEX35AAAC	Grey modem for Bell Canada subscribers
NTEX35AAAD	Red modem for Transwire subscribers
NTEX3710	Assembly drawer for 10BaseT support
NTEX38AA	Basic wall mount filter
NTEX54AA	Data-enhanced bus interface card - 10BaseT Ethernet
NTEX54AB	Data-enhanced bus interface card - 10BaseT Ethernet
NTRX1699	Category 5 UTP cable

Baselines

Table 1-10 lists the software baseline for each hardware configuration in the 1-Meg Modem Service. A baseline release is the minimum release required to provide the full functionality available in the hardware configuration.

Table 1-10 Software baselines (Sheet 1 of 2)

Hardware Configuration			Software Baseline					
DBIC	**xLC**	**1-Meg Modem**	**DMS-10**	**DMS-100**	**DMS-500**	**SL-100**	**xEMS**	**DBIC**
NTEX54AA	NTEX17AA	NTEX35AA	411.10	NA007	N/A	MSL07	1	3
		NTEX35BA	411.20	NA008	LLT08	N/A	3	3
	NTEX17BA	NTEX35AA	411.20	NA008	LLT08	N/A	3	3
		NTEX35BA	411.20	NA008	LLT08	N/A	3	3
	NTEX17CA	NTEX35AA	411.20	NA008	LLT008	N/A	3	3
		NTEX35BA (See Note 1.)	411.20	NA008	LLT008	N/A	3	3
NTEX54AB (See Note 2)	NTEX17AA	NTEX35AA	411.20	NA008	LLT08	N/A	3	3
		NTEX35BA	411.20	NA008	LLT08	N/A	3	3
	NTEX17BA	NTEX35AA	411.20	NA008	LLT08	N/A	3	3
		NTEX35BA	411.20	NA008	LLT08	N/A	3	3
	NTEX17CA	NTEX35AA	411.20	NA008	LLT008	N/A	3	3
		NTEX35BA	411.20	NA008	LLT008	N/A	3	3
NTEX54BA (See Note 2)	NTEX17AA	NTEX35AA	412.20	NA0008	LLT008	MSL09	4	4
		NTEX35BA	412.20	NA008	LLT008	MSL09	4	4
	NTEX17BA	NTEX35AA	412.20	NA008	LLT008	MSL09	4	4
		NTEX35BA	412.20	NA008	LLT008	MSL09	4	4
	NTEX17CA	NTEX35AA	412.20	NA008	LLT008	MSL09	4	4

Note 1: This configuration can use 1.0 or 2.0 software. However, the off-hook detect feature is not available.

Note 2: Offices at a CCM08, CCM09, CCM10, or CCM11-based PCLs need patch JMC12BC8 to support this hardware configuration.

Table 1-10 Software baselines (Sheet 2 of 2)

Hardware Configuration			Software Baseline					
DBIC	**xLC**	**1-Meg Modem**	**DMS-10**	**DMS-100**	**DMS-500**	**SL-100**	**xEMS**	**DBIC**
		NTEX35BA	412.20	NA008	LLT008	MSL09	4	4
NTEX54CA (See Note 2)	NTEX17DA	NTEX35AA	412.20	NA008	LLT008	MSL09	4	4
		NTEX35BA	412.20	NA008	LLT008	MSL09	4	4

Note 1: This configuration can use 1.0 or 2.0 software. However, the off-hook detect feature is not available.

Note 2: Offices at a CCM08, CCM09, CCM10, or CCM11-based PCLs need patch JMC12BC8 to support this hardware configuration.

Available functionality

Nortel Networks components in the1-Meg Modem Service are backwards-compatible. However, the version of each 1-Meg Modem Service component in the loop can affect the functionality in the loop. For example, the 1-Meg Modem Service supports downstream rates up to 1280 kbit/s. A subscriber loop can include an xLC (NTEX17AA) that supports downstream rates up to 960 kbit/s and a 1-Meg Modem (NTEX35BA) that supports downstream rates up to 1280 kbit/s. Due to the available functionality in the xLC, this subscriber loop can support downstream rates of only 960 kbit/s.

Table 1-11 lists the possible 1-Meg Modem Service hardware configurations and the functionality available with each configuration.

Table 1-11 Available functionality (Sheet 1 of 2)

Hardware Configuration			Available Functionality						
DBIC	**xLC**	**1-Meg Modem**	**Off Hk**	**Max DS Rate**	**Max US Rate**	**FEC**	**Inter-leave**	**Max xLC fill**	**CPE F/W**
NTEX54AA	NTEX17AA	NTEX35AA	No	960	120	No	No	16	No
		NTEX35BA	No	960	120	No	No	16	Yes
	NTEX17BA	NTEX35AA	No	960	120	No	No	16	No
		NTEX35BA	Yes	960	120	Yes	Yes	16	Yes
	NTEX17CA	NTEX35AA	No	960	120	No	No	16	No
		NTEX35BA	Yes	960	120	Yes	Yes	16	Yes
NTEX54AB	NTEX17AA	NTEX35AA	No	960	120	No	No	16	No
		NTEX35BA	No	960	120	No	No	16	Yes
	NTEX17BA	NTEX35AA	No	960	120	No	No	16	No
		NTEX35BA	Yes	1280	320	Yes	Yes	16	Yes
	NTEX17CA	NTEX35AA	No	960	120	No	No	16	No
		NTEX35BA	Yes	1280	320	Yes	Yes	16	Yes
NTEX54BA	NTEX17AA	NTEX35AA	No	960	120	No	No	16	No
		NTEX35BA	No	960	120	No	No	16	Yes
	NTEX17BA	NTEX35AA	No	960	120	No	No	16	No
		NTEX35BA	Yes	1280	320	Yes	Yes	16	Yes
	NTEX17CA	NTEX35AA	No	960	120	No	No	31	No
		NTEX35BA	Yes	1280	320	Yes	Yes	31	Yes

Note 1: The table lists downstream (DS) and upstream (US) rates in kbit/s.

Note 2: If available, FEC is on by default. FEC must be on to reach a maximum DS rate of 1280 kbit/s.

Note 3: During an off-hook condition, the DS rate is a maximum of 960 kbit/s if the hardware configuration includes an NTEX54AB or an NTEX17BA.

Table 1-11 Available functionality (Sheet 2 of 2)

Hardware Configuration			Available Functionality						
DBIC	xLC	1-Meg Modem	Off Hk	Max DS Rate	Max US Rate	FEC	Inter-leave	Max xLC fill	CPE F/W
NTEX54CA	NTEX17DA	NTEX35AA	No	960	120	No	No	31	No
		NTEX35BA	Yes	1280	320	Yes	Yes	31	Yes

Note 1: The table lists downstream (DS) and upstream (US) rates in kbit/s.

Note 2: If available, FEC is on by default. FEC must be on to reach a maximum DS rate of 1280 kbit/s.

Note 3: During an off-hook condition, the DS rate is a maximum of 960 kbit/s if the hardware configuration includes an NTEX54AB or an NTEX17BA.

Parts list

This section lists the hardware and software in the 1-Meg Modem Service.

Hardware

This section lists the orderable hardware for the 1-Meg Modem Service.

Table 1-12 1-Meg Modem Service hardware (Sheet 1 of 3)

Item	PEC	Additional information
1-Meg Modem	NTEX35BA	Includes the following: • Class 2 power supply • RJ-11 telephone wire, 7 feet long • Category 3 Ethernet UTP cable with RJ-45 male connectors; 6 feet long • *1-Meg Modem User Guide*
	NTEX35BAAB	Grey modem. Includes the following: • Class 2 power supply • RJ-11 telephone wire, 7 feet long • Category 3 Ethernet UTP cable with RJ-45 male connectors; 6 feet long • *1-Meg Modem User Guide*

Table 1-12 1-Meg Modem Service hardware (Sheet 2 of 3)

Item	PEC	Additional information
	NTEX35BAAC	Grey modem for Bell Canada subscribers. Includes the following: • Class 2 power supply • RJ-11 telephone wire, 7 feet long • Category 3 Ethernet UTP cable with RJ-45 male connectors; 6 feet long • *1-Meg Modem User Guide*
	NTEX35BAAD	Red modem for Transwire subscribers. Includes the following: • Class 2 power supply • RJ-11 telephone wire, 7 feet long • Category 3 Ethernet UTP cable with RJ-45 male connectors; 6 feet long • *1-Meg Modem User Guide*
Wall mount telephone filter	NTEX38BA	Wall mount filter with improved noise isolation
Desk mount telephone filter	NTEX39AA	Desk mount filter with unique telephone and RJ-11 jacks
	NTEX39BA	Desk mount filter with interchangeable telephone and RJ-11 jacks
LCM line drawer	NT6X05EA	POTS line drawer provisioned for 1-Meg Modem Service
	NT6X05HA	Line drawer assembly for CLCE cabinet
xLC	NTEX17CA	xDSL line card for all host LCMs
	NTEX17DA	xDSL line card for RLCM and Star Remote Hub
DBIC	NTEX54BA	DBIC for all host LCMs
	NTEX54CA	DBIC for RLCM and Star Remote Hub

Table 1-12 1-Meg Modem Service hardware (Sheet 3 of 3)

Item	PEC	Additional information
Patch panel kit	NTEX46AA	• 26 inch connectorized patch panel • Supports up to 20 drawers • Includes the following: — cable management panel for Ethernet cable — 20 port patch panel — brackets to install patch panel and cable management panel to frame
	NTEX46BA	• DMS-10 equipment • 19 inch connectorized patch panel • Supports up to 24 drawers • Includes the following: — cable management panel for Ethernet cable — 24 port patch panel — brackets to install patch panel and cable management panel to frame
Product change kit	NTEX37AA	• Labels for drawer • One per drawer
Cable trough Assembly	NTEX3712	• Assembly for drawer for 100BaseT support • One per drawer
	NTEX3720	• Assembly for drawer in CLCE line drawer • Includes data cable • Includes bulkhead access panel with EMI filter for Model B CLCE
System data cable	NTRX1693	• Category 5 UTP cable • Supports 10Base T or 100BaseT Ethernet • One cable per drawer
	NTRX1698	• Category 5 UTP cable • Connects NT6X05EA to NTEX45AA • One cable per drawer

Software

Table 1-13 lists the orderable software for each1-Meg Modem Service release.

Table 1-13 1-Meg Modem Service software (Sheet 1 of 3)

Release	Ordering code	Functional Group	Description
Release 1	HSTP0002		CM software for DMS-100 and MSL-100 systems
	1-Meg Modem Service		CM software for DMS-10 systems.
	XEMS0001		Base software for xEMS workstation
		XEMS0100	Base software for xEMS workstation (1 per each xEMS workstation that supports up to 500 DBICs)
	XEMSM001		Maintenance software for xEMS workstation
	XDSL0001		Base software for DBIC
		XDSL0100	Base software for DBIC
	XDSLM001		Maintenance software for DBIC
Release 2	HSTP0002		CM software for DMS-100 and MSL-100 systems
	1-Meg Modem Service		CM software for DMS-10 systems.
	XEMS0001		Base software for xEMS workstation
		XEMS0100	Base software for xEMS workstation (1 per each xEMS workstation that supports up to 500 DBICs)
	XEMSM001		Maintenance software for xEMS workstation
	XDSL0001		Base software for DBIC
		XDSL0100	Base software for DBIC
		XDSL0101	Multi-PC networking
	XDSLM001		Maintenance software for DBIC

Note: Software with a code in italic type is optional. Software with a code in bold type is required. Software with a code in bold italic type is required in quantity.

Table 1-13 1-Meg Modem Service software (Sheet 2 of 3)

Release	Ordering code	Functional Group	Description
Release 3	HSTP0002		CM software for DMS-100, DMS-500 and MSL-100 systems
	1-Meg Modem Service		CM software for DMS-10 systems.
	XEMS0003		Base software for xEMS workstation
		XEMS0100	Base software for xEMS workstation (1 per each xEMS workstation that supports up to 500 DBICs)
	XEMSM003		Maintenance software for xEMS workstation
	XDSL0003		Base software for DBIC
		XDSL0100	• Support for HP and Sun workstations • Support for CPE firmware download
		XDSL0101	Support for Multi-PC networking
		XDSL0102	Support for 802.1Q tagging
	XDSLM003		Maintenance software for DBIC

Note: Software with a code in italic type is optional. Software with a code in bold type is required. Software with a code in bold italic type is required in quantity.

Table 1-13 1-Meg Modem Service software (Sheet 3 of 3)

Release	Ordering code	Functional Group	Description
Release 4	HSTP0002		CM software for DMS-100, DMS-500, and MSL-100 systems
	1-Meg Modem Service		CM software for DMS-10 systems
	XEMS0051	***XEMS0100***	Base software for xEMS workstation
	XEMSM051		Maintenance software for xEMS workstation
	XDSL0003		Base software for 10-BaseT DBIC
	XDSL0004		Base software for 100-BaseT DBIC
		XDSL0100	• Support for HP and Sun workstations • Support for CPE firmware download
		XDSL0101	Support for Multi-PC networking
		XDSL0102	Support for 802.1Q tagging
	XDSLM004		Maintenance software for DBIC
Release 5	HSTP0002		CM software for DMS-100, DMS-500, and MSL-100 systems
	1-Meg Modem Service		CM software for DMS-10 systems
	XEMS0051	***XEMS0100***	Base software for xEMS workstation
	XEMSM051		Maintenance software for xEMS workstation
	XDSL0005		Base software for DBIC
		XDSL0100	• Support for HP and Sun workstations • Support for CPE firmware download
		XDSL0101	Support for Multi-PC networking
		XDSL0102	Support for 802.1Q tagging
	XDSLM005		Maintenance software for DBIC

Note: Software with a code in italic type is optional. Software with a code in bold type is required. Software with a code in bold italic type is required in quantity.

Maintenance software is not available for every 1-Meg Modem Service release. Nortel Networks reserves a code for maintenance software for each release. However, each release may not require maintenance software.

2 xEMS

This chapter describes the functionality of the xDSL Element Management System (xEMS).

Note: The chapter describes xEMS functionality if a user has read-write access to xEMS. Users with read-only access to the xEMS will not see all the functionality described in this chapter.

Terms

This chapter uses terms that may be new to some operating company personnel. Table 2-1 lists these terms.

Table 2-1 New terms (Sheet 1 of 2)

Term	Description
Object	An object is a specific entity in the network. An object can be a physical entity, such as a peripheral module (PM), or a logical entity, such as a group of PMs. Each object has a specific set of attributes and actions.
Symbol	A symbol is a graphical representation of an object. A symbol can be an icon symbol or a connection symbol. An icon symbol represents a single object, such as the 1-Meg Modem. A connection symbol represents the connection between two objects, such as the Ethernet connection between the modem and a personal computer (PC).
Event	An event is like a DMS log. HP OpenView and xEMS generate an event when one of the following conditions occurs. • The 1-Meg Modem Service exceeds a threshold limit. • The network topology changed. • The status of an object changes. • An error occurred. • A node configuration changed. • An application event occurred.

Table 2-1 New terms (Sheet 2 of 2)

Term	Description
Menu	A menu is a list of items that you select to perform tasks. A menu can be a pull-down menu or a pop-up menu.
Status	Status is the operating or administrative condition of the object. The color of the symbol represents the status of the object.
MIB	A management information base (MIB) is a collection of information about an object in the network. A MIB represents provisioning information similar to DMS tables. A MIB represents performance information similar to DMS operational measurements (OM).
Dialog box	A dialog box is an interactive message box. A dialog box displays information on an object and allows you to change or enter information.

Introduction

The xEMS provides operations, administration, maintenance, and provisioning (OAM&P) functions for the data portion of the 1-Meg Modem Service. The MAP terminal provides OAM&P functions for the voice portion of the 1-Meg Modem Service.

The xEMS is a graphical user interface (GUI) based on HP OpenView that uses icons and pull-down menus. The xEMS runs on a Hewlett-Packard (HP) or Sun workstation.

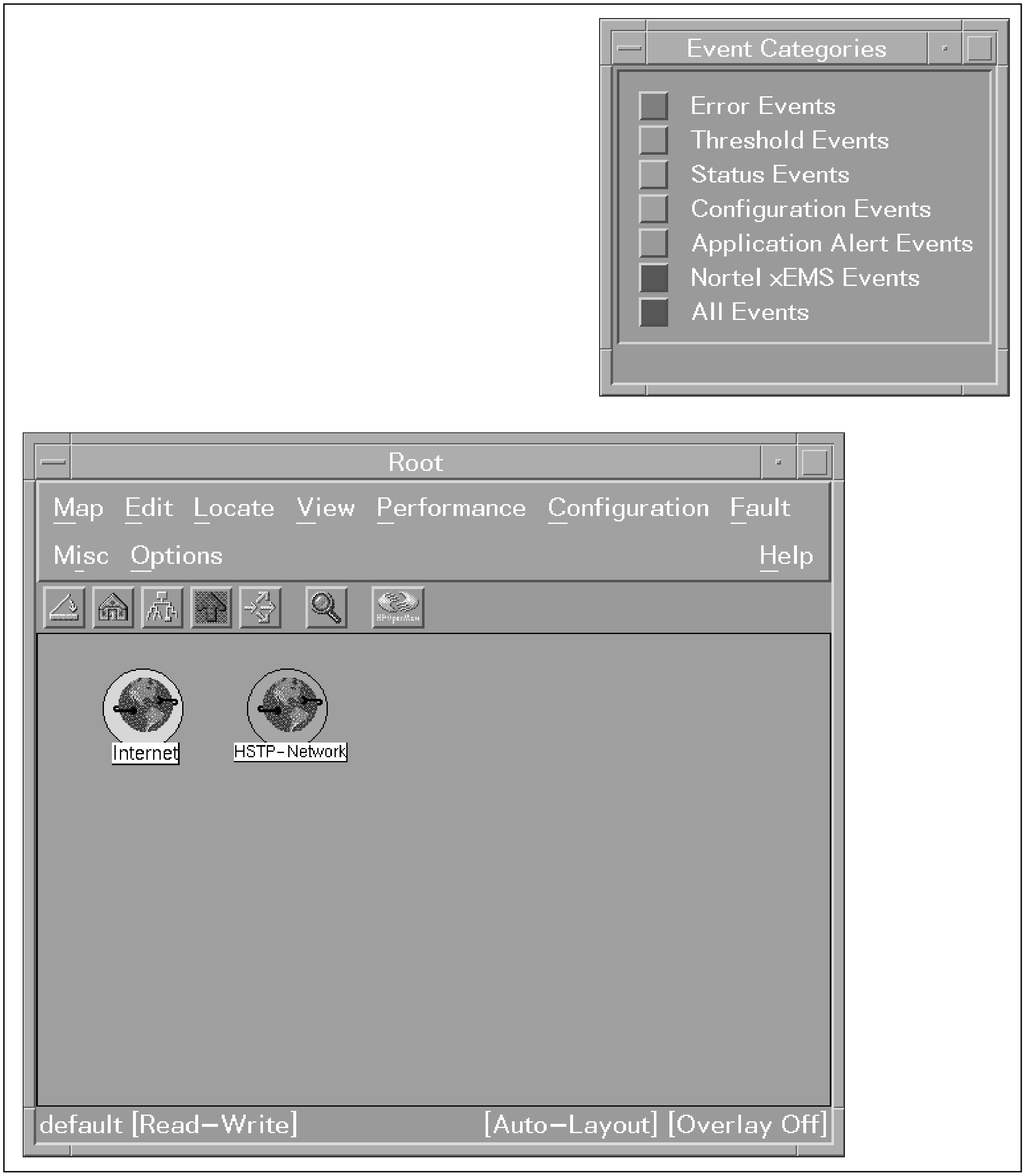
Startup

You can start xEMS one of two ways: standard navigation or direct navigation. Standard navigation starts the xEMS session and the root submap. Direct navigation starts the xEMS session at a specified submap.

Standard navigation

To start xEMS with standard navigation from the xEMS workstation, type **ovw** from the path `opt/OV/bin` at the UNIX command line. Figure 2-1 shows the two windows that appear.

Figure 2-1 Start-up xEMS windows with standard navigation



Direct map navigation

To start xEMS with direct navigation from an xEMS workstation, type **directNav.sh** from the path `opt/OV/bin/Nortel/HSTP`. In the pop-up dialog box, enter the object you wish to view. The xEMS session will open at that object's submap.

Functions

Some of the functions of the xEMS follow:

- automatic discovery of IP nodes
- event management
- status changes
- data collection and threshold monitoring
- event response configuration

Automatic discovery of IP nodes

The xEMS provides automatic discovery of all IP nodes in the network, such as routers and workstations, and the related node connection topology. The xEMS uses simple network management protocol (SNMP) to automatically discover information about the nodes. This information includes node type identification, such as bridge or router, and product vendor identification. The xEMS also uses the information derived from SNMP messages to display the state of the network nodes on the screen displays. When conditions change in network connections or IP nodes, the xEMS reflects the changes through automatic discovery.

Status changes

The color of the symbol at the xEMS indicates the administrative or operational status of the object. For example, a red xDSL line card (xLC) symbol indicates that the xLC object is down or in a critical maintenance condition.

Refer to the chapter "Fault management" in this document for more information on status changes.

Event management

The xEMS receives and logs network events that are detected by SNMP event trap mechanisms in the data-enhanced bus interface cards (DBIC). Events are logged into different event categories. You can browse event categories using default or customized sorting and filtering standards. For example, you can display all critical events generated for a given node on a given date during a specific range of time.

Refer to the chapter "Fault management" in this document for more information on events.

Data collection and threshold monitoring

The network administrator can configure the xEMS to regularly access and poll network entities and determine their operating state. The network administrator can configure the data collection software to generate an SNMP trap when the value of a polled entity exceeds a given threshold. The xEMS logs the polled information, and the network administrator can plot the collected data in a historical or real-time graph.

Refer to the chapter “Performance management” in this document for more information on data collection and threshold monitoring.

Event response configuration

You can configure the xEMS to perform an action when the xEMS receives an event from the SNMP trap mechanism. For example, you can configure the xEMS to perform the following:

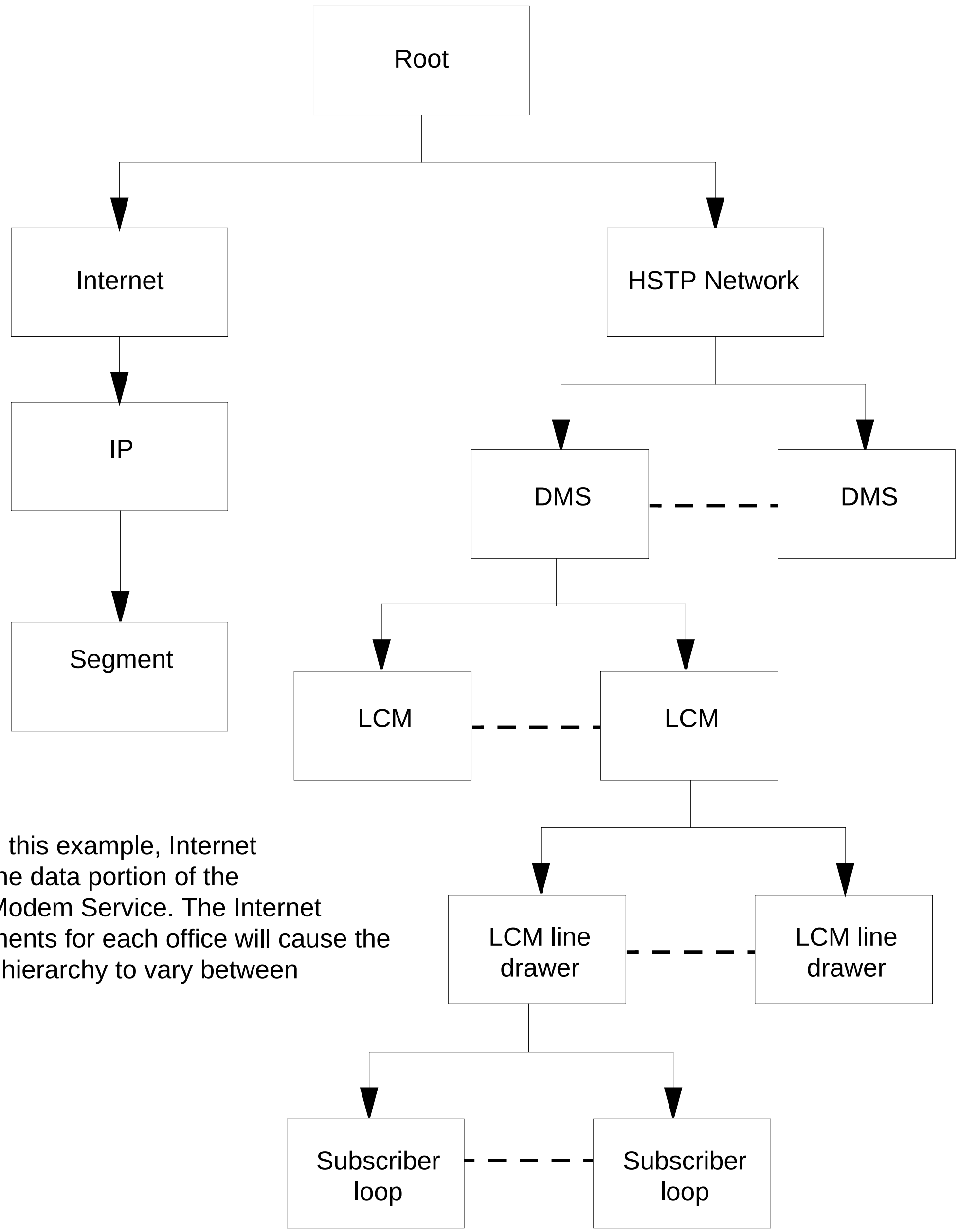
- Log an event by category in a defined format.
- Display a customized alarm severity color to indicate trouble events.
- Execute a customized procedure, such as sending an email or dialing a pager number.
- Automatically perform maintenance tests when an SNMP trap detects that a network node is going out-of-service.

Submap hierarchy

The xEMS arranges submaps in a hierarchy. With this hierarchy, operating company personnel can move between submaps to isolate a component or function.

Figure 2-2 shows the submap hierarchy for the xEMS.

Figure 2-2 xEMS submap hierarchy

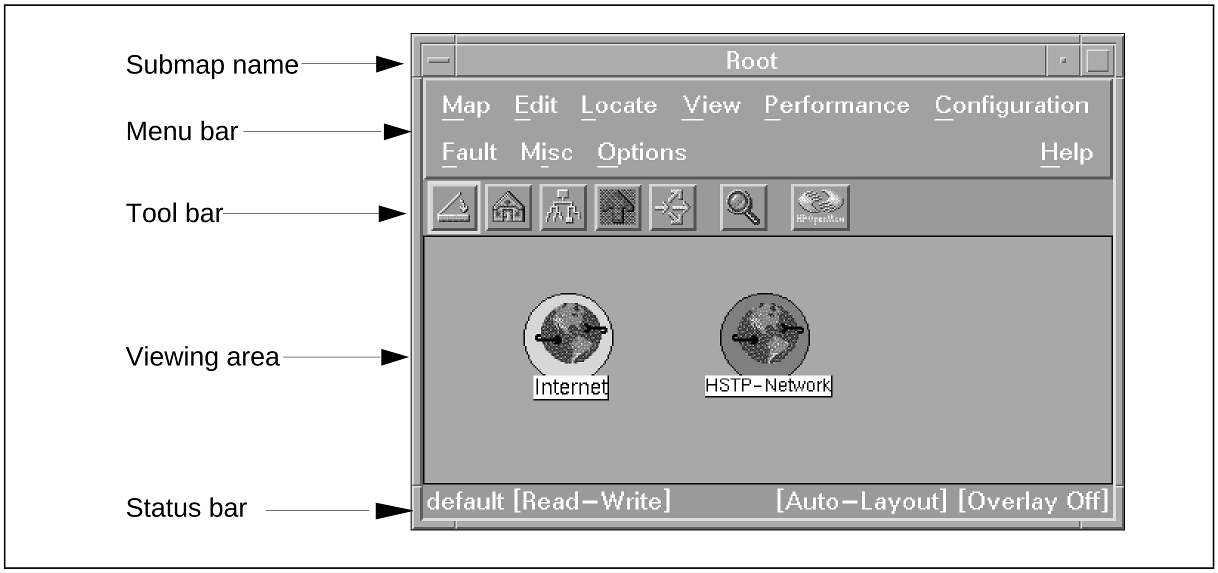


Note: In this example, Internet shows the data portion of the 1-Meg Modem Service. The Internet requirements for each office will cause the Internet hierarchy to vary between offices.

Submap components

Figure 2-3 shows the Root submap and the components of an xEMS submap.

Figure 2-3 Submap components



Submap name

The submap displays its name at the top of the submap window.

Menu bar

Each submap has a menu bar near the top of the submap window. The menu bar contains pull-down menus organized by functionality. Figure 2-4 shows a pull-down menu.

Figure 2-4 Pull-down menu

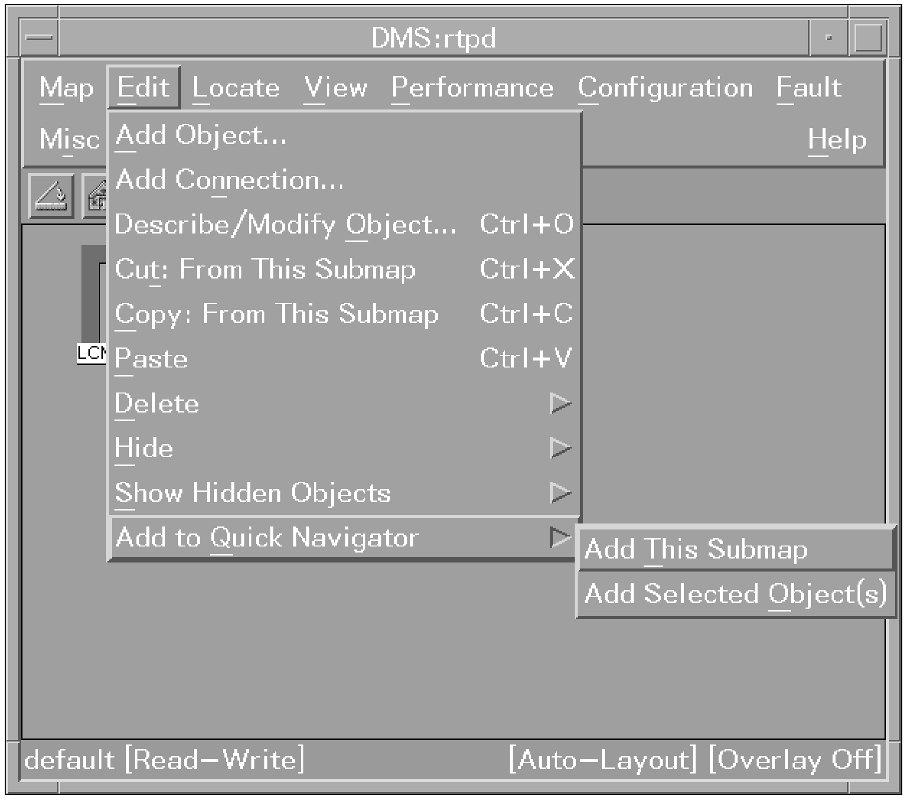


Table 2-2 describes the pull-down menus available through the menu bar.

Table 2-2 Pull-down menus

Menu	Description
Map	Manipulates files.
Edit	Edits symbols, objects, and submaps.
Locate	Locates objects and submaps.
View	Changes the way that the xEMS displays data.
Performance	Monitors network and component performance.
Configuration	Displays information on the configuration of the 1-Meg Modem Service network.
Fault	Displays events and tests the 1-Meg Modem Service network.
Misc	Uses other interfaces, such as a web browser or UNIX window, to perform other actions.
Options	Configures xEMS operations.
Help	Accesses detailed help information on Network Node Manager and HP OpenView.

Perform the following steps to open a pull-down menu:

1. Position the cursor over the name of the menu.
2. Press the left mouse button.

> ***Note:*** The previous steps support a right-handed mouse. If your mouse is programmed for the left-hand, use the right mouse button to open a pull-down menu.

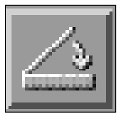
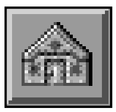
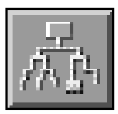
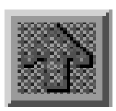
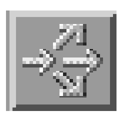
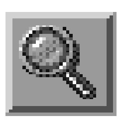
If a letter is underlined in the name of the menu, you can use a keyboard accelerator to open a menu. Press the **Alt** key and the underlined letter to open the menu. For example, press **Alt M** to open the Map menu.

Each pull-down menu provides additional selections. The availability of each selection varies according to the submap. If the xEMS displays the selection in white type, the selection is available at the current submap. If the xEMS displays the selection in a gray color, the selection is not available at the current submap.

Tool bar

Each submap has a tool bar below the menu bar. The tool bar contains several buttons that allow you to perform several quick actions. Figure 2-5 shows and describes each tool bar button.

Figure 2-5 Tool bar buttons

Button	Description
	Closes the submap.
	Displays the home submap.
	Displays the root submap.
	Displays the primary parent of this submap.
	Displays the Quick Navigator, which contains symbols for submaps that you frequently access.
	Displays the panner, which lets you zoom or pan areas of the submap window.
	Displays the About HP OpenView WIndows dialog box, which provides the copyright date, session identification, server name, and access to information on registered applications.

Viewing area

The viewing area contains the symbols for the submap.

Status bar

The status bar displays the following information:

- the name of the open map
- the read access available on the open map
- whether automatic layout is enabled for the submap
- whether submap overlay is on or off

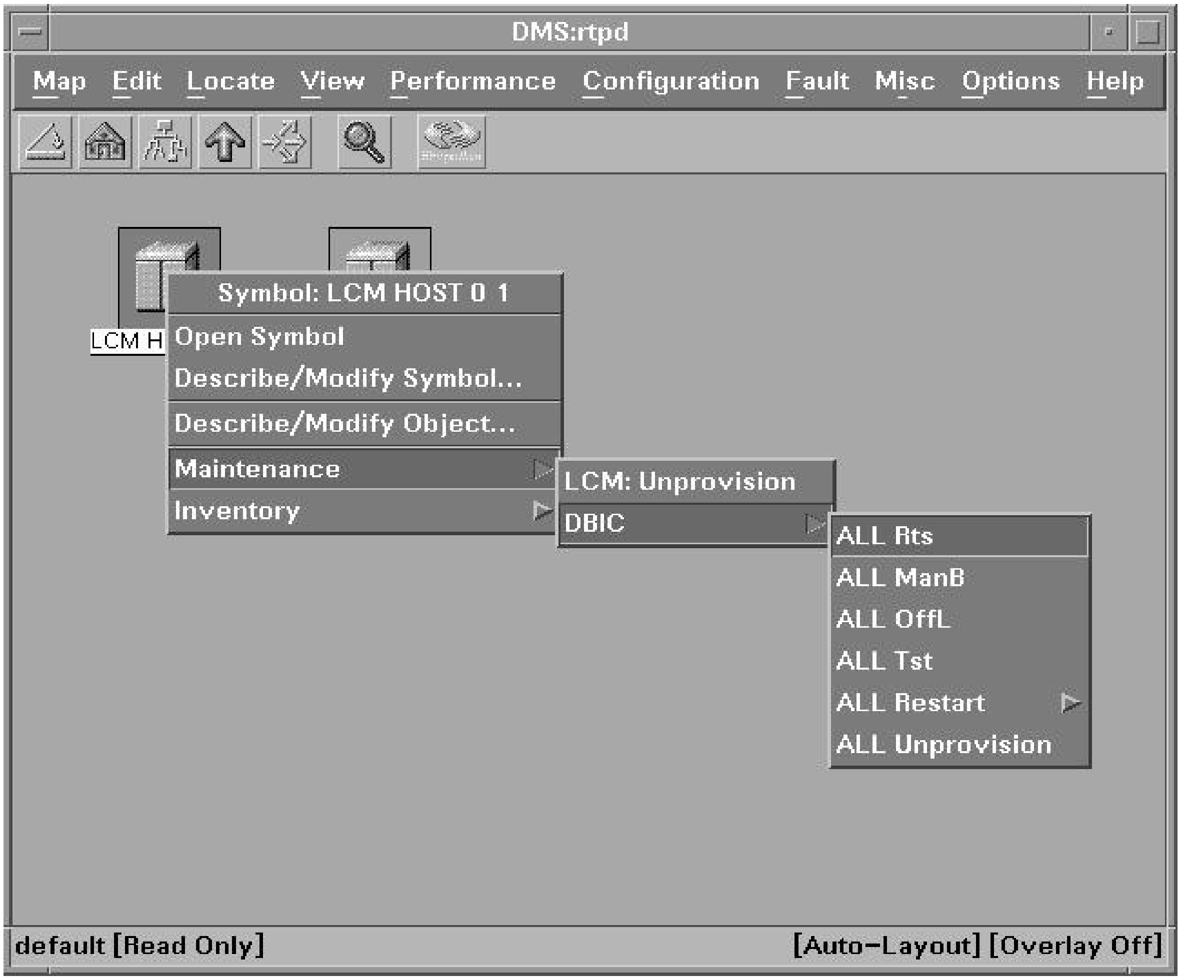
Pop-up menu

Each object in a submap has a pop-up menu that allows you to perform one or more of the following functions:

- display information on the selected object
- configure the selected symbol or object
- perform maintenance on the selected object
- navigate between submaps
- display inventory information on the selected object and its child objects

Figure 2-6 shows a pop-up menu.

Figure 2-6 Pop-up menu



Perform the following steps to open a pop-up menu and make a selection:

1. Position the cursor over the symbol.
2. Press the right mouse button.
3. The pop-up menu for the object will appear. Scroll down the menu to find your selection.
4. To activate a selection, position the cursor over the selection and remove your finger from the right mouse button. If a selection has three dots (...), the selection will display a window with additional information. If a

selection has an arrow, move the cursor across the arrow to display options for that selection.

Note: The previous steps support a right-handed mouse. If your mouse is programmed for the left-hand, use the left mouse button to open a pop-menu.

Naming conventions

To support multiple switching platforms, xEMS uses the terms LAC and LC.

LAC

Line access controller (LAC) refers to the DBIC in the DMS SuperNode and the data processor (DP) in the S/DMS AccessNode.

LC

Line card (LC) refers to the xLC in the DMS SuperNode and the XDLC line card (XnLC) in the S/DMS AccessNode.

Root submap

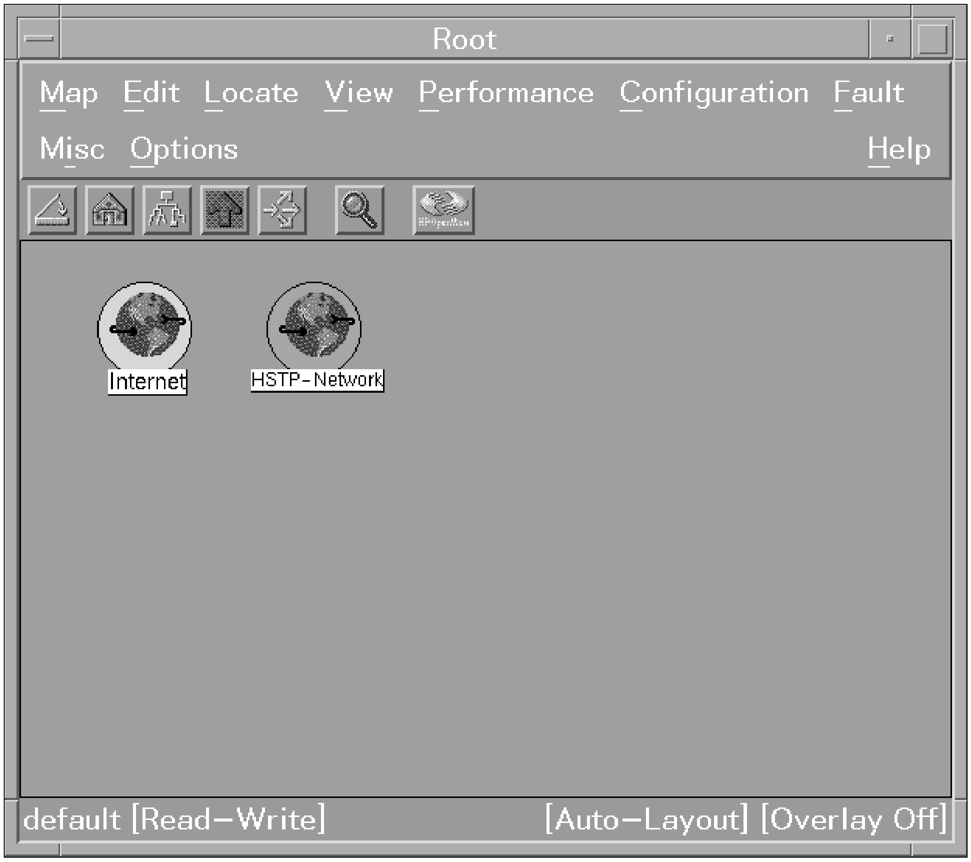
The Root submap is the default submap for the xEMS. The Root submap displays the following symbols:

- the Internet symbol, which provides access to all data service provider objects and symbols
- the HSTP-Network symbol, which provides access to all DMS objects and symbols
- symbols for other network management products that are integrated with the 1-Meg Modem Service

You can access all components of the 1-Meg Modem Service through these symbols.

Figure 2-7 shows the Root submap.

Figure 2-7 Root submap



Functions

You can perform the following activities from the Root submap:

- Open Network submaps.
- Monitor the status of each network object in the 1-Meg Modem Service.
- Provision and add Network objects to the 1-Meg Modem Service.
- Unprovision Network objects from the 1-Meg Modem Service.
- Change the attributes of each Network object in the 1-Meg Modem Service.

Symbols

This submap uses symbols in the Network symbol class. The HSTP-Network symbol is a default symbol that xEMS creates when the first xEMS map is opened or the first HSTP object is provisioned through a command-line interface.

Pop-up menu

The Root symbol and the HSTP-Network symbol have different pop-up menus at the Root submap. Table 2-3 describes each selection available from the pop-up menu for a selected Internet symbol at the Root submap.

Table 2-3 Pop-up menu for Internet symbol at Root submap

Selection	Description
Open Symbol	Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...	Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...	Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol	Deletes the selected symbol. Does not delete the symbol's object.
Hide Symbol	Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...	Opens the Object Description dialog box and allows you to change the attributes of the selected object.

Table 2-4 describes each selection available from the pop-up menu for a selected HSTP-Network symbol at the Root submap.

Table 2-4 Pop-up menu for HSTP-Network symbol at Root submap (Sheet 1 of 2)

Selection	Option	Description
Open Symbol		Opens the object submap or executes the action related to the symbol.
Change Symbol Type...		Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...		Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol		Deletes the selected symbol. Does not delete the symbol's object.
Hide Symbol		Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...		Opens the Object Description dialog box and allows you to change the attributes of the selected object.

Table 2-4 Pop-up menu for HSTP-Network symbol at Root submap (Sheet 2 of 2)

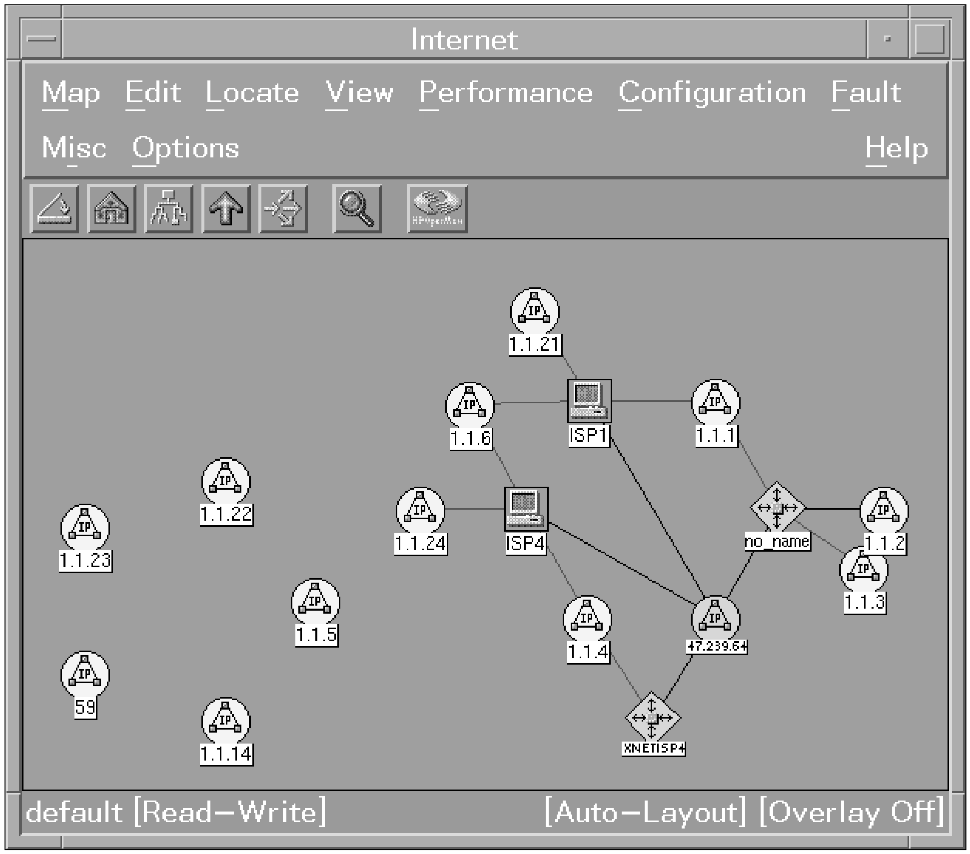
Selection	Option	Description
Inventory	**All**	Displays the status and other attributes of every 1-Meg Modem Service component in the 1-Meg Modem Service.
	DMS	Displays the status and other attributes of every DMS in the 1-Meg Modem Service.
	LCM	Displays the status and other attributes of every LCM in the 1-Meg Modem Service.
	DBIC	Displays the physical address, IP address, status, and other attributes of every DBIC in the 1-Meg Modem Service.
	XLC	Displays the status and other attributes of every xLC in the 1-Meg Modem Service.

Internet submap

The Internet submap displays the symbols for the network. These symbols can support Internet service providers (ISP), transport networks, the xEMS, and other network components. This submap groups the symbols based on the IP address of the node. Offices can customize this submap based on the configuration of the office and the network connections. Double-click the Internet symbol at the Root submap to open the Internet submap.

Figure 2-8 shows the Internet submap.

Figure 2-8 Internet submap



Functions

You can perform the following activities from Internet submap:

- Open submaps.
- Monitor the status of each network object in the submap.
- Provision and add objects to the submap.
- Unprovision objects from the submap.
- Change the attributes of each object in the submap.

Symbols

This submap uses symbols in the following symbol classes:

- Connector
- Computer
- Network

Pop-up menu

Table 2-5 describes each selection available from the pop-up menu for a selected object at the Internet submap.

Table 2-5 Pop-up menu at Internet submap

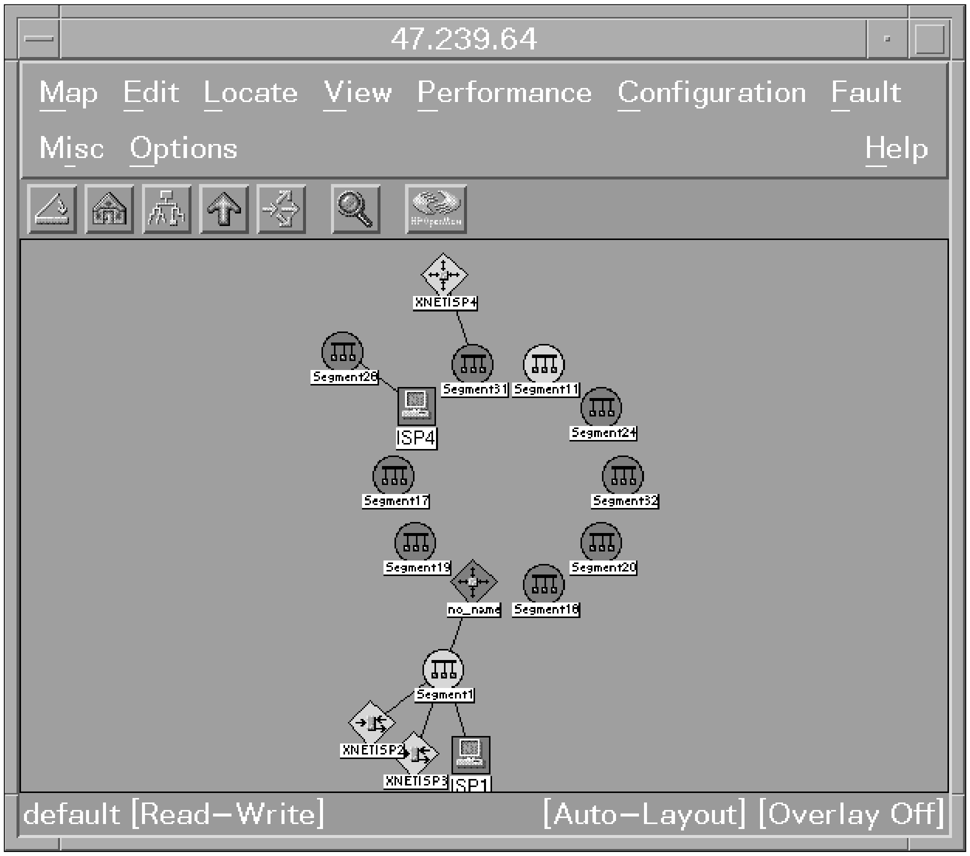
Selection	Description
Open Symbol	Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...	Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...	Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol	Deletes the selected symbol. Does not delete the symbol’s object.
Hide Symbol	Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...	Opens the Object Description dialog box and allows you to change the attributes of the selected object.

IP submap

The IP submap displays symbols for the 1-Meg Modem Service network. These symbols can support Internet service providers (ISP), transport networks, the xEMS, DBIC and other network components. This submap groups the symbols based on the IP address of the node. Offices can customize this submap based on the configuration of the office and the network connections. Double-click the ISP symbol at the Internet submap to open the IP submap.

Figure 2-9 shows the IP submap.

Figure 2-9 IP submap



Functions

You can perform the following activities from the IP submap:

- Open submaps.
- Monitor the status of each network object in the submap.
- Provision and add objects to the submap.
- Unprovision objects from the submap.
- Change the attributes of each object in the submap.

Symbols

This submap uses symbols in the following symbol classes:

- Connector
- Computer
- Network

Pop-up menu

Table 2-6 describes each selection available from the pop-up menu for a selected object at the IP submap.

Table 2-6 Pop-up menu at IP submap

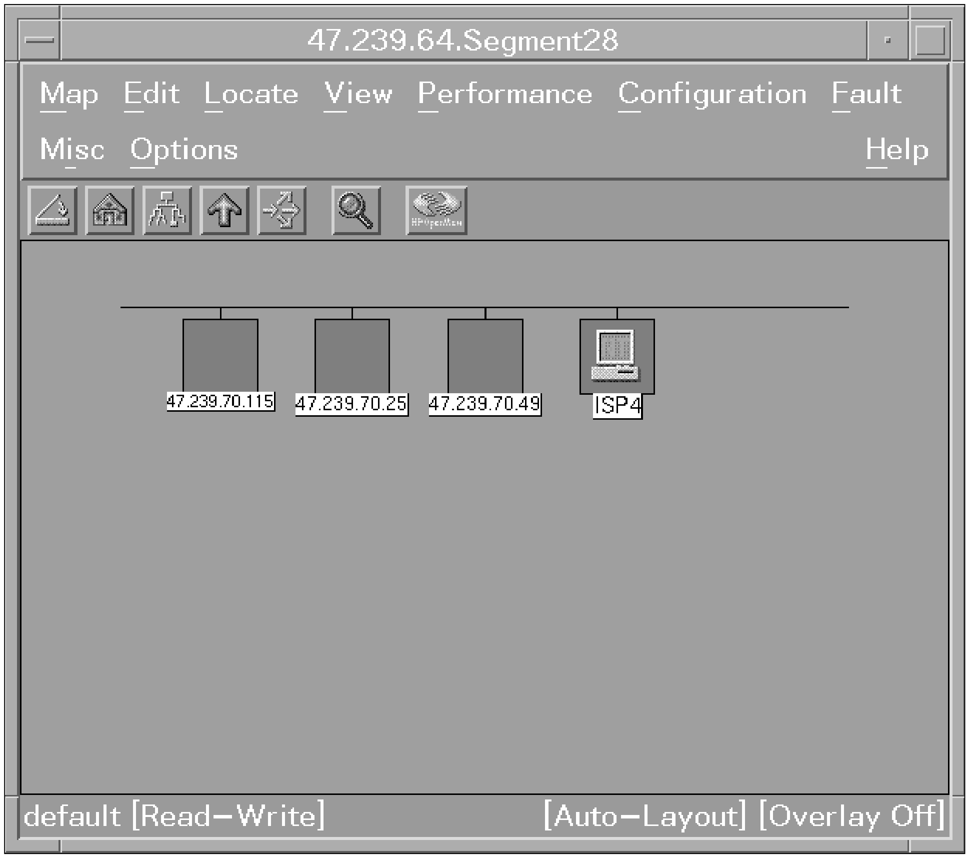
Selection	Description
Open Symbol	Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...	Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...	Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol	Deletes the selected symbol. Does not delete the symbol’s object.
Hide Symbol	Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...	Opens the Object Description dialog box and allows you to change the attributes of the selected object.
Goto HSTP Object	Opens the submap for the selected object. ***Note:*** This selection is only available for DMS objects.

Segment submap

The Segment submap displays the DBICs and Ethernet connections for the selected data service provider. Double-click the Segment symbol at the IP submap to open the Segment submap.

Figure 2-10 shows the Segment submap.

Figure 2-10 Segment submap



Functions

You can perform the following activities from the Segment submap:

- Open submaps.
- Monitor the status of each network object in the submap.
- Provision and add objects to the submap.
- Unprovision objects from the submap.
- Change the attributes of each object in the submap.

Symbols

This submap uses symbols from the Computer and Connector symbol classes.

Pop-up menu

Table 2-7 describes each selection available from the pop-up menu for a selected object at the Segment submap.

Table 2-7 Pop-up menu at Segment submap

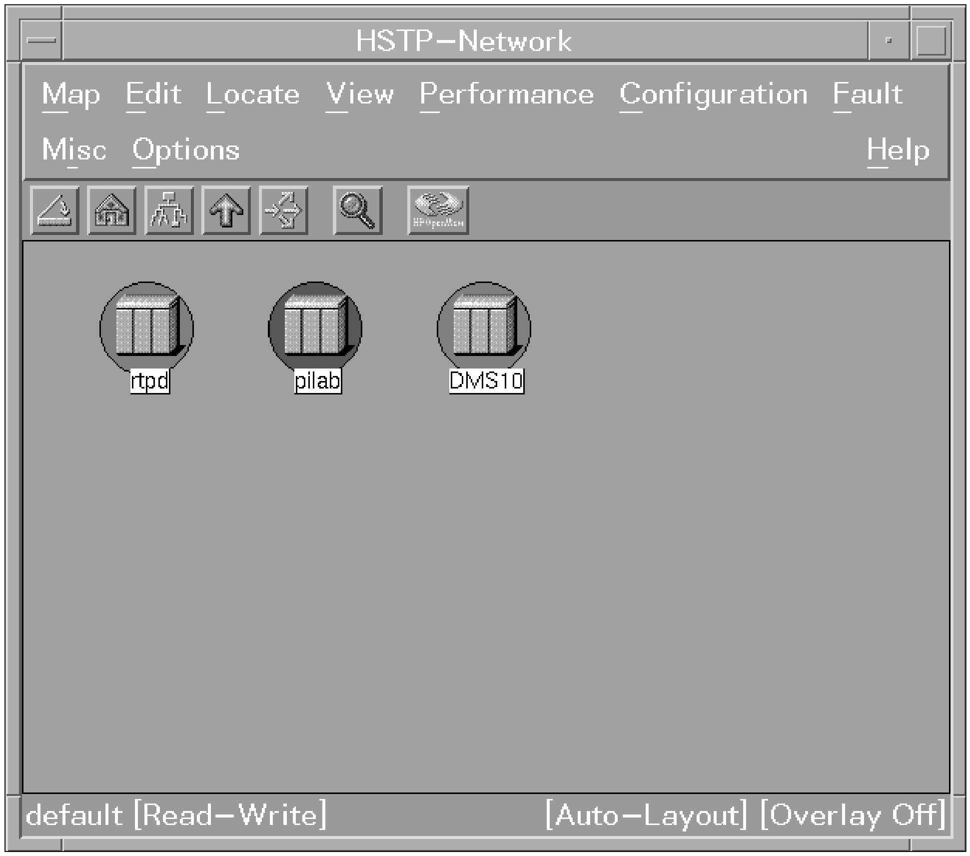
Selection	Description
Open Symbol	Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...	Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...	Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol	Deletes the selected symbol. Does not delete the symbol’s object.
Hide Symbol	Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...	Opens the Object Description dialog box and allows you to change the attributes of the selected object.

HSTP-Network submap

The HSTP-Network submap displays each DMS in the 1-Meg Modem Service. Double-click the HSTP-Network symbol at the Root submap to open the HSTP-Network submap.

Figure 2-11 shows the HSTP-Network submap.

Figure 2-11 HSTP-Network submap



Functions

You can perform the following activities from the HSTP-Network submap:

- Open the DMS submap.
- Monitor the status of each DMS in the 1-Meg Modem Service.
- Provision and add DMSs to the 1-Meg Modem Service.
- Unprovision DMSs from the 1-Meg Modem Service.
- Change the attributes of each DMS in the 1-Meg Modem Service.
- Unprovision a DMS from 1-Meg Modem Service.
- Perform maintenance activities on all DBICs in a DMS.
- Display inventory information on each DMS in the 1-Meg Modem Service and the objects in the DMS.

Symbols

This submap uses symbols in the HstpNode class.

Pop-up menu

Table 2-8 describes each selection available from the pop-up menu for a selected DMS object at the HSTP-Network submap.

Table 2-8 Pop-up menu at HSTP-Network submap (Sheet 1 of 2)

Selection	Option	Option	Description
Open Symbol			Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...			Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...			Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol			Deletes the selected symbol. Does not delete the symbol's object.
Hide Symbol			Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...			Opens the Object Description dialog box and allows you to change the attributes of the selected object.

Table 2-8 Pop-up menu at HSTP-Network submap (Sheet 2 of 2)

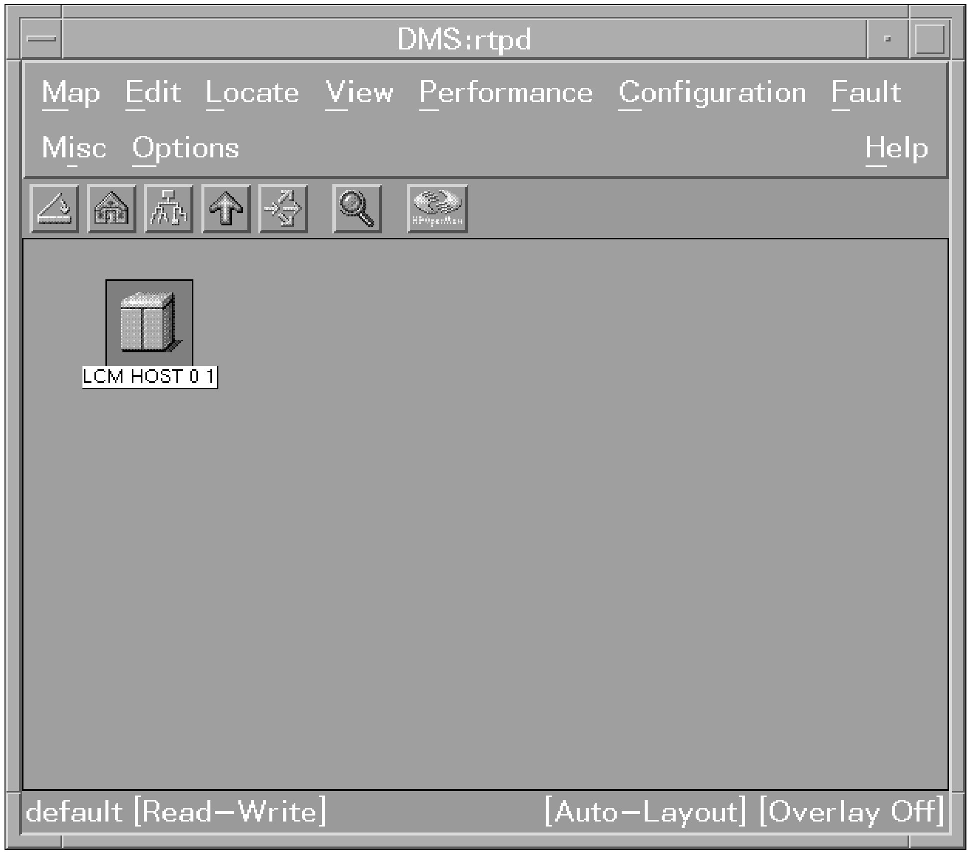
Selection	Option	Option	Description
Maintenance	**DMS: Unprovision**		Unprovisions the selected switch from 1-Meg Modem Service.
	DBIC	**All Rts**	Returns all DBICs in the selected switch to service.
		All ManB	Manually busies all DBICS in the selected switch.
		All OffL	Takes all DBICs in the selected switch offline.
		All Tst	Tests all DBICs in the selected switch.
		All Restart	Performs a cold restart on all DBICs in the selected switch. ***Note:*** If you have xEMS Release 3 or lower, you can perform a warm or cold restart.
		All Unprovision	Unprovisions all DBICs in the selected switch.
Inventory	**All**		Displays the status and other attributes of every 1-Meg Modem Service component.
	LCM		Displays the status and other attributes of every LCM in the 1-Meg Modem Service.
	DBIC		Displays the physical address, IP address, status and other attributes of every DBIC in the 1-Meg Modem Service.
	XLC		Displays the status and other attributes of every xLC in the 1-Meg Modem Service.

DMS submap

The DMS submap displays each LCM in the selected DMS. Double-click a DMS symbol at the DMS submap to open a DMS submap.

Figure 2-12 shows the DMS submap.

Figure 2-12 DMS submap



Functions

You can perform the following activities from the DMS submap.

- Open the LCM submap.
- Monitor the status of each LCM-type PM in the DMS.
- Provision and add LCM-type PMs to the DMS.
- Unprovision LCM-type PMs from the 1-Meg Modem Service.
- Change the attributes of each LCM-type PM in the DMS.
- Unprovision an LCM-type PM from 1-Meg Modem Service.
- Perform maintenance activities on all DBICs in LCM-type PMs.
- Display inventory information on each LCM-type PM in the DMS and the objects in the LCM-type PM.

Symbols

This submap uses symbols in the HstpPm symbol class. The DMS SuperNode uses the following symbols in the HstpPm symbol class:

- Lcm
- ELcm
- ALcm
- ILcm
- Star
- Lce

> ***Note:***
>
> The Lce symbol represents the LCM in DMS-10 switches.

The syntax for the name of this symbol follows:

`<DMS_CLLI>:<LCM_Type/LCM_Site/Frame_Number/ Module_Number>`

An example of the name for this symbol follows:

`SNFCCA01DS0:LCM/HOST/00/1`

Pop-up menu

Table 2-9 describes each selection available from the pop-up menu for a selected LCM-type PM at the DMS submap.

Table 2-9 Pop-up menu at DMS submap (Sheet 1 of 2)

Selection	Option	Option	Description
Open Symbol			Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...			Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...			Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol			Deletes the selected symbol. Does not delete the symbol’s object.
Hide Symbol			Hides the selected symbol so the submap does not display the symbol.

Table 2-9 Pop-up menu at DMS submap (Sheet 2 of 2)

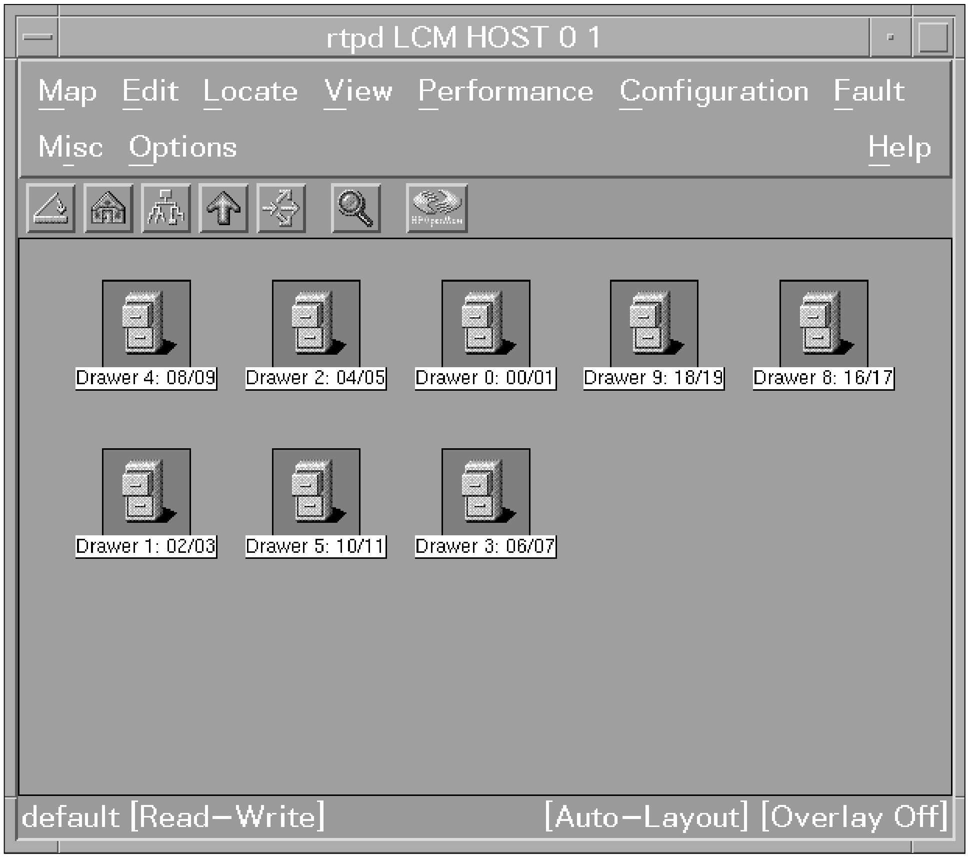
Selection	Option	Option	Description
Describe/Modify Object...			Opens the Object Description dialog box and allows you to change the attributes of the selected object.
Maintenance	**LCM: Unprovision**		Unprovisions the selected LCM-type PM from 1-Meg Modem Service.
	DBIC	**All Rts**	Returns all DBICs in the selected LCM-type PM to service.
		All ManB	Manually busies all DBICS in the selected LCM-type PM.
		All OffL	Takes offline all DBICs in the selected LCM-type PM.
		All Tst	Tests all DBICs in the selected LCM-type PM.
		All Restart	Performs cold restart on all DBICs in the selected LCM-type PM. ***Note:*** If you have xEMS Release 3 or lower, you can perform a warm or cold restart.
		All Unprovision	Unprovisions all DBICs in the selected LCM-type PM.
Inventory	**All**		Displays the status and other attributes of every 1-Meg Modem Service component in the LCM-type PM.
	DBIC		Displays the physical address, IP address, status, and other attributes of every DBIC in the LCM-type PM.
	XLC		Displays the status and other attributes of every xLC in the LCM-type PM.

LCM submap

The LCM submap displays each LCM line drawer in the selected LCM. Double-click the LCM symbol at the DMS submap to open the LCM submap.

Figure 2-13 shows the LCM submap.

Figure 2-13 LCM submap



Functions

You can perform the following activities from the LCM submap:

- Open the LCM drawer submap.
- Monitor the status of each 1-Meg Modem Service line drawer in the LCM-type PM.
- Provision and add 1-Meg Modem Service line drawers to the LCM-type PM.
- Unprovision 1-Meg Modem Service line drawers from the LCM-type PM.
- Change the attributes of each 1-Meg Modem Service line drawer in the LCM-type PM.
- Monitor the IP traffic of an LCM line drawer.
- Perform maintenance activities on the DBIC in the LCM line drawer.
- Perform maintenance activities on all xLCs in the LCM line drawer.

- Display inventory information on the LCM line drawer.
- Go to the IP submap for the selected LCM line drawer.

Symbols

The DMS SuperNode uses symbols from the HstpDraw symbol class. The syntax for the name of the Dbic symbol follows:

```
<DMS_CLLI>:<LCM_Type/LCM_Site/Frame_Number/
Module_Number:Drawer_Number>
```

An example of the name of this symbol follows:

```
SNFCCA01DS0:LCM/HOST/00/1:5
```

Pop-up menu

Table 2-10 describes each selection available from the pop-up menu for a selected LCM line drawer at the LCM submap.

Table 2-10 Pop-up menu at LCM submap (Sheet 1 of 2)

Selection	Option	Option	Description
Open Symbol			Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...			Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...			Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol			Deletes the selected symbol. Does not delete the symbol’s object.
Hide Symbol			Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...			Opens the Object Description dialog box and allows you to change the attributes of the selected object.

Table 2-10 Pop-up menu at LCM submap (Sheet 2 of 2)

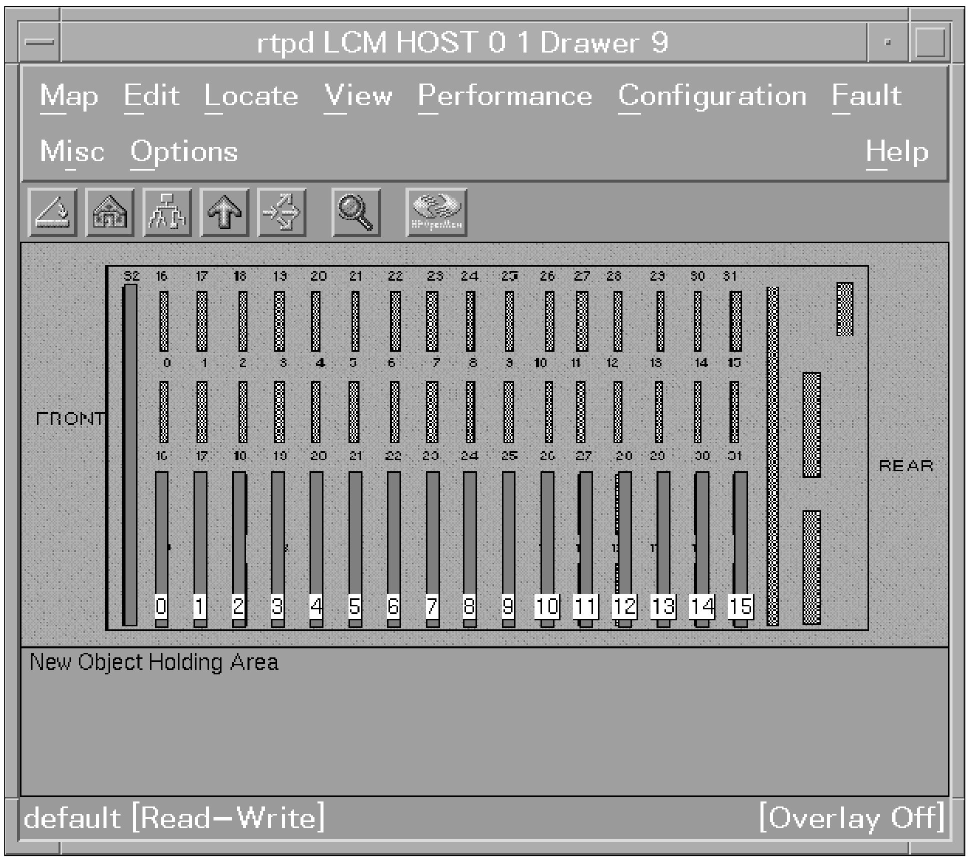
Selection	Option	Option	Description
Maintenance	**DBIC**	**Rts**	Returns the DBIC in the selected LCM line drawer to service.
		ManB	Manually busies the DBIC in the selected LCM line drawer.
		OffL	Takes the DBIC in the selected LCM line drawer offline.
		Tst	Tests the DBIC in the selected LCM line drawer.
		Restart	Perform a cold restart on the DBIC in the selected LCM line drawer. ***Note:*** If you have xEMS Release 3 or lower, you can perform a warm or cold restart.
		Unprovision	Unprovisions the DBIC in the selected LCM line drawer.
	XLC	**ALL IDL**	Idles all xLCs in the selected LCM line drawer.
		ALL MB	Manually busies all xLCs in the selected LCM line drawer.
		ALL INB	Inhibits all xLCs in the selected LCM line drawer.
		ALL TST	Tests all xLCs in the selected LCM line drawer.
		ALL Unprovision	Unprovisions all xLCs in the selected LCM line drawer.
Monitor	**IP Traffic (Pkts)**		Displays a graph of the IP traffic in packets for the object.
	IP Traffic (Octets)		Displays a graph of the IP traffic in octets for the object.
Goto IPobject			Opens the IP submap for the selected object.
Inventory	**All**		Displays the status and other attributes of every 1-Meg Modem Service component in the LCM line drawer.
	XLC		Displays the status and other attributes of every xLC in the LCM line drawer.

LCM drawer submap

The LCM drawer submap displays the 1-Meg Modem Service components in the selected LCM drawer. Double-click the LCM drawer symbol at the LCM submap to open the LCM drawer submap.

Figure 2-14 shows the LCM drawer submap.

Figure 2-14 LCM drawer submap



Functions

You can perform the following activities from the LCM drawer submap:

- Open the xLC submaps.
- Monitor the status of the DBIC and each xLC in the drawer.
- Provision and add 1-Meg Modem Service components to the drawer.
- Unprovision 1-Meg Modem Service components from the drawer.
- Change the attributes of each 1-Meg Modem Service component in the drawer.
- Monitor the IP traffic of each 1-Meg Modem Service component.

- Perform maintenance activities on the DBIC and each xLC in the LCM line drawer.
- Display inventory information on the line drawer.
- Go to the IP submap for the selected object.

Symbols

The DMS SuperNode uses symbols in the Cards4Slot class and the HstpCard class.

Cards4Slot class

The syntax of the name of Cards4Slot symbols follows:

```
<DMS_CLLI>:<LCM_Type/LCM_Site/Frame_Number/
Module_Number:Drawer_Number>
```

An example of the name of Cards4Slot symbols follows:

```
SNFCCA01DS0:LCM/HOST/00/1:5
```

HstpCard class

The syntax of the name of HstpCard symbols follows:

```
<DMS_CLLI>:<LCM_Type/LCM_Site/Frame_Number/
Module_Number:Drawer_Number/Slot_Number>
```

An example of the name of HstpCard symbols follows:

```
SNFCCA01DS0:LCM/HOST/11/1:5:2/0
```

Pop-up menu

The DBIC and xLC have different pop-up menus at the LCM drawer submap. Table 2-11 describes each selection available from the pop-up menu for a selected DBIC at the LCM drawer submap.

Table 2-11 Pop-up menu for DBIC at LCM drawer submap (Sheet 1 of 3)

Selection	Option	Option	Description
Open Symbol			Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...			Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...			Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.

Table 2-11 Pop-up menu for DBIC at LCM drawer submap (Sheet 2 of 3)

Selection	Option	Option	Description
Delete Symbol			Deletes the selected symbol. Does not delete the symbol's object.
Hide Symbol			Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...			Opens the Object Description dialog box and allows you to change the attributes of the selected object.
Maintenance	**DBIC**	**Rts**	Returns the DBIC in the selected LCM line drawer to service.
		ManB	Manually busies the DBIC in the selected LCM line drawer.
		OffL	Takes the DBIC in the selected LCM line drawer offline.
		Tst	Tests the DBIC in the selected LCM line drawer.
		Restart	Performs a cold restart on the DBIC in the selected LCM line drawer. ***Note:*** If you have xEMS Release 3 or lower, you can perform a warm or cold restart.
		Unprovision	Unprovisions the DBIC in the selected LCM line drawer.
	XLC	**ALL IDL**	Idles all xLCs in the selected LCM line drawer.
		ALL MB	Manually busies all xLCs in the selected LCM line drawer
		ALL INB	Inhibits all xLCs in the selected LCM line drawer.
		ALL TST	Tests all xLCs in the selected LCM line drawer.
		ALL Unprovision	Unprovisions all xLCs in the selected LCM line drawer.
Monitor	**IP Traffic (Pkts)**		Displays a graph of IP traffic for the object in packets.
	IP Traffic (Octets)		Displays a graph of IP traffic for the object in octets.

Table 2-11 Pop-up menu for DBIC at LCM drawer submap (Sheet 3 of 3)

Selection	Option	Option	Description
Goto IP object			Opens the submap for the selected object.
Inventory	**All**		Displays the status and other attributes of every 1-Meg Modem Service component in the LCM line drawer.
	XLC		Displays the status and other attributes of every xLC in the LCM line drawer.

Table 2-12 describes each selection available from the pop-up menu for a selected DBIC at the LCM drawer submap.

Table 2-12 Pop-up menu for xLC at LCM drawer submap

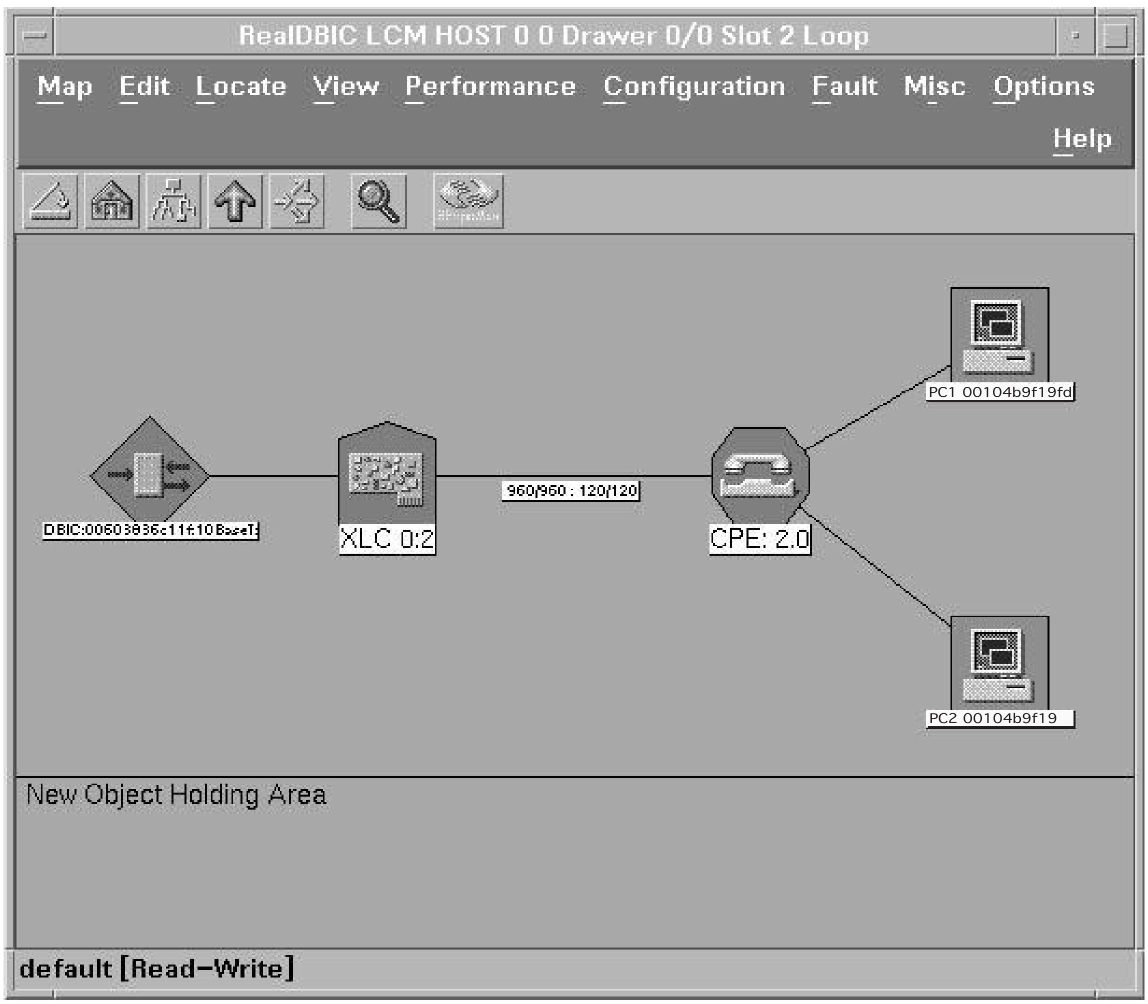
Selection	Option	Option	Description
Open Symbol			Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...			Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...			Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol			Deletes the selected symbol.Does not delete the symbol's object.
Hide Symbol			Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...			Opens the Object Description dialog box and allows you to change the attributes of the selected object.
Maintenance	**XLC**	**IDL**	Idles the xLC.
		MB	Manually busies the xLC.
		INB	Inhibits the xLC.
		TST	Tests the xLC.
		Unprovision	Unprovisions the xLC.
Monitor	**Traffic (XDLC)**		Displays a graph of traffic for the object.

Subscriber loop submap

The Subscriber loop drawer submap displays the subscriber loop for the selected xLC. Double-click the xLC at the LCM drawer submap to open the Subscriber loop submap.

Figure 2-15 shows the Subscriber loop submap. To support Multi-PC Networking, the Subscriber Loop submap displays two PC symbols for each CPE symbol.

Figure 2-15 Subscriber loop submap



The object names at this submap include the following information.

- If the office uses xEMS Release 4 or higher, the name of the DBIC includes the MAC address, the Ethernet mode, and the Ethernet identifier of the DBIC. The syntax of the name of the DBIC follows:

  ```
  DBIC: <mac_address>:<Ethernet_mode>:<Ethernet_id>
  ```

  If the office uses xEMS Release 3 or lower, the name of the DBIC includes the MAC address of the DBIC.

- If the office uses xEMS Release 4 or higher, the name of the link between the xLC and CPE includes maximum and actual downstream and upstream rates. The syntax of the name of the link follows:

  ```
  <maximum_ds_rate>/<actual_ds_rate>:
  <maximum_us_rate>/actual_us_rate>
  ```

- If the office uses xEMS Release 4 or higher, the name of the xLC includes the logical drawer number and logical slot number of the xLC. The syntax of the name of the xLC follows:

  ```
  XLC:<drawer_number>:<slot_number>
  ```

  If the office uses xEMS release 3 or lower, the name of the xLC includes the logical slot number.

- The name of the PC includes the learned MAC address of the PC. If xEMS does not have a learned MAC address for the PC, the name of the PC will include the MAC address 000000000000. The PC symbol will continue to display the MAC address when the MAC entry expires in the DBIC switching table.
- The CPE name includes the version of firmware in the CPE.

Functions

You can perform the following activities from the Subscriber loop submap.

- Monitor the status of each 1-Meg Modem Service component in the subscriber loop.
- Provision and add 1-Meg Modem Service components to the loop.
- Unprovision 1-Meg Modem Service components from the loop.
- Change the attributes of each 1-Meg Modem Service component in the loop.
- Monitor the IP traffic of each 1-Meg Modem Service component.
- Perform maintenance activities on the DBIC, xLC, and modem in the subscriber loop.

Symbols

This submap uses symbols from the following symbol classes:

- Connector
- Cards
- Net Device
- Computer

Connector class

The syntax of the name of symbols from the Connector symbol class follows:

```
<DMS_CLLI>:<LCM_Type/LCM_Site/Frame_Number/
Module_Number:Drawer_Number>
```

An example of the name of symbols from the Connector symbol class follows:

```
SNFCCA01DS0:LCM/HOST/00/1:5
```

Cards class

The syntax of the name of symbols from the Cards symbol class follows:

```
<DMS_CLLI>:<LCM_Type/LCM_Site/Frame_Number/
Module_Number:Drawer_Number/Slot_Number>
```

An example of the name of the symbols from the Cards symbol class follows:

```
SNFCCA01DS0:LCM/HOST/11/1:5:2/0
```

Net Device class

The syntax of the name of symbols from the Net Device symbol class follows:

```
<DMS_CLLI>:<LCM_Type/LCM_Site/Frame_Number/
Module_Number:Drawer_Number/Slot_Number>:CPE
```

An example of the name of the symbols from the Net Device symbol class follows:

```
SNFCCA01DS0:LCM/HOST/00/1:5:2/0:CPE
```

Computer class

The syntax of the name of the symbols from the Computer symbol class follows:

```
<DMS_CLLI>:<LCM_Type/LCM_Site/Frame_Number/
Module_Number:Drawer_Number/Slot_Number>:PC
```

An example of the name of the symbols from the Computer symbol class follows:

SNFCCA01DS0:LCM/HOST/00/1:5:2/0:PC

Pop-up menu

Table 2-13 describes each selection available from the pop-up menu for the subscriber loop submap.

Table 2-13 Pop-up menu at Subscriber loop submap (Sheet 1 of 2)

Selection	Option	Option	Description
Open Symbol			Opens the object submap or executes the action associated with the symbol.
Change Symbol Type...			Opens the Change Symbol Type dialog box and allows you to change the symbol of the selected object.
Describe/Modify Symbol...			Opens the Symbol Description dialog box for the symbol and allows you to change the attributes of the symbol.
Delete Symbol			Deletes the selected symbol. Does not delete the symbol's object.
Hide Symbol			Hides the selected symbol so the submap does not display the symbol.
Describe/Modify Object...			Opens the Object Description dialog box and allows you to change the attributes of the selected object.
Maintenance: DBIC		**Rts**	Returns the DBIC to service.
		ManB	Manually busies the DBIC.
		OffL	Takes the DBIC offline.
		Tst	Tests the DBIC.
		Restart	Performs a cold restart on the DBIC.
		Unprovision	Unprovisions the DBIC.

Table 2-13 Pop-up menu at Subscriber loop submap (Sheet 2 of 2)

Selection	Option	Option	Description
Maintenance: XLC		**IDL**	Idles the xLC.
		MB	Manually busies the xLC.
		INB	Inhibits the xLC.
		TST	Tests the xLC.
		Unprovision	Unprovisions the xLC.
Maintenance: CPE		**Tst**	Tests the 1-Meg Modem.
		Reset	Resets the 1-Meg Modem.
Monitor	**DBIC**	**IP Traffic (Pkts)**	Displays a graph of IP traffic in packets for the object.
		IP Traffic (Octets)	Displays a graph of IP traffic in octets for the object.
	XLC	**Traffic (XDLC)**	Displays a graph of traffic for the object.
	CPE	**Ethernet Traffic**	Displays a graph of Ethernet traffic for the object.
Goto IP Object			Opens the IP submap for the selected object. ***Note:*** This selection is only available for DBIC objects.

On-line help

HP OpenView provides the following on-line help:

- a Help selection from the pull-down menu at each submap
- a Help button on some dialog boxes

Through the Help selection from the pull-down menu, you can display information on HP OpenView and the open submap. Through the Help button on some dialog boxes, you can display information on the open dialog box.

Table 2-14 lists the selections available from the Help pull-down menu at any submap.

Table 2-14 Help pull-down menu

Selection	Description
Display legend	Displays a legend of HP OpenView symbols, colors and statuses
Mouse and Keyboard	Describes how to use the keyboard and mouse in HP OpenView
On Window	Displays information on the current window
What's New with OVW	Displays information on new and changed functionality in the current release
Using Help	Describes how to use the HP OpenView on-line Help facility
NNM	Displays the Help facility for Network Node Manager (NNM)
Misc	Displays information on any custom HP OpenView applications
About HP OpenView	Displays license, version, and copyright information on HP OpenView
Nortel xEMS	Displays license, version, and copyright information on xEMS

The HP document *Using Network Node Manager* recommends the following process to search for a subject in the Help facility.

1. Select Overview from the Help pull-down menu to open the Help facility.
2. Click the Index button or select **Search:Index** from the pull-down menu.
3. Use one of the following methods to search the index.
   - Scroll through the index.
   - Enter a word in the Entries:With field and click the Start Search button.

3 Installation

This chapter describes how to install the 1-Meg Modem Service at the office and the subscriber's location.

Introduction

The process to install 1-Meg Modem data service differs from the process to install voice services at the DMS. The 1-Meg Modem Service installation process involves the following tasks:

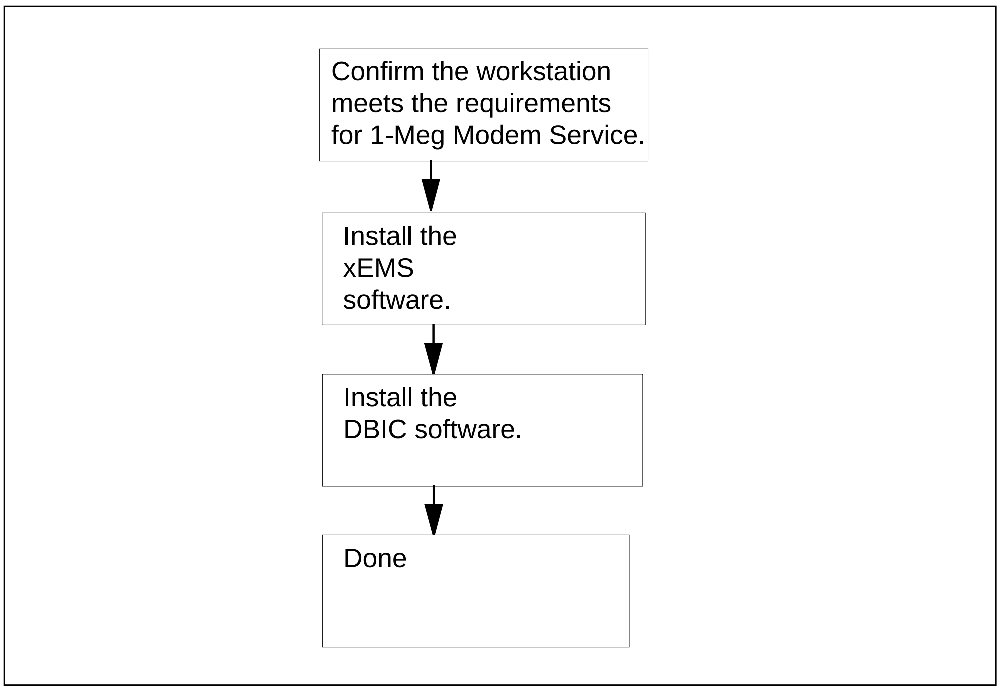
1. A technician with experience in UNIX* and HP OpenView Network Node Manager* (NNM) sets up a Hewlett-Packard (HP) or Sun workstation as the xDSL Element Management System (xEMS) workstation.
2. A technician with DMS experience installs or configures the DMS in the office to support 1-Meg Modem Service.
3. A subscriber installs the 1-Meg Modem at the subscriber location.

xEMS workstation

ATTENTION
This section summarizes the installation process for the xEMS workstation. Use the documents *1-Meg Modem Service xEMS Release Notes*, *1-Meg Modem Service DBIC Release Notes* and Installation Method (IM) *35-5543 xEMS Workstation for 1-Meg Modem* to install the xEMS workstation. Use the information in this section to troubleshoot installation and operations problems. Operating company personnel with a working knowledge of UNIX and HP OpenView should set-up the xEMS workstation.

Figure 3-1 shows the steps to set up the xEMS workstation.

Figure 3-1 Setup of xEMS workstation



Requirements

The xEMS workstation can be a HP or Sun platform. Table 3-1 lists the hardware and software requirements for the xEMS workstation.

Table 3-1 Hardware and software requirements for xEMS installation

Item	Directory	Minimum	Recommended
HP model		HPB180L	C3000
Sun model		Sun UltraSPARC* 10/440	Sun UltraSPARC 60/450
Memory		512 Mbyte RAM	1 Gbyte RAM
Disk size		4 Gbyte	9 Gbyte
Free disk space		300 Mbyte	1 Gbyte
Disk partition	`/(root)`	100 Mbyte	200 Mbyte
	`/tmp(swap)`	512 Mbyte	512 Mbyte
	`/var`	300 Mbyte	2 Gbyte
	`/opt`	500 Mbyte	685 Mbyte
	`/usr`	430 Mbyte	430 Mbyte
	`/export/home`	100 Mbyte	200 Mbyte
Monitor		1024 x 768 color	1280 x 1024 color
HP peripherals		CD-ROM	• CD-ROM • fxe graphics PCI card
Sun peripherals		• CD-ROM • Creator 24 bit Graphics	• CD-ROM • Creator3D Graphics
Network interface card		2 100 BaseT	2 100BaseT
HP operating system		HP-UX* 10.20	
Sun operating system		Sun Solaris* 2.6	
HP OpenView NNM		Version 5.01	Version 5.01
Patches		Check the *1-Meg Modem Service xEMS Release Notes* that accompany your xEMS software for any patches.	

Table3-2 lists the maximum configurations that the xEMS workstation can support at the minimum and recommended requirements.

Note: A 960/120 configuration is any hardware configuration that supports a maximum downstream rate of 960 kbit/s and a maximum upstream rate of 120 kbit/s. A 1280/320 configuration is any hardware configuration that supports a maximum downstream rate of 1280 kbit/s and a maximum upstream rate of 320 kbit/s. Some offices may identify a 960/120 configuration as Phase I hardware and a 1280/320 configuration as Phase II hardware

Table 3-2 Maximum configuration for xEMS workstation

Item	Minimum	Recommended
# of LACs (DBICs and DPs) (960/120 configuration	250	1000
# of LACs (DBICs and DPs) (1280/320 configuration	200	800
OVW sessions (from server)	Up to 3	Up to 8
OVW client sessions (from remote consoles)	Up to 9	Up to 15

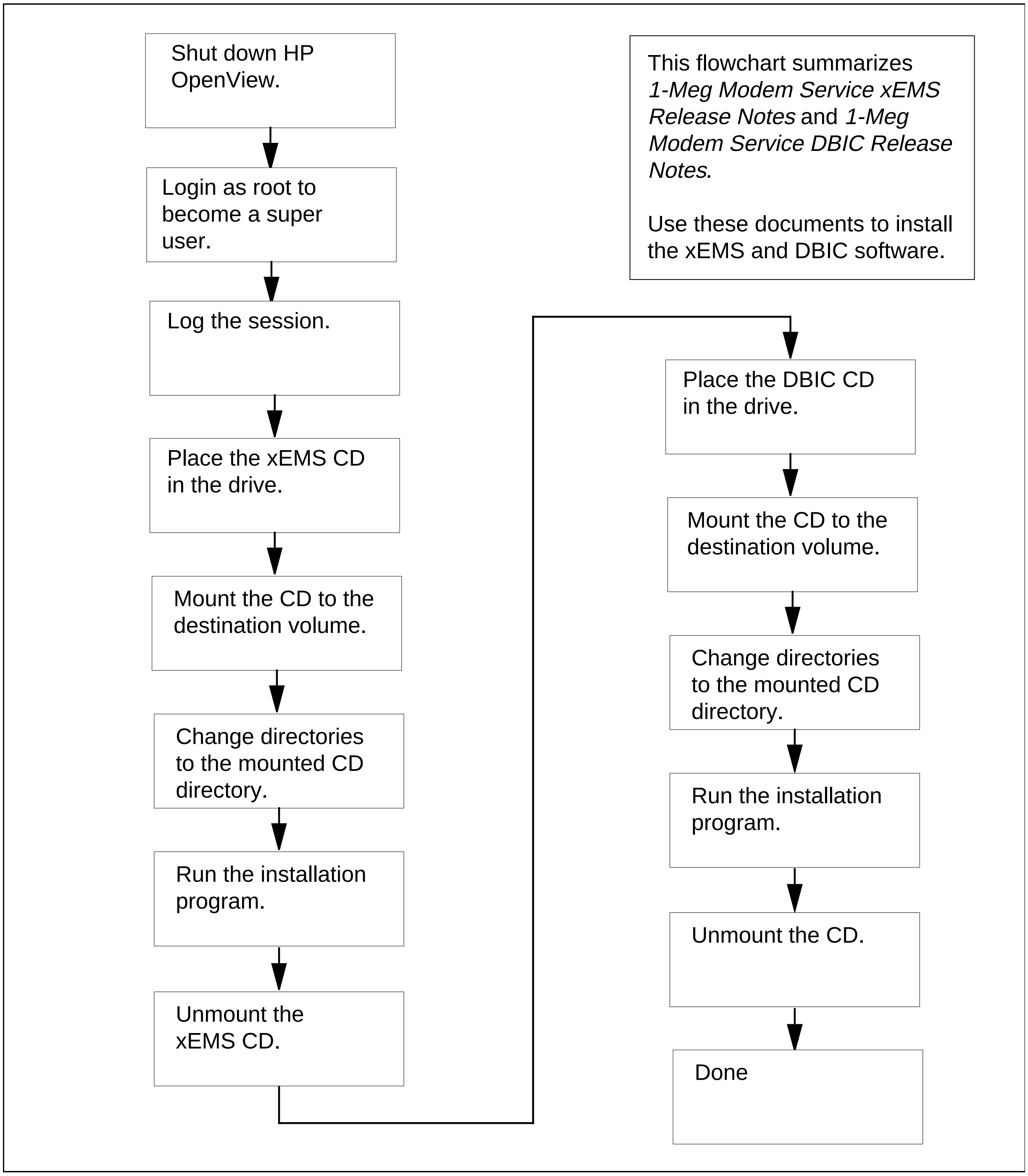
xEMS and DBIC software

The xEMS workstation requires the following software to run xEMS and support 1-Meg Modem Service:

- xEMS software (XEMSxxxx) and an xEMS software maintenance release (XEMSMxxx)
- data-enhanced bus interface card (DBIC) firmware (XDSLxxxx) and a DBIC firmware maintenance release (XDSLMxxx)

Nortel Networks delivers each product on compact disc (CD). Release notes accompany each product and describe how to install the software. Figure 3-2 shows the steps to install xEMS and DBIC software.

Figure 3-2 Summary of xEMS and DBIC software installation



Remote access

Some operating companies provide remote access to the xEMS workstation to Nortel Networks. Remote access allows Nortel Networks technical support groups to monitor the office's 1-Meg Modem Service.

To support remote access, the xEMS workstation must have a modem that meet the following requirements:

- Hayes-compatible from any vendor
- V.34 compliant
- 33.6 baud — other baud rates will affect performance and transfer rate.

The xEMS workstation does not need special software for the modem or remote access. The required HP-UX release provides the necessary tools to configure the modem.

Kernel configuration

If you modify the kernel tunable parameters for the system running as a server, you allow the server to support the following:

- more requests
- a larger database
- the procedure to make the requests active

If you use an HP workstation, perform the following steps to modify the kernel parameters:

1. Start the SAM utility (**/usr/sbin/sam**).
2. Select Kernel Configuration and Configurable Parameters.
3. Select maxuprc. Activate the Actions menu. Choose Modify Configurable Parameters.
4. Change Formula/Value to 200. Select OK to accept the value.
5. Select nfile. Activate the Actions menu. Choose Modify Configurable Parameters.
6. Change Formula/Value to 2200. Select OK to accept the value.
7. Select ninode. Activate the Actions menu. Choose Modify Configurable Parameters.
8. Change Formula/Value to 1600. Select OK to accept the value.
9. Select maxdsiz. Activate the Actions menu. Choose Modify Configurable Parameters.
10. Change Formula/Value to 256. Select OK to accept the value.
11. When you finish changing the kernel parameters, SAM will ask if you wish to create/build a new kernel. Select OK to create a new kernel.
12. When the kernel is built, SAM will ask if you wish to move the kernel in place and reboot the system. Select OK to move the kernel and reboot the system.

Sun workstation and DHCP

If you use a Sun workstation, you must configure DHCP and TFTP services. Refer to *1-Meg Modem Service xEMS Release Notes* for more information.

DMS

ATTENTION

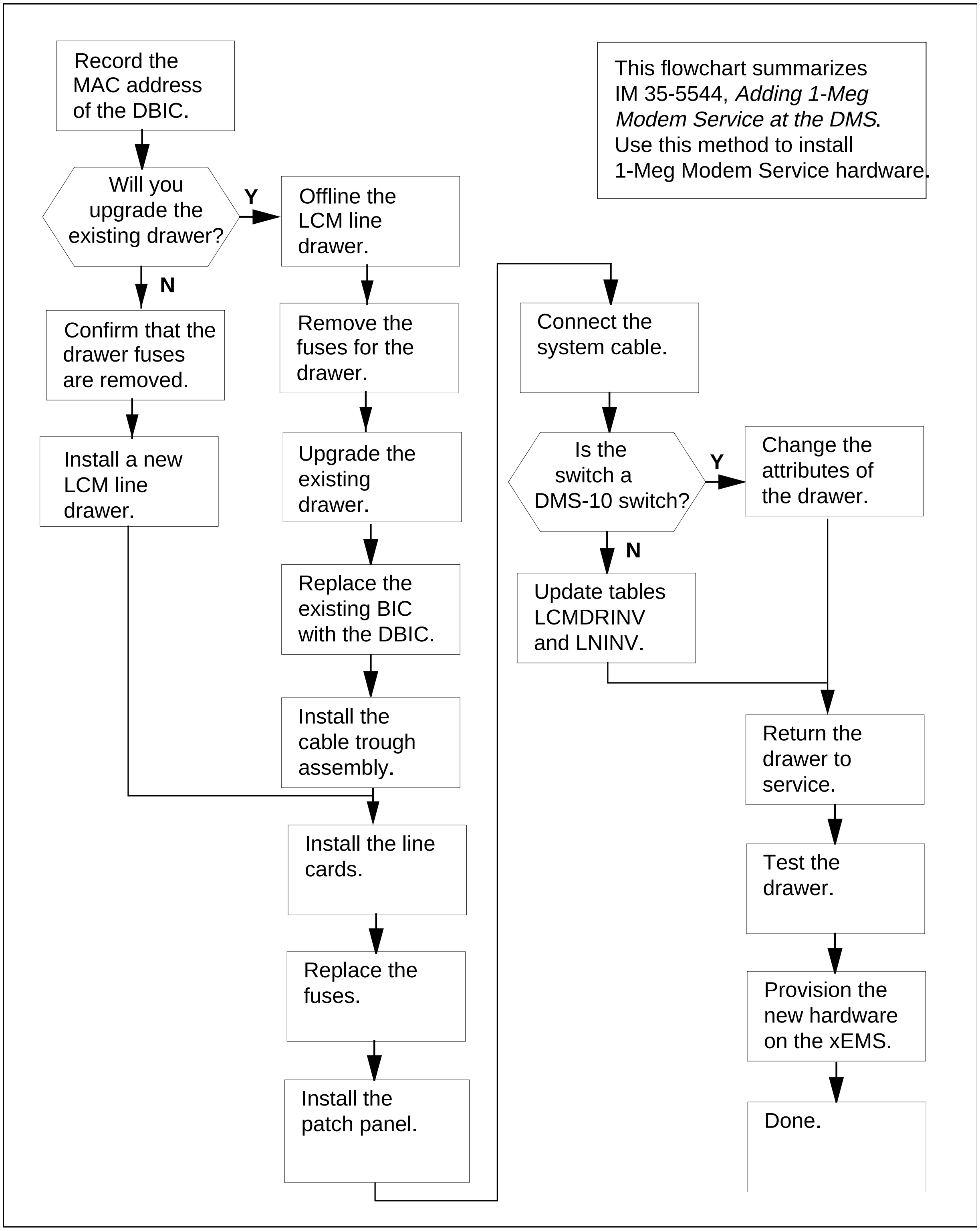
This section summarizes the information in IM *35-5544 Adding 1-Meg Modem Service at the DMS*. Use this IM to install the DMS hardware. You can use the information in this section to troubleshoot installation and operations problems.

The upgrade of the DMS to the 1-Meg Modem Service consists of the following activities:

- Upgrade or replace the existing line concentrating module (LCM) drawer.
- Replace the existing line cards with xDSL line cards (xLC).
- Add additional wiring.
- Provision the new hardware on the xEMS.

Figure 3-3 shows the process to install 1-Meg Modem Service hardware in the DMS.

Figure 3-3 Summary of DMS installation



For most offices, the 1-Meg Modem Service will require no other equipment changes. The service does not affect floor space, facilities, or power at the switching office.

Requirements

The DMS must meet the following requirements during installation and operation.

Installation

The DMS and xEMS workstation must meet the following requirements before you install the DMS:

- Thermal constraints and power distribution within the LCM line drawer restrict the type and number of line cards in an LCM line drawer that supports 1-Meg Modem Service. Refer to "Engineering rules for fill of LCM line drawers" in this chapter for information on these restrictions.
- The transport network is installed and fully operational.
- The data access cabling between the data switch and the patch panel is ready.
- The xEMS workstation is installed and fully operational.
- Operating company personnel have removed all subscribers, line cards, and datafill for each LCM line drawer to be upgraded to 1-Meg Modem Service.
- The following hardware is on site:
  - DBIC
  - System data cable
  - xLC
  - Cable trough assembly
  - Patch panel
  - Product change kit
- The following software is on site:
  - DBIC software and any required maintenance releases
  - xEMS software and any required maintenance releases
  - CM software
- The LCM that supports 1-Meg Modem Service meets the following prerequisites:
  - 256K LCM load
  - NT6X51AB processor

- Operating company personnel may need to rewire some subscribers at the main distribution frame (MDF). For example, if subscriber line cards occupy the slots next to the existing BIC, operating company personnel should move these cards if an xLC is provisioned in that column.
- Install the DBIC during a maintenance window or a period of low traffic. Installation will interrupt service for all subscribers supported in the drawer. After installation, the DBIC automatically recovers and continues to handle normal voice communication and telephone traffic.

Operation

The DMS must meet the following standards during installation and operation:

- The 1-Meg Modem Service can operate over most existing non-loaded loops without specialized engineering, loop extensions, or remote access vehicles. The maximum reach from the switching office to home is 19,500 feet. However, the presence of noise, bridged taps, or other impairments can affect this range. In practice, consider 18,500 of 26 AWG as the maximum distance.
- The 10BaseT and 100BaseT protocols limit the distance between the LCM line drawer and the data equipment to 100 meters. The first 50 meters of cable can connect the LCM drawers to the cross-connect panel. The second 50 meters can connect the patch panel to the data equipment.

LCM

The LCM can reside in the following types of equipment:

- line concentrating equipment (LCE) frame
- Star Remote Hub or remote line concentrating module (RLCM) frame
- cabinetized LCE

Each LCM consists of two shelves that are line concentrating arrays (LCA). Each LCA consists of up to five LCM line drawers.

Each line drawer consists of two line subgroups (LSG): an odd-numbered LSG and an even-numbered LSG. The LSGs in the upper section of the drawer are odd-numbered. The LSGs in the lower section of the drawer are even-numbered.

Each line drawer can hold one DBIC and multiple line cards. The LCE and CLCE can hold 2 LCMs and up to 20 LCM line drawers. The Star Remote Hub can hold up to 2 LCMs and 18 line drawers.

Data cable/trough assembly

Existing LCM line drawers require the data cable/trough assembly. The assembly allows the DBIC to connect to the 10BaseT or 100BaseT Ethernet cable to the transport network. Refer to IM *35-5544*, *Adding 1-Meg Modem Service at the DMS* for information on the installation of the assembly.

Patch panel kit

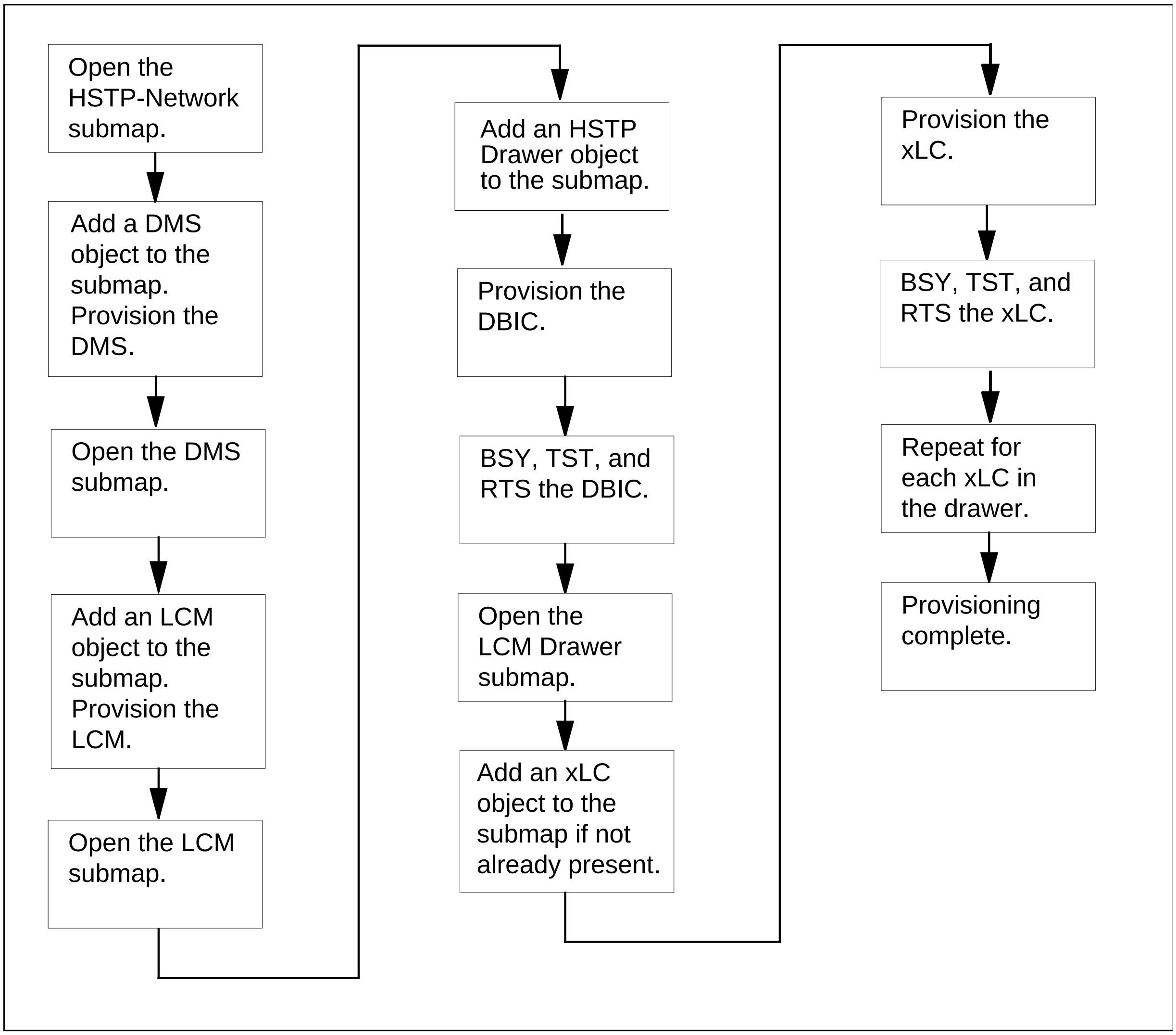
The patch panel kit provides a point of separation between 1-Meg Modem Service hardware and the transport network. One side of the panel connects the 10BaseT or 100BaseT Ethernet cables from the DBIC. The other side of the panel provides the RJ-45 connections to the transport network.

Refer to IM *35-5544*, *Adding 1-Meg Modem Service at the DMS* for information on the installation of the panel.

Provisioning

After you install the DMS hardware, you must provision the 1-Meg Modem Service at the xEMS workstation. Use IM *35-5543*, *xEMS Workstation for 1-Meg Modem Service* to provision the DMS for 1-Meg Modem Service. Figure 3-4 shows the steps to provision DMS hardware.

Figure 3-4 Summary of DMS provisioning



Global cutoff on disconnect

You can set the software in the DMS switch to cutoff the relay in a subscriber loop after a call disconnect. The feature is suited for lines with FAX machines that do not recognize a call disconnect. However, the feature can interrupt data transmissions after a POTS call in the 1-Meg Modem Service.

Field global_cutoff_on_disconnect in table OFCENG identifies the global cutoff for the office. Nortel Networks recommends that you not set this parameter in offices with 1-Meg Modem Service. If office policy requires you to set this parameter, Nortel Networks recommends that you set the disconnect time to 800 milliseconds (ms) or less.

Engineering rules for fill of LCM line drawers

DANGER
Possible damage to line cards
If you do not follow these guidelines, you can damage the line cards in the drawer.

Thermal constraints, power distribution, and component size create restrictions on the fill of the LCM line drawer that provides 1-Meg Modem Service. If you follow the engineering guidelines for LCM drawer fill, the total power dissipated within the line drawer will remain within acceptable levels.

LCE

An LCM line drawer in an LCE that provides 1-Meg Modem Service must meet the following engineering rules:

- The line drawer must be an NT6X05AA or NT6X05EA.
- The xLC can an NTEX17AA, NTEX17BA, or NTEX17CA.
- The IBERT card (NT6X99AA) can reside only in slots 15/31 of the odd-numbered LSG of the line drawer NT6X05EA. The IBERT card cannot reside in the NT6X05AA.
- The xLCs can reside in the either even-numbered LSG or the odd-numbered LSG. The xLCs cannot straddle the two LSGs.
- Slots 00/16 in the odd-numbered LSG must be empty. The RJ-45 connector on the DBIC use these slots.
- If the drawer is drawer 0, the drawer must have an xLC in slot 00 of the even-numbered LSG. Slot 00 in drawer 0 is reserved for system tests. You can use the xLC in this slot to test data functionality. You cannot assign a directory number (DN) to this card.
- The drawer cannot have the following cards:
  - — line card type B (NT6X18AB)
  - — message waiting line card (NT6X19AA)

- — message waiting supply card (NT6X20AA)
- — digitone fraud supply card (NT6X23)

  The NT6X18AB and NT6X19AA require a supply card (NT6X32 or NT6X20AA), which must reside in slot 16 of the odd-numbered LSG.

- The line drawer can have the following combinations of line cards:
  - — NTEX17CA xLCs
  - — NTEX17AA or NTEX17BA xLCs
  - — a mix of xLCs
  - — a mix of xLCs and POTS line cards

The line drawer must also meet the engineering rules that follow for the line card combination that the drawer supports.

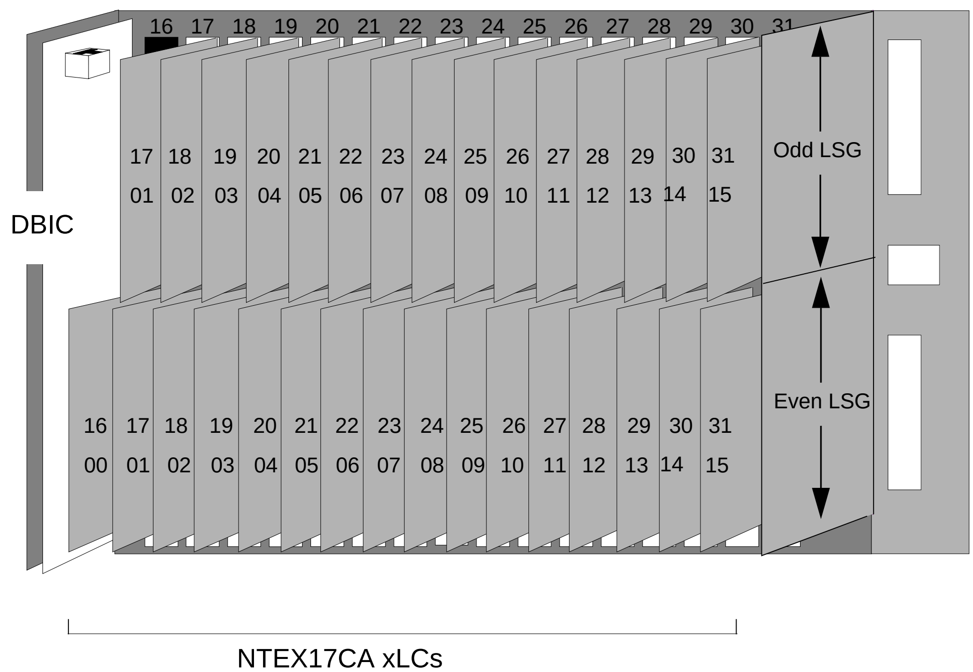
NTEX17CA xLCs in LCE

If the line drawer in the LCE supports only NTEX17CA xLCs, the line drawer must meet the following engineering rules.

- The drawer can hold a maximum of 31 xLCs.
- The xLCs can reside in either LSG.

Figure 3-5 shows an LCM line drawer (NT6X05AA or NT6X05EA) with NTEX17CA line cards.

Figure 3-5 LCE drawer fill: NT6X05AA/EA with NTEX17CA xLCs



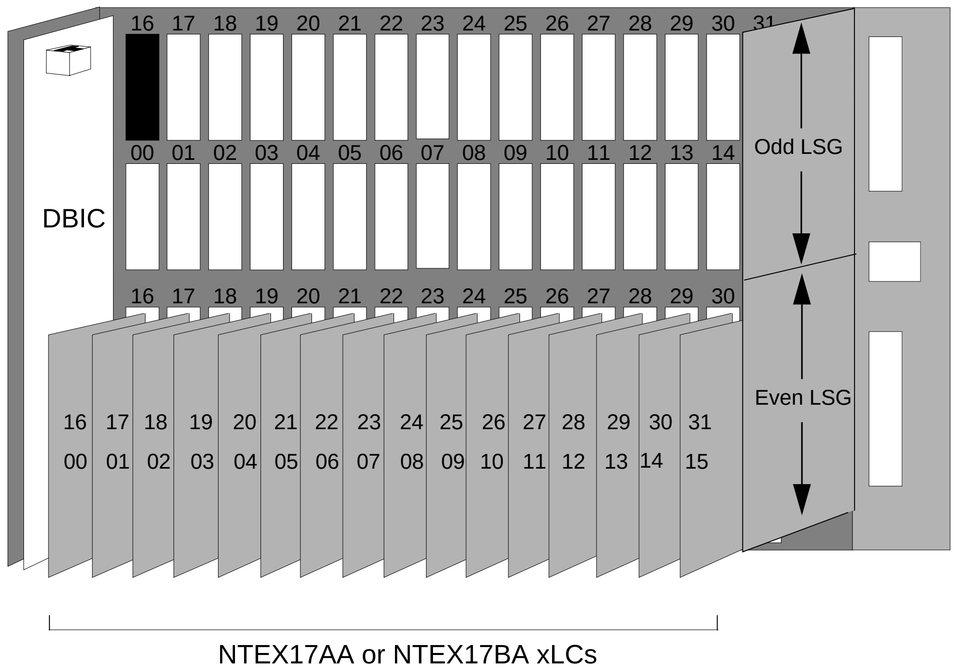
NTEX17AA or NTEX17BA xLCs in LCE

If the line drawer in the LCE supports only NTEX17AA or NTEX17BA xLCs, the line drawer must meet the following engineering rules.

- The drawer can hold a maximum of 16.
- The xLCs must reside in the even-numbered LSG. The odd-numbered LSG must be empty.

Figure 3-6 shows an LCM line drawer (NT6X05AA or NT6X05EA) with NTEX17AA or NTEX17BA xLCs.

Figure 3-6 LCE drawer fill: NT6X05AA/EA with NTEX17AA/BA xLCs



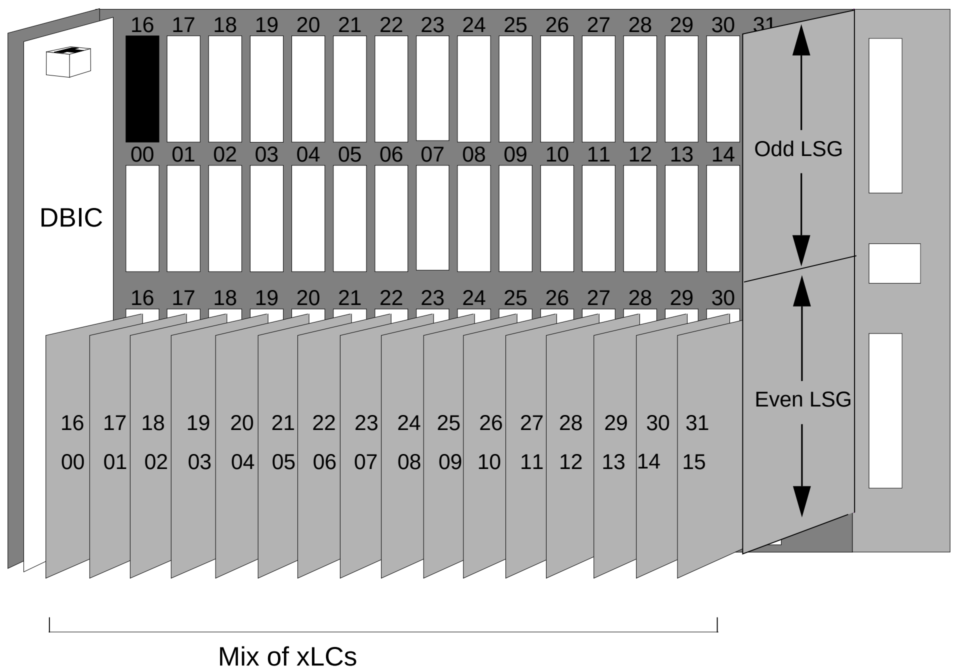
Mix of xLCs in LCE

If the line drawer in the LCE supports a mix of xLCs, the drawer must meet the following engineering rules.

- The drawer can hold a maximum of 16 xLCs.
- The xLCs can only reside in the even-numbered LSG. The odd-numbered LSG must be empty.

Figure 3-7 shows an LCM line drawer (NT6X05AA or NT6X05EA) with a mix of xLCs.

Figure 3-7 LCE drawer fill: NT6X05AA/EA with mix of xLCs



Mix of xLCs and POTS line cards in LCE

If the line drawer in the LCE supports a mix of xLCs and POTS line cards, the line drawer must meet the following engineering rules:

- The drawer cannot have a POTS line card in a slot above or below a NTEX17CA.
- The drawer cannot have a POTS line card in a slot nearer to the DBIC than the farthest xLC. For example, if an NTEX17CA resides in slots 07/23 of

the even-numbered LSG, you cannot install a POTS line card in slots 00 to 07 and slots 16 to 23 of either subgroup.

- If the xLCs include an NTEX17AA or NTEX17BA, the xLCs can only reside in the odd-numbered LSG.
- If all the xLCs are NTEX17CA, the xLCs can reside in both LSGs.

Figure 3-8 shows an LCM line drawer (NT6X05AA or NT6X05EA) with a mix of NTEX17AA/BA xLCs and POTS line cards.

Figure 3-8 LCE drawer fill: NT6X05AA/EA with NTEX17AA/BA xLCs and POTS line cards.

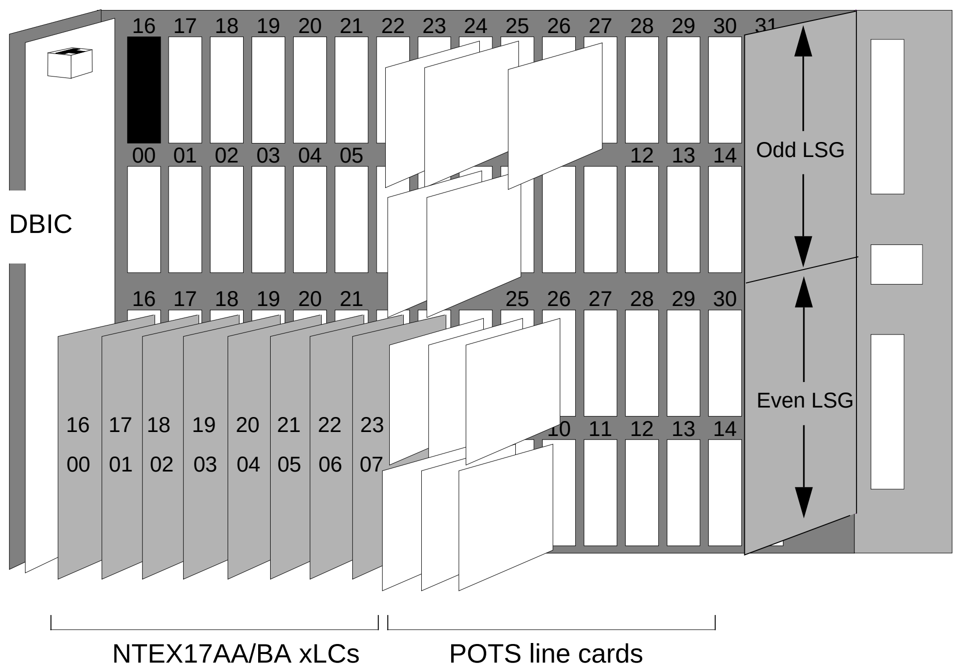
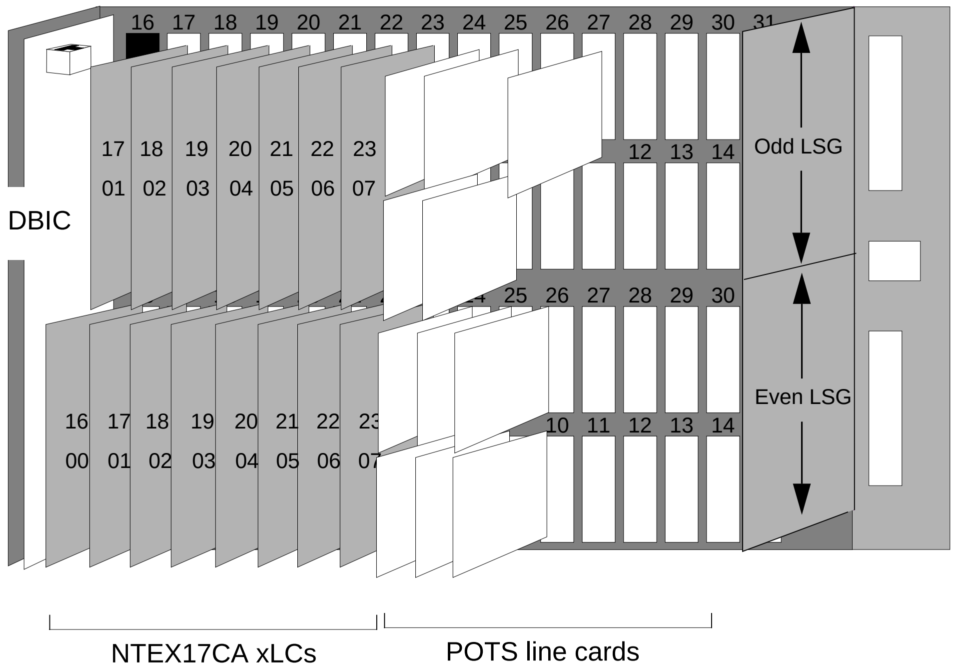


Figure 3-9 shows an LCM line drawer (NT6X05AA or NT6X05EA) with a mix of NTEX17CA xLCs and POTS line cards.

Figure 3-9 LCE drawer fill: NT6X05AA/EA with NTEX17CA xLCs and POTS line cards.



RLCM and Star Remote Hub

An LCM line drawer that provides 1-Meg Modem Service in an RLCM or Star Remote Hub must meet the following rules:

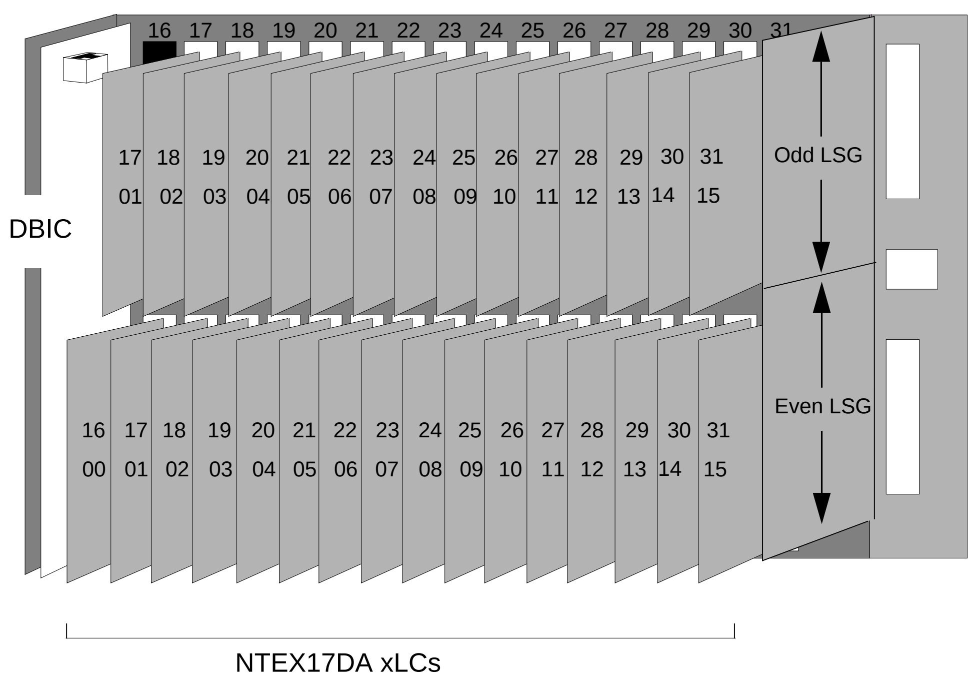
- The RLCM or Star Remote Hub can support a mix of line drawers that support each service. However, a line drawer cannot support a mix of services. A line drawer can support *either* 1-Meg Modem Service *or* POTS.
- The line drawer must be an NT6X05AA or NT6X05EA.
- The DBIC must be an NTEX54CA.
- The xLC must be an NTEX17DA.
- The line drawer cannot have POTS line cards or other versions of NTEX17 xLCs.
- The IBERT card (NT6X99AA) can reside only in slots 15/31 of the odd-numbered LSG of the line drawer NT6X05EA. The IBERT card cannot reside in the NT6X05AA.
- If the drawer is drawer 0, the drawer must have an xLC in slot 00 of the even-numbered LSG. Slot 00 in drawer 0 is reserved for system tests. You can use the xLC in this slot to test data functionality. You cannot assign a directory number (DN) to this card.

- Slots 00/16 in the odd-numbered LSG must be empty. The RJ-45 connector on the DBIC uses these slots.
- The drawer cannot have the following cards:
  - — line card type B (NT6X18AB)
  - — message waiting line card (NT6X19AA)
  - — message waiting supply card (NT6X20AA)
  - — digitone fraud supply card (NT6X23)

  The NT6X18AB and NT6X19AA require a supply card (NT6X32 or NT6X20AA), which must reside in slot 16 of the odd-numbered LSG.
- The line drawer can hold a maximum of 31 xLCs.
- The xLCs can reside in either the odd-numbered LSG or he even-numbered LSG. The xLC cannot straddle both groups.

Figure 3-10 shows an LCM line drawer with NTEX17DA line cards.

Figure 3-10 RLCM/Star Remote drawer fill: NT6X05AA/EA with NTEX17DA xLCs



CLCE

An LCM line drawer in a CLCE that provides 1-Meg Modem Service must meet the following engineering rules:

- The line drawer must be an NT6X05HA.
- The xLC can be an NTEX17AA, NTEX17BA, or NTEX17CA.
- The line drawer cannot have an IBERT card (NT6X99AA).
- The xLCs can reside in either the even-numbered LSG or the odd-numbered LSG. The xLCs cannot straddle the two LSGs.
- The following odd-numbered LSG slots must be empty.
  - 00 and 16

    The RJ-45 connector on the DBIC uses these slots.
  - 14, 15, 30, and 31

    The cable trough assembly uses these slots.
- If the drawer is drawer 0, the drawer must have an xLC in slot 00 of the even-numbered LSG. Slot 00 in drawer 0 is reserved for system tests. You can use the xLC in this slot to test data functionality. You cannot assign a directory number (DN) to this card.
- The drawer cannot have the following cards:
  - line card type B (NT6X18AB)
  - message waiting line card (NT6X19AA)
  - message waiting supply card (NT6X20AA)
  - digitone fraud supply card (NT6X23)

  The NT6X18AB and NT6X19AA require a supply card (NT6X32 or NT6X20AA), which must reside in slot 16 of the odd-numbered LSG.
- The line drawer can have the following combinations of line cards:
  - NTEX17CA xLCs
  - NTEX17AA or NTEX17BA xLCs
  - a mix of xLCs.
  - a mix of xLCs and POTS line cards

The line drawer must also meet the engineering rules that follow for the line card combination that the drawer supports.

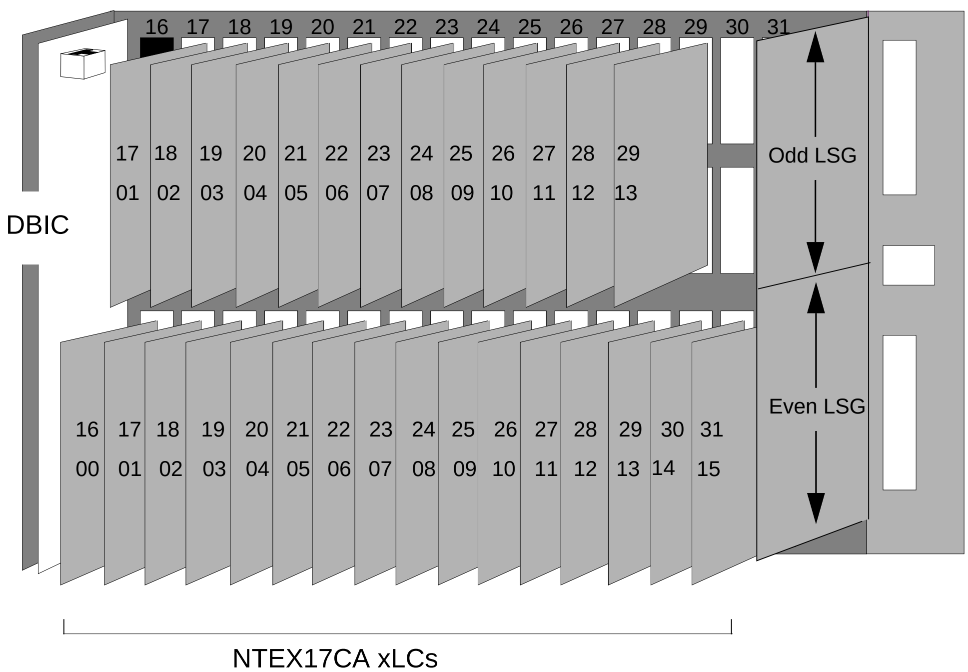
NTEX17CA xLCs in CLCE

If the line drawer in the CLCE supports only NTEX17CA xLCs, the line drawer must meet the following engineering rules.

- The drawer can hold a maximum of 29 xLCs.
- The xLCs can reside in either LSG.

Figure 3-11 shows an LCM line drawer (NT6X05HA) with NTEX17CA line cards.

Figure 3-11 CLCE drawer fill: NT6X05HA with NTEX17CA xLCs



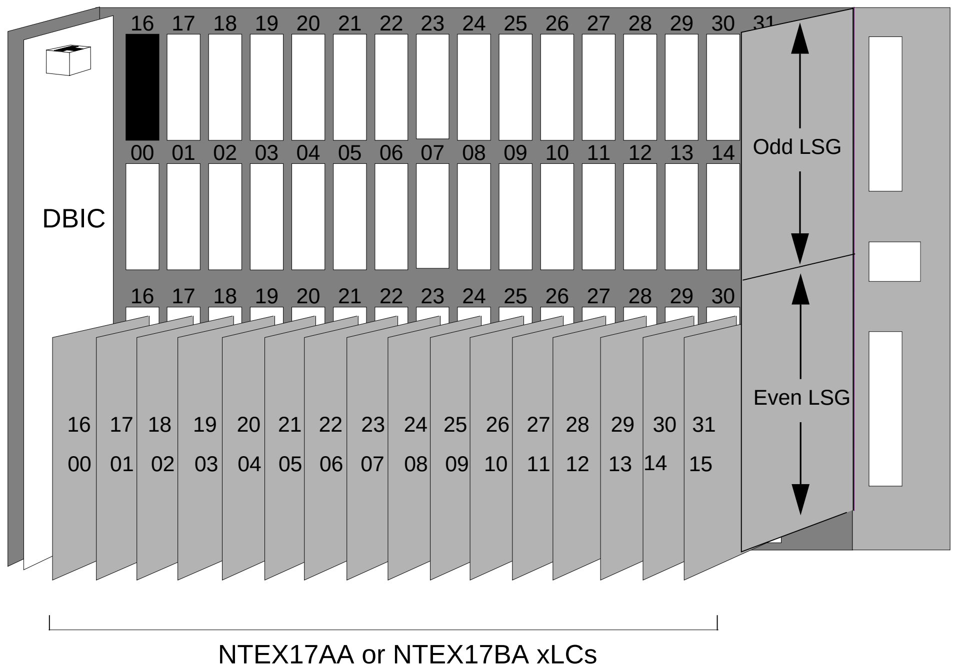
NTEX17AA or NTEX17BA xLCs in CLCE

If the line drawer in the CLCE supports only NTEX17AA or NTEX17BA xLCs, the line drawer must meet the following engineering rules.

- The drawer can hold a maximum of 16.
- The xLCs must reside in the even-numbered LSG. The odd-numbered LSG must be empty.

Figure 3-12 shows an LCM line drawer (NT6X05HA) with NTEX17AA or NTEX17BA xLCs.

Figure 3-12 CLCE drawer fill: NT6X05HA with NTEX17AA/BA xLCs



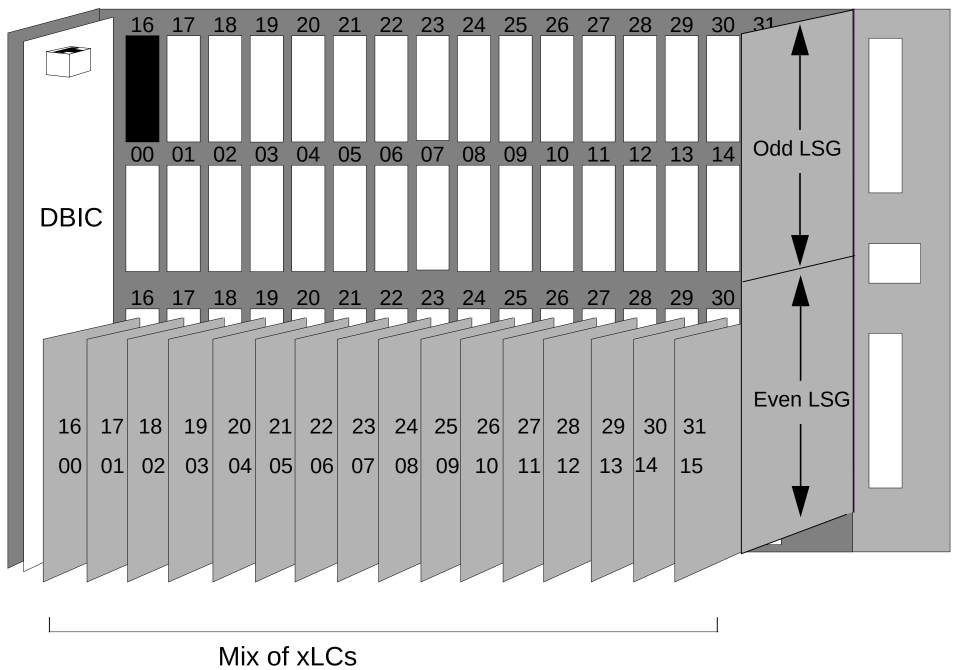
Mix of xLCs in CLCE

If the line drawer in the CLCE supports a mix of xLCs, the drawer must meet the following engineering rules.

- The drawer can hold a maximum of 16 xLCs.
- The xLCs can only reside in the even-numbered LSG. The odd-numbered LSG must be empty.

Figure 3-13 shows an LCM line drawer (NT6X05HA) with a mix of xLCs.

Figure 3-13 CLCE drawer fill: NT6X05HA with mix of xLCs



Mix of xLCs and POTS line cards in CLCE

If the line drawer in the CLCE supports a mix of xLCs and POTS line cards, the line drawer must meet the following engineering rules:

- The drawer cannot have a POTS line card in a slot above or below a NTEX17CA.
- The drawer cannot have a POTS line card in a slot nearer to the DBIC than the farthest xLC. For example, if an NTEX17CA resides in slots 07/23 of

the even-numbered LSG, you cannot install a POTS line card in slots 00 to 07 and slots 16 to 23 of either subgroup.

- If the xLCs include an NTEX17AA or NTEX17BA, the xLCs can only reside in the odd-numbered LSG.
- If all the xLCs are NTEX17CA, the xLCs can reside in both LSGs.

Figure 3-14 shows an LCM line drawer (NT6X05HA) with a mix of NTEX17AA/BA xLCs and POTS line cards.

Figure 3-14 CLCE drawer fill: NT6X05HA with NTEX17AA/BA xLCs and POTS line cards.

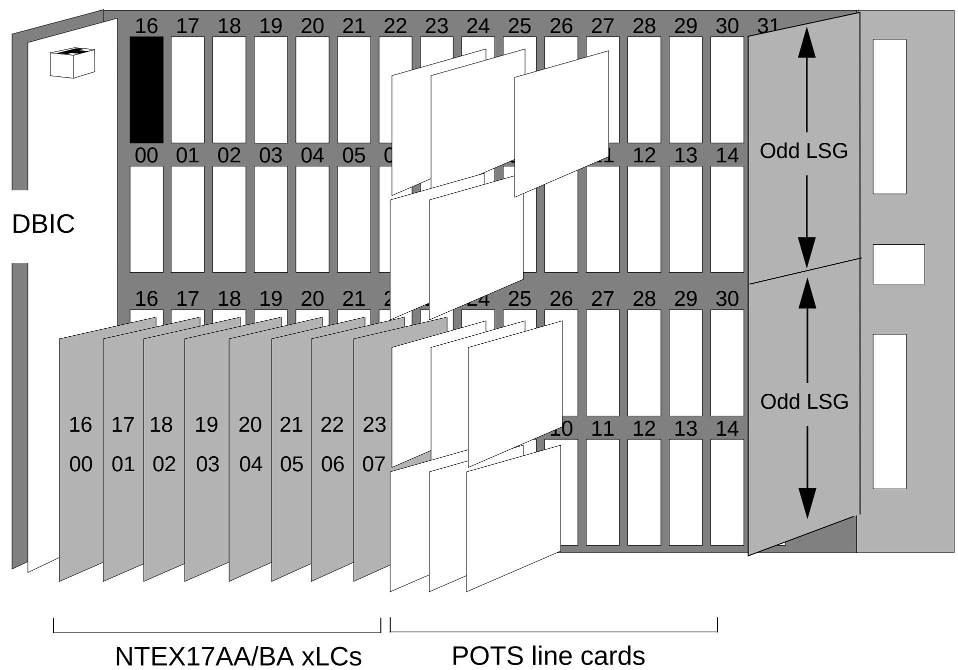
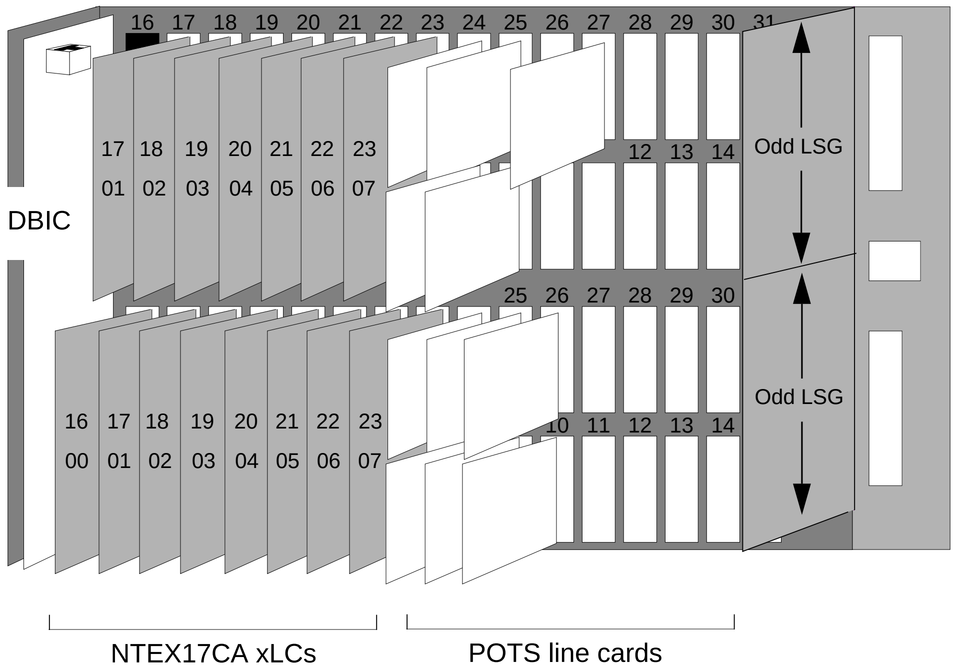


Figure 3-15 shows an LCM line drawer (NT6X05HA) with a mix of NTEX17CA xLCs and POTS line cards.

Figure 3-15 CLCE drawer fill: NT6X05HA with NTEX17CA xLCs and POTS line cards.



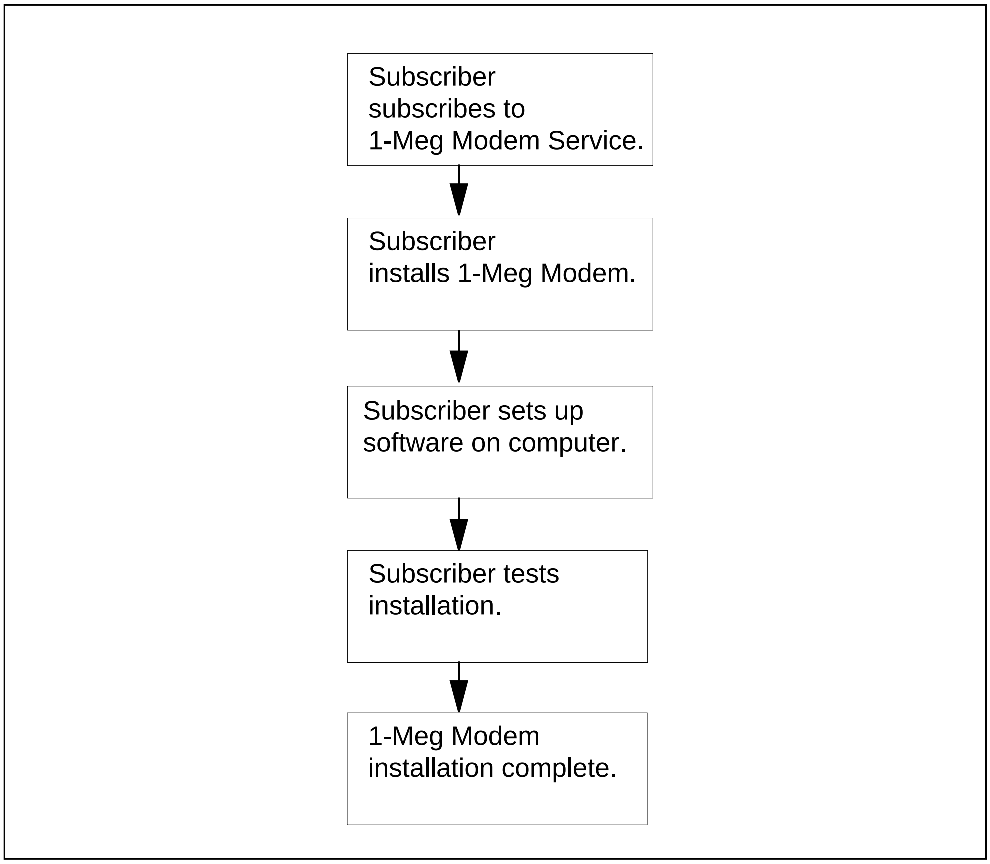
1-Meg Modem

> **ATTENTION**
>
> This section summarizes the information in *1-Meg Modem User Guide*. The subscriber uses this document to install the 1-Meg Modem. Use the information in this section to troubleshoot installation and operations problems.

The 1-Meg Modem is a plug-and-play device that is installed by the subscriber without a service call. The *1-Meg Modem User Guide* accompanies the modem and describes how to install the device.

Figure 3-16 shows the steps that a subscriber takes to install the 1-Meg Modem and 1-Meg Modem Service.

Figure 3-16 Summary of subscriber steps to install 1-Meg Modem Service



The 1-Meg Modem can use any telephone jack at the subscriber location. The subscriber connects their computer to the RJ-45 jack and their telephone line to the 1-Meg Modem. The regular voice telephone line connected to the 1-Meg Modem provides regular voice service. If a computer is connected directly to the 1-Meg Modem RJ-45 jack, a straight Ethernet cable must be used. On power-up, the 1-Meg Modem communicates directly with the xLC.

Requirements

The 1-Meg Modem must meet the following requirements during installation and operation.

Installation

Following are the requirements for installation of the 1-Meg Modem at the subscriber's location. These requirements are included in the chapter “Modem Operation Requirements” in the *1-Meg Modem User Guide*.

- The subscriber cannot connect more than two Ethernet devices to a 10BaseT Ethernet hub to the 1-Meg Modem Service. This requirement includes such devices as printers with Ethernet connections. The DBIC learns all MAC addresses regardless of the type of device. If two PCs and a printer are connected through a hub to the 1-Meg Modem, the DBIC can learn the MAC address of the printer. The DBIC will associate the MAC address of the printer with the PC.
- If two PCs are connected through a hub to the 1-Meg Modem, both PCs must use the same data service provider.
- If the subscriber has multiple telephone lines, the 1-Meg Modem resides on line one. If the 1-Meg Modem Service uses a secondary pair, perform one of the following actions:
  - Rewire the jack.
  - Use a swapping cable.
- Each computer has a 10BaseT Ethernet card with the following:
  - software drivers
  - a standard RJ-45 connector
- The subscriber knows the TCP/IP setup requirements of the data service provider.

Operation

The 1-Meg Modem must meet the following standards during installation and operation:

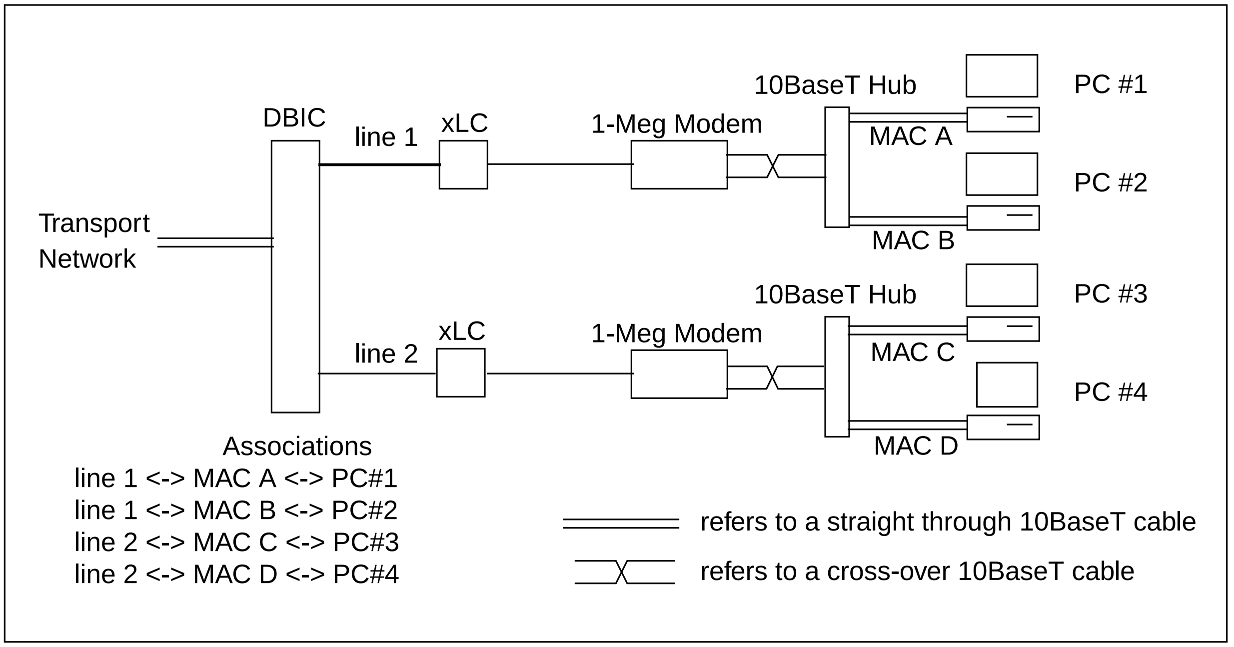
- 10BaseT protocol limits the distance between the modem and the PC to 100 meters.
- The 1-Meg Modem will not function until the office and data service provider activate 1-Meg Modem Service for the subscriber.
- The 1-Meg Modem must be at least 12 inches away from the computer monitor. Some computer monitors radiate significant amounts of electromagnetic interference that could impair 1-Meg Modem operations.
- The 1-Meg Modem should be out of direct sunlight. Sunlight can cause the 1-Meg Modem to heat up beyond its designed operating point.

Multi-PC Networking

If the office supports Multi-PC Networking, a subscriber can use a 10BaseT Ethernet hub to connect two PCs to a single 1-Meg Modem. The subscriber must use a 10BaseT Ethernet hub with at least three ports. The subscriber must follow the installation and operation requirements for the hub.

Figure 3-17 shows a configuration that uses the Multi-PC Networking feature.

Figure 3-17 1-Meg Modem Service configuration with two PCs



This feature allows the DBIC to learn up to two source MAC addresses. Each PC has a unique MAC address coded on the PC's 10BaseT card. The 1-Meg Modem CPE passes all upstream and downstream traffic that it detects, regardless of the MAC address. When the DBIC detects upstream traffic from a PC, the DBIC learns the source MAC address and associates the MAC address with a subscriber line. This feature allows the DBIC to associate up to two MAC addresses with a single line and pass traffic to up to two PCs on the same 1-Meg Modem.

Offices at xEMS Release 5 or higher can control the number of simultaneous connections from a subscriber premise that uses Multi-PC Networking. You can provision the number of connections at the HSTP-Network level, DBIC level, or xLC level through the xEMS or the command line.

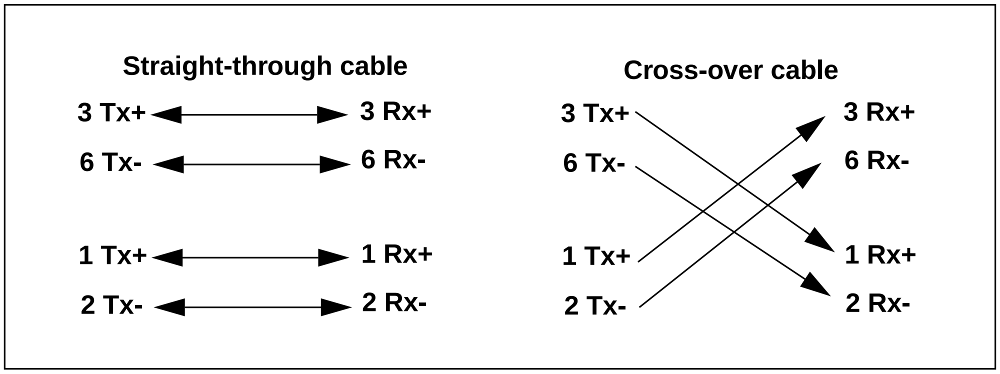
Cables

Most hubs require a cross-over cable between one of the Ethernet ports of the hub and the 1-Meg Modem. The 1-Meg Modem includes a straight-through cable for single PC subscribers. If the 1-Meg Modem supports two PCs, the subscriber may need to purchase a cross-over cable. Many computer and electronic retail outlets offer cross-over cables.

Some hubs have a unique configurable port that uses a straight-through cable. This port has the TX and RX pins reversed, so a subscriber can use a straight-through cable to cascade hubs.

Figure 3-18 shows the differences in the pins between the straight-through cable and the cross-over cable.

Figure 3-18 Comparison of pins in straight-through and cross-over cable



The two cables look the same, which makes it easy for a subscriber to install the wrong cables. The subscriber can perform the following steps to identify the type of cable:

1. Hold the ends of the cable together so you can see the pins of both ends.
2. Look at the colors of pins 1, 2, 3 and 6 of one end of the cable.
3. Look at the colors of pins 1, 2, 3 and 6 of the other end of the cable.

In a straight-through cable, the colors of each pin at each end of the cable match. In a cross-over cable, the colors of pins 1, 2, 3, and 6 at each end of the cable are different.

Software setup

The following section describes how to set up the software on IBM*-compatible computers and Macintosh* computers to support 1-Meg Modem Service.

IBM-compatible

Before a subscriber can use the 1-Meg Modem, the subscriber must configure the communication software on the IBM-compatible computer. To configure the software, the subscriber needs the following information from the data service provider:

- the IP address
- the domain name

- subnet mask
- gateway address

The following steps tell the subscriber how to configure the software on an IBM-compatible computer with Windows* 95 version 4.0. The chapter Software Setup in the *1-Meg Modem User Guide* includes this information. The installation steps can vary for other IBM-compatible computers and Windows systems.

1. Click on the Start button.
2. Select Settings.
3. Click on Control Panel.
4. Double click on the Network icon. The Network dialog box will appear. If TCP/IP is not installed, go to step 5. If TCP/IP is installed, go to step 9.
5. Click the Add button in the Network dialog box. The Select Network Component Type dialog box will appear.
6. In the Network dialog box, perform the following steps.
   a. Click on Protocol.
   b. Click the Add button. The Select Network Protocol dialog box will appear.
7. In the Select Network Protocol dialog box, perform the following steps.
   a. Under Manufacturers, click on Microsoft*.
   b. Under Network Protocols, click on TCP/IP.
8. Click OK. The Network dialog box will appear.
9. Click on TCP/IP.
10. Click on Properties. The TCP/IP Properties dialog box will appear.
11. Under the IP Address header, select Specify an IP Address.
12. Enter the IP address and subnet mask provided by the data service provider.
13. Click the Gateway tab.
14. In New Gateway, enter the gateway address provided by the data service provider.
15. Click Add. The Installed Gateways dialog box will display the new gateway address.
16. Click the DNS Configuration tab.
17. Select Enable DNS.

18. Enter the host name and domain name provided by the data service provider.
19. Click OK. The Network dialog box will appear.
20. Click OK to restart the computer.

After the computer restarts, the Ethernet Link Status or 10bt Link Pulse Status LED on the modem will turn green. The *1-Meg Modem User Guide* recommends the subscriber perform the following tasks to test the connection:

- Establish a TCP/IP connection through the data service provider icon for any TCP/IP compatible application.
- Make a telephone call on the telephone that is connected to the 1-Meg Modem.

Macintosh

Before a subscriber can use the 1-Meg Modem, the subscriber must configure the Macintosh communication software for the modem and the data service provider. To configure the software, the subscriber needs the following information from the data service provider:

- IP address
- domain name
- subnet mask
- gateway address

The steps to configure the communication software differ between operating systems. The following steps tell the subscriber how to configure the software on a Macintosh Quadra* 610 with operating system 7.5.3. The chapter “Software Setup” in the *1-Meg Modem User Guide* includes this information. The installation steps can vary for other Macintosh computers and operating systems.

1. Confirm the computer, computer monitor, and modem are turned on.
2. Confirm the Power light on the modem is green.
3. From the Apple menu, select Control Panels and one of the following options:
   - Network
   - MacTCP* Admin
   - MacTCP

4. From this window, perform the following steps:
   a. Select the Ethernet icon.
   b. Enter the IP address.
   c. Click the More button.
5. From this window, perform the following steps:
   a. Under the Obtain Address header, select Manually.
   b. Under IP Address, enter the information provided by the data service provider. This information includes the gateway address, IP address, subnet mask, and domain.
   c. When you finish entering the information, click the OK button.
6. When you receive the message “You must restart the Macintosh for your changes to take effect,” click the OK button and restart the Macintosh.

After the Macintosh restarts, the Ethernet Link Status or 10bt Link Pulse Status LED on the modem will turn green. The *1-Meg Modem User Guide* recommends the subscriber perform the following tasks to test the connection:

- Establish a TCP/IP connection through the data service provider icon for any TCP/IP compatible application.
- Make a telephone call on the telephone that is connected to the 1-Meg Modem.

The following steps tell the subscriber how to configure the software on a Macintosh with a operating system 8.0. The chapter The installation steps can vary for other Macintosh computers and operating systems.

1. Confirm the computer, computer monitor, and modem are turned on.
2. Confirm the Power light on the modem is green.

3. From the Apple menu, select Control Panels and TCP/IP.
4. From the TCP/IP window, enter the following information:
   - At the Connect via: header, select Ethernet.
   - At the Configure header, select Manually.
   - At the IP Address header, enter the IP address provided by the data service provider.
   - At the Subnet mask header, enter the address provided by the data service provider.
   - At the Router address header, enter the address provided by the data service provider.
   - At the Name Server Address header, enter the address provided by the data service provider.
   - Close the window.
   - The system generates a message “Save changes to current configuration?” Click the Save button.
   - You have completed software setup.

Filters

A telephone filter prevents noise interference on telephones, FAX machines, and answering machines at the subscriber's location. The 1-Meg Modem can use two types of filters. A desk mount filter supports FAX machines, answering machines, and desk telephones that are not directly connected to the 1-Meg Modem. A wall mount filter supports wall-mounted telephones.

Desk mount filter

The following steps tell the subscriber how to install a desk mount filter. The chapter “Telephone Filters” in the *1-Meg Modem User Guide* includes this information.

1. Disconnect the telephone line cord from the wall jack.
2. Insert the telephone line cord into the jack on the filter. If the filter is an NTEX39AA, insert the cord into the filter jack with the telephone icon. If the filter is an NTEX39BA, insert the card into either jack on the filter.
3. RJ-11 telephone line cord comes with the filter. If the filter is an NTEX39AA, insert one end of the cord into the RJ-11 jack on the filter. If the filter is an NTEX39BA, insert the card into either jack on the filter.
4. Plug the other end of the RJ-11 telephone line cord into the wall jack.
5. Confirm the device has dial tone.

Wall mount filter

The following steps tell the subscriber how to install a wall mount filter. The chapter “Telephone Filters” in the *1-Meg Modem User Guide* includes this information.

1. Remove the telephone from the wall.
   a. Push the telephone upward.
   b. Pull the telephone away from the mounting pins on the wall.
   c. If the telephone has a short line cord that connects the telephone to the wall jack, disconnect the cord from the wall jack.
2. Plug the filter's line cord into the wall jack.
3. Install the wall mount filter.
   a. Place the filter over the wall jack.
   b. Slide the filter down until the filter seats on the mounting pins.
4. Plug the telephones line cord into the jack on the front of the filter.
5. Install the telephone on the wall mount filter.
6. Confirm the telephone has dial tone.

Data rate prediction

Before you deploy the 1-Meg Modem Service, you should analyze the characteristics of the loop to predict the data rate available to the subscriber. You can use one of the following methods:

- spectral characteristics
- loop plant records

Without the resources to evaluate the spectral characteristics, an evaluation using plant records is acceptable. However, plant records do not consider the potential presence of interferers on the loop.

Spectral characteristics

This section describes how use spectral characteristics to predict data rates for downstream and upstream rates.

Downstream rate prediction

All rate predictions in this section are based on the following criteria:

- signal-to-noise ratios (SNR) on a loop
- requirements to guarantee a specific bit-error-ratio (BER)

The loop loss in dB is measured at 180 kHz and 240 kHz using 100 Ω. The loop loss measured at 180 kHz is used for narrowband predictions. The loop loss measured at 240 kHz is used for wideband predictions.

The noise floor is measured at the network interface device (NID) using a 100 Ω noise meter with the following bandwidths:

- 160 to 320 kHz wideband
- 160 to 200 kHz narrowband

Set the noise meter on *averaging*.

In a noise-free environment, you should observe a floor of -88 dBm for wideband or -94 dBm for narrowband. You can determine the loop impact factor (LIF) by adding the noise level in dBm to the loop loss in dB. You can use the LIF to determine the expected data rate.

The 1-Meg Modem will default to the highest possible rate. The 1-Meg Modem will choose wideband if allowed by the loop. If the loop does not allow wideband, the 1-Meg Modem will choose narrowband.

Use table 3-3 to predict the downstream wideband rate on a loop.

Table 3-3 Downstream wideband rate prediction using spectral characteristics

	Downstream wideband	QAM	Kilobit per second (kbit/s)
Loop loss (+dB $_{240\ kHz}$)			
Noise level (-dBm $_{160\ -\ 320}$) (If NL > -80 dBm, add the measured value. If NL < -80 dBm, add -80 dBm.)	+		
LIF			
	LIF < -44.5 dBm	256	1280
	-38.5 < LIF < -44.5	64	960
	-32.5 < LIF < -38.5	16	640
	-25.5 < LIF < -32.5	4	320

Use table 3-4 to predict the downstream narrowband rate on a loop.

Table 3-4 Downstream narrowband rate prediction using spectral characteristics

	Downstream narrowband	QAM	Kbit/s
Loop loss (+dB $_{180\ kHz}$)			
Noise level (-dBm $_{160\ -\ 200}$) (If NL > -84 dBm, add the measured value. If NL < -84 dBm, add -84 dBm.)	+		
LIF			
	LIF < -39.5 dBm	256	320
	-33.5 < LIF < -39.5	64	240
	-27.5 < LIF < -33.5	16	160
	-25.5 < LIF < -27.5	4	80

Upstream rate prediction

The upstream noise floor is measured at the central office MDF, using a 100 Ω noise meter with the following bandwidths:

- 48 kHz to 88kHz wideband
- 70 kHz to 90 kHz narrowband

Set the noise meter on *averaging*. In a noise-free environment, you should observe a noise floor -94 dBm for wideband and -97 dBm for narrowband.

Use table 3-5 to predict the upstream wideband rate on a loop.

Table 3-5 Upstream wideband rate prediction using spectral characteristics

	Upstream wideband	QAM	Kbit/s
Loop loss (+dB $_{68kHz}$)			
Noise level (-dBm $_{48-88}$) (If NL > -76 dBm, add the measured value. If NL < -76 dBm, add -76 dBm.)	+		
LIF			
	LIF < -41.5 dBm	256	320
	-35.5 < LIF < -41.5	64	240
	-29.5 < LIF < -35.5	16	160
	-22.5 < LIF < -29.5	4	80

Use table 3-6 to predict the upstream narrowband rate on a loop.

Table 3-6 Upstream narrowband rate prediction using spectral characteristics

	Upstream narrowband	QAM	Kbit/s
Loop loss (+dB $_{80\ kHz}$)			
Noise level (-dBm $_{70-90}$) (If NL > -77 dBm, add the measured value. If NL < -77 dBm, add -77 dBm.)	+		
LIF			
	LIF < -38.5 dBm	256	160
	-32.5 < LIF < -38.5	64	120
	-26.5 < LIF < -32.5	16	80
	-19.5 < LIF < -26.5	4	40

The downstream SNR limits the 1-Meg Modem transmission performance. Except for the presence of severe bridged taps between 1,700 and 3,000 square feet, the upstream SNR will rarely limit 1-Meg Modem transmission performance.

Plant records

Use loop records to determine the loop segment lengths of various gauges. You can then convert the segment into an equivalent cable length.

Use table 3-7 to perform the following tasks:

1. Enter the quantity of 19, 22, 24, and 26 American wire gauge (AWG) cable present on the loop. For each component, multiply the quantity by the corresponding conversion factor.
2. Add the equivalent lengths to determine the total equivalent loop length.

Table 3-7 Using plant records to determine equivalent loop length

Type of wire	Length (1000 feet)		Conversion factor		Equivalent length (1000 feet)
26 AWG plastic insulated conductor (PIC)		x	1.00	=	
24 AWG PIC		x	0.76	=	
22 AWG PIC		x	0.59	=	
19 AWG PIC		x	0.42	=	
26 AWG pulp		x	1.06	=	
24 AWG pulp		x	0.85	=	
22 AWG pulp		x	0.68	=	
19 AWG pulp		x	0.50	=	
Equivalent 26 AWG PIC (at 70° F) - Buried cable					(1a)
					x 1.06
Equivalent 26 AWG PIC (at 150° F) - Aerial cable					
					(1b)

Use table 3-8 to perform the following tasks:

1. At each carrier frequency, multiply the equivalent loop length found in (1a) or (1b) of the previous table by the insertion loss.
2. Add six dB to the total insertion loss for each bridged tap.

Table 3-8 Using plant records to determine total insertion loss

	kHz	1a or 1b	Loss factor (dB/ 1000 feet)	Total loss (dB)	Number of bridged taps	Total loop loss (dB)
Narrowband upstream	80	x	3.22 =		+ (x6 dB) =	(2a)
Wideband upstream	68	x	2.90 =		+ (x6 dB) =	(2b)
Narrowband downstream	180	x	3.81 =		+ (x6 dB) =	(2c)
Wideband downstream	240	x	4.14 =		+ (x6 dB) =	(2d)

Develop the data rates for upstream narrowband by comparing the calculated loop loss with the information in table 3-9.

Table 3-9 Total loop loss for upstream narrowband

Upstream loss (dB)	QAM	Kbit/s
LL < 53.5 dB	256	160
53.5 < LL < 59.5	64	120
59.5 < LL < 65.5	16	80
65.5 < LL < 72.5	4	40

Develop the data rates for upstream wideband by comparing the calculated loop loss with the information in table 3-10.

Table 3-10 Total loop loss for upstream wideband

Upstream loss (dB)	QAM	Kbit/s
LL < 51.5 dB	256	160
51.5 < LL < 57.5	64	320
57.5 < LL < 63.5	16	240
63.5 < LL < 69.5	4	80

Develop the data rates for downstream narrowband by comparing the calculated loop loss with the information in table 3-11.

Table 3-11 Total loop loss for downstream narrowband

Downstream narrowband loss (dB)	QAM	Kbit/s
LL < 58.5 dB	256	320
58.5 dB < LL < 64.5	64	240
64.5 < LL < 70.5	16	160
70.5 < LL < 77.5	4	80

Develop the data rates for downstream wideband by comparing the calculated loop loss with the information in table 3-12.

Table 3-12 Total loop loss for downstream wideband

Downstream wideband loss (dB)	QAM	Kbit/s
LL < 60.5 dB	256	320
60.5 < LL < 66.5	64	960
66.5 < LL < 72.5	16	640
72.5 < LL < 79.5	4	320

The following examples show how to use loop records to determine the loop segment lengths of various gauges. The following examples use a 15,000 foot buried loop that consists of the following:

- 6,000 feet of 26 AWG pulp
- 5,000 feet of 24 AWG PIC
- 4,000 feet of 22 AWG PIC
- 2 bridged taps

Table 3-13 Example of plant records to determine equivalent loop length

Type of wire	Length (1000 feet)		Conversion factor		Equivalent length (1000 feet)
26 AWG plastic insulated conductor (PIC)		x	1.00	=	
24 AWG PIC	**5**	x	0.76	=	**3.80**
22 AWG PIC	**4**	x	0.59	=	**2.36**
19 AWG PIC		x	0.42	=	
26 AWG pulp	**6**	x	1.06	=	**6.36**
24 AWG pulp		x	0.85	=	
22 AWG pulp		x	0.68	=	
19 AWG pulp		x	0.50	=	
Equivalent 26 AWG PIC (at 70° F) - Buried cable					(1a) **12.52**
					x 1.06
Equivalent 26 AWG PIC (at 150° F) - Aerial cable					
					(1b)

Table 3-14 Example of plant records to determine total insertion loss

	kHz	1a or 1b		Loss factor (dB/ 1000 feet)	Total loss (dB)	Number of bridged taps	Total loop loss (dB)	
Narrowband upstream	80	**12.52**	x	3.22 =	**40.31**	+ (**2** x6 dB) =	**52.31**	(2a)
Wideband upstream	68	**12.52**	x	2.90 =	**36.31**	+ (**2** x6 dB) =	**48.31**	(2a)
Narrowband downstream	180	**12.52**	x	3.81 =	**47.70**	+ (**2** x6 dB) =	**49.70**	(2c)
Wideband downstream	240	**12.52**	x	4.14 =	**51.83**	+ (**2** x6 dB) =	**51.83**	(2d)

4 Configuration management and provisioning

This chapter describes how to configure the xDSL Element Management System (xEMS) and provision 1-Meg Modem Service.

xEMS and HP OpenView operations

This section contains recommendations and operational information to assist you when you configure and maintain xEMS and HP OpenView.

Recommendations to improve performance

This section contains recommendations to maintain system performance. Office policy can require you to modify these recommendations.

Confirm one ovw session per system

Unless each xEMS workstation has additional random access memory (RAM), monitor operations for extra ovw sessions. List all programs that are running, and watch for ovw sessions. You can use the following command.

```
ps -ef | grep ovw
```

Do not run commands in debug mode

Do not issue commands with the **-debug** option. The option sends debug information to the standard output or file, which consumes central processing unit (CPU) cycles because of the debug overhead.

Limit the number of objects in RAM

You can trim the `ovwdb.lrf` file to limit the number of objects in RAM. The second line and third field of the file has an **n** parameter that identifies the number of objects in RAM. You can reduce this value to `-n<number of objects>` to reduce the amount of memory used by ovwdb. As a general rule, you can assume that each node in ovwdb uses three objects.

Limit the number of objects in the database

You can increase the performance of HP OpenView if you limit the number of objects in the database. You can use discovery filters to limit the number of objects.

Monitor CPU use

Use the network management functions of your operating system to monitor CPU use.

Watch for applications that create memory leaks

If you suspect an application is creating a memory leak, use a system command to verify the amount of available RAM. Repeat the process over a period of time to identify any leak trends. Depending on your operating system, you can use a system command such as **vmstat** or **sar**.

Recommendations to maintain system resources

This section contains recommendations to maintain system resources. Office policy can require you to modify these recommendations.

Monitor disk space use

Use the network management functions of your operating system or HP OpenView to monitor the use of your disk space. You can create an alarm when a threshold exceeds a specified percentage. For example, in HP OpenView you can define thresholds to monitor specific MIB values. If you have limited programming expertise, you can use the MIB Application Builder to build MIB applications for standard and enterprise-specific MIB objects

Monitor the size of large files

Watch for large files that grow in size and take up needed space. Some of the files and partitions to watch follow:

- log files, such as the following:
  - `syslog.log` on HP workstations or `messages` on Sun workstations
  - `snmpCollect.trace`
  - `hstpmon.log`
  - `hstp-user.log`
- core files
- `/var` partition

For a typical xEMS installation, a daily cron job archives specified logs. The file `archive.conf` in `/etc/opt/OV/share/conf/Nortel/HSTP` identifies the logs to be archived. You can edit this file to meet the backup requirements of your office. The xEMS renames each archived log file to

.arch and compresses the file. The xEMS then moves each archived log file to a tar file.

The /var partition is used by many other processes including the following:

- xEMS log files
- syslog
- patching (/var/adm/sw/patch and /var/adm/sw/product).

A reasonable rule is to ensure that /var has 200 megabytes of free space before xEMS is installed. Large installations can need up to one gigabyte of free space. For precise engineering rules, consult your support organization or the vendor of your workstation.

Monitor the size of the HP OpenView database

As the HP OpenView database increases in size, some Locate commands will decrease in performance time. In addition, the increasing size of the database will increase the likelihood of potential database corruptions.

Perform the following actions to reduce the size of the database:

1. Restrict the HP OpenView auto-discovery mechanism to discover only nodes of interest.
2. If the database is already too large, perform the following steps to reduce the size of the database:
   a. Produce a list of commands you can use to reprovision all HSTP objects that are currently provisioned. Use the following command at the UNIX command line:

      `# ${OV_BIN}/Nortel/HSTP/hstpprovdump > /tmp/hstpprovBkp`

   b. Delete all HP OpenView databases so HP OpenView can perform a clean discovery. Use the following command at the UNIX command line:

      `# sh /opt/OV/contrib/NNM/deleteOVDB/deleteOVDB`

      Note: This command deletes the entire HP OpenView database. If the xEMS workstation has applications other than the xEMS, the command deletes the objects for those applications.

   c. Restore all high-speed twisted pair (HSTP) provisioned objects. Use the following command at the UNIX command line:

      `# ${OV_BIN}/Nortel/HSTP/hstpprov</tmp/hstpprovBkp`

Set the PATH environmental variable for xEMS executables

Set your PATH environmental variable to know the location of xEMS and HP OpenView executables. All xEMS executables are located in the directory `${OV_BIN}/Nortel/HSTP`. All HP OpenView executables are located in the directory `${OV_BIN}`.

Once you add these directories to your PATH, you do not need to specify the full path name to execute an HP OpenView or xEMS command. For example, at the UNIX command line the command **ovw** is the same as the command **${OV_BIN}/ovw**.

Perform the following actions to set your PATH environmental variable:

- Use the following command at the UNIX command line to display your PATH variable:

  `# echo $PATH`

- If your xEMS client machine is running C-Shell, and your path is not set, you can use the following command at the UNIX command line to add the directories to your PATH:

  `# setenv PATH ${OV_BIN}:${PATH}`

  `# setenv PATH ${OV_BIN}/Nortel/HSTP:${PATH}`

- If your xEMS client machine is running Bourne shell, and your path is not set, you can use the following command at the UNIX command line to add the directories to your PATH:

  `# export PATH=${OV_BIN}:${PATH}`

  `# export PATH=${OV_BIN}/Nortel/HSTP:${PATH}`

Perform regular backups

Perform database backups on a regular basis. Nortel Networks recommends the following backups:

- daily incremental backups
- weekly full backups
- monthly full dump and fbackup from a single user
  - — full dump and fbackup from a single user
  - — system reboot to clear any memory leaks and processes

You can automate most backup activities to simplify system maintenance.

If you use an HP workstation you can perform the following commands at the UNIX command line to backup all databases in HP OpenView.

```
# ${OV_BIN}/ovstop

# /usr/sbin/fbackup_f ovwDbBkup -i /var/opt/OV/share/databases

# ${OV_BIN}/ovstart
```

If you use an HP workstation, you can perform the following command at the UNIX command line to restore files that were backed up with the **fbackup** command.

```
# ${OV_BIN}/ovstop

# /usr/sbin/frecover -f ovwDbBkup -r -s -o

# ${OV_BIN}/ovstart
```

Disable all HP OpenView and xEMS background processes during the database backup/restore operations. Failure to do so can result in a corrupted database.

Recommendations for efficient operation

This section contains recommendations for the efficient operation of the xEMS and HP OpenView. Office policy can require you to modify these recommendations.

Background processes

The xEMS is dependent on information learned by background processes. If these processes are not running, in particular the HSTPMON process, xEMS cannot detect changes in device inventory and status.

Use the following command at the UNIX command line to check if all background processes are functioning properly.

```
# ${OV_BIN}/ovstatus
```

Each background process, as displayed by the output from this command, should be in a state of `RUNNING`

Use the following command at the UNIX command line to manually start HSTPMON.

```
${OV_BIN}/ovstart hstpmon
```

Change host name and IP address of xEMS workstation

This section describes how to change the host name and IP address of an xEMS workstation. The section provides steps for an HP workstation and a Sun workstation.

HP workstation Perform the steps that follow to change the host name and IP address on an HP workstation used as an xEMS workstation.

Procedure 4-1 Change host name and IP address of HP workstation

From the command line of the HP workstation

1 Login as root.

2 Verify the current settings for the interfaces.

`# ifconfig -a`

3 Change the nodename and IP address in HP-UX.

Note: The commands that follow are based on HP-UX 10.20

a Change the nodename and IP address.

`# set_parms hostname`

`# set_parms ip_address`

`# set_parms addl_network`

b Reboot the workstation.

`# /etc/shutdown -r now`

or

`# /etc/shutdown -h now`

Note: This command performs a graceful system shutdown.

c Verify the new settings for the interface.

`# ifconfig -a`

4 Change the nodename in HP OpenView

Note: The commands that follow are based on HP OpenView 5.01

a Stop HP OpenView.

`# ovstop`

b Replace the nodename in the files that follow with the new nodename.

- /var/opt/OV/share/databases/openview/ovwdb/ovserver
- /var/opt/OV/share/conf/ovspmd.auth
- /var/opt/OV/share/conf/ovwdb.auth
- /var/opt/OV/share/conf/ovw.auth

c Clear the SNMP OpenView cache.

`# /opt/OV/bin/xnmsnmpconf -clearCache`

- **d** If necessary, clear the nodename from the SNMP database.
  - **i** Clear the nodename in the SNMP database.

    `# /opt/OV/bin/xnmsnmconf -export /tmp/snmpconf.tmp`
  - **ii** Replace the old workstation name with the new name in the file /tmp/snmpconf.tmp.

    `# /opt/OV/bin/xnmsnmpconf -import /tmp/snmpconf.tmp`
- **e** Start HP OpenView.

  `# ovstart`

5 Update the DBIC objects in the xEMS with the new gateway information and, if necessary, the new netmask information.

6 Reset the DBICs. The reset allows the DBICs to receive traps on the reconfigured xEMS.

Sun workstation Perform the steps that follow to change the host name and IP address on a Sun workstation used as an xEMS workstation.

Procedure 4-2 Change host name and IP address of Sun workstation

From the command line of the Sun workstation

1 Login as root.

2 Verify the current settings for the interfaces.

`# ifconfig -a`

3 Change the nodename and IP address in Sun Solaris. You can change the information automatically or manually.

Note: The commands that follow are based on Sun Solaris 2.6.

- **a** To change the information automatically, perform the steps that follow:
  - **i** Change the configuration.

    `# usr/sbin/sys-unconfig`
  - **ii** Reboot the workstation.

    `# cd /`

    `# /etc/reboot`
- **b** To change the information manually, perform the steps that follow:
  - **i** Change the files that follow:

Table 4-1 (Sheet 1 of 2)

File	Information to change
`/etc/inet/hosts`	Nodename and IP address
`/etc/netmasks`	Netmask of node
Note: File names in *italic* type may not reside on all systems.	

Table 4-1 (Sheet 2 of 2)

File	Information to change
`/etc/hostname.interfacename`	Nodename
`/etc/nodename`	Nodename
`/etc/defaultdomain`	
`/etc/defaultrouter`	
`/etc/net/ticlts/hosts`	Two nodenames
`/etc/net/ticots/hosts`	Two nodenames
`/etc/net/ticotsord/hosts`	Two nodenames
Note: File names in *italic* type may not reside on all systems.	

ii Shutdown the system

`# `**`cd /`**

`# `**`/usr/sbin/shutdown -g0 -y -i0`**

c Verify the new settings for the interface.

`# `**`ifconfig -a`**

4 Change the nodename in HP OpenView

Note: The commands that follow are based on HP OpenView 5.01

a Stop HP OpenView.

`# `**`ovstop`**

b Replace the nodename in the files that follow with the new nodename.

- `/var/opt/OV/share/databases/openview/ovwdb/ovserver`
- `/var/opt/OV/share/conf/ovspmd.auth`
- `/var/opt/OV/share/conf/ovwdb.auth`
- `/var/opt/OV/share/conf/ovw.auth`

c Clear the SNMP OpenView cache.

`# `**`/opt/OV/bin/xnmsnmpconf -clearCache`**

d If necessary, clear the nodename from the SNMP database.

i Clear the nodename in the SNMP database.

`# `**`/opt/OV/bin/xnmsnmconf -export /tmp/snmpconf.tmp`**

ii Replace the old workstation name with the new name in the file /tmp/snmpconf.tmp.

`# `**`/opt/OV/bin/xnmsnmpconf -import /tmp/snmpconf.tmp`**

e Start HP OpenView.

```
# ovstart
```

5 Reconfigure the DHCP server so all DBICs reboot from the server.

6 Update the DBIC objects in the xEMS with the new gateway information and, if necessary, the new netmask information.

7 Reset the DBICs. The reset allows the DBICs to receive traps on the reconfigured xEMS.

DBIC and BOOTP requests

The DBIC only sends BOOTP requests to the immediate LAN. On every restart, a DBIC broadcasts a BOOTP request to learn its IP address and load name. By default, the BOOTP requests are only broadcast to nodes on the same subnet as the DBIC.

If the xEMS and DBIC are on different subnets, confirm that a BOOTP relay agent is configured on each gateway or router between the DBIC and xEMS. This configuration ensures that BOOTP requests from a DBIC are forwarded to the xEMS.

Deletion of 1 MMS symbols or submaps

The pop-up menus for symbols has a **Delete** selection. If you choose this selection, the symbol will be deleted but the underlying object will continue to exist. Use the **Unprovision** selection from the pop-up menu. If you use the **Delete** selection to delete a symbol, you must create a new map and remove the existing map.

If you use the **Delete** selection to delete a submap, you will delete all symbols on the submap. However, you will not unprovision or delete the underlying objects. If you use the **Delete** selection to delete a submap, follow office policy. Contact your next level of support or Nortel Emergency Technical Assistance Services (ETAS).

DBIC discovery

The xEMS depends on HP OpenView processes, such as netmon, to discover and poll the DBICs to detect a loss of connectivity. If HP OpenView does not discover a DBIC, the xEMS can not identify the hardware for that DBIC. If HP OpenView does not discover a DBIC, xEMS will not display an IP address for the DBIC on the IP Internet submap.

Perform one of the following actions to ensure that HP OpenView discovers a DBIC:

- Define a discovery filter.On a large network, auto-discovery can create a large database and a significant amount of network traffic. For most networks, you can define a discovery filter.
  - — Turn on the HP OpenView auto-discovery mechanism to automatically discover the DBIC and the IP address. Use the selection

Options:Network Polling Configuration: IP ->Discover New Nodes from the pull-down menu.

— Go to `/etc/opt/OV/share/conf/C/filters`.

— Add additional filter specifications in the “Filters” section. A sample filter specification follows.

```
DbicSnmpAgent "DBICs by sysObjectld"

{ “SNMP sysObjectID" -.1.3.6.1.4.1.562.4.100.3.* }
```

— Add the following expression in the “FilterExpressions”.

```
NortelHpAndDbic “All Nortel, HP Nodes and DBICs on IP Map”

{ NortelNodes || HPNodes || DbicSnmpAgent }
```

Table 4-2 lists commands to verify syntax and test the functionality of discovery filters.

Table 4-2 Commands to test discovery filters

Command	Action
ovfiltercheck -v	Lists filters and expressions
ovfiltertest -f NortelHPAndDbic	Tests filter and lists passed objects

Refer to the HP document *Using Network Node Manager* for more information. Filters requires a thorough understanding of your network configuration and engineering.

- Force HP OpenView to discover the DBIC's IP address.

  If auto-discovery is turned ON, you can use the PING utility to identify the IP address. If auto-discovery is turned OFF, you can use the **loadhosts** command at the UNIX command line. An example of the **loadhosts** command follows:

```
# ${OV_BIN}/ovstop netmon

# ${OV_BIN}/loadhosts

47.126.221.12 bcarheb

47.128.211.132 47.128.211.132

^D
```

Note: **^D** is the combination of the **control** and **D** keys.

```
${OV_BIN}/ovstart netmon
```

Disable netmon when you use the **loadhosts** command. The command expects to be the sole user of the HP OpenView topology database.

- Hasten the discovery of the DBIC.

  If auto-discovery is turned ON, hasten the discovery by having HP OpenView poll the specific address. Use the selection **Options:SNMP Configuration** from the pull-down menu to configure the rate.

Display colors

Do not change the colors used by xEMS software. These colors identify the operating states of 1-Meg Modem Service components. Nortel Networks technical support 1-Meg Modem Service documentation, and HP OpenView on-line help refer to these colors.

Multiple interfaces from xEMS workstation

If the xEMS workstation has multiple interfaces, the hostname of the xEMS workstation must correspond to the interface that faces the DBIC. If the hostname corresponds to another interface. the DBIC can send unnecessary trap and unacknowledged trap messages. System performance declines.

If the xEMS workstation supports multiple interfaces, refer to the *1-Meg Modem Service xEMS Release Notes* for information.

Location of BOOTP/TFTP server and DBIC software loads

The BOOTP server is resident on the xEMS workstation. When a data-enhanced bus interface card (DBIC) is provisioned, the BOOTP server will be transparently configured for the user. On a reboot, the DBIC will automatically configure itself to send Simple Network Management Protocol (SNMP) traps, such as a cold restart, to the Internet Protocol (IP) address that was the source of the BOOTP reply. In addition, the DBIC assumes that new DBIC loads are accessible from the same IP address.

If your office uses xEMS 5.1 or higher, the Sun* and HP* use a common DHCP server for BOOTP services. The DHCP server runs in the background, and issues BOOTP replies only when it recognizes the MAC address of the DBIC. If the DBIC is not recognized, the server does not send the DBIC's IP information or its load information, and the DBIC will not come into service. Make sure that the DHCP server is running by using the **ps** and **grep** commands. At the command prompt (#), enter the following command:

ps -ef|grep dhcp

If the DHCP process is running, the system will return its pathname. An example response follows:

```
/usr/local/sbin/dhcpd
```

> ***Note:*** Additional options may appear after the process.

Ensure that the DBIC software loads are accessible from the xEMS. The loads must be resident on the xEMS local disk or on a remote disk that is locally mounted. In most cases, the TFTP server is configured to run as the “root” user. Verify this by using the **grep** command to check the configuration file, `/etc/inetd.conf`. At the command prompt (#), enter the following:

\# **grep tftp /etc/inetd.conf**

If the TFTP server is configured to run as the “root” user, the server will return the following:

Make sure this string is present

```
tftp dgram udp wait root /usr/sbin/tftpd tftpd
/etc/opt/OV/share/loads/Nortel /
```

If this is the case, the permissions on the firmware load must include read permission for “world” users as follows:

-r-xr-xr-x ~ firmware_load

“world” access (read permission)

If the server is running, but no reply is issued, verify that the DHCP server’s configuration file contains an appropriate host clause. The DHCP server’s configuration file is located at `/etc/dhcpd.conf`. Because the DHCP server uses the DBIC’s MAC address to locate the corresponding boot information, be sure you use the DBIC’s MAC address as the primary search criterion. An example host clause follows:

```
host 006038ababab {
     hardware ethernet 00:60:38:ab:ab:ab:ab;
     fixed-address 192.168.1.1;
     filename
"/etc/opt/OV/share/loads/Nortel/dbfap4_1_10.cps"
     next-server 192.168.1.254;
     }
```

Note: The "hardware ethernet" statement is the field used to reference the MAC address. Although the MAC address follows the "host" statement, the host name is chosen arbitrarily, and might not be the MAC address of the DBIC.

For information on BOOTP services in earlier versions of xEMS, please consult the release notes specific to the xEMS version used.

Reprovisioning and read-write maps

If you cannot edit fields in the Describe/Modify dialog box, you may be in a read-only map. The bottom left corner of each submap window displays the read-write status of the submap.

When you open a map, the map will open as a read-write map. However, if another user has the map open as a read-write map, you can only open the map in read-only mode.

You can choose another map with the selection **Map:Maps->Open/List** from the pull-down menu. You can create a new map with the selection **Map:Maps->New** from the pull-down menu.

Transient states

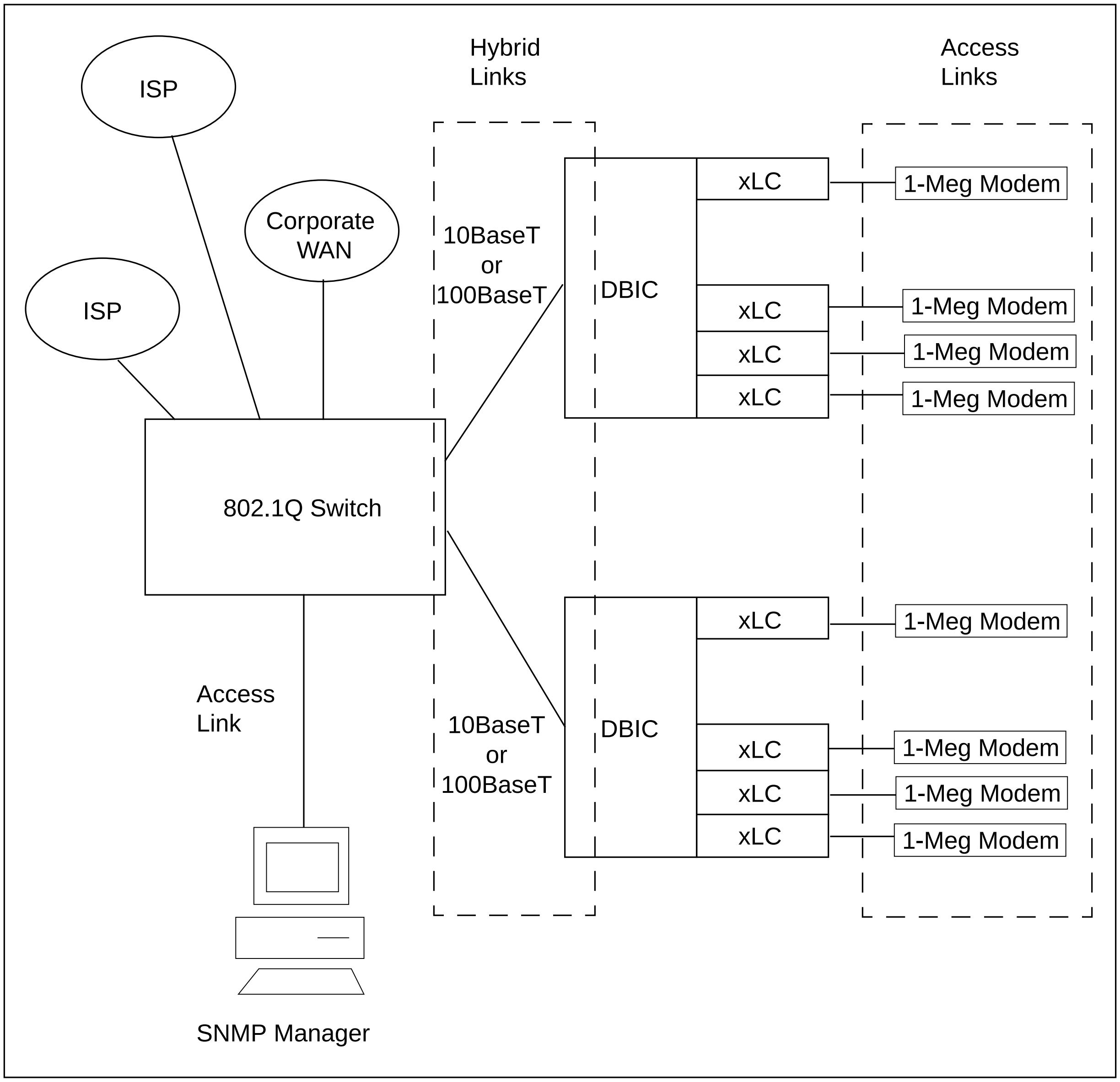
xEMS may not detect all transient states. For example, a DBIC may go from InSv to ISTb to InSv while the network is down. The xEMS will not detect the state transition to ISTb.

802.1Q VLANs

xEMS Release 3 and higher supports 802.1Q VLANs. A VLAN consists of the path between the subscriber and the data service provider. xEMS releases lower than Release 3 use the MAC address of the DBIC to create the VLAN. In xEMS Release 3, the 1-Meg Modem Service uses a 12 bit VLAN identifier (VID) in a four byte tag that the DBIC inserts in the MAC frame. The VID is a number from 1 to 4094.

Figure 4-1 shows the DBIC in an 802.1Q VLAN environment.

Figure 4-1 DBIC in 802.1Q VLAN environment

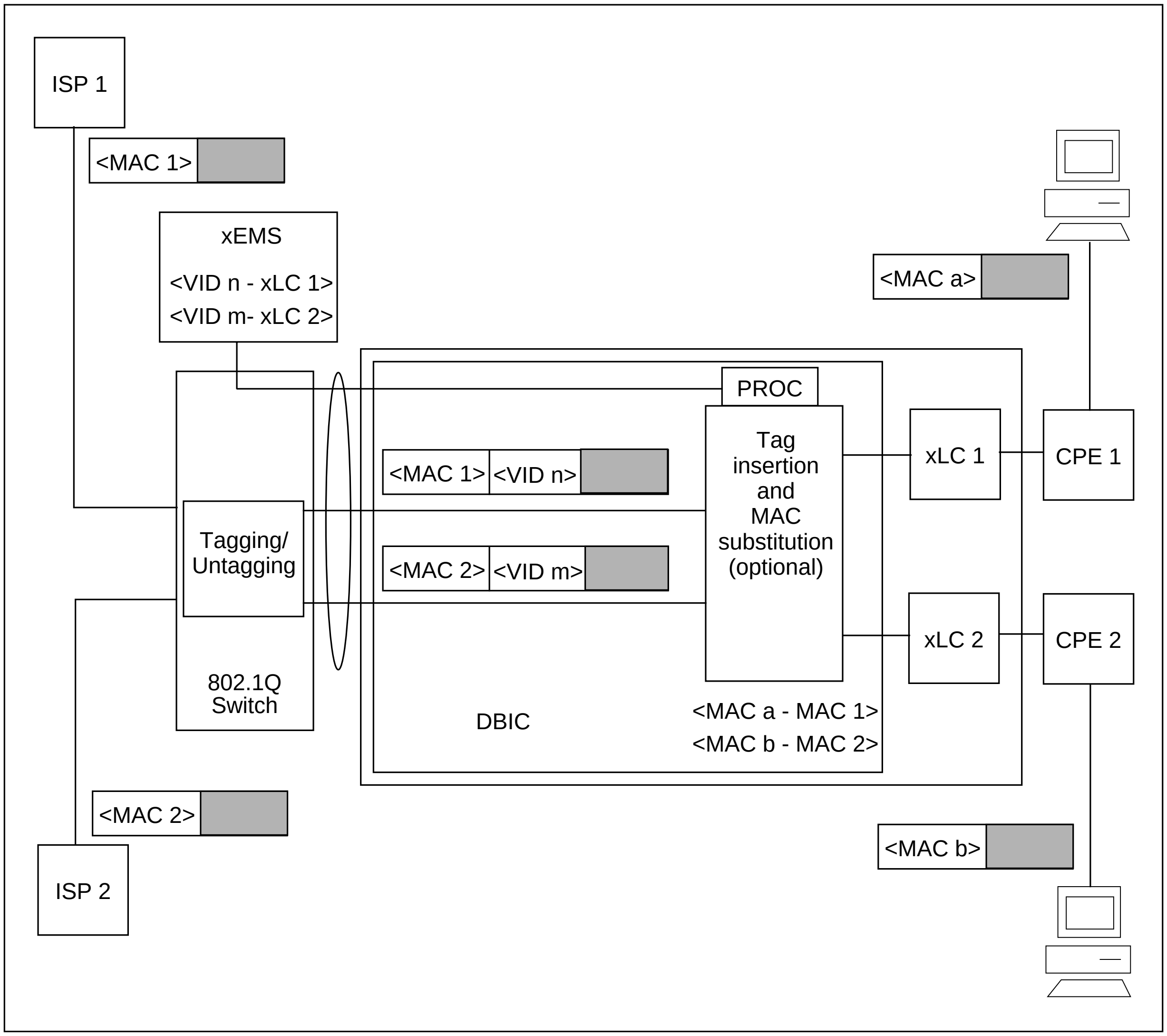


The VLAN-aware DBIC connects to an 802.1Q switching device through Ethernet port. The DBIC receives and transmits tagged frames through this port.

The xEMS holds the static frame forwarding information that identifies a subscriber loop with a data service provider VLAN. When the DBIC is booted, SNMP configures the DBIC to associate the subscriber's xLC with the VID. With 802.1Q VLAN tags, you can preconfigure data networks and replace failed DBICs with no affect on VLAN configurations.

Figure 4-2 shows an 802.1Q VLAN and the tagging process.

Figure 4-2 802.1Q tagging



The xEMS identifies the VID as the data service provider identifier (SPID). You can provision the SPID at the HSTP-Network level, DBIC, or xLC.

The DBIC allows only one VLAN per xLC.

Provision the 802.1Q switch so the port virtual identifier (PVID) on each DBIC port is the same as the PVID on the xEMS port. DBIC and xEMS ports should be members of the same tagged set for the VLAN specified by the PVID and accept all frames. For security, allow only the DBIC and xEMS ports to share the same PVID.

Provisioning

The 1-Meg Modem Service allows you to provision an 802.1Q VLAN for HSTP-Network, DBIC, and xLC objects. Table 4-3 lists the VLAN functions you can provision.

Table 4-3 VLAN functions

VLAN function	Explanation	Possible values	Default value
VLAN state	Controls whether the VLAN mode is enabled when xEMS discovers the DBIC, the DBIC restarts, or the DBIC reconnects to the network	Disabled or Enabled	Disabled
VLAN mode	Identifies the mode of the VLAN. The only VLAN mode currently available is 802.1Q.	None or 802.1Q	None
VLAN identifier	Identifies the number of the VLAN	0 to 4094	

This VLAN functionality allows you to provision a VLAN in the methods that follow:

- a VLAN state for the HSTP-Network object
- a VLAN mode for each DBIC or every DBIC in the network
- a VLAN identifier for each DBIC and xLC or every DBIC and xLC in the network

You can provision a VLAN through the xEMS or the command line.

Guidelines

Observe the guidelines that follow when you provision a VLAN in the 1- Meg Modem Service.

- If the VLAN state is set to **disabled**, the VLAN mode operates as **none** regardless of the provisioned value.
- Any change in the VLAN state of the network takes affect the next time the xEMS discovers the DBIC, the DBIC restarts, or the DBIC reconnects to the network
- If the DBICs connect to a switch or router that does not accept 802.1Q tagging, subscriber traffic will drop if you use 802.1Q tagging.

Management traffic remains untagged to support communication with the DBIC.

> ***Note:*** The 10BaseT DBIC supports tagged management traffic. If the xEMS replies to a BOOTP request with a TAGGED BOOTP reply, the DBIC assumes that management traffic is tagged.

- If you are uncertain about VLAN provisioning, leave the VLAN state for the object as **Disabled**.

xEMS

Perform the steps that follow to provision a VLAN through the xEMS.

1. Select the HSTP-Network, DBIC, or xLC object.
2. Select **Describe/Modify Object** from the pop-up menu.
3. Select `HSTP Application` and click the View/Modify Object Attributes button.
4. Enter the VLAN information for the object. Table 4-4 describes the fields that support VLAN provisioning for each object.

Table 4-4 xEMS fields that support VLAN provisioning

Object	Field	Values	Default Value
HSTP_Network	Network VLAN State	**Disabled** or **Enabled**	**Disabled**
	Default LAC VLAN Mode	**None** or **802.1Q**	**None**
	Default LAC VLAN ID	0 to 4094	
DBIC	VLAN Mode	**None** or **802.1Q**	**None**
	Default VLAN ID	0 to 4094	
xLC	Default VLAN ID	0 to 4094	

Command line

Use the **hstpprov** command to provision a VLAN from the command line. Table 4-5 lists the parameters for the hstpprov command that support VLAN provisioning.

Table 4-5 hstpprov parameters that support VLAN provisioning

Object	Command line parameter	Possible values	Default value
HSTP-Network	**-default-vlan-mode**	**none** or **ieee802.1q**	**none**
	-vlan-state	**disabled** or **enabled**	**disabled**
	-default-vlan-id	0 to 4094	
DBIC	**-vlan-mode**	**none** or **ieee802.1q**	**none**
	-default-vlan-id	0 to 4094	
xLC	**-default-vlan-id**	0 to 4094	

Refer to "Command-line provisioning" in this chapter for additional information on the parameters and use of the **hstpprov** command.

Global and batch provisioning

If your office uses xEMS Release 4 or higher, the 1-Meg Modem Service allows you to provision objects globally or in batches.

Global provisioning

The 1-Meg Modem Service allows you to set global default parameters for every new object in the HSTP network. The methods to set global default parameters follow.

- the **Describe/Modify** menu at the DMS submap of the xEMS
- the **hstpprov** command for the network at the command line

Global default parameters only apply to new objects. The global default parameters do not affect the provisioned values in existing objects.

The parameters you can set with global defaults follow:

- VLAN id
- Load
- DBIC PEC
- Status of local switching
- Status of broadcast filtering

- Read community string
- Write community string
- Admin community string
- ARP message limit
- Status of MAC translation
- Gateways
- Subnet masks for gateways
- Downstream speed
- Upstream speed
- Maximum number of devices connected to a CPE

If you use a global parameter, the values for each object default to the global parameter when you provision the object. If you want to override a global default parameter, provision the object with the correct value.

Batch provisioning

Use the **reprovision** command from the command line to update provisioning information for a group of DBICs or xLCs. The reprovision command can update any DBIC or xLC information you provision through the command line. For example, you can change the VLAN id for all xLCs in a DMS. A sample command follows:

```
reprovision xlc DMS5 -vlan-id=15
```

Refer to "Command-line provisioning" in this chapter for more information.

SERVORD provisioning

Offices with xEMS Release 4 or higher, and with PCL software based on CCM11 or higher, can use SERVORD to provision 1-Meg Modem Service from the DMS switch.

Flow-through sequence

Provisioning information flows through the DMS switch to the xEMS in the following order:

1. Operating company personnel use the 1MMS option in SERVORD to enter provisioning information on a dialing number (DN) or line equipment number (LEN). Types of provisioning information follow:
   - downstream data rate (DDR)
   - upstream data rate (UDR)
   - status of the line’s data service
   - identifier of the data service provider
2. The DMS activates the voice side of the service order.
3. The DMS stores the order in a buffer for flow-through provisioning to the xEMS.
4. The xEMS establishes a connection with the DMS.
5. The xEMS retrieves the data portion of the order.
6. The xEMS updates the provisioning databases.
7. The xEMS acknowledges receipt of the information.
8. The DMS clears the buffer.

Interface

To support SERVORD provisioning, the xEMS must connect to the DMS by one of the methods that follow:

- an Ethernet interface unit (EIU) in a link peripheral processor (LPP) in the DMS
- a telnet session through a terminal server connection at the input output controller (IOC). The serial port speed must be 9600 baud.

Supported commands and prompts

The 1MMS option uses a limited number of SERVORD commands and prompts. Table 4-6 lists the SERVORD commands that support the 1MMS option.

Table 4-6 SERVORD commands that support 1MMS option

Command	Functionality
ADO	Add an option
DEO	Delete an option
CHF	Change feature information
NEW	Establish service
CLN	Change LEN
SWAP	Exchange of DNs for up to 32 LENs
OUT	Remove service

Table 4-7 lists the prompts you can use with the 1MMS option.

Table 4-7 SERVORD prompts for 1MMS option

Prompt	Input	Explanation
SONUMBER	Refer to SONUMBER in the Prompts table in the *Servord Reference Manual* for information on valid inputs.	The service order number the user enters
DN_OR_LN	Refer to DN and LEN_OR_LTID in the Prompts table in the *Servord Reference Manual* for information on valid inputs.	Enter the DN or LEN of the line. For a MDN line or MLH/DLH hunt members, if the user specifies the DN, the system prompts for the LEN. If the user enters the LEN, the system does not prompt for the DN.
OPTION	**1MMS**	The 1-Meg Modem Service option.
DDR	1280, 960, 640, 320, 240, 160, 80	The downstream data rate. The default value is 960.
UDR	320, 240, 160, 120, 80, 40	The upstream data rate. The default value is 120.
DSI	**OFF**, **ON**	The status of the data service of the line. The default value is OFF.
SP	0 to 4096	The id of the service provider for the line

Examples

Figure 4-3 shows an example of the 1MMS option in prompt mode.

Figure 4-3 1MMS option in prompt mode

```
CI:
>SERVORD
SO:
>ado
SONUMBER:     NOW  98 1 24 AM
>
DN_OR_LEN
>6210022
OPTION:
>1mms
DDR: 960
>1280
UDR: 120
>320
DSI: OFF
>
SP: 0
>
OPTION:
>$
COMMAND ENTERED:
ADO NOW98 1 24 PM 6210022 (1MMS 1280 320 OFF 0) $
ENTER Y TO CONFIRM,N TO REJECT OR E TO EDIT
>Y
```

Figure 4-4 shows an example of the 1MMS option in no-prompt mode.

Figure 4-4 1MMS option in no-prompt mode

```
>ADO $ 6210022 1MMS 1280 320 OFF 0 $
```

xEMS provisioning

This section describes the following xEMS activities

- add objects
- delete objects
- locate objects
- define xEMS settings

Add objects to xEMS submap

This section provides guidelines for adding objects to the xEMS. Use the step-action procedure in this document to add an object to the xEMS.

Summary

Each time you add an object, the xEMS displays dialog boxes that require information on the new object. This information can include the name, physical address, media access control (MAC) address, and Internet Protocol (IP) address. This information allows the 1-Meg Modem Service to perform the following actions:

- assign the object an identification in the xEMS database
- link the object to the component in the 1-Meg Modem Service
- track data on the object and generate events when necessary

When you add an object, the xEMS pulls information from existing devices in the same data path. For example, if you add a data-enhanced bus interface card (DBIC) object, the xEMS provides the name of the switch and the number of the line concentrating module (LCM).

You can add objects before the you install the hardware for the object. However, the xEMS will display the symbol with a no h/w flag until you install the hardware.

Follow the submap hierarchy when you add multiple objects. For example, if you add a new LCM, add the objects in the following sequence:

- LCM symbol
- one LCM drawer
- each xDSL line card (xLC) in the drawer
- each remaining LCM drawer
- each xLC in each remaining drawer

DBIC

When you add an object, the xEMS pulls information from existing devices in the same data path. For example, if you add a DBIC object, the xEMS provides the name of the switch and the number of the LCM. You enter the following information:

- LCM drawer number
- DBIC MAC address
- DBIC IP addresses
- the path of the DBIC load file

When you complete this information, you create a DBIC object in the xEMS database.

You can create a DBIC object before you install the DBIC hardware. However, the xEMS displays the symbol with a no h/w flag until you install the hardware. The xEMS creates downstream symbols for the DBIC for the LCM drawer, and Subscriber loop submaps. When you install the hardware, the network manager software detects the new hardware through a SNMP trap. The xEMS updates the DBIC symbol status and removes the no h/w flag from the DBIC symbol.

xLC

When you add an object, the xEMS pulls information from existing devices in the same data path. For example, if you add an xLC object, the xEMS adds the following information:

- switch name
- LCM number
- LCM drawer number
- slot number
- upstream transmission rate
- downstream transmission rate

You can create an xLC object before you install the hardware. When you create the xLC object, the xEMS displays the object in the correct submaps.

You also create an xLC object when you install xLC hardware. The xEMS detects the new xLC and creates xLC objects in the correct submaps. The xEMS will display the symbol with a `Not Provisioned` flag until you provision the object.

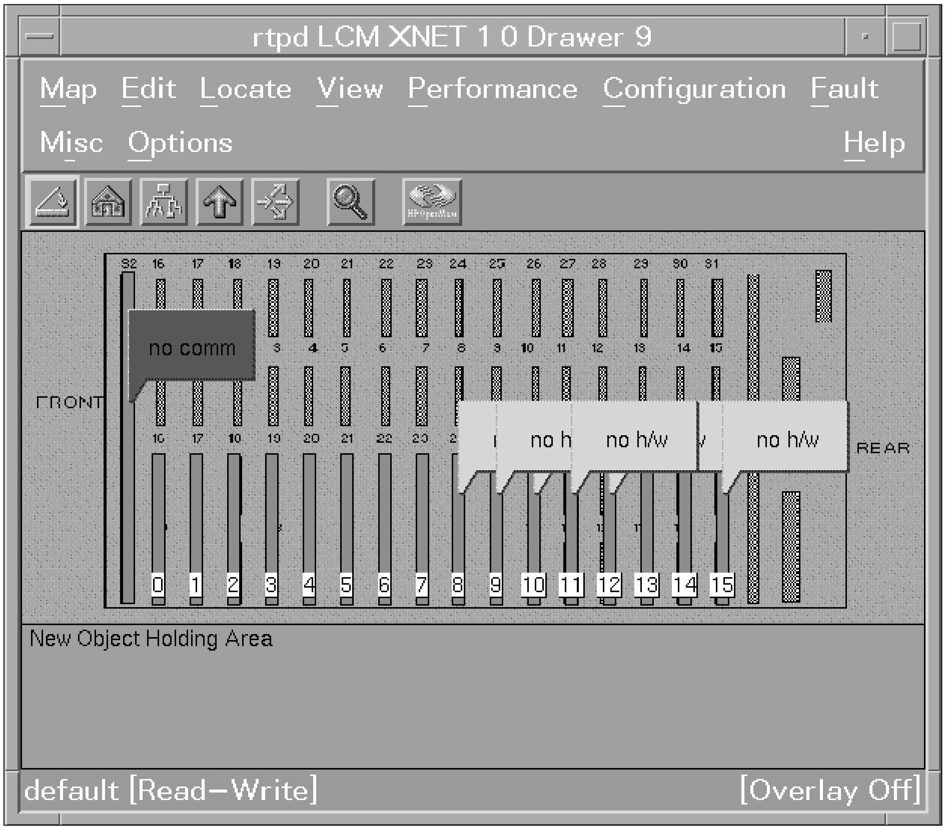
Delete objects

If you remove a hardware component from the switch, the component's symbol remains in the submap. The network management software detects the removal of hardware as part of normal polling. When the software detects hardware removal, xEMS performs the following actions:

- identifies the object in a critical/down maintenance state
- flags the symbol with a `No Comm` flag

Figure 4-5 shows a submap with a no hardware flag.

Figure 4-5 Submap with a no hardware flag



To delete an object, unprovision the object from the xEMS database. Do not use the Delete selection from the pop-up menu.

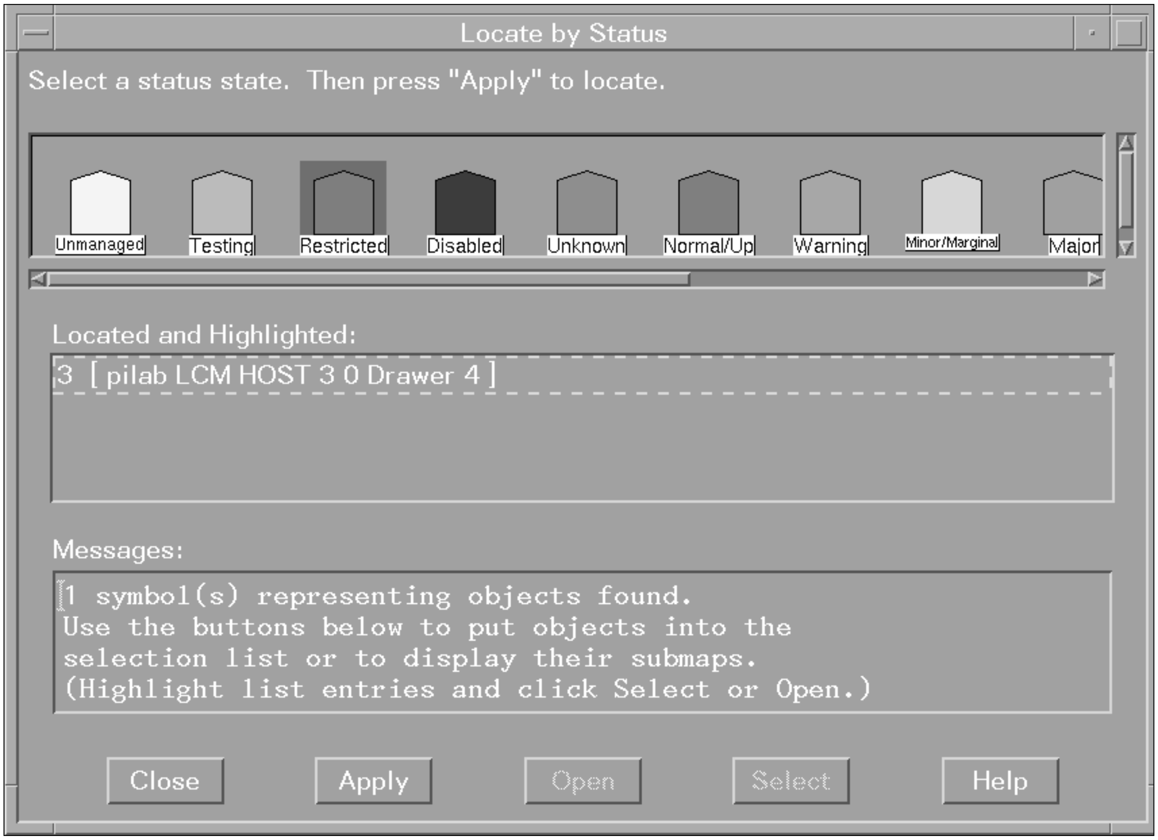
Locate objects

Use the Locate selection from the pull-down menu of any submap to quickly locate an object or objects. You can use the Locate selection to search for objects based on the following variables:

- selection name
- attribute
- comment
- symbol status
- symbol type
- symbol label

Figure 4-6 shows a search for all objects with a status of Restricted or Manual Busy (ManB).

Figure 4-6 Sample of Locate Symbol Status display



Double-click any object under Located and Highlighted: to go to the object's submap.

xEMS settings

Table 4-8 lists some of the settings that you can define to your specific needs.

Table 4-8 xEMS settings

Setting	Description	Action
Define a submap as the home submap.	The home submap is the first submap that appears when a map is opened.	Perform the following steps. 1. Open the selected submap. 2. From the pull-down menu, select **Map:Submap->Set this Submap as Home**
Define the map that appears at start-up	This map is the user default map.	Perform the following steps. 1. From the pull-down menu, select **Map:Maps->Open/List**. 2. Select the name of the map you want to specify as the user default. 3. Select **Set User Default**.
Toggle the tool bar OFF or ON		Select one of the following items from pull-down menu. **View:Tool Bar->On for this Submap** **View:Tool Bar->On for all Submaps** **View:Tool Bar->Off for this Submap** **View:Tool Bar->Off for all Submaps**
Add a shortcut to a submap to Quick Navigator		Perform the following steps. 1. Open the selected submap. 2. From the pull-down menu, select **Edit:Add to Quick Navigator**
Delete a shortcut to a submap from the Quick Navigator		Perform the following steps. 1. Open the Quick Navigator. 2. Click on the submap symbol with the third mouse button. The symbol pop-up menu displays. 3. Select **Delete Symbol** from the pop-up menu.

Command-line provisioning

You can use the following commands at the UNIX command line to provision 1-Meg Modem Service objects.

- Use the **hstpprov** command to provision 1-Meg Modem Service objects.
- Use the **reprovision** command to perform batch updates on DBIC and xLCs
- Use the **hstptree** command to output all the xEMS device names in the provisioning database.
- Use the **hstpdump** command to print the contents of fields in the provisioning database.

You can string the **hstptree** and **hstpdump** commands with the **hstpprov** command to test bulk provisioning.

HSTPPROV command

This section describes the syntax and parameters for the **hstpprov** command.

Syntax

The syntax for the **hstpprov** command follows:

```
>hstpprov <device-type> [operation] <device-name>
[<options>...]

>hstpprov [-stop-on-error [=<N>]]

>hstpprov help
```

Parameters

Table 4-9 lists the parameters for the **hstpprov** command.

> ***Note:*** Parameters and values are case-sensitive.

Table 4-9 Parameters for hstpprov command

Parameter	Value	Description
<device-type>	**network**	
	dms	
	lcm	
	lcm	
	alcm	
	elcm	
	ilcm	
	lce	
	star	
	dbic	
	xlc	
<operation>	**add**	Provisions a 1-Meg Modem Service object.
	remove	Unprovisions a 1-Meg Modem Service object.
	update	Changes the provisioning information for a 1-Meg Modem Service object.
<device-name>		The HSTP unique name or HP OpenView selection name
<options>		The device-specific option. Refer to the device-specific information in this chapter.

REPROVISION command

This section describes the syntax and parameters for the **reprovision** command.

Syntax

The syntax for the **reprovision** command follows:

```
>reprovision <device-type> [parent-device] [<options>...]
```

Parameters

Table 4-10 lists the parameters for the **reprovision** command.

> ***Note:*** Parameters and values are case-sensitive.

Table 4-10 Parameters for reprovision command

Parameter	Value	Description
<device-type>	**dbic**	
	xlc	
<parent-device>		The unique name or selection name of the device where all affected DBICs reside. If you do not specify a parent device, the command will affect all DBICs or xLCs.
<options>		The device-specific option. Refer to the device-specific information for the DBIC and xLC in this chapter. Specify only one option with each command.

HSTPTREE command

This section describes the syntax and parameters for the **hstptree** command.

Syntax

The syntax for the **hstptree** command follows:

```
>hstptree <options> [<object> <top_level> <bottom_level>]
```

Parameters

Table 4-11 lists the parameters for the **hstptree** command.

> ***Note:*** Parameters and values are case-sensitive.

Table 4-11 Parameters for hstptree command

Parameter	Value	Description
<options>	**-t**	Begin output with device type and colon
	-T	Begin output with device type without a colon
	-e	Include equipped devices
	-E	Include unequipped devices
	-r	Include unprovisioned devices
	-o	Show object id instead of the unique HSTP name
	-s	Show HP OpenView selection name instead of HSTP name
	-c	Remove command between device type and device name
	-O <options>	Appends options to command line. Useful to string hsptprov command lines.
<object>		The HSTP unique name or object id
<top_level>	**dms**	The highest level of device type to output.
	lcm	
	dbic	
	xlc	
	lac	
	lc	
<bottom_level>	**dms**	The lowest level of device type to output.
	lcm	
	dbic	
	xlc	
	lac	
	lc	

HSTPDUMP command

This section describes the syntax and parameters for the **hstpdump** command.

Syntax

The syntax for the **hstpdump** command follows:

```
>hstpdump <options> <field...> <object...>
```

Parameters

Table 4-12 lists the parameters for the **hstpdump** command.

Note: Parameters and values are case-sensitive.

Table 4-12 Parameters for hstpdump command

Parameter	Value	Description
<options>	**-E**	Output field values numerically
	-f	Include field name and value with each field
	-t	Begin output with device type followed by colon
	-T	Begin output with device type and no colon
	-n	Begin output with HSTP unique name followed by colon
	-N	Begin output with HSTP unique name and no colon
	-b	Print boolean fields as `T` and `F` instead of `1` and `0`
	-B	Print boolean fields as `TRUE` and `FALSE` instead of `1` and `0`
	-Q	Suppress quoting of field names, enumeration, and string values ***Note:*** When you use this parameter, use the **-d<c>** parameter to change the inter-field delimiter.
	-d <c>	Delimit fields with a character. The default is the space character.
<field...>		The HP OpenView database field name(s) or field id(s)
<object...>		The HP OpenView database object name(s) or object id(s)
Note: If the command includes the parameters **-t** and **-n**, or **-T** and **-N**, the device type is output first.		

Example

An example of the **hstpdump** command to output the selection name and HSTP unique name for every provisioned HSTP device follows:

```
hstpdump -Q "Selection Name" "Nortel HSTP unique name"
```

Network

This section provides syntax, parameters, and examples of the **hstpprov** command when used for network provisioning.

Syntax

The syntax for the **hstpprov** command for network provisioning follows:

```
>hstpprov network [<operation>] <device-name>
[<net-options>...]
```

Parameters

Table 4-13 lists the parameters for the **hstpprov** command for network provisioning.

> ***Note:*** Parameters and values are case-sensitive.

Table 4-13 Network parameters for hstpprov command (Sheet 1 of 3)

Parameter	Value	Parameter	Value
<net-options>	**-vlan-state=<vlan-state>**	**<vlan-state>**	**disabled** (default)
			enabled
	-default-vlan-mode= <default-vlan-mode>	**<default-vlan-mode>**	**none** (default)
			ieee802.1q
	-default-vlan-id= <default-vlan-id>	**<default-vlan-id>**	0 to 4094
	-default-load= <default-load>	**<default-load>**	Character string that identifies the default load
	-default-dbic-pec= <default-dbic-pec>	**<default-dbic-pec>**	Character string that identifies the default DBIC PEC, such as EX54BA
	-default-localswitching= <default-localswitching>	**<default-local switching>**	**disabled**
			enabled

Table 4-13 Network parameters for hstpprov command (Sheet 2 of 3)

Parameter	Value	Parameter	Value
	-default-broadcastfiltering= <default-broadcast filtering>	**<default-broadcast filtering>**	**enabled**
			upstream
			downstream
			none
	-default-readcommunity= <default-readcommunity>	**<default-readcommunity>**	The Read Community string
	-default-writecommunity= <default-writecommunity>	**<default-writecommunity**	The Write Community string
	-default-admincommunity= <default-admincommunity>	**<default-admincommunity>**	The Admin Community string
	-default-cachetimeout= <default-learned-mac-cachetimeout>	**<default-learned-mac-cachetimeout>**	The time in seconds that a learned MAC address remains in cache when the DBICs do not send traffic
	-default-arpthroughput= <default-arp-message-limit>	**<default-arp-message-limit>**	The maximum number of ARP messages per second that the DBICs process
	-default-mactranslation= <default-mactranslation-status>	**<default-mactranslation-status>**	**enabled**
			disabled
	-default-gateway= <default-gateway-list>	**<default-gateway-list>**	The list of default gateways for the DBICs
	-default-subnetmask= <default-subnetmask>	**<default-subnetmask>**	The subnet masks for the default gateways
	-default-speeddown= <default-downstream-speed>	**<default-downstream-speed>**	Valid speeds are 80, 160, 240, 320, 640, 960, and 1280 kilobit per second (kbit/s)

Table 4-13 Network parameters for hstpprov command (Sheet 3 of 3)

Parameter	Value	Parameter	Value
	-default-speedup= <default-upstream-speed>	**<default-upstream-speed>**	Valid speeds are 40, 80, 120, 240, and 320 kbit/s
	-default-max-devices= <default-max-devices>	**<default-max-devices>**	**1** or **2**

Examples

An example of a network provisioning command follows:

```
hstpprov network update Nortel:HSTP-Network
-default-vlan-mode=ieee802.1q
```

DMS

This section provides syntax, parameters, and examples of the **hstpprov** command when used for DMS provisioning.

Syntax

The syntax for the **hstpprov** command for DMS provisioning follows:

```
>hstpprov dms [<operation>] <dms-clli> [-ip-addr=<ip address>]
```

Parameters

Table 4-14 lists the parameters for the **hstpprov** command for DMS provisioning.

> ***Note:*** Parameters and values are case-sensitive.

Table 4-14 DMS parameters for hstpprov command

Parameter	Value	Description
<dms-clli>		The unique name of the DMS. The unique name is the CLLI or the short name of the CLLI.
<ip-addr>		The IP address of the DMS CM. The DMS CM must have an Ethernet interface unit (EIU) or equivalent interface.

Examples

An example of a DMS provisioning command follows:

```
hstpprov dms add SNFCCA01 -ipaddr=47.345.67.890
```

LCM-type PMs

This section provides syntax, parameters, and examples of the **hstpprov** command when used for provisioning LCM-type PMs.

Syntax

The syntax for the **hstpprov** command for provisioning LCM-type PMs follows:

```
>hstpprov lcm [<operation>] <lcm-name>
```

Parameters

Table 4-15 lists the parameters for the **hstpprov** command for provisioning LCM-type PMs.

> ***Note:*** Parameters and values are case-sensitive.

Table 4-15 LCM parameters for hstpprov command

Parameter	Value	Description
<lcm-name>	**<dms-clli>**	The HSTP unique name of the DMS switch
	<lcm-type>	A required parameter indicating the object is one of the following type of LCMs • **LCM** • **ELCM** • **ALCM** • **ILCM** • **LCE** • **STAR**
	<frame-location>	The four-character location code of the frame
	<frame-number>	A number (0 to 500) that indicates the physical frame
	<lcm-number>	A number (0 to 1) that indicates whether the LCM-type PM is in the upper or lower portion of the frame

Examples

An example of the **lcm-name** parameter follows:

```
SNFCCA01:LCM/REM0/24/0
```

An example of a provisioning command for an LCM-type PM follows:

```
hstpprov lcm add SNFCCA01:LCM/REM0/24/0
```

DBIC

> **ATTENTION**
> The DBIC must be offline, unequipped, or unset before you unprovision the xLC. You can override this provision by using the -**force** option.

This section provides syntax, parameters, and examples of the **hstpprov** command when used for DBIC provisioning.

Syntax

The syntax for the **hstpprov** command for DBIC provisioning follows

```
>hstpprov dbic add <dbic-name> <dbic-parms> [<dbic-options>...]
```

```
>hstpprov dbic update <dbic-name> <dbic-parms>
[<dbic-options>...]
```

```
>hstpprov dbic remove <dbic-name>
```

Parameters

Table 4-16 lists the parameters for the **hstpprov** command for DBIC provisioning.

> ***Note:*** Parameters and values are case-sensitive. Do not add white space between the equals (=) signs.

Table 4-16 DBIC parameters for hstpprov command (Sheet 1 of 4)

Parameter	Values	Parameter	Value
<dbic-name>	**<lcm-name>: <physical-drawer- number>**	**<lcm-name>**	The name of the LCM. See the table “LCM parameters for **hstpprov** command” in this chapter for information.
		<physical-drawer- number>	For most types of LCMs, the physical number of the LCM drawer with the DBIC. For STAR and LCE objects, the logical drawer number.
Note 1: Specify MAC addresses in hexadecimal notation. Formats 08000993E634, 08:0:9:93:E6:34, and 0x08000993E634 represent the same MAC address.			
Note 2: Specify IP addresses in dotted-decimal notation. 47.128.11.213 is a valid IP address.			

Table 4-16 DBIC parameters for hstpprov command (Sheet 2 of 4)

Parameter	Values	Parameter	Value
<dbic-parms> (Required for DBIC provisioning)	**-macaddr=<mac-address>**	**<mac-address>**	The MAC address of the DBIC. (See note 1.)
	-ipaddr=<ip-address>	**<ip-address>**	The IP address of the DBIC. (See note 2.)
	-load=<load-image-path>	**<load-image-path>**	The location of the load file
<dbic-options>	**[-initialstate=<status>]**	**<status>**	**inservice**
			manbusy
			offline
	[-broadcastfiltering= <state>]	**<state>**	**enabled**
			upstream
			downstream
			none
	[-trustedmac= <xems-mac-address>]	**<xems-mac-address>**	The xEMS MAC address. (See note 1.)
	[-trustedip= <xems-ip-address>]	**<xems-ip-address>**	The xEMS IP address. (See note 2.)
	[-trustcontrol=<state>]	**<state>**	**enableMAC**
			enableIP
			enableBOTH
			disabled
			preEnable
	[-readcommunity= <read-community-string>]	**<read-community-string>**	The Read Community string

Note 1: Specify MAC addresses in hexadecimal notation. Formats 08000993E634, 08:0:9:93:E6:34, and 0x08000993E634 represent the same MAC address.

Note 2: Specify IP addresses in dotted-decimal notation. 47.128.11.213 is a valid IP address.

Table 4-16 DBIC parameters for hstpprov command (Sheet 3 of 4)

Parameter	Values	Parameter	Value
	[-writecommunity= <write-community-string>]	**<write-community -string>**	The Write Community string
	[-cachetimeout= <learned-mac-cache-timeout>]	**<learned-mac-cache-timeout>**	The time in seconds that a learned MAC address remains in cache when the DBIC does not send traffic. The default time is 15 minutes.
	[-arpthroughput= <arp-message-limit>]	**<arp-message-limit>**	The maximum number of ARP messages per second that the DBIC processes. The default value is 15.
	[-mactranslation=<status>]	**<status>**	**enabled** **disabled**
	[-gateway= <default-gateway-list>]	**<default-gateway-list>**	If the DBIC is on a different network from the xEMS, specify a list of default gateways for the DBIC. The parameter **default-gateway- list** is a comma-delimited list of IP addresses.
	-subnetmask= <subnet-mask>	**<subnet-mask>**	Specify the subnet mask when you specify the gateway list. Use dotted-decimal notation, such as 255.255.240.0 for a class-A network with a 12-bit subnet.

Note 1: Specify MAC addresses in hexadecimal notation. Formats 08000993E634, 08:0:9:93:E6:34, and 0x08000993E634 represent the same MAC address.

Note 2: Specify IP addresses in dotted-decimal notation. 47.128.11.213 is a valid IP address.

Table 4-16 DBIC parameters for hstpprov command (Sheet 4 of 4)

Parameter	Values	Parameter	Value
	[-vlan-mode=<vlan-mode>]	**<vlan-mode>**	**none** (default)
	Note: If the value of the network option **-vlan-state** is **disabled**, the configured value of this option is **none** regardless of the provisioned value.		**ieee802.1q**
	[-default-vlan-id=<vlan-id>]	**<vlan-id>**	0 to 4094
	[-ethernetid = <ethernet-id>]	**<ethernet-id>**	A character string that contains the Ethernet identifier of the DBIC
	[-pec=<pec>]	**<pec>**	A character string that contains the DBIC PEC, such as EX54BA
	-default-max-devices= <default-max-devices>	**<default-max-devices>**	**1** or **2**
	[-timeref=<time-ref>]	**<time-ref>**	**unset**
	Note: This value is valid only in S/DMS AccessNode offices.		
			external
			internal
			default

Note 1: Specify MAC addresses in hexadecimal notation. Formats 08000993E634, 08:0:9:93:E6:34, and 0x08000993E634 represent the same MAC address.

Note 2: Specify IP addresses in dotted-decimal notation. 47.128.11.213 is a valid IP address.

Examples

An example of the **dbic-name** parameter follows:

```
SNFCCA01:LCM/HOST/12/0:5
```

An example of a DBIC provisioning command follows:

```
hstpprov dbic add SNFCCA01:LCM/HOST/12/0:5
-macaddr=08000993E643 -ipaddr=47.128.11.213
-load=/etc/opt/OV/share/loads/Nortel/dbfap051.cps
```

xLC

> **ATTENTION**
> The xLC must be offline, unequipped, or unset before you unprovision the xLC. You can override this provision by using the **-force** option.

This section provides syntax, parameters, and examples of the **hstpprov** command when used for xLC provisioning.

Syntax

The syntax for the **hstpprov** command for xLC provisioning follows:

```
>hstpprov xlc add <xlc-name> [<xlc-options>...]

>hstpprov xlc update <xlc-name> [<xlc-options>...]

>hstpprov xlc remove <xlc-name>
```

Parameters

Table 4-17 lists the parameters for the **hstpprov** command for xLC provisioning.

> ***Note:*** Parameters and values are case-sensitive.

Table 4-17 xLC parameters for hstpprov command (Sheet 1 of 2)

Parameter	Values	Parameter	Value
<xlc-name>	**<dbic-name>: <logical-drawer- number>/ <logical-slot-number>**	**<dbic-name>**	The name of the DBIC. See the table “DBIC parameters for **hstpprov** command” in this chapter for information on this parameter.
		<logical-drawer-number>	The logical number of the drawer with the DBIC. The logical number is 2xN or (2xN)+1, where N is the physical drawer number.
		<logical-slot- number>	The logical number of the slot with the xLC
<xlc-options>	**[-initialstatus=<status>]**	**<status>**	**IDL**
			MB
	[-subscriberphone number= <subscriber-phone-number>]	**<subscriber-phone-number>**	Subscriber’s telephone number
	[-subscriberareacode= <subscriber-area-code>]	**<subscriber-area-code>**	Subscriber's area code
	[-speeddown= <max-loop-speed- down>]	**<max-loop-speed-down>**	Valid speeds are 80, 160, 240, 320, 640, 960, and 1280 kbit/s
	[-speedup=<max-loop-speed-up>]	**<max-loop-speed- up>**	Valid speeds are 40, 80, 120, 240, and 320 kbit/s

Table 4-17 xLC parameters for hstpprov command (Sheet 2 of 2)

Parameter	Values	Parameter	Value
	[-fec=<state>]	**<state>**	**on**
			off
			auto
	[-offhook=<state>]	**<state>**	**enabled**
			disabled
	[-vlan-id=<vlan-id>]	**<vlan-id>**	0 to 4094
	-max-devices= <max-devices>	**<default-max-devices>**	**1** or **2**

Examples

An example of the **xlc-name** parameter follows:

```
SNFCCA01:LCM/HOST/1/0:2:4/0
```

An example of an xLC provisioning command follows:

```
hstpprov xlc add SNFCCA01:LCM/HOST/1/0:2:4/0 -i -initalstate=MB
-subscriberphonenumber=1234567 -subscriberareacode=123
-speeddown=1280 -speedup=320
```

Map synchronization

If you perform xEMS provisioning from the command line, you must refresh the xEMS submaps to reflect the provisioning changes made from the command line. Use the selection **Misc->Nortel xEMS->Synchronize Map** from the pull-down menu.

The **Synchronize Map** command synchronizes all objects in the xEMS object hierarchy. The command can take several minutes to execute, depending on the number of line cards in the network. You must have read-write permission on the map to execute the command.

CPE firmware download

The NTEX35BA version of the 1-Meg Modem allows you to download new 1-Meg Modem firmware from the DBIC to the 1-Meg Modem at the subscriber location.

Single download

> **ATTENTION**
> The xLC must be manually busy (MB) before you download the firmware to a single 1-Meg Modem.

You can download firmware to a single 1-Meg Modem with the **hstpmaint** parameter **-load=<loadfile-path>** from the command line at the xEMS workstation. The following actions occur:

1. The xEMS verifies that the 1-Meg Modem is compatible with the new firmware load.
2. The xEMS busies the 1-Meg Modem.
3. The xEMS takes the 1-Meg Modem offline.
4. The xEMS provides the name of the 1-Meg Modem, the name of the firmware load, and the location of the firmware load.
5. The DBIC downloads the firmware load to the 1-Meg Modem.
6. The 1-Meg Modem confirms to the DBIC the receipt of the load.
7. The 1-Meg Modem begins to use the new load.
8. The DBIC informs the xEMS that the download is successful.
9. The xEMS returns the 1-Meg Modem to service.

You can download firmware on up to 16 lines simultaneously. This download takes about 20 minutes. On a single line, a download takes about four minutes.

Bulk download

> **ATTENTION**
> To avoid conflicts with other 1-Meg Modem Service activities, schedule bulk downloads of CPE firmware during off hours.

Offices with xEMS Release 5 or higher can perform bulk downloads of CPE firmware. With this functionality, you can perform a bulk download of CPE firmware to the groups of CPEs that follow:

- all CPEs in the network or all CPEs for a specific xLC, DBIC, LCM, or DMS
- all CPEs provisioned after a specific time
- all CPEs provisioned after the last bulk download

The bulk download process consists of the **cpedlconfig** command, UNIX crons, and the cpedld daemon process. Through a user, the **cpedlconfig** command provides the information for the bulk download. The **cpedlconfig** command sets up UNIX crons that schedule the bulk downloads. The cpedld process performs the bulk download.

Syntax

The syntax of the **cpedlconfig** command follows:

```
cpedlconfig <version> <loadfile> [-d<object-name>
-t<start-time> -i<time-interval> -r<number-retries> -S
-s<last-provisioned-time>}
```

Table 4-18 describes each parameter for the **cpedlconfig** command.

Table 4-18 Parameters for cpedlconfig command (Sheet 1 of 2)

Parameter	Description	Default value	Example
<version>*	The version of the firmware load	Not applicable	**2.0**
<loadfile>*	The path for the firmware load	Not applicable	**/tmp/cpe20/cp20.bin**
-d<object-name>	The name of the HSTP object. The command will download to all CPEs below the object.	HSTP-Network	**DMS1** **DMS1:LCM/HOST/0/0** **DMS1:LCM/HOST/0/0:0** **DMS1:LCM/HOST/0/0:0/1**
-t<start-time>	The time to start the download. The format is Hour:Minutes.	The current time	**2:30** **15:00**
-i<time-interval>	The number of hours between the start and finish of the download	3	**1** **12**
-r<number-retries>	The number of retries in days if the download fails.	3	**1** **5**
Note: An asterisk (*) indicates a required parameter.			

Table 4-18 Parameters for cpedlconfig command (Sheet 2 of 2)

Parameter	Description	Default value	Example
-S	Performs the download only on CPEs provisioned after the previous bulk download	Not applicable	Not applicable
-s<last-provisioned-time>	Performs the download only on CPEs provisioned after a specific time. The format is YYYY:mm:dd:HH:MM	Not applicable	**1999:06:09:15:30** **2000:02:05:01:15**
Note: An asterisk (*) indicates a required parameter.			

Prerequisites

Bulk downloading of CPE firmware has the prerequisites that follow:

- The CPE must be on.
- The CPE must be synchronized at the time of the download.
- The HP OpenView database must be running.

Add a data object to an xEMS submap

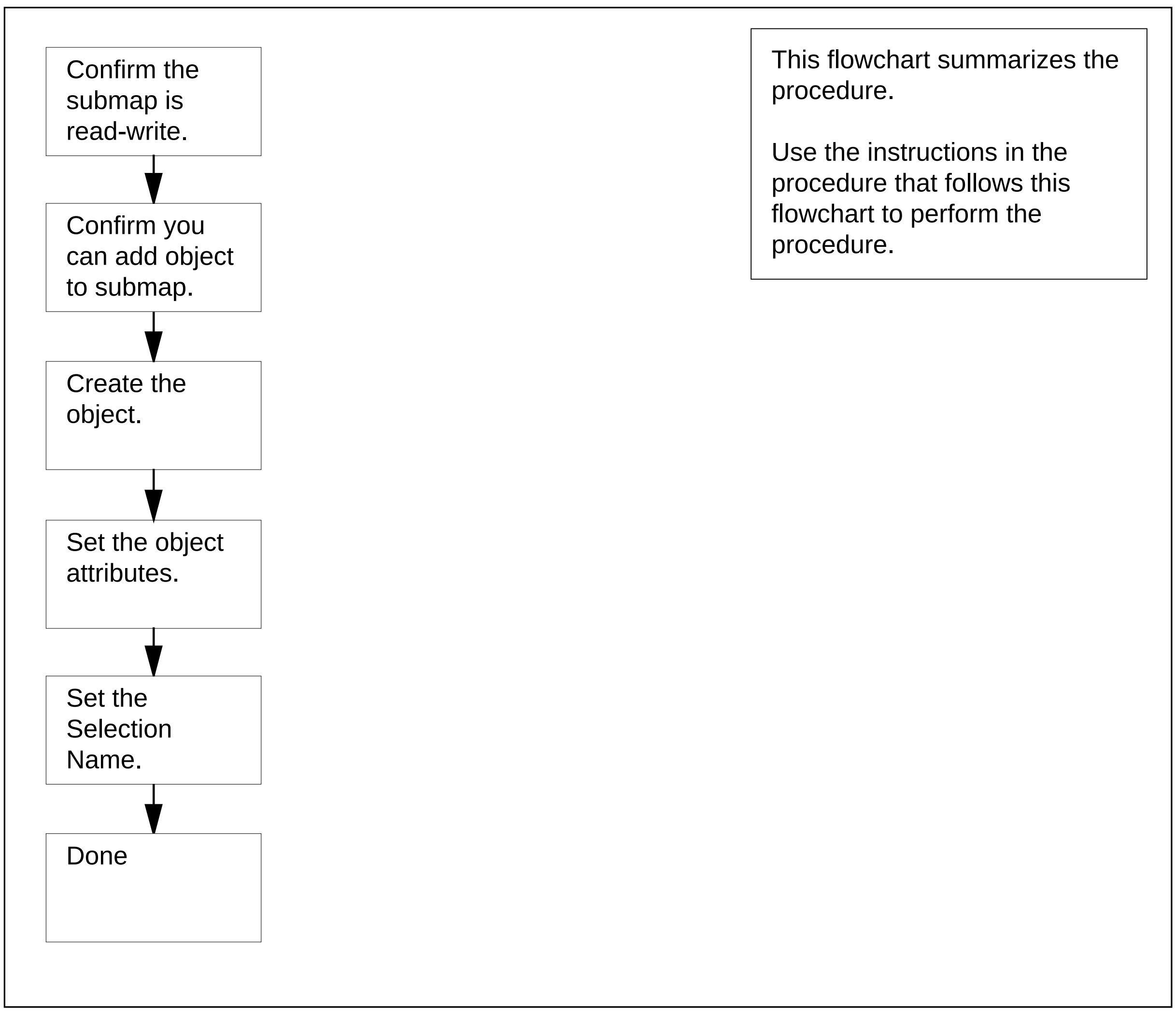
Application

Use this procedure to add a data object, such as an Internet protocol (IP) object, to an xDSL Element Management System (xEMS) submap.

Action

This procedure contains a summary flowchart and steps. Use the summary flowchart as an summary of the procedure. Use the steps to perform this procedure.

Summary of procedure



Add a data object to an xEMS submap (continued)

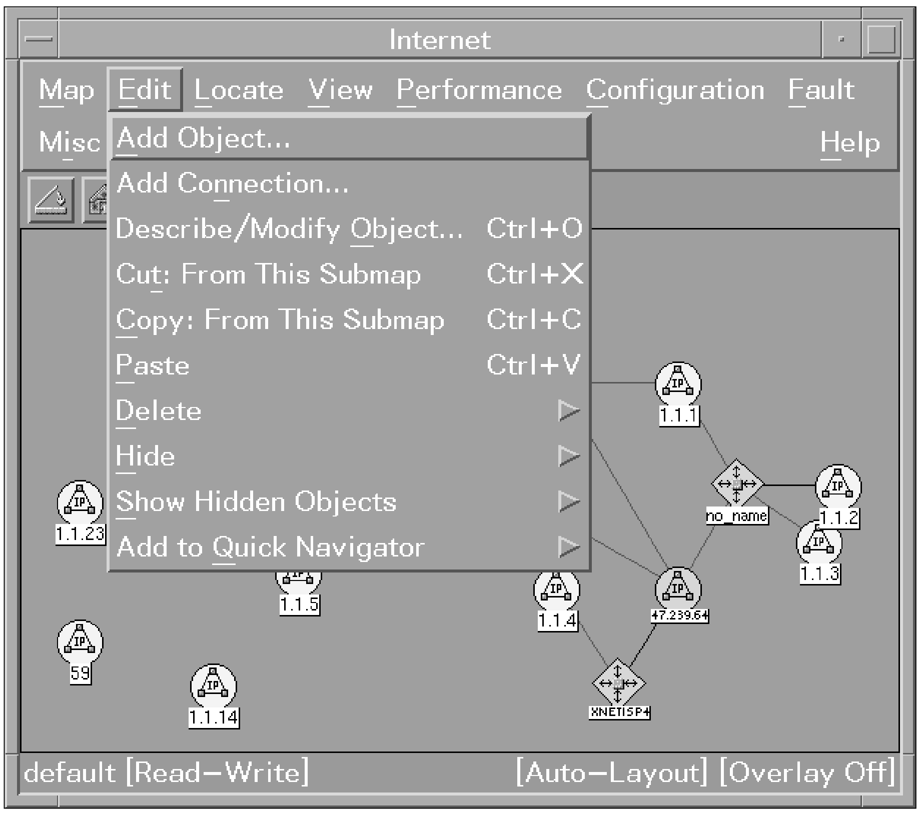
Steps of procedure

At the submap

1 Look at the status bar of the submap. Confirm that you have read-write access to the submap.

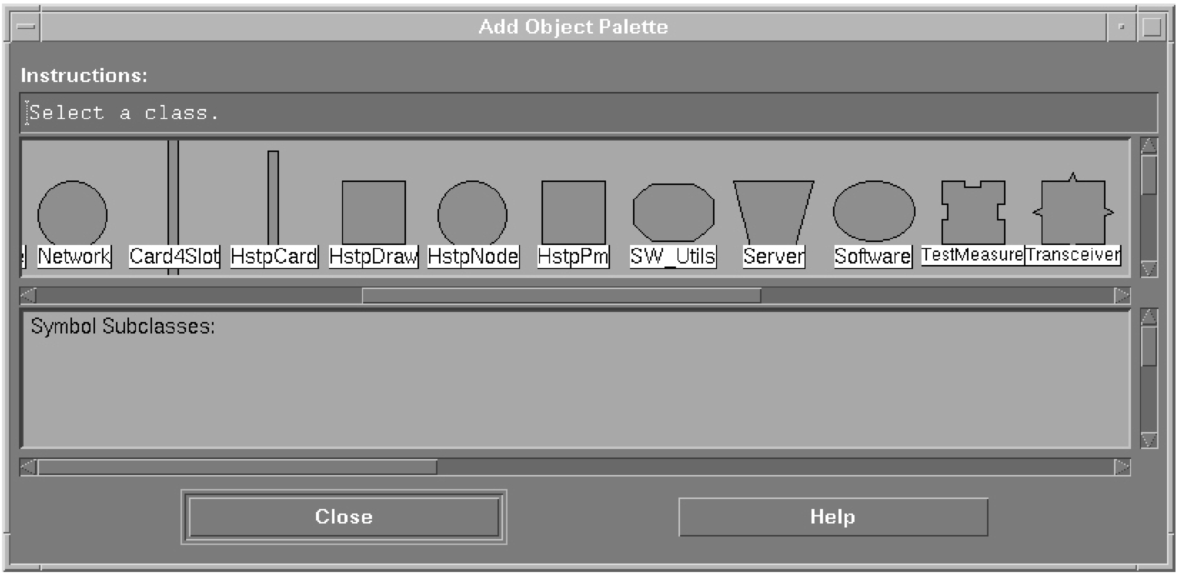
2 Select the pull-down menu **Edit:Add Object** from the menu bar. The Add Object Palette dialog box appears.

Example of action



Add a data object to an xEMS submap (continued)

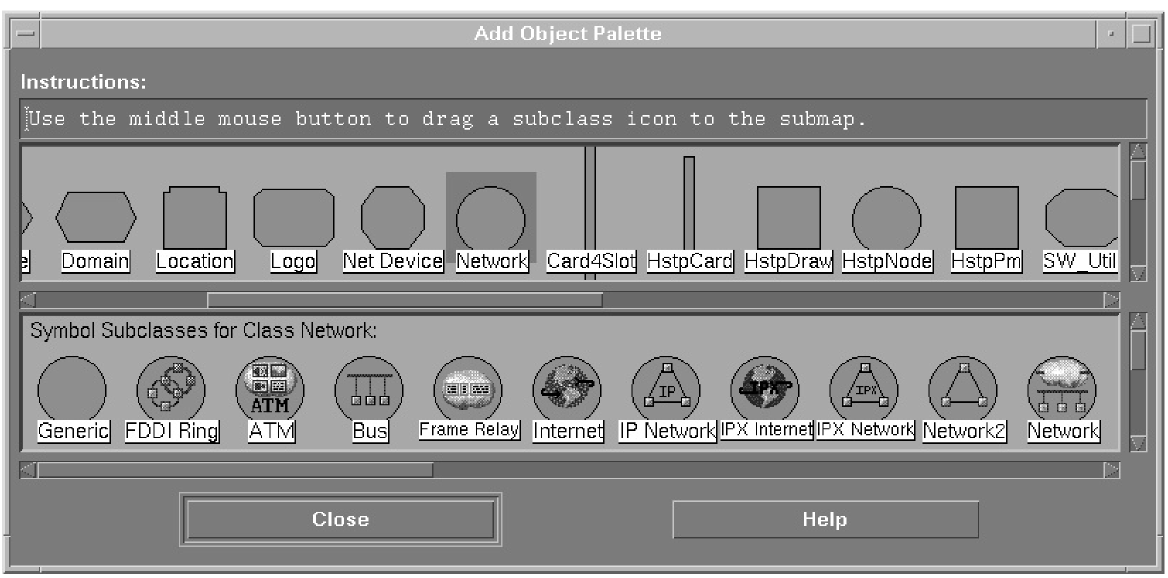
Example of response



3 Use the left mouse button to select a symbol class. The symbol subclasses for the symbol appear.

Note: If your mouse is programmed for the left-hand, use the right mouse button to select a symbol class.

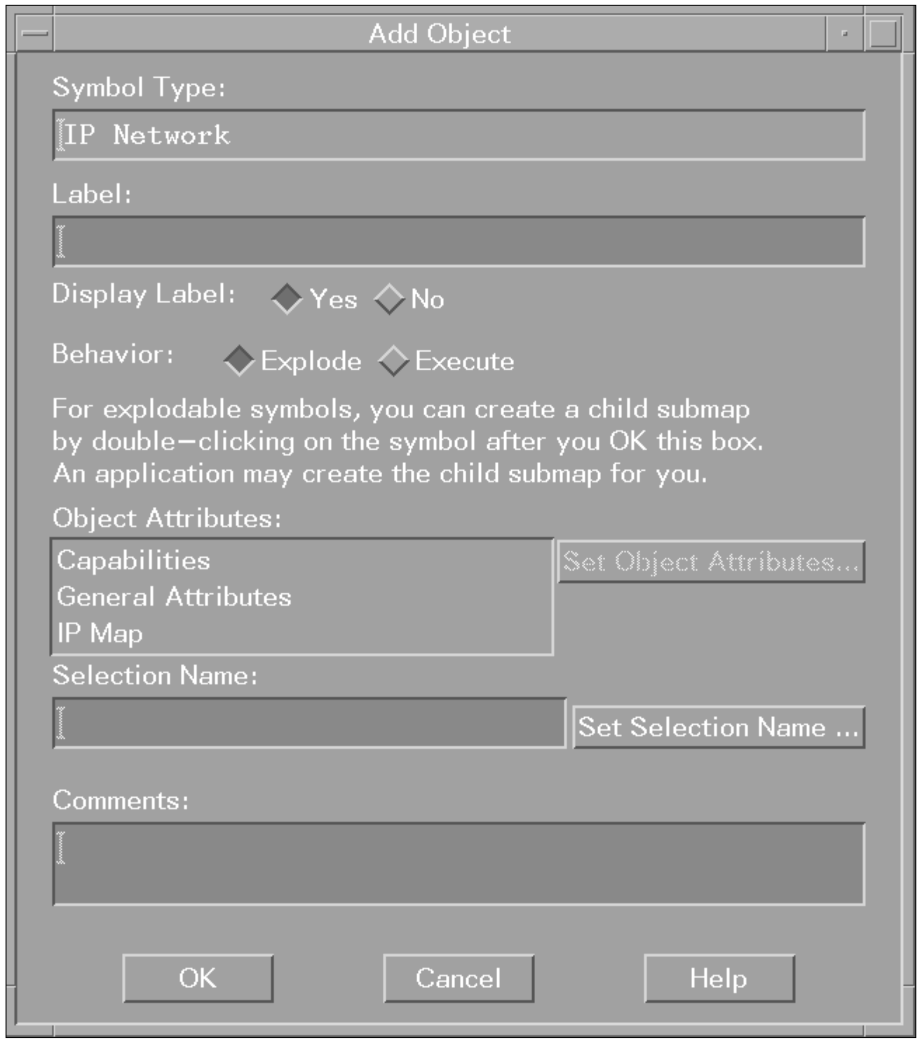
Example of response



Add a data object to an xEMS submap (continued)

4 Use the middle mouse button to select a symbol from the symbol subclass palette. Drag the symbol to the submap. The Add Object dialog box appears.

Example of response



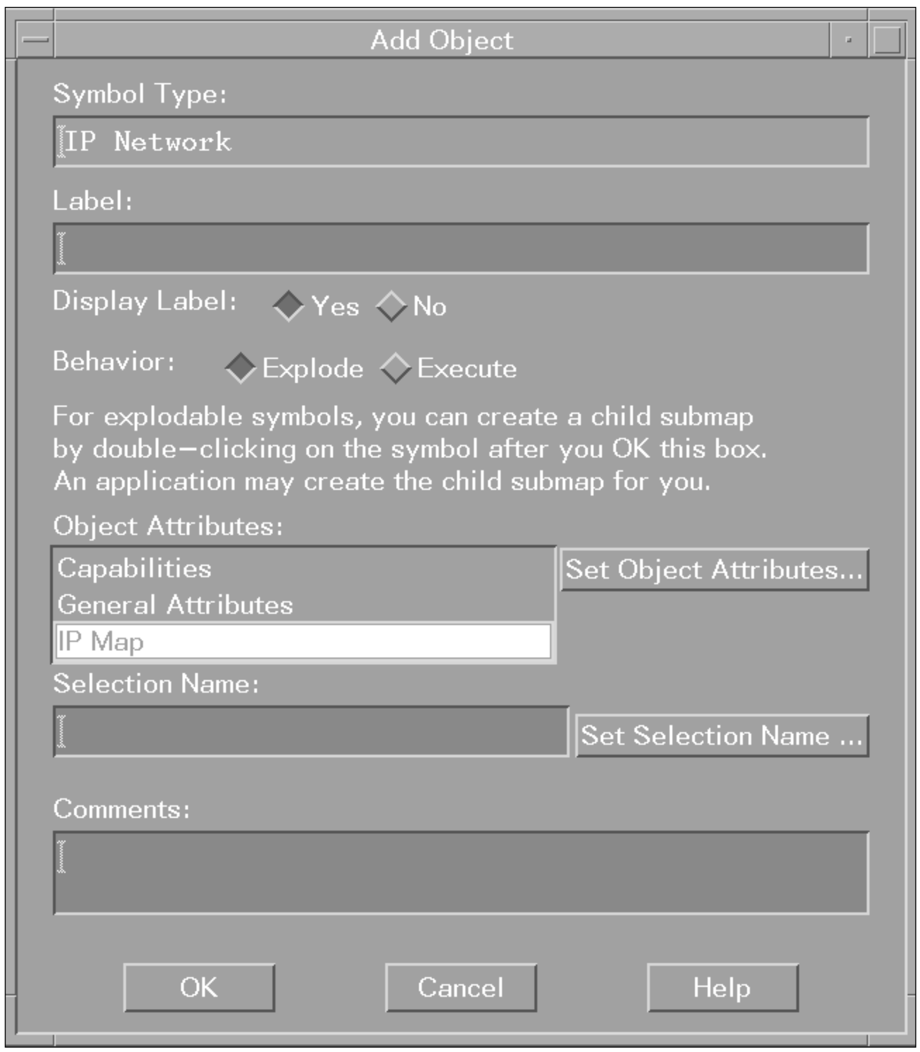
Add a data object to an xEMS submap (continued)

5

> **ATTENTION**
> Under Object Attributes, do not select Capabilities or General Attributes. Do not change any of the attributes in these categories. If you modify these fields, you can affect the operation of some menu items.

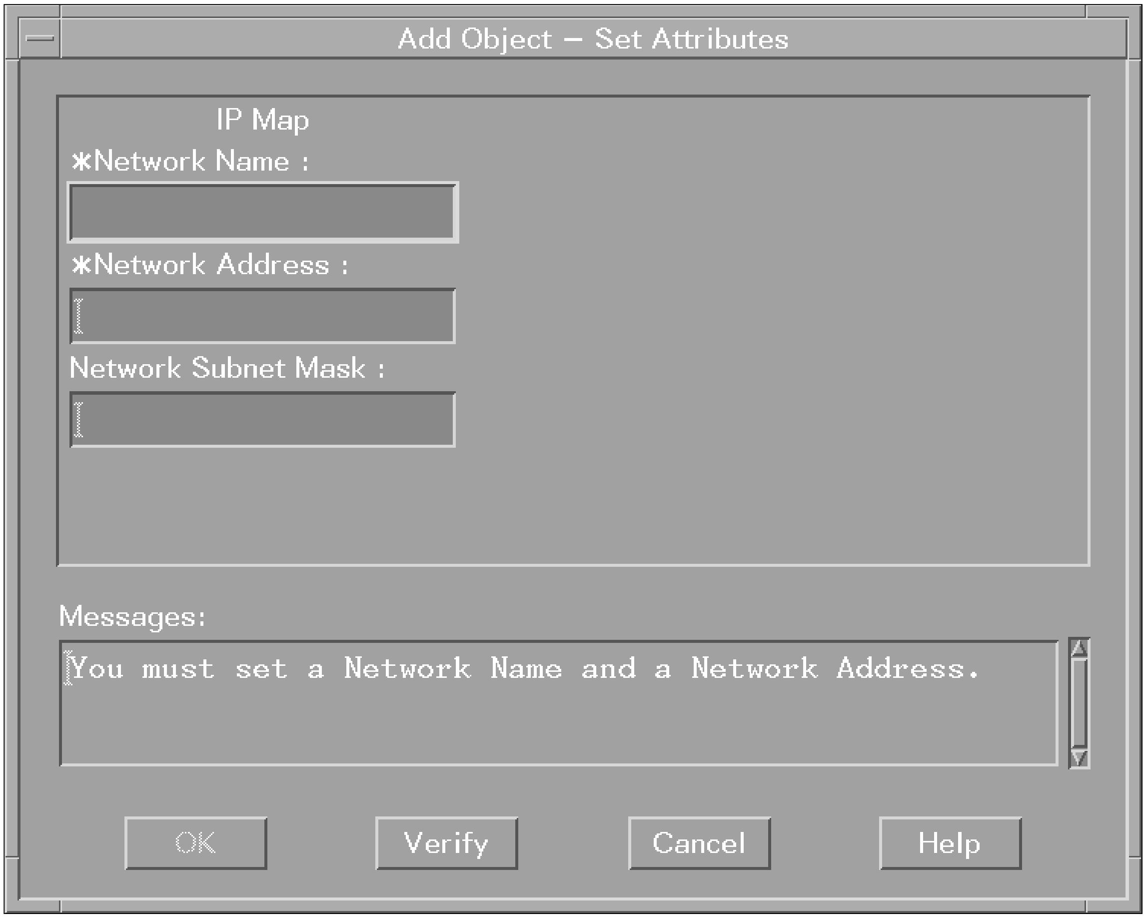
Under Object Attributes, select IP Map and click the Set Object Attributes button. The Add Object—Set Attributes dialog box appears.

Example of action



Add a data object to an xEMS submap (continued)

Example of response



6 Enter the Network Name, Network Address, and Network Subnet Mask.

7 Click the Verify button to check your entries. Follow any instructions that appear.

8 Click the OK button to close the Add Object—Set Attributes dialog box and return to the Add Object dialog box.

Add a data object to an xEMS submap (end)

9 Click the OK button to close the Add Object dialog box and complete this procedure.

If this procedure is	Result
successful	The xEMS displays the new symbol on the submap. The label of the symbol reflects the attributes you entered during this procedure. The color of the symbol reflects the status of the object.
not successful	The xEMS displays the new symbol with a shadow. The shadow indicates the new symbol is on the user plane. Check recent events to determine why the procedure was not successful.

Add an HSTP object to an xEMS submap

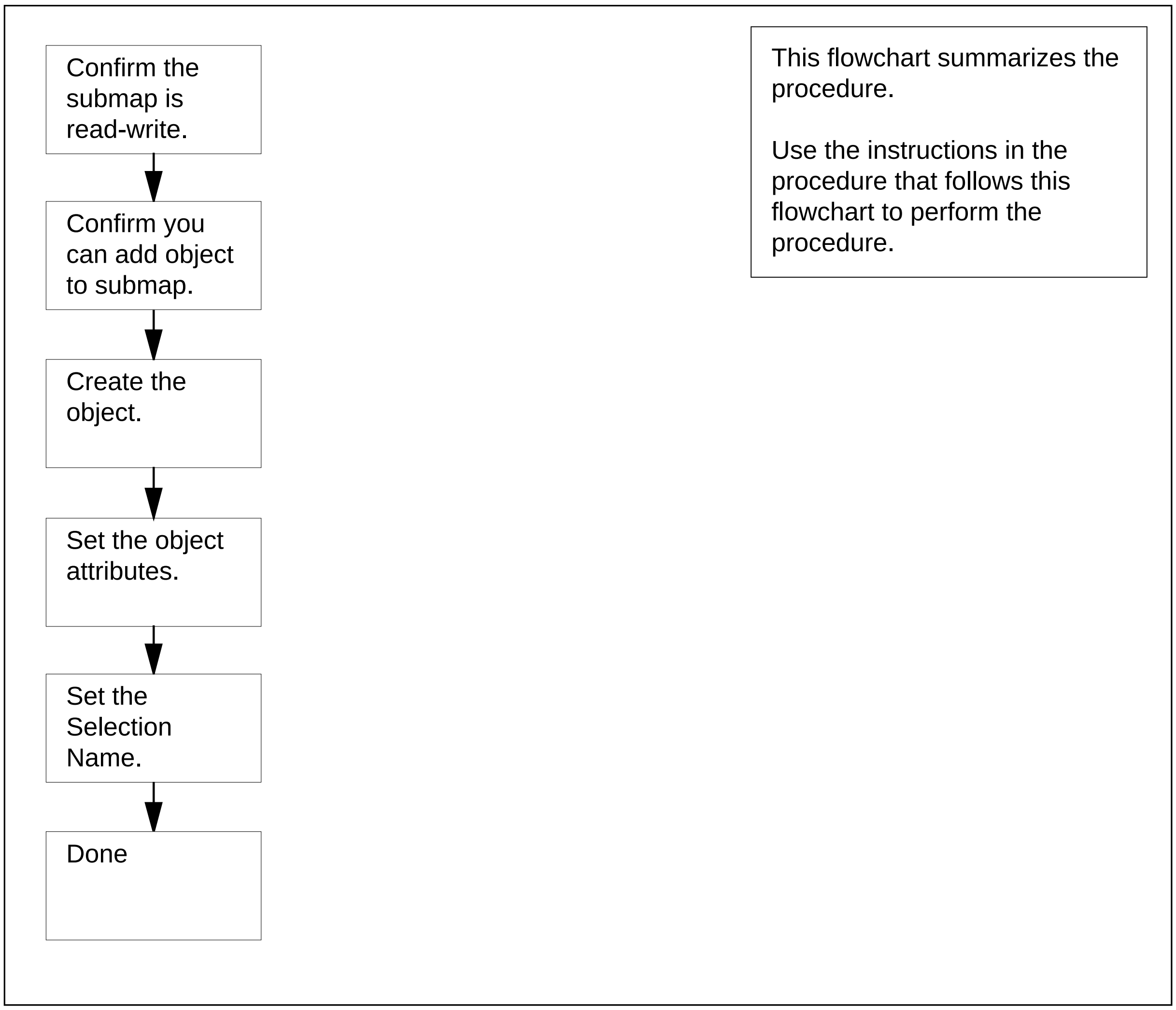
Application

Use this procedure to add a high-speed twisted pair (HSTP) object to an xDSL Element Management System (xEMS) submap.

Action

The following flowchart provides an overview of the procedure. Use the instructions in the step-action procedure that follows the flowchart to perform the procedure.

Summary of procedure



Add an HSTP object to an xEMS submap (continued)

Steps of procedure

At the submap

1 Look at the status bar of the submap. Confirm that you have read-write access to the submap.

2 Review the following table. Confirm that you can add the object to the submap.

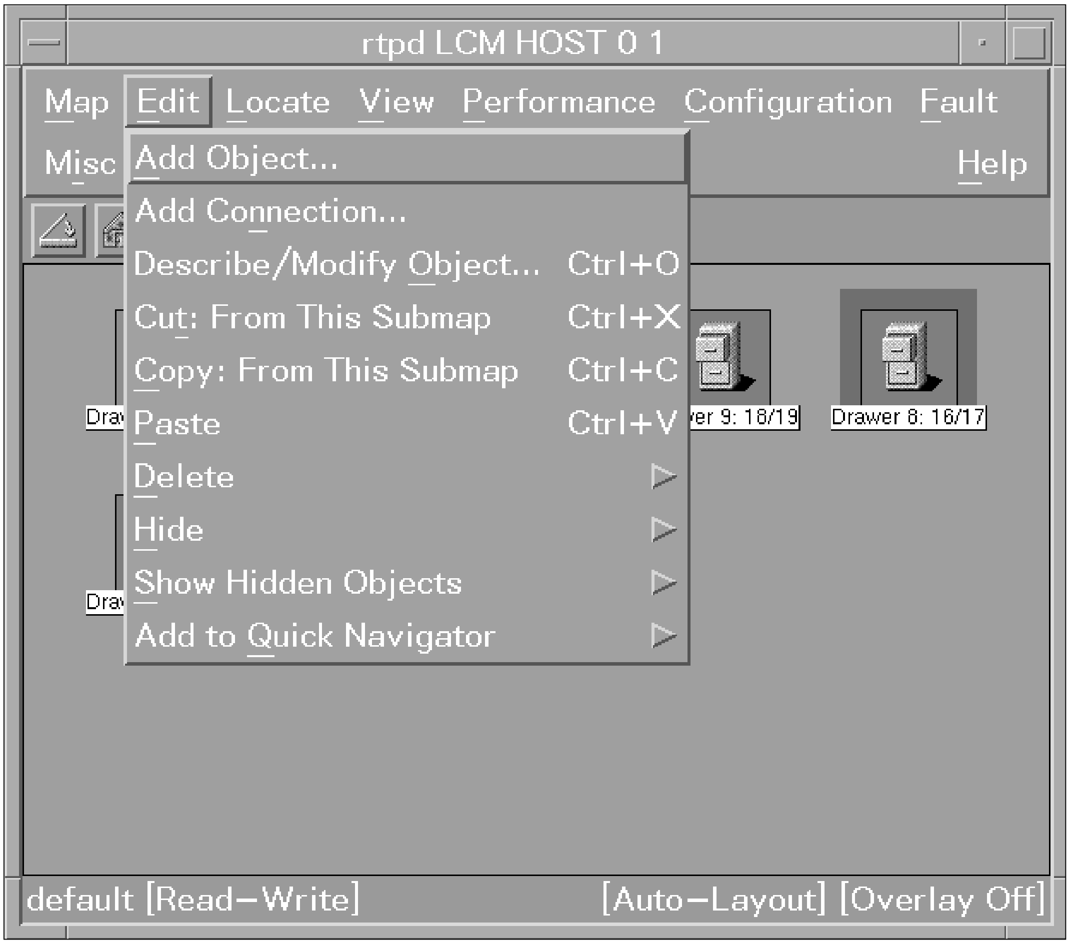
Object-to-submap applicability

Object	Symbol class	Symbol subclass	Submap names	Parent object
DMS	HstpNode	Dms100	HSTP Network	HSTP Network
LCM	HstpPm	Lcm	DMS	DMS
DBIC	HstpDraw	Dbic	LCM	LCM
xLC	HstpCard	Xlc	LCM Drawer	DBIC

Add an HSTP object to an xEMS submap (continued)

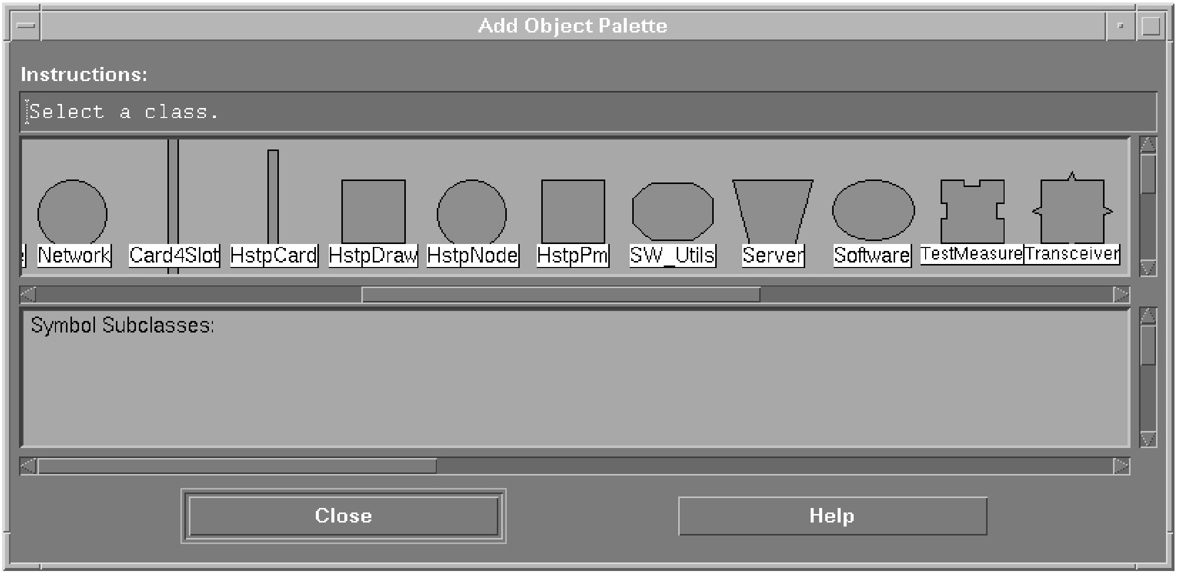
3 Select the pull-down menu **Edit:Add Object** from the menu bar. The Add Object Palette appears.

Example of action



Add an HSTP object to an xEMS submap (continued)

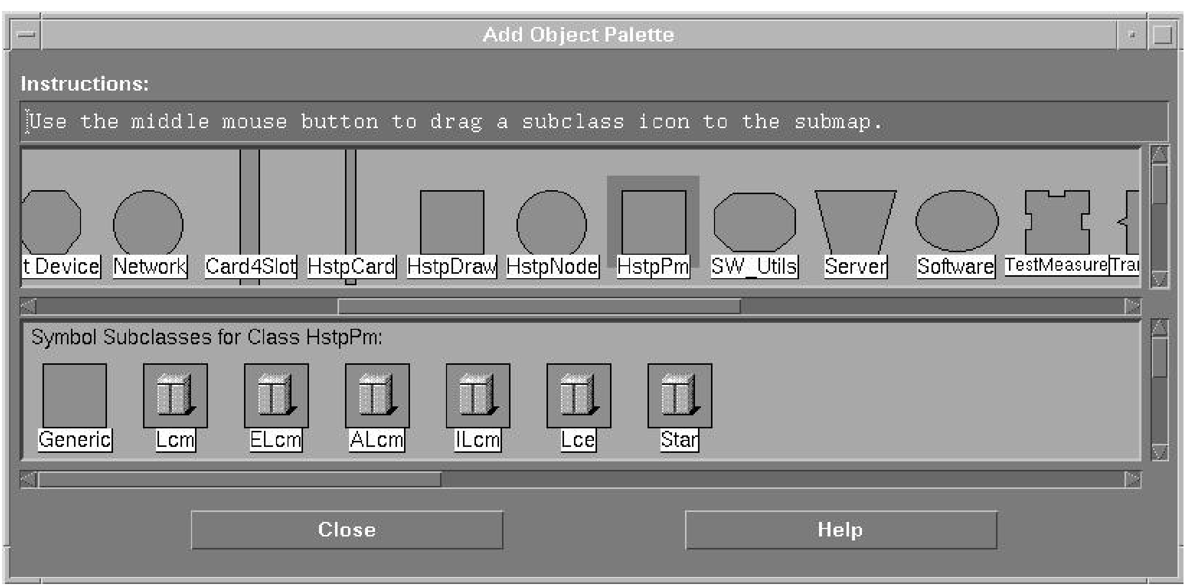
Example of response



4 Use the left mouse button to select a symbol class. The symbol subclasses for the symbol appear.

Note: If your mouse is programmed for the left-hand, use the right mouse button to select a symbol class.

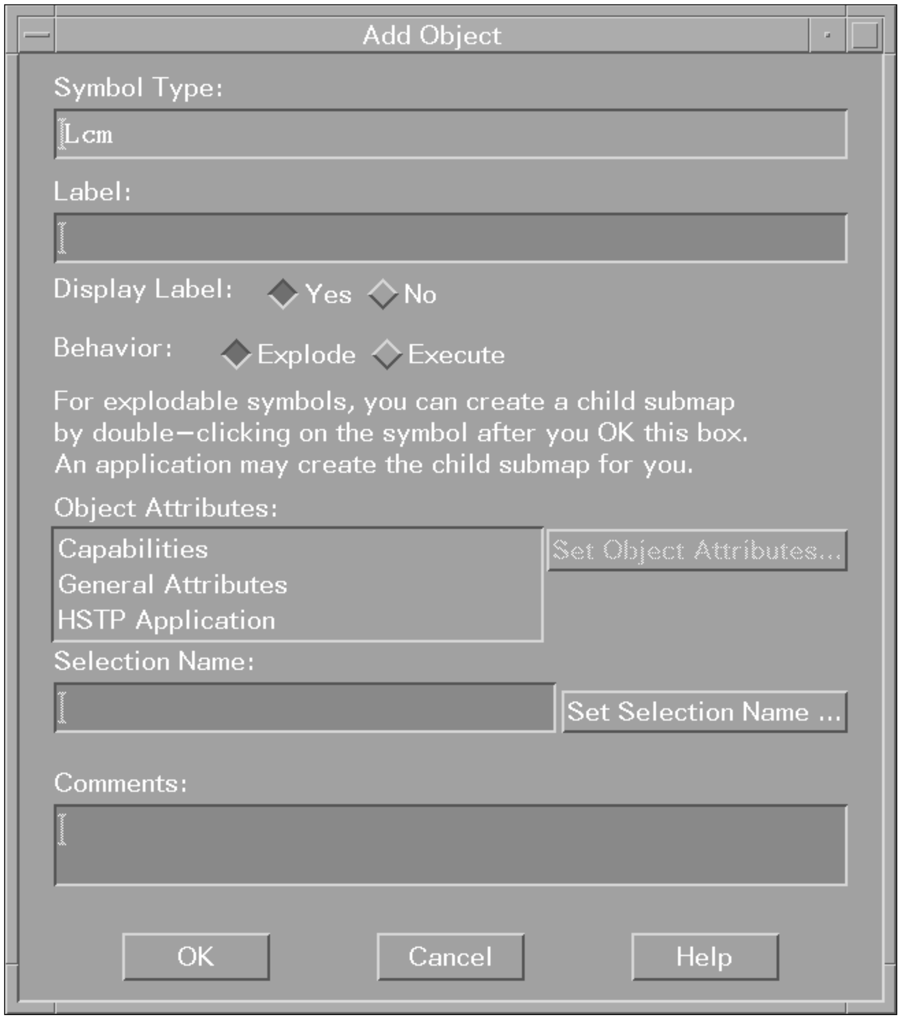
Example of response



Add an HSTP object to an xEMS submap (continued)

5 Use the middle mouse button to select a symbol from the symbol subclass palette. Drag the symbol to the submap. The Add Object dialog box appears.

Example of response



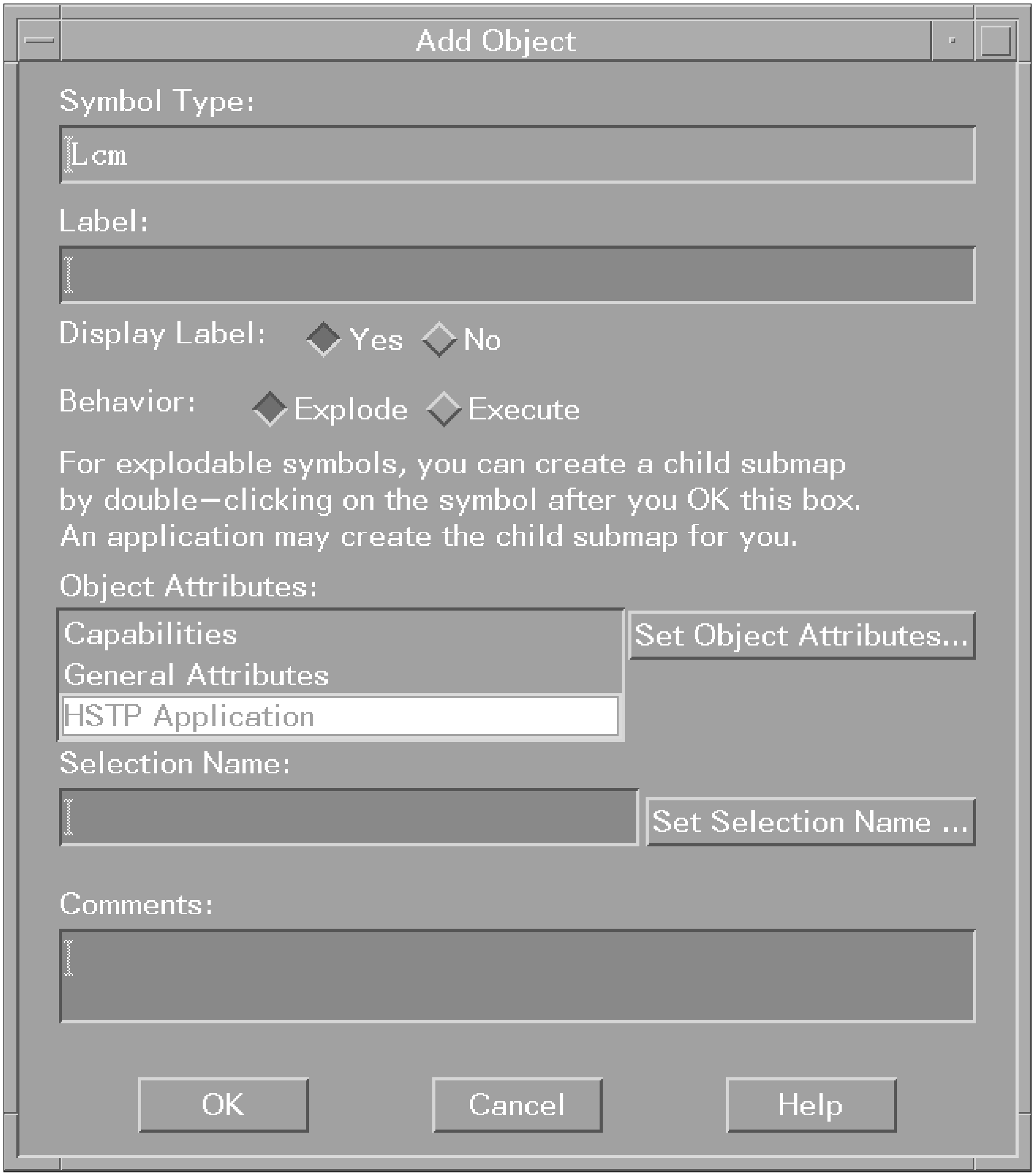
6

> **ATTENTION**
> Under Object Attributes, do not select Capabilities or General Attributes. Do not change any of the attributes in these categories. If you modify these fields, you can affect the operation of some menu items.

Under Object Attributes, select HSTP Application and click the Set Object Attributes button. The Add Object—Set Attributes dialog box appears.

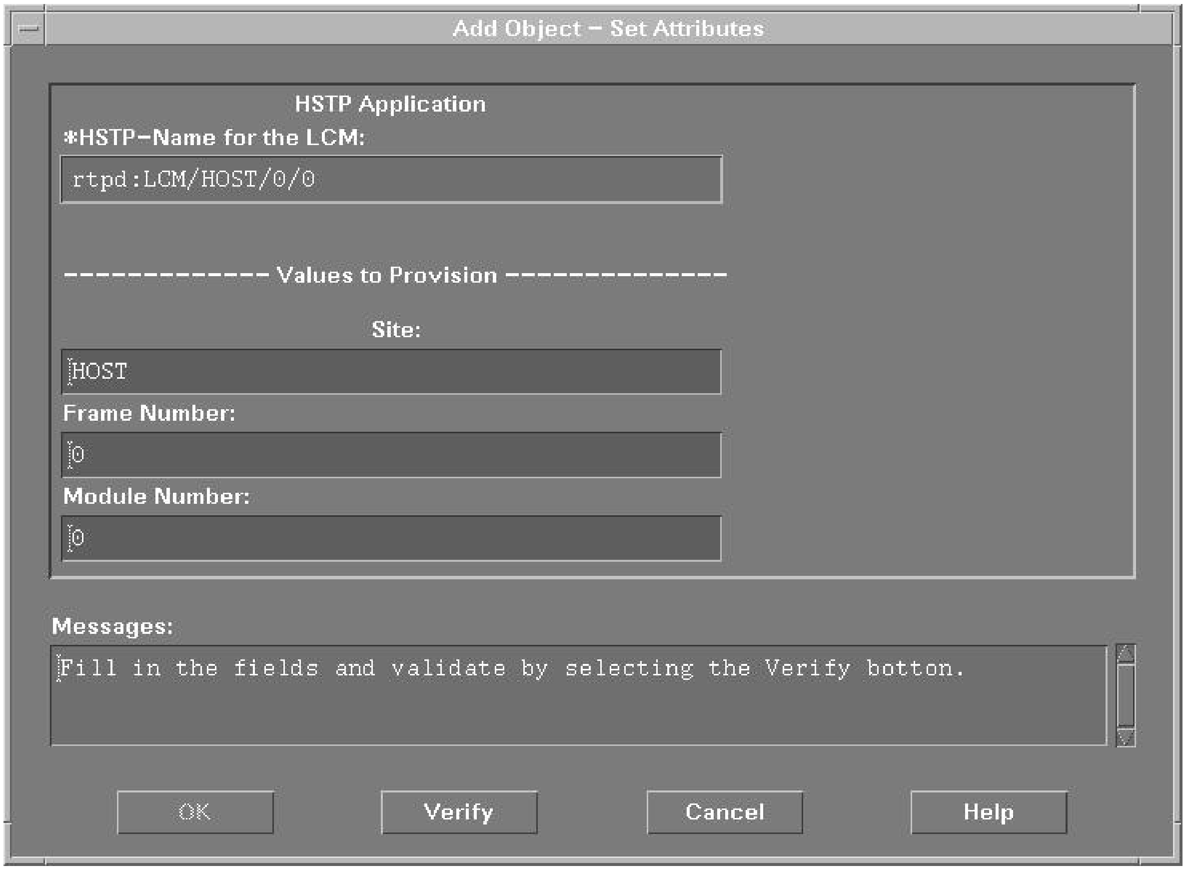
Add an HSTP object to an xEMS submap (continued)

Example of action



Add an HSTP object to an xEMS submap (continued)

Example of response



Add an HSTP object to an xEMS submap (continued)

7

> **ATTENTION**
> A field with an asterisk (*) next to its name is a name field. The value in a name field identifies the object.
>
> Do not change the HSTP-Name field. The xEMS creates this value based on the symbol type and entries in the provisionable field. The HSTP-Name field is the unique identifier for each object in the 1-Meg Modem Service. Refer to “xEMS” in this document for the naming convention for this field.
>
> If the default entry in a field matches the object’s provisioning information, you must change the default entry before you verify the information.

Complete the provisionable fields for the new object. The following tables describe the provisionable fields in the xEMS for each object.

Provisionable xEMS fields for HSTP-Network object

Field	Description
Default LAC VLAN Mode	Value is **None** or **802.1Q**
Network VLAN State	Value is **Disabled** or **Enabled**.
Default LAC VLAN Id	Value from 0 to 4094
Default maximum number of devices connected to a CPE	**1** or **2**

Provisionable xEMS fields for DMS object

Field	Description
DMS CLLI	DMS CLLI

Provisionable xEMS fields for LCM object

Field	Description
Site Number	Site number
Frame Number	Frame number
Module Number	Unit number

Add an HSTP object to an xEMS submap (continued)

Provisionable xEMS fields for ALCM object

Field	Description
Site	Site
Frame Number	Frame number
Module Number	Site Number

Provisionable xEMS fields for ELCM object

Field	Description
Site	Site
Frame Number	Frame number
Module Number	Unit number

Provisionable xEMS fields for ILCM object

Field	Description
Site	Site
Frame Number	Frame number
Module Number	Unit number

Provisionable xEMS fields for LCE object

Field	Description
Site	Site
Frame Number	Frame number
Module Number	Unit number

Provisionable xEMS fields for STAR object

Field	Description
Site	Site
Frame Number	Frame number
Module Number	Unit number

Add an HSTP object to an xEMS submap (continued)

Provisionable xEMS fields for DBIC object (Sheet 1 of 2)

Field	Description
Physical Drawer number	Physical drawer number for most types of LCMs. Logical drawer number for STAR and LCE objects.
LAC MAC Address	12-digit MAC address of the DBIC in hexadecimal format
LAC IP Address	IP address of the DBIC in decimal format
LAC Load Path	Directory path of the DBIC software load
LAC SNMP Read Community	SNMP read community string (password)
LAC SNMP Write Community	SNMP write community string (password)
LAC SNMP Admin Community	SNMP admin community string (password)
LAC Default Gateway	IP address of default gateway
LAC Subnet Mask	Subnet mask address in decimal format
LAC ARP Throughput	ARP throughput
LAC Broadcast Filtering	One of the options that follow: • **Unset** • **Enabled** • **Upstream** • **Downstream** • **None**
Ethernet Local Switching	One of the options that follow: • **Disabled** • **Enabled** • **Unset**

Add an HSTP object to an xEMS submap (continued)

Provisionable xEMS fields for DBIC object (Sheet 2 of 2)

Field	Description
MAC Translation	One of the options that follow: • **Unset** • **Enabled** • **Disabled**
Default LAC VLAN Mode	Value is **None** or **802.1Q**
Default VLAN ID	Value from 0 to 4094
Initial State	Initial state of DBIC
Trusted IP address and control	Trusted IP address and control
Ethernet ID	The Ethernet id of the DBIC ***Note:*** Do enter white space in this field.
PEC code	The provisioned PEC of the DBIC. The default value is **indeterminate**.
Default maximum number of devices connected to a CPE	**1** or **2**

Add an HSTP object to an xEMS submap (continued)

Provisionable xEMS fields for xLC object (Sheet 1 of 2)

Field	Description
Slot Number	Slot number
Line subgroup	Value is **Upper** or **Lower**.
Maximum Downstream Speed	One of the rates that follow: • 80 • 160 • 240 • 320 • 640 • 960 • 1280
Maximum Upstream Speed	One of the rates that follow: • 40 • 80 • 120 • 240 • 320
Forward Error Correction (FEC)	One of the values that follow: • **On** • **Off** • **Automatic** • **Unset** The default is **On**.
Offhook Detect Mode	One of the values that follow: • **Enabled** • **Disabled** • **Unset** The default is **Disabled**.
Default VLAN ID	Value from 0 to 4094

Add an HSTP object to an xEMS submap (continued)

Provisionable xEMS fields for xLC object (Sheet 2 of 2)

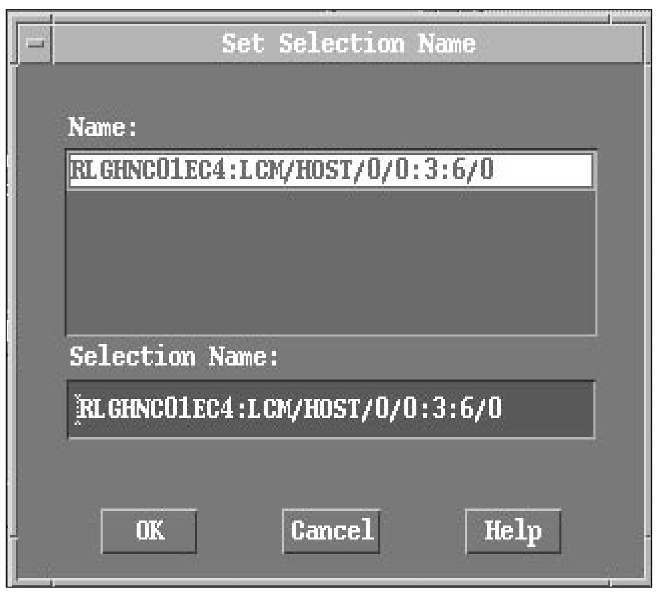
Field	Description
Initial line state	Initial state of line
Subscriber area code and telephone number	Subscriber area code and telephone number
Default maximum number of devices connected to a CPE	**1** or **2**

8 Click the Verify button to verify your entries. Follow any instructions that appear during verification.

9 Click the OK button to close the Add Object-Set Attributes dialog box. You will return to the Add Object dialog box.

10 Click the Set Selection Name button.

Example of response



11 Use the HSTP-Name as the Selection Name. The HSTP-Name is the first name in the list. Select the HSTP-Name and click the OK button. You will return to the Add Object dialog box.

Add an HSTP object to an xEMS submap (end)

12 Click the OK button to close the Add Object dialog box and complete this procedure.

If this procedure is	Result
successful	The xEMS displays the new symbol on the submap. The label of the symbol reflects the attributes you entered during this procedure. The color of the symbol reflects the status of the object.
not successful	The xEMS displays the new symbol with a shadow. The shadow indicates the new symbol is on the user plane. Check recent events to determine why the procedure was not successful.

5 Subscriber service

This chapter summarizes general steps to perform the following tasks:

- activate service for a new 1-Meg Modem Service subscriber
- change a service provider for an existing 1-Meg Modem Service subscriber

The requirements of the office, transport network, and service providers can affect these general steps.

Activate new service

The following steps describe how to activate 1-Meg Modem Service for a new 1-Meg Modem Service subscriber:

1. The subscriber verifies the operating company and service provider can provide 1-Meg Modem Service.
2. The subscriber purchases and installs the 1-Meg Modem.
3. If necessary, the subscriber purchases and installs a 10BaseT Ethernet card.
4. The office assigns the xDSL line card (xLC) to the subscriber.
5. The office makes any necessary changes to the main distribution frame (MDF).

6. The subscriber contacts the service provider.
    a. The subscriber provides the service provider with the following information:
        - directory number (DN)
        - desired speed of service
    b. The service provider provides the subscriber with the following information:
        - gateway address
        - point of presence (POP) server
        - simple mail transfer protocol (SMTP) server
        - email address
        - IP address
        - domain name service (DNS) server

        Note: The service provider can provide this information on the disk that installs the software on the subscriber's PC.
7. The service provider contacts the operating company and requests 1-Meg Modem Service for the subscriber.
8. The data-enhanced bus interface controller (DBIC) automatically discovers the new xLC. The DBIC displays the new card on the xDSL Element Management System (xEMS).
9. The office notifies the service provider that 1-Meg Modem Service is available for the subscriber.
10. The service provider establishes the 1-Meg Modem Service account for the subscriber.
11. The service provider notifies the subscriber that 1-Meg Modem Service is available.
12. The subscriber uses the BOOTP or DHCP client provided by the service provider to obtain the IP address, if not statically configured.

Change a subscriber's service provider

The following steps describe how to change the service provider of an existing 1-Meg Modem Service subscriber:

1. The subscriber contacts the new service provider and requests a service change.
2. The new service provider contacts the operating company.

3. The office obtains the subscriber's MAC address.
    a. The office uses the subscriber's DN to obtain the subscriber's LEN.
    b. The office uses the subscriber's LEN and xEMS to locate xLC.
    c. The office opens the xLC's submap and obtains the known fixed port MAC address.
    d. The office sets the speed on the xLC.
4. The office informs the previous service provider of the service change.
5. The office informs the new service provider that 1-Meg Modem Service is available.
6. The new service provider establishes the 1-Meg Modem Service account for the subscriber.
7. The new service provider notifies the subscriber that 1-Meg Modem Service is available.
8. The subscriber uses the BOOTP or DHCP client provided by the service provider to obtain the IP address, if necessary.

6 Performance management

This chapter provides information to help you manage the performance of the 1-Meg Modem Service.

Subscriber loop specifications

The following section provides specifications and performance measurements for subscriber loops. While Nortel Networks verified this information under laboratory conditions, the information may not reflect the operating conditions of your office or the locations of your subscribers. Use this information for reference in measuring the performance of the 1-Meg Modem Service in your office.

Note: Some of the tables in this section provide different measurements for a 960/120 configuration and a 1280/320 configuration. A 960/120 configuration is any hardware configuration that supports a maximum downstream rate of 960 kilobits per second (kbit/s) and a maximum upstream rate of 120 kbit/s. A 1280/320 configuration is any hardware configuration that supports a maximum downstream rate of 1280 kbit/s and a maximum upstream rate of 320 kbit/s. A 1280/320 configuration consists of the hardware that follows:

- a 1-Meg Modem of NTEX35BA or higher
- an xDSL line card (xLC) of NTEX17BA or higher
- a data-enhanced bus interface card (DBIC) of NTEX54AB or higher

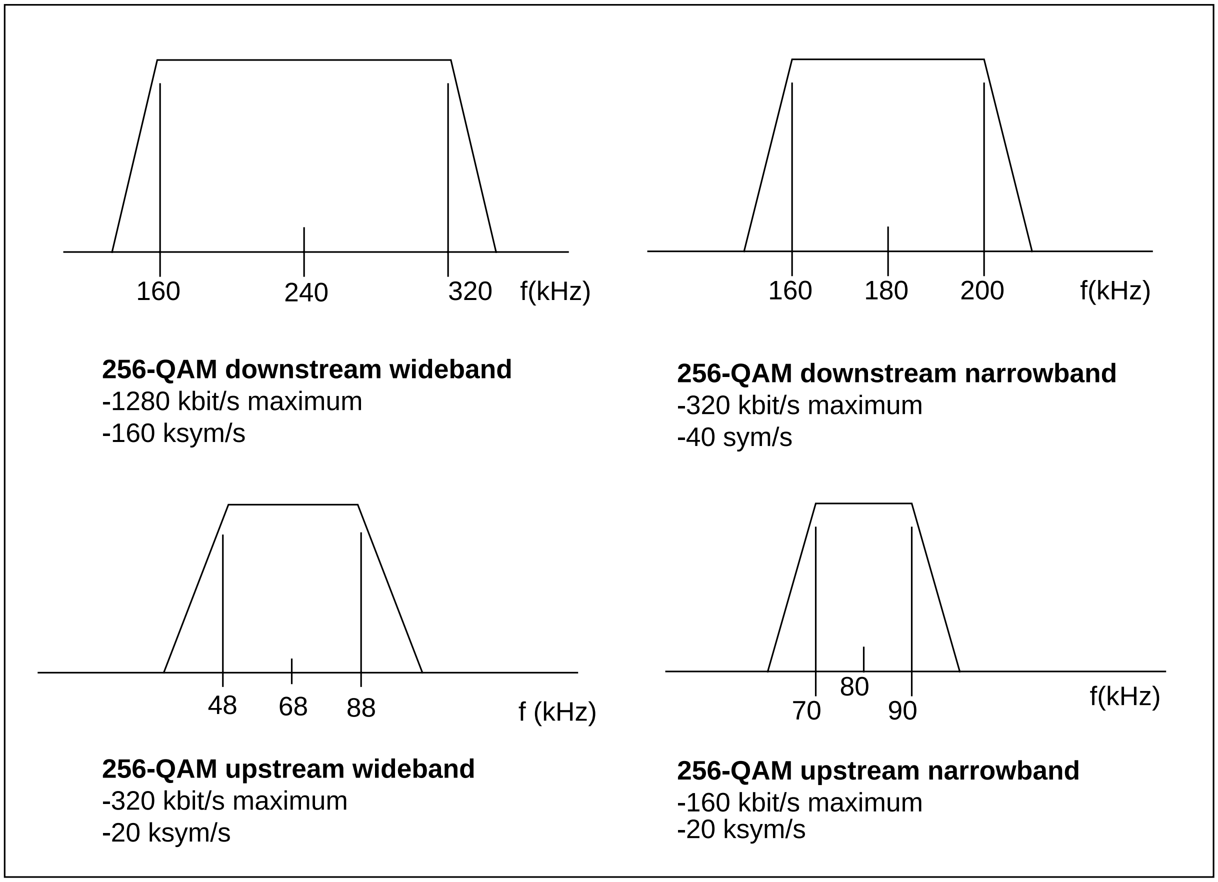
Some offices may identify a 960/120 configuration as Phase I hardware and a 1280/320 configuration as Phase II hardware.

Refer to the section “Available functionality” in the chapter “Introduction” of this document for more information on the possible data transfer rates across different 1-Meg Modem Service hardware configurations.

Spectrum assignments

Figure 6-1 shows the spectrum assignments for the 1-Meg Modem Service for each band. The figure includes downstream wideband and downstream narrowband modes. The narrowband mode should be used on long loops or loops with poor characteristics.

Figure 6-1 1-Meg Modem Service spectrum assignments



Band QAM rates

The 1-Meg Modem operates upstream and downstream using quadrature amplitude modulation (QAM) at constellation sizes of 256 QAM, 64 QAM, 16 QAM, and 4 QAM. Table 6-1 lists the QAM rates in kilobit per second (kbit/s) for each band and constellation size.

Table 6-1 Band QAM rates

Band	256 QAM	64 QAM	16 QAM	4 QAM
Downstream wideband	1280	960	640	320
Downstream narrowband	320	240	160	80
Upstream wideband	320	240	160	80
Upstream narrowband	160	120	80	40

Note: The rates in this table are line rates. The data rates are less dependent on such factors as protocol, size of packet, and protocol time outs.

Rate adaption

The 1-Meg Modem is rate adaptive in both downstream and upstream directions. Available downstream rates follow:

- 1280 kbit/s
- 960 kbit/s
- 640 kbit/s
- 320 kbit/s
- 240 kbit/s
- 160 kbit/s
- 80 kbit/s

Available upstream rates follow:

- 320 kbit/s
- 240 kbit/s
- 160 kbit/s
- 120 kbit/s
- 80 kbit/s
- 40 kbit/s

The upstream and downstream rates can be controlled on a per-user basis through the xDSL Element Management System (xEMS). In most cases, the modems are allowed to negotiate the highest rate at which they can communicate. The maximum rate depends on a number of factors, such as the following:

- quality and length of the loop, including bridge taps and wire gauge
- external disturbers, such as other data offerings in the same or adjacent binder groups.

The modem will continuously monitor the quality of the data channel and change the data rate if required. The xEMS can override the rate negotiated.

Table 6-2 lists several loops of American wire gauge (AWG), with the expected downstream and upstream rates for each loop. Table 6-2 is provided only for reference, to assist in measuring the performance of your 1-Meg Modem Service, and may not reflect the operating conditions of your office.

Table 6-2 Expected data rates on various loops

Loop	960/120 configuration Downstream rate (kbit/s)	960/120 configuration Upstream rate (kbit/s)	1280/320 configuration Downstream rate (kbit/s)	1280/320 configuration Upstream rate (kbit/s)
18,000 feet #24 AWG	960	120	1280	320
15,000 feet #26 AWG	640	80	960	320
ISDN Loop #2	320	40	320	240
ISDN Loop #3	320	80	320	240
ISDN Loop #4	640	80	960	320
ISDN Loop #5	640	80	960	320
ISDN Loop #6	160	120	320	320
ISDN Loop #7	960	120	1280	320
ISDN Loop #8	640	120	960	320
ISDN Loop #9	960	80	1280	320
ISDN Loop #11	960	120	1280	320
ISDN Loop #12	960	120	1280	320
ISDN Loop #13	960	120	960	320
ISDN Loop #15	960	120	1280	320

Note 1: In the 1280/320 configuration, forward error correction (FEC) must be on to achieve the typical data rate.

Note 2: An ISDN loop is the ISDN line to the subscriber's location.

Bit error rate

The performance objective of the 1-Meg Modem Service is a bit error rate of 10^{-7} with a three decibel (dB) margin when any one noise source that follows is at its maximum allowed level:

- interference introduced in the receiver by the local transmitter
- near-end crosstalk (NEXT) induced by other transmitters located in the same cable
- ingress from AM broadcast stations

The three dB margin for each noise source allows the 1-Meg Modem Service to operate at the following conditions:

- at zero dB margin in the presence of two interference sources at their maximum stated level
- at a reduced data rate in the presence of more than two disturbers at their stated maximum level
- at a reduced data rate in the presence of disturbers exceeding this maximum stated level

Loop reach

The 1-Meg Modem Service can transmit data on the subscriber loop up to a distance of 19,500 feet of non-loaded 26 AWG plastic-insulated cable (PIC) between the xDSL line card (xLC) and the customer premise equipment (CPE). This distance includes the following wiring:

- office wiring between the LCM drawer and the main distribution frame (MDF) in the office
- the in-house wiring between the subscriber demarcation point and the CPE

This 19,500 feet of total distance is an absolute maximum. The presence of noise, bridged taps, or other impairments reduces this distance. In practice, consider 18,500 feet of non-loaded 26 AWG as the distance over which you can establish 1-Meg Modem Service. Loaded loops will not support DSL in general and deployment of 1-Meg Modem Service should not be attempted on loaded loop.

Although loading is only used on loops longer than 18,000 feet (19, 22 and 24 AWG) or 15,000 ft. (26), load coils can occur on shorter loops. Even single-load coils significantly attenuate 1-Meg Modem Service signals and result in low sync speeds or no service.

The downstream performance of the 1-Meg Modem limits the target reach to 19,500 feet. The upstream performance can obtain longer reach, although high noise levels in the office can also limit the upstream performance.

Loop reach with AWGN

Table 6-3 provides the data rate and loop reach provided by 960/120 configuration on 26 AWG single gauge loops with additive white gaussian noise (AWGN) at -140 decibel above one milliwatt/hertz (dBm/Hz). The numbers include a three dB margin.

Table 6-3 Loop reach on 960/120 configuration with AWGN

Data rate (kbit/s)	QAM index	Symbol rate (Kbaud)	Center frequency (kHz)	Loop reach (feet)
Upstream 120	64	20	80	13,500
Upstream 80	16	20	80	15,700
Upstream 40	4	20	80	18,600
Downstream 960	64	160	240	12,200
Downstream 640	16	160	240	14,400
Downstream 320	4	160	240	16,500
Downstream 240	64	40	180	12,600
Downstream 160	16	40	180	14,700
Downstream 80	4	40	180	16,800

Table 6-4 provides the data rate and loop reach provided by 1280/320 configuration on 26 AWG single gauge loops with additive white gaussian noise (AWGN) at -140 decibel above one milliwatt/hertz (dBm/Hz). The numbers include a six dB margin.

Table 6-4 Loop reach on 1280/320 configuration with AWGN

Data rate (kbit/s)	QAM index	Symbol rate (Kbaud)	Center frequency (kHz)	Loop reach (feet)
Upstream 320	256	40	68	19,200
Upstream 240	64	40	68	21,700
Upstream 160	256	20	80	19,000
	16	40	68	24,300
Upstream 120	64	20	80	21,100
Upstream 80	16	20	80	23,300
	4	40	68	27,100
Upstream 40	4	20	80	25,500
Downstream 1280	256	160	240	13,700
Downstream 960	64	160	240	15,600
Downstream 640	16	160	240	17,400
Downstream 320	256	40	180	13,700
	4	160	240	19,400
Downstream 240	64	40	180	15,500
Downstream 160	16	40	180	17,500
Downstream 80	4	40	180	19,600

Note: In the 1280/320 configuration, forward error correction (FEC) must be on to achieve the typical loop reach.

Table 6-5 lists loop coverage for the 960/120 configuration for each band at nominal power in the presence of AWGN at -140 dBm/Hz. The table lists integrated digital services (ISDN) and carrier serving area (CSA) loops. The numbers include a three dB margin.

Table 6-5 Loop coverage for 960/120 configuration with -140 dBm/Hz AWGN

	64 QAM		16 QAM		4 QAM	
Band	**ISDN**	**CSA**	**ISDN**	**CSA**	**ISDN**	**CSA**
Downstream narrowband	9, 11 to 15	All	Not 1, 2, 3, 4, 6	All	All	All
Downstream wideband	15	All	Not 1, 2, 3, 4, 6	All	Not 1 and 6	All
Upstream narrowband	12, 14, 15	All	Not 1, 2, 9	All	All	All

Table 6-6 lists loop coverage for the 1280/320 configuration for each band at nominal power in the presence of AWGN at -140 dBm/Hz. The table lists ISDN and CSA loops.

Table 6-6 Loop coverage with -140 dBm/Hz AWGN

Band	256 QAM		64 QAM		16 QAM		4QAM	
	ISDN	**CSA**	**ISDN**	**CSA**	**ISDN**	**CSA**	**ISDN**	**CSA**
Downstream narrowband	7, 11-15	All	4-5, 7-15	All	Not 1, 2, 3, 4, 6	All	All	All
Downstream wideband	7, 9-12, 14, 15	All	4-5, 7-15	All	4-5, 7-15	All	All	All
Upstream narrowband	Not 2	All		All		All	All	All
Upstream wideband	Not 2	All	All	All	All	All	All	All

The numbers include a six dB margin, for all loops except the loops that follow:

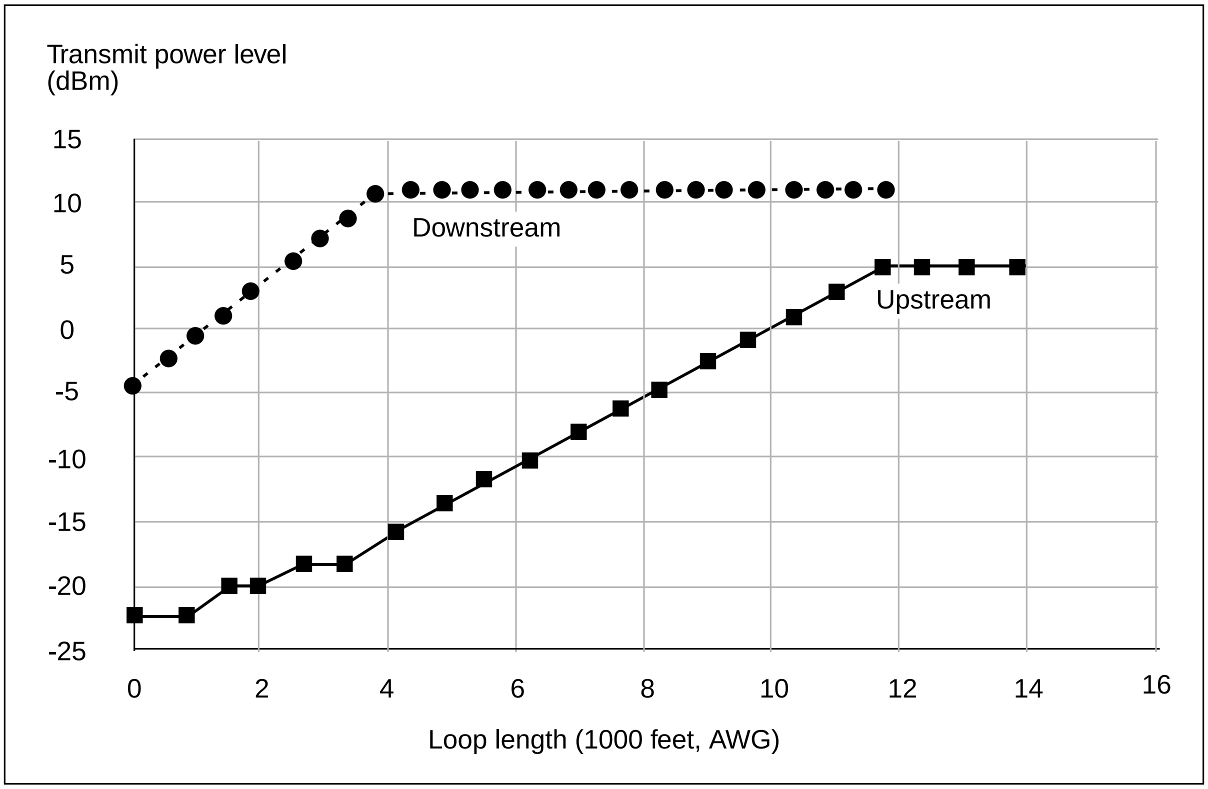
- loops 2 and 3 in wideband downstream
- loops 1 and 3 in narrowband downstream

These loops have a zero dB margin. The ISDN standard specification T1.601 sets an objective of operating at 0 dB margin on loops 1 to 3. These loops are longer than typical long loops.

Loop reach with FEXT

Figure 6-2 shows the transmit power levels for downstream and upstream at various loop lengths. These levels allow a compromise operation between FEXT migration and the need to maintain good reach in the presence of central office noise.

Figure 6-2 Loop length transmit power levels



Loop reach with NEXT

Table 6-7 provides the data rate and loop reach for the 960/120 configuration on 26 AWG single gauge loops with 49 disturber-level NEXT.

Table 6-7 Loop reach with NEXT for 960/120 configuration

Rate (kbit/s)	AWGN	24-ISDN NEXT	10-HDSL NEXT	10-HDSL
Upstream 120	13,500	13,000	9,200	
Upstream 80	15,700	15,100	11,300	
Upstream 40	18,600	17,600	13,600	
Downstream 240	12,600	11,900	6,900	6,900
Downstream 160	17,500	13,800	8,600	8,600
Downstream 80	19,600	15,800	10,400	13,000 to 16,800

Note: The values in 10-HDSL assume that HDSL disturbers are located in an adjacent binder group or non-existent when the 1-Meg Modem Service is installed on a loop longer than 9000 feet of equivalent 26 AWG.

Table 6-7 provides the data rate and loop reach provided by the 1-Meg Modem Service on 26 AWG single gauge loops with 49 disturber-level NEXT. The numbers include six dB of margin.

Table 6-8 Loop reach with NEXT for 1280/320 configuration

Rate (kbit/s)	AWGN	24-ISDN NEXT	10-HDSL NEXT(a)	10-HDSL NEXT (b)	24 FDM-ADSL
Upstream 320	19,200	4,000	0	0	18,300
Upstream 240	21,700	13,500	5,600	5,600	20,500
Upstream 160	24,300	15,700	13,300	13,300	23,000
	19,000	13,700	0	0	16,000
Upstream 120	21,100	15,600	3,300	3,300	18,000
Upstream 80	23,300	17,700	10,800	10,800	20,000
	27,100	18,200	15,800	15,800	25,600
Upstream 40	25,500	20,100	14,700	14,700	22,300
Downstream 1280	13,700	11,100	6,900	6,900	10,900
Downstream 960	15,600	12,700	8,600	8,600	12,600
Downstream 640	17,400	14,300	10,200	16,800	14,300
Downstream 320	19,400	16,300	12,000	19,200	16,700
	13,700	11,200	6,100	6,100	10,800
Downstream 240	15,500	12,800	7,700	7,700	12,500
Downstream 160	17,500	14,600	9,500	15,900	14,300
Downstream 80	19,600	16,500	11,300	19,100	16,300

Note: The values 10-HDSL NEXT(a) assume that HDSL disturbers are located in the same binder group as the 1-Meg Modem Service and are installed for the total length of the loop. The values in 10-HDSL NEXT (b) assume that all HDSL disturbers are located 9,000 feet equivalent of 26 AWG.

Radio frequency interference

The 1-Meg Modem Service does not use a frequency band that overlaps the AM broadcast radio band. The input low-pass filters of the xLC and CPE receivers provide enough rejection of the AM broadcast frequencies. The filters allow the 1-Meg Modem Service to operate at one dB of margin at the maximum loop reach allowed under white noise, with three dB of margin, when the AM broadcast station differential ingress level is of -30 dBm.

Forward error correction

xEMS Release 3 and higher supports forward error correction (FEC) on a subscriber loop with the following hardware:

- an xLC of NTEX17BA or higher
- a 1-Meg Modem of NTEX35BA or higher

The 1 MMS provides FEC in upstream and downstream directions, narrowband and wideband operation, and all modulation rates. The FEC permits correction of up to eight errored bytes within a 233-byte frame, with an additional margin of three to five dB for a given data rate on any loop.

FEC is on by default. FEC must be on to achieve a maximum downstream rate of 1280 kbit/s.

Interleaving

xEMS Release 3 and higher supports interleaving. Interleaving provides enhanced FEC performance in an impulse noise environment by spreading the errors across multiple data frames. Interleaving is only available in the downstream direction at a maximum rate of 256 QAM. The 1-Meg Modem Service supports interleaving of two or four frames.

Off-hook detection

xEMS Release 3 and higher detects when a telephone is off-hook at the subscriber location and optimizes the data transmission level and rate. This detection reduces the probability of noise interference on the subscriber line and the need for telephone filters at the subscriber’s location.

The 1-Meg Modem Service monitors the subscriber loop at the CPE and xLC for an off-hook. When an off-hook occurs, the 1-Meg Modem Service performs the following actions:

- reduces the transmit power
- optimizes the data transmission rate for the lower power level
- returns the rates to the original levels when an on-hook occurs

You can configure off-hook detection at the xEMS for each xLC.

Off-hook detection is available on a subscriber loop with the following hardware:

- an xLC of NTEX17BA or higher
- a 1-Meg Modem of NTEX35BA or higher

> ***Note:*** The downstream rate is a maximum of 960 kbit/s if the hardware configuration includes an NTEX54AB or an NTEX17BA. The downstream rate is a maximum of 1280 kbit/s if the hardware configuration includes an NTEX54BA or higher *and* an NTEX17CA or higher.

An office that uses off-hook detection may can encounter data errors and resynchronization during one of the events that follow:

- data transmission
- presence of ringing
- changes in hook status

The margin available on the loop causes the data errors and resynchronization.

If the PM performs a switch of activity (SWACT) during an off-hook condition, the 1-Meg Modem Service may reset the DBIC. The DBIC will recover automatically.

MIB variables

A MIB variable is a specific type or class of data in the MIB. A MIB object can be a specific value, such as a port address, or a variable value, such as the number of packet errors.

With MIB variables, you can monitor the performance of 1-Meg Modem Service components and the network. Following are some of the capabilities available with MIB variables through xEMS:

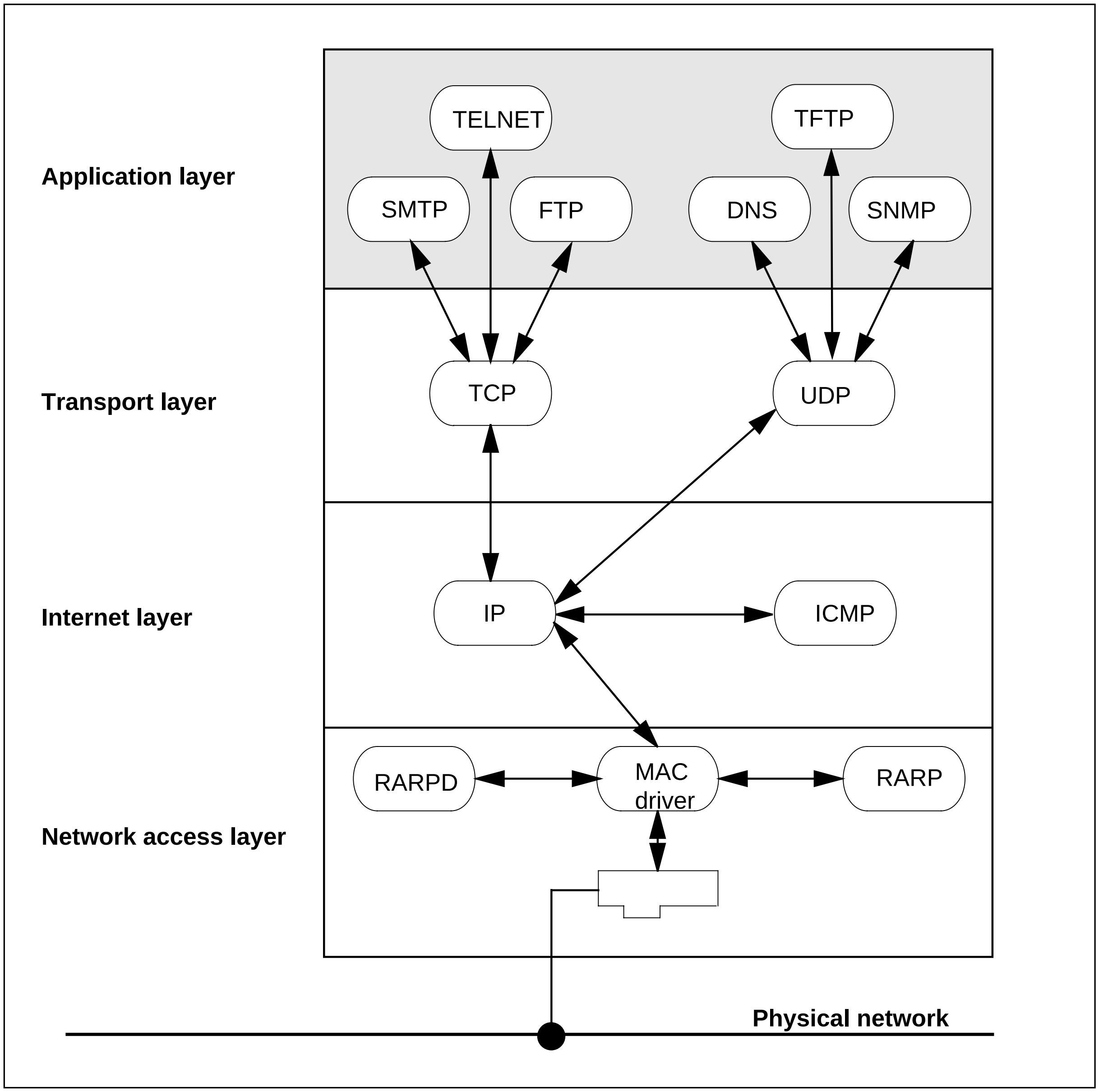
- Display information on a component or set of components in the 1-Meg Modem Service.
- View performance real-time on a component or set of components.
- Configure performance measurements for a component.

You can perform all the previous capabilities on a single 1-Meg Modem Service component, a set of similar 1-Meg Modem Service components, or all 1-Meg Modem Service components in a specific node.

Overview

Simple Network Management Protocol (SNMP) is an application-level protocol that is part of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite. Figure 6-3 shows SNMP in the TCP/IP suite.

Figure 6-3 SNMP in TCP/IP protocol suite

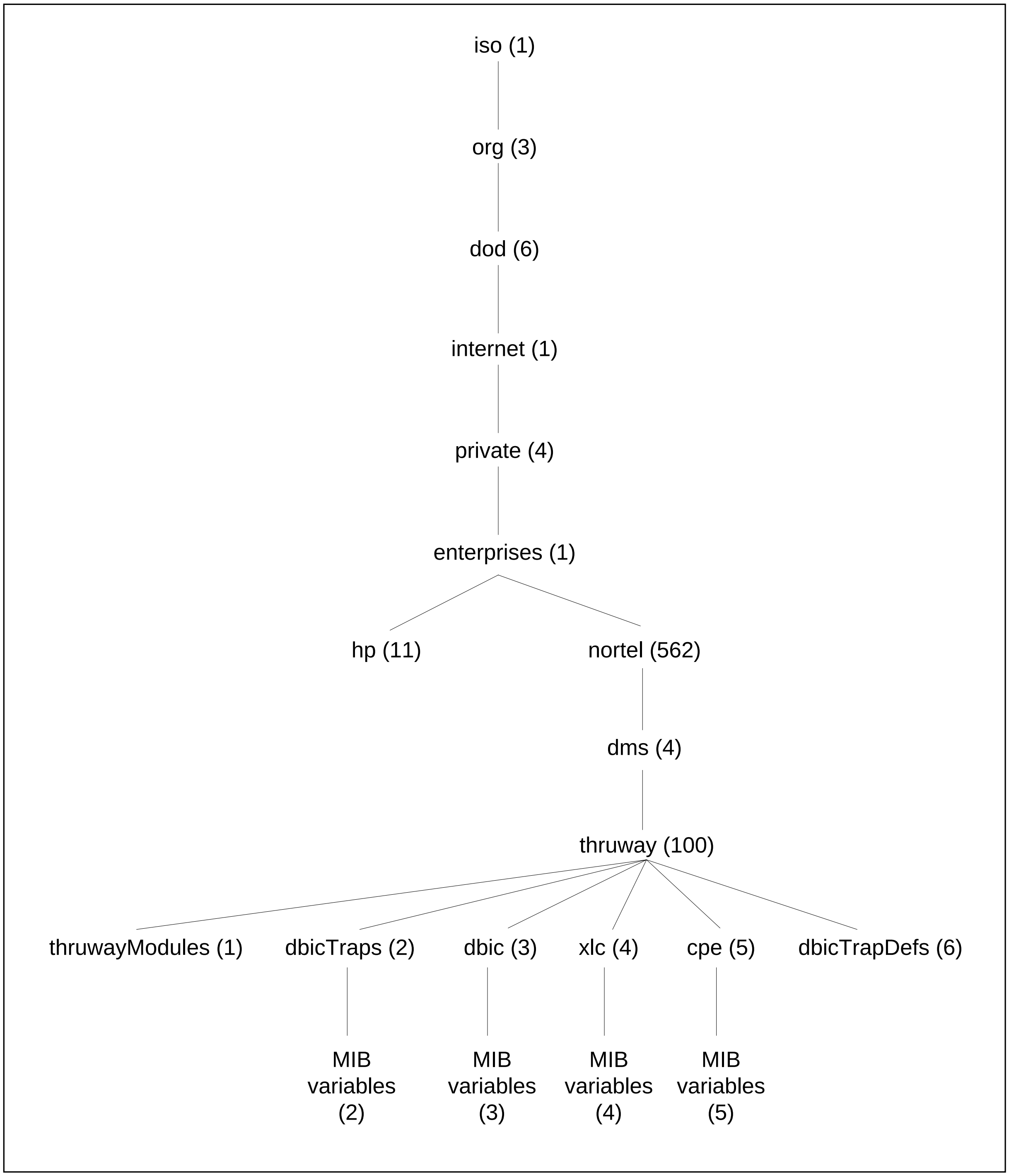


The SNMP is a request-and-reply protocol. A network management application, such as xEMS, requests performance data from its server agents, such as a 1-Meg Modem Service component. Each server agent replies with the data. The SNMP stores the data in a management information base (MIB).

The SNMP arranges MIB variables in a tree hierarchy. Each branch of the tree has a unique name and number identifier, following the standard Abstract Syntax Notation One (ASN.1). Each MIB is defined in the ASN.1 file delivered with the DBIC software.

Figure 6-4 shows the tree hierarchy for MIB variables specific to the 1-Meg Modem Service.

Figure 6-4 Tree hierarchy for 1-Meg Modem Service MIB variables



Naming convention

The full name and number identifier of each MIB variable reflects the order of the variable in the tree hierarchy. The full name of the variable uses the names of the tree in the hierarchy. The number identifier of the variable uses the numbers of the trees in the hierarchy.

For example, 1-Meg Modem Service has an xLC MIB variable `xlcTable`. The full name of the variable follows:

```
iso.org.dod.internet.private.enterprises.nortel.dms.thruway.xlc.xlcTable
```

The number identifier of the variable follows:

```
1.3.6.1.4.1.562.4.100.4.3
```

The xEMS uses the short name of the variable, the full name of the variable, and the number identifier of the variable.

On-line information

ATTENTION

Do not use the MIB Browser to change DBIC MIBs. The xEMS can reset the value when you add or reprovision an object to the LCM line drawer. The xEMS can also reset the value in other situations.

Use **Describe/Modify** from the pop-up menu to reprovision fields. You must have read/write access to the submap to use this command. Use **Maintenance** from the pop-up menu to perform maintenance actions.

You can also use the **hstpprov** or **hstpmaint** commands from a command line to change DBIC MIBs.

Information on all MIB variables, including 1-Meg Modem Service MIB variables, is available through xEMS. Perform the following steps:

1. From any submap, deselect any selected objects.
2. Select **Misc:SNMP MIB Browser** from the pull-down menu.

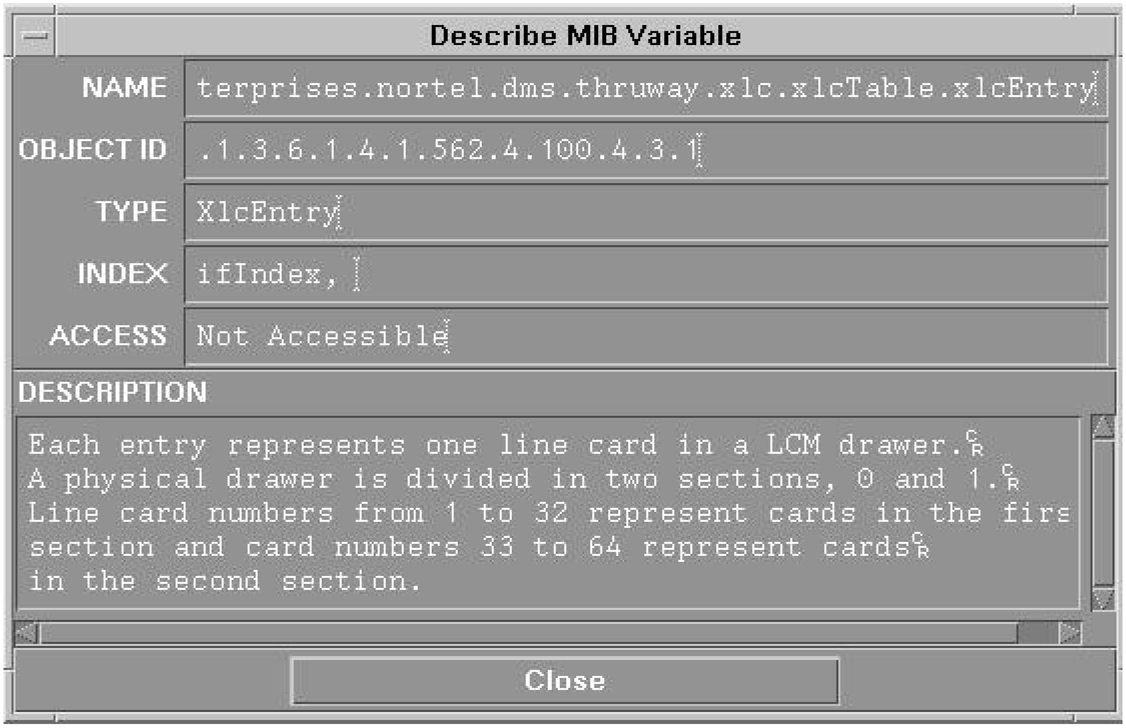
Figure 6-5 shows the initial Browse MIB window.

Figure 6-5 Initial Browse MIB window.

3. Double-click through the MIB hierarchy, or use the Up Tree and Down Tree buttons, to locate the MIB variable.
4. Select the MIB variable.
5. Click the Describe button. The xEMS displays the Describe MIB variable window.

Figure 6-6 shows a Describe MIB Variable window for the xLC MIB variable `xlcTable`.

Figure 6-6 Sample Describe MIB Variable window



MIB management

The following section describes how to use xEMS to manage MIBs. Refer to the HP document *Using Network Node Manager* for additional information.

Change MIB thresholds

The 1-Meg Modem Service allows you customize performance management by changing the MIB thresholds for a specific object, a set of similar objects, or all objects in a node. Perform the steps that follow to change the MIB thresholds for a specific object:

1. Go to the submap with the object.
2. Select the object with the MIB thresholds that you wish to change.
3. Select **Options:Data Collection & Thresholds:SNMP** from the pull-down menu. The Data Collection & Thresholds dialog box appears.
4. Select the MIB object from the objects listed under MIB Objects Configured for Collection. A list of values appear under MIB Object Collection Summary.
5. Double-click the MIB value that you want to change. A Modify dialog box for the value appears.
6. Change the necessary information in the dialog box.
7. Click the OK button.

You can also use the **Edit** pull-down menu from the Data Collection & Thresholds window.

Monitor traffic

The xEMS allows you to monitor traffic on 1-Meg Modem Service components. Perform the steps that follow:

1. Go to the submap with the object.
2. Select the object that you want to monitor.
3. From the pop-up menu, select **Monitor->Traffic**, and the traffic option you want to monitor.

The xEMS displays a real-time graph of the traffic for the object.

Maintain performance data

CAUTION
Remove only specified files.
Remove only the files that correspond to the collection labels defined through the selection **Options->Data Collection & Thresholds: SNMP** from the pull-down menu. Do not remove files with a name that ends with the exclamation point (!) character.

The snmpCollect HP OpenView process saves all collected data to the $OV_DB/snmpCollect directory. The HP OpenView documentation recommends the following methods manage the volume of this directory:

- Reduce the polling intervals. Select **Options:Data Collection & Thresholds:SNMP** from the pull-down menu.
- Configure a cron to periodically remove files from the directory. A cron is the UNIX daemon that executes commands at specified dates and times.

  Depending on office policy, you can keep the last 100 entries of a file in the snmpCollect directory. An example of a cron that includes this recommendation follows:

```
snmpColDump -tTI $OV_DB/snmpCollect/<file_name> | \

awk -F\t ' {(printf (“%d\t%d\t%s\t%lg\n", $4, $5, $6,
$3)} ' | \

tail -100 > /tmp/save

snmpColDump -r /tmp/save $ OV_DB/snmpCollect/FILE
```

DBIC trap MIBs

DBIC trap MIBs are part of the following tree hierarchy:

private->enterprises->nortel->dms->thruway->dbicTraps

Table 6-9 describes each DBIC trap MIB. Refer to the on-line facilities available through xEMS for additional information.

Table 6-9 DBIC Trap MIBs (Sheet 1 of 3)

Label	Identifier	Type	Description
dbicAlarmLevel	1.3.6.1.4.1.562.4.100.2.6	Integer	The alarm level of the last trap issued
dbicManagerEntry	1.3.6.1.4.1.562.4.100.2.8.1.1	Dbic Manager Entry	Controls the acknowledgment of traps for each manager
dbicManagerIPAddress	1.3.6.1.4.1.562.4.100.2.3.1.1	IP Address	IP Address of the management station to receive traps
dbicManagerStatus	1.3.6.1.4.1.562.4.100.2.8.1.6	Integer	Status of this entry in the table
dbicManagerTable	1.3.6.1.4.1.562.4.100.2.8	Dbic Manager Entry	A list of network managers
dbicSystemStatusCode	1.3.6.1.4.1.562.4.100.2.7	Gauge	Current system status code used by manufacturer
dbicSystemStatusMsg	1.3.6.1.4.1.562.4.100.2.9	Display String	Last system status message
dbicTrapAckedSequence	1.3.6.1.4.1.562.4.100.2.8.1.4	Gauge	Sequence number of the last trap received by the management station
dbicTrapEntry	1.3.6.1.4.1.562.4.100.2.3.1	DbicTrap Entry	A trap entry containing destination addresses

Table 6-9 DBIC Trap MIBs (Sheet 2 of 3)

Label	Identifier	Type	Description
dbicTrapFilter	1.3.6.1.4.1.562.4.100.2.3.1.4	Gauge	Indicates the level of filtering for traps for this management station
dbicTrapGlobalSequence	1.3.6.1.4.1.562.4.100.2.5	Gauge	The global sequence number of the last trap issued
dbicTrapHighRange	1.3.6.1.4.1.562.4.100.2.3.1.3	Gauge	Indicates the higher end of the trap number range for this management station
dbicTrapLastGlobalStatusChange	1.3.6.1.4.1.562.4.100.2.4	Time Ticks	The time the last status change occurred in the DBIC or any of its subcomponents
dbicTrapLastSequence	1.3.6.1.4.1.562.4.100.2.8.1.3	Gauge	The sequence number of the last trap sent to this manager
dbicTrapLowRange	1.3.6.1.4.1.562.4.100.2.3.1.2	Gauge	Indicates the lower end of the trap number range for this management station
dbicTrapStatus	1.3.6.1.4.1.562.4.100.2.3.1.5	Integer	Status of this entry in the table
dbicTrapTable	1.3.6.1.4.1.562.4.100.2.3	DbicTrap Entry	A list of destinations for traps
dbicTrapTableNumber	1.3.6.1.4.1.562.4.100.2.1	Integer	Indicates the maximum number of entries allowed in the DBIC trap destination table
dbicTrapTableSize	1.3.6.1.4.1.562.4.100.2.2	Integer	Indicates the current upper limit of entries in the trap destination

Table 6-9 DBIC Trap MIBs (Sheet 3 of 3)

Label	Identifier	Type	Description
dbicTrapUnAckedControl	1.3.6.1.4.1.562.4.100.2.8.1.2	Integer	The unacknowledged trap will be retransmitted at the specified retransmit interval until the sequence numbers are equal.
dbicTrapUnAckedRetransmitInterval	1.3.6.1.4.1.562.4.100.2.8.1.5	Gauge	Wait time before the first and between each retransmission of the dbicUnAckedTrap
dbicTrapVersion	1.3.6.1.4.1.562.4.100.2.8.11	Integer	Indicates the SNMP packet format for traps to be sent

DBIC MIBs

DBIC MIBs are part of the following tree hierarchy:

private->enterprises->nortel->dms->thruway->dbic

Table 6-10 describes each DBIC MIB. Refer to the on-line facilities available through xEMS for additional information.

Table 6-10 DBIC MIBs (Sheet 1 of 6)

Label	Identifier	Type	Description
dbicAdminCommunity	1.3.6.1.4.1.562.4.100.3.14	Display String	Community string used to set or get the community strings
dbicApplicationLoad	1.3.6.1.4.1.562.4.100.3.23	Display String	Name of the current application load
dbicArpThroughput	1.3.6.1.4.1.562.4.100.3.19	Gauge	Limit of ARP messages processed by the DBIC, measured in ARPs/second
dbicBootResult	1.3.6.1.4.1.562.4.100.3.11	Integer	Reflects the status of the last boot operation

Table 6-10 DBIC MIBs (Sheet 2 of 6)

Label	Identifier	Type	Description
dbicBroadcastFiltering	1.3.6.1.4.1.562.4.100.3.3	Function Status	Only ARP broadcast messages are allowed when enabled. All other Ethernet/802.3 broadcast messages are dropped.
dbicDeviceIndex	1.3.6.1.4.1.562.4.100.3.20.1.8	Integer	Identifies the specific device at the subscriber premises
dbicDevicesPerInterface	1.3.6.1.4.1.562.4.100.3.31	Integer	Maximum number of device per xLC interface supported by the DBIC
dbicDiscardsDS	1.3.6.1.4.1.562.4.100.3.25	Counter	Number of packets discarded by the DBIC because a valid Subscriber Loop was not available
dbicDrawerStatus	1.3.6.1.4.1.562.4.100.3.17	Integer	This status is set by a manager station or DBIC
dbicEthernetLocalSwitching	1.3.6.1.4.1.562.4.100.3.2	Function Status	When enabled, this MIB allows ethernet messages to be transmitted directly between subscribers. When this MIB is disabled, Ethernet traffic will not flow between subscriber lines.
dbicEthernetMode	1.3.6.1.4.1.562.4.100.3.1	Integer	Indicates the mode of the Ethernet interface
dbicFilteredARPsDS	1.3.6.1.4.1.562.4.100.3.26	Counter	Number of ARP packets discarded, due to downstream ARP filtering
dbicFilteredARPsUS	1.3.6.1.4.1.562.4.100.3.27	Counter	Number of ARP packets discarded due to upstream ARP filtering
dbicFilteredNUPktsDS	1.3.6.1.4.1.562.4.100.3.28	Counter	Number of packets discarded due to downstream broadcast filtering
dbicFilteredNUPktsUS	1.3.6.1.4.1.562.4.100.3.29	Counter	Number of packets discarded due to upstream broadcast filtering

Table 6-10 DBIC MIBs (Sheet 3 of 6)

Label	Identifier	Type	Description
dbicLastStatusChange	1.3.6.1.4.1.562.4.100.3.7	TimeTicks	This field is updated whenever a status change occurs on the DBIC
dbicLearnedMac	1.3.6.1.4.1.562.4.100.3.20.1.1	Physical address	The MAC address learned by examining source addresses of Ethernet packets received on this interface
dbicLearnedProviderMac	1.3.6.1.4.1.562.4.100.3.20.1.3	Physical address	The MAC address learned by examining source addresses of Ethernet packets received on the DBIC Ethernet interface and destined for this interface port
dbicLoopDeviceCount	1.3.6.1.4.1.562.4.100.3.32.1.1.4	Integer	The number of active devices known at the subscriber premises
dbicLoopEntry	1.3.6.1.4.1.562.4.100.3.32.1	DbicLoop Entry	A mapping of discovered 1-Meg Modem Service providers MAC addresses to xLC numbers
dbicLoopLearnedProviderMac	1.3.6.1.4.1.562.4.100.3.32.1.1.2	Physical address	The last MAC address learned by examining source addresses of unicast Ethernet packets received on the DBIC Ethernet interface and destined for this interface port
dbicLoopProviderValid	1.3.6.1.4.1.562.4.100.3.32.1.1	Integer	Indicates the validity of the dbicLearnedProviderMac object
dbicLoopTable	1.3.6.1.4.1.562.4.100.3.32	DbicLoop Entry	Information relating to xLC interfaces or the loops that is on a per-interface basis
dbicLoopVLANId	1.3.6.1.4.1.562.4.100.3.32.1.1.3	Integer	A number to uniquely identify a service provider for this loop
dbicMacTranslation	1.3.6.1.4.1.562.4.100.3.21	Function Status	Enables or disables MAC address translation

Table 6-10 DBIC MIBs (Sheet 4 of 6)

Label	Identifier	Type	Description
dbicPortStaticMac	1.3.6.1.4.1.562.4.100.3.20.1.2	Physical address	The fixed MAC address assigned to each device at the subscriber premises through MAC translation
dbicPowerAlgorithm	1.3.6.1.4.1.562.4.100.3.16	Integer	Indicates if the power saving algorithm is active
dbicProviderId	1.3.6.1.4.1.562.4.100.3.20.1.7	Integer	Identifies a service provider for the subscriber
dbicProviderMacLearning	1.3.6.1.4.1.562.4.100.3.30	Function Status	Controls data service provider MAC learning
dbicReadCommunity	1.3.6.1.4.1.562.4.100.3.12	Display String	Community string used for get requests
dbicRecoveryLoad	1.3.6.1.4.1.562.4.100.3.24	Display String	Name of the current recovery load
dbicReset	1.3.6.1.4.1.562.4.100.3.15	Integer	(warmReset) will restart the DBIC, disabling all communications.
dbicSelfTest	1.3.6.1.4.1.562.4.100.3.8	Integer	Performs an OOS self test on the DBIC
dbicSelfTestResult	1.3.6.1.4.1.562.4.100.3.9	Integer	Reflects the status of the last OOS or in-service test done since the last reset
dbicSelfTestResultTime	1.3.6.1.4.1.562.4.100.3.10	Integer	Time when the OOS self test finished or the in-service test terminated
dbicSourceAddrFilterControl	1.3.6.1.4.1.562.4.100.3.6	Integer	Controls the enabling and disabling of the Source filter. This field should be used with EXTREME caution. If the source addresses are incorrect, management communications will be lost.
dbicSourceAddrFilterIP	1.3.6.1.4.1.562.4.100.3.5	IpAddress	Identifies source IP address that is permitted to communicate to DBIC application layer

Table 6-10 DBIC MIBs (Sheet 5 of 6)

Label	Identifier	Type	Description
dbicSourceAddrFilterMAC	1.3.6.1.4.1.562.4.100.3.4	Phys Address	Identifies source MAC address that is permitted to communicate to DBIC application layer
dbicSwitchingEntry	1.3.6.1.4.1.562.4.100.3.20.1	Dbic Switching Entry	A mapping of discovered 1-Meg Modem Service subscribers MAC addresses to xLC and device numbers
dbicSwitchingTable	1.3.6.1.4.1.562.4.100.3.20	Dbic Switching Entry	Information relating to the switching function of the DBIC
dbicSwitchingTableTimeout	1.3.6.1.4.1.562.4.100.3.18	Gauge	Timeout in minutes of the learned MAC addresses in the cache
dbicSwitchingTimeActivated	1.3.6.1.4.1.562.4.100.3.20.1.6	Timeticks	The last time the MAC address was learned
dbicSwitchingTimeLearned	1.3.6.1.4.1.562.4.100.3.20.1.5	Timeticks	The first time the MAC address was learned
dbicSwitchingValid	1.3.6.1.4.1.562.4.100.3.20.1.4	Integer	This entry is valid if the learned MAC address is currently cached
dbicVLANBroadcastFiltering	1.3.6.1.4.1.562.4.100.3.34.1.3	Integer	Controls broadcast data communication flow from CPE to VLAN
dbicVLANConnectionCount	1.3.6.1.4.1.562.4.100.3.34.1.4	Integer	Indicates the number of subscribers lines currently in this VLAN
dbicVLANEntry	1.3.6.1.4.1.562.4.100.3.34.1	DbicVLAN Entry	All possible VLANs entries in the relation
dbicVlanFrDiscardedBrDS	1.3.6.1.4.1.562.4.100.3.36	Counter	The number of discarded frames or counters due to downstream bridging on the VLAN port.
dbicVlanFrDiscardedBrUS	1.3.6.1.4.1.562.4.100.3.35	Counter	The number of discarded frames or counters due to upstream bridging on the VLAN port.

Table 6-10 DBIC MIBs (Sheet 6 of 6)

Label	Identifier	Type	Description
dbicVLANId	1.3.6.1.4.1.562.4.100.3.34.1.1	Integer	A number to uniquely identify a VLAN in the relation
dbicVLANLocalSwitching	1.3.6.1.4.1.562.4.100.3.34.1.2	Integer	Allows Ethernet messages to be transmitted to other subscriber interfaces with the same VLAN number
dbicVLANMacTranslation	1.3.6.1.4.1.562.4.100.3.34.1.6	Integer	Enables or disables MAC address translation
dbicVLANMode	1.3.6.1.4.1.562.4.100.3.22	Integer	Enables or disables Ethernet message tagging
dbicVLANRowStatus	1.3.6.1.4.1.562.4.100.3.34.1.5	Integer	Indicates the current status of this row
dbicVLANTable	1.3.6.1.4.1.562.4.100.3.34	DbicVLAN Entry	Stores information related to a VLAN. This MIB maintains information about number of lines that are members of the VLAN and options for the VLAN.
dbicVLANTableSize	1.3.6.1.4.1.562.4.100.3.33	Integer	Indicates the current upper limit of entries in the VLAN table
dbicWriteCommunity	1.3.6.1.4.1.562.4.100.3.13	Display String	Community string used for set requests

xLC MIBs

xLC MIBs are part of the following tree hierarchy:

private->enterprises->nortel->dms->thruway->xlc

Table 6-11 describes each xLC MIB. Refer to the on-line facilities available through xEMS for additional information.

Table 6-11 xLC MIBs (Sheet 1 of 4)

Label	Identifier	Type	Description
xlcAGCIn	1.3.6.1.4.1.562.4.100.4.3.1.27	Integer	Represents the automatic gain control value read from the line card
xlcBoardVintage	1.3.6.1.4.1.562.4.100.4.3.1.25	Integer	Indicates xLC board Identification
xlcCRC8	1.3.6.1.4.1.562.4.100.4.3.1.13	Counter	Number of CRC8 errors detected by the DBIC on the XLBUS
xlcDesiredState	1.3.6.1.4.1.562.4.100.4.3.1.2	Integer	State of the xLC and interface as requested by the manager station
xlcDSLoopErrorRate	1.3.6.1.4.1.562.4.100.4.3.1.35	Gauge	Normalized downstream loop error rate measured as a percentage
xlcEnergyValue	1.3.6.1.4.1.562.4.100.4.3.1.29	Gauge	Represents the energy value detected at the xLC
xlcEntry	1.3.6.1.4.1.562.4.100.4.3.1	XlcEntry	Each entry represents one line card in a LCM drawer.
xlcEquippedSummary0	1.3.6.1.4.1.562.4.100.4.4	Gauge	Represents a bit map of equipped xLCs on the lower unit 0
xlcEquippedSummary1	1.3.6.1.4.1.562.4.100.4.5	Gauge	Represents a bit map of equipped xLCs on the upper unit 1
xlcFECCount	1.3.6.1.4.1.562.4.100.4.3.1.28	Counter	Number of times FEC is unable to correct a frame
xlcFECState	1.3.6.1.4.1.562.4.100.4.3.1.26	Integer	Turns FEC on or off
xlcLastStatusChange	1.3.6.1.4.1.562.4.100.4.3.1.21	Timeticks	The time when the xLC state last changed
xlcLoopbackSubscriber	1.3.6.1.4.1.562.4.100.4.3.1.3	Integer	Data received from the loop by the xLC is looped back to the subscriber.

Table 6-11 xLC MIBs (Sheet 2 of 4)

Label	Identifier	Type	Description
xlcLoopbackTest	1.3.6.1.4.1.562.4.100.4.3.1.5	Integer	Controls all diagnostics to validate the integrity of the xLC and communications to and from the DBIC over a specific channel of the XLBUS.
xlcLoopbackXLBus	1.3.6.1.4.1.562.4.100.4.3.1.4	Integer	Data received from the XLBUS is looped back to the XLBUS by the xLC.
xlcLoopMaxSpeedDown	1.3.6.1.4.1.562.4.100.4.3.1.6	Gauge	Sets the maximum speed allowed, in kbit/s, for the loop in the downstream direction
xlcLoopMaxSpeedUp	1.3.6.1.4.1.562.4.100.4.3.1.7	Gauge	Sets the maximum speed allowed, in kbit/s, for the loop in the upstream direction
xlcLoopTestResult	1.3.6.1.4.1.562.4.100.4.3.1.8	Integer	Results of the last xLC loop-back test
xlcMaxOffHookPowerLevel	1.3.6.1.4.1.562.4.100.4.3.1.34	Integer	To prevent interference from the noise level or disturbance on a customer’s phones the xLC transmitter power level must be reduced whenever an off-hook event occurs. The default is approximately -25dBm.
xlcOffHookControl	1.3.6.1.4.1.562.4.100.4.3.1.33	Integer	Controls whether signal power is reduced when the phone is off-hook
xlcOffHookStatus	1.3.6.1.4.1.562.4.100.4.3.1.32	Integer	Current status of the analog loop. The initial condition is onHook.
xlcRxCorrections	1.3.6.1.4.1.562.4.100.4.3.1.17	Counter	Number of corrected bytes in the frame. Number of data corrections made by the xLC.
xlcRxCRC32	1.3.6.1.4.1.562.4.100.4.3.1.15	Counter	Number of XDLC framer CRC errors for frames received by the xLC from the loop
xlcRxErrors	1.3.6.1.4.1.562.4.100.4.3.1.18	Counter	This is the total of all XLINK CRC8 receive errors from the loop as determined by the xLC.

Table 6-11 xLC MIBs (Sheet 3 of 4)

Label	Identifier	Type	Description
`xlcRxSyncFound`	1.3.6.1.4.1.562.4.100.4.3.1.16	Counter	Number of times CPE loop sync is found by the xLC
`xlcRxXDLCFrames`	1.3.6.1.4.1.562.4.100.4.3.1.14	Counter	Number of XDLC frames received by the xLC from the loop
`xlcSignalQuality`	1.3.6.1.4.1.562.4.100.4.3.1.23	Gauge	Represents the Signal to Noise Ratio detected by the xLC
`xlcSpare1`	1.3.6.1.4.1.562.4.100.4.3.1.39	Integer	Indicates the spare input bits register
`xlcSpeedDownstream`	1.3.6.1.4.1.562.4.100.4.3.1.11	Gauge	Actual speed of the xLC transmitter in kbit/s
`xlcSpeedUpstream`	1.3.6.1.4.1.562.4.100.4.3.1.12	Gauge	Actual speed of the xLC receiver in kbit/s
`xlcState`	1.3.6.1.4.1.562.4.100.4.3.1.1	Integer	State of the xLC and interface
`xlcStatus`	1.3.6.1.4.1.562.4.100.4.3.1.22	Integer	Indicates the current status of this row
`xlcStatusRx`	1.3.6.1.4.1.562.4.100.4.3.1.9	Integer	Status of the xLC receiver
`xlcStatusTx`	1.3.6.1.4.1.562.4.100.4.3.1.10	Integer	Status of the xLC transmitter
`xlcTable`	1.3.6.1.4.1.562.4.100.4.3	XlcEntry	A list of xLCs
`xlcTableMaxSize`	1.3.6.1.4.1.562.4.100.4.1	Integer	Indicates the maximum number of entries allowed in the xLC table
`xlcTableSize`	1.3.6.1.4.1.562.4.100.4.2	Integer	Indicates the current upper limit of entries in the xLC table
`xlcTimePeek`	1.3.6.1.4.1.562.4.100.4.3.1.30	Gauge	Indicates how long timing recovery is taking
`xlcTxErrors`	1.3.6.1.4.1.562.4.100.4.3.1.20	Counter	The total of all transmit errors detected by the xLC
`xlcTxXDLCFrames`	1.3.6.1.4.1.562.4.100.4.3.1.19	Counter	The total of all XLDC frames sent by the xLC

Table 6-11 xLC MIBs (Sheet 4 of 4)

Label	Identifier	Type	Description
xlcType	1.3.6.1.4.1.562.4.100.4.3.1.24	Integer	Indicates ASIC identification of JTAG
xlcUSLoopErrorRate	1.3.6.1.4.1.562.4.100.4.3.1.36	Gauge	Normalized upstream loop error rate measured as a percentage
xlcXlBusSyncFound	1.3.6.1.4.1.562.4.100.4.3.1.31	Gauge	Number of times XLBUS Sync is found by the DBIC

CPE MIBs

CPE MIBs are part of the following tree hierarchy:

private->enterprises->nortel->dms->thruway->cpe

Table 6-12 describes each CPE MIB. Refer to the on-line facilities available through xEMS for additional information.

Table 6-12 CPE MIBs (Sheet 1 of 4)

Label	Identifier	Type	Description
cpeAGCIn	1.3.6.1.4.1.562.4.100.5.1.1.33	Gauge	Represents the automatic gain control value read from the CPE
cpeDownloadControl	1.3.6.1.4.1.562.4.100.5.1.1.36	Integer	Controls download process
cpeDownloadFile	1.3.6.1.4.1.562.4.100.5.2	Display String	This string is divided into fields that identify the target path name and the source file name required by the TFTP Server.
cpeDownloadStatus	1.3.6.1.4.1.562.4.100.5.1.1.35	Integer	Reflects the current download status of a CPE
cpeEthInErrors	1.3.6.1.4.1.562.4.100.5.1.1.16	Counter	Total number of receive errors detected on the Ethernet interface
cpeEthInFCSErrors	1.3.6.1.4.1.562.4.100.5.1.1.18	Counter	Total number CRC32 errors detected on the Ethernet interface

Table 6-12 CPE MIBs (Sheet 2 of 4)

Label	Identifier	Type	Description
cpeEthInFrameTooLongs	1.3.6.1.4.1.562.4.100.5.1.1.19	Counter	Total number frames received that were longer than the maximum frame length
cpeEthInNUcastPkts	1.3.6.1.4.1.562.4.100.5.1.1.14	Counter	Number of broadcast Ethernet frames received on the Ethernet interface
cpeEthInOctets	1.3.6.1.4.1.562.4.100.5.1.1.12	Counter	Number of good octets received on the Ethernet interface
cpeEthInPktsDiscarded	1.3.6.1.4.1.562.4.100.5.1.1.15	Counter	Total number of frames discarded that were received
cpeEthInSyncDetect	1.3.6.1.4.1.562.4.100.5.1.1.11	Integer	If (found) the CPE Ethernet Interface is receiving link beat. The state will be (unknown) if communications to the CPE are down.
cpeEthInUcastPkts	1.3.6.1.4.1.562.4.100.5.1.1.13	Counter	Number of good non-broadcast Ethernet frames received on the Ethernet interface
cpeEthInUnknownProtos	1.3.6.1.4.1.562.4.100.5.1.1.17	Counter	Number of valid frames discarded with bad protocol types
cpeEthOutDiscards	1.3.6.1.4.1.562.4.100.5.1.1.24	Counter	Number of frames discarded to free transmit buffer space
cpeEthOutErrors	1.3.6.1.4.1.562.4.100.5.1.1.25	Counter	Total number of transmit errors
cpeEthOutExcessiveCollisions	1.3.6.1.4.1.562.4.100.5.1.1.20	Counter	Frames requiring an excessive number of retransmissions due to collisions

Table 6-12 CPE MIBs (Sheet 3 of 4)

Label	Identifier	Type	Description
cpeEthOutNUcastPkts	1.3.6.1.4.1.562.4.100.5.1.1.23	Counter	Number of broadcast Ethernet frames transmitted on the Ethernet interface
cpeEthOutOctets	1.3.6.1.4.1.562.4.100.5.1.1.21	Counter	Number of octets sent on the Ethernet interface
cpeEthOutUcastPkts	1.3.6.1.4.1.562.4.1005.1.1.22	Counter	Number of non-broadcast Ethernet frames transmitted on the Ethernet interface
cpeEthSpeed	1.3.6.1.4.1.562.4.100.5.1.1.10	Integer	Speed of Ethernet Interface on CPE
cpeIdentification	1.3.6.1.4.1.562.4.100.5.1.1.6	Display String	Identifies the manufacturer, product, and version
cpeLastStatusChange	1.3.6.1.4.1.562.4.100.5.1.1.2	Timeticks	The time when cpeState last changed, since reset
cpeLoadFile	1.3.6.1.4.1.562.4.100.5.1.1.37	Display string	The target pathName and source fileName last used for download
cpeLoopback	1.3.6.1.4.1.562.4.100.5.1.1.3	Integer	Sets the loopback mode
cpeLoopInCRC32	1.3.6.1.4.1.562.4.100.5.1.1.28	Counter	Total number of XDLC CRC32 errors
cpeLoopInCRC8	1.3.6.1.4.1.562.4.100.5.1.1.27	Counter	Total number of XLink CRC8 errors
cpeLoopInErrors	1.3.6.1.4.1.562.4.100.5.1.1.29	Counter	Total number of loop receive errors
cpeLoopInFrames	1.3.6.1.4.1.562.4.100.5.1.1.26	Counter	Total number of good XDLC frames received from the Loop
cpeLoopOutFrames	1.3.6.1.4.1.562.4.100.5.1.1.31	Counter	Total number of XDLC frames transmitted on the loop

Table 6-12 CPE MIBs (Sheet 4 of 4)

Label	Identifier	Type	Description
`cpeLoopSyncFound`	`1.3.6.1.4.1.562.4.100.5.1.1.30`	Counter	Total number of times receive sync is found
`cpeMacOffHookPowerLevel`	`1.3.6.1.4.1.562.4.100.5.1.1.34`	Integer	To prevent interference from the noise level or disturbance on a customer's phones, the CPE transmitter power level must be reduced whenever an off-hook event occurs.
`cpeProductCode`	`1.3.6.1.4.1.562.4.100.5.1.1.7`	Display string	Identifies the PEC code of the device
`cpeReset`	`1.3.6.1.4.1.562.4.100.5.1.1.4`	Integer	Setting this MIB to reset will reset the CPE
`cpeSerialNumber`	`1.3.6.1.4.1.562.4.100.5.1.1.8`	Display string	Identifies the serial number of the device
`cpeSignalQuality`	`1.3.6.1.4.1.562.4.100.5.1.1.32`	Counter	Signal quality of the loop as viewed by the CPE
`cpeState`	`1.3.6.1.4.1.562.4.100.5.1.1.1`	Integer	The state of the CPE
`cpeTable`	`1.3.6.1.4.1.562.4.100.5.1`	CpeEntry	A list of CPE
`cpeTest`	`1.3.6.1.4.1.562.4.100.5.1.1.5`	Integer	Performs out of service tests on CPE. Check `cpeTestResult` for results. The xLC must be manBusy.
`cpeTestResult`	`1.3.6.1.4.1.562.4.100.5.1.1.9`	Integer	The result of a CPE test

DBIC TrapDef MIBs

DBIC trap MIBs are part of the following tree hierarchy:

private->enterprises->nortel->dms->thruway->dbicTrapDefs

Table 6-9 describes each DBIC TrapDef MIB. Refer to the on-line facilities available through xEMS for additional information.

Table 6-13 DBIC trap MIBs

Label	Identifier	Type	Description
`dbicGlobalAlarmStatus`	`1.3.6.1.4.1.562.4.100.6.0.101`	Notification Type	The xEMS detected a system fault
`dbicLinkPerformance`	`1.3.6.1.4.1.562.4.100.6.0.201`	Notification Type	The xEMS detected a persistent performance problem on the loop
`dbicNewMacLearned`	`1.3.6.1.4.1.562.4.100.6.0.200`	Notification Type	The DBIC learned a new MAC address.
`dbicStatusChange`	`1.3.6.1.4.1.562.4.100.6.0.102`	Notification Type	The DBIC changed state.
`dbicTestResultChange`	`1.3.6.1.4.1.562.4.100.6.0.103`	Notification Type	The test result changed.
`dbicUnAckedTrap`	`1.3.6.1.4.1.562.4.100.6.0.100`	Notification Type	Indicates an unacknowledged trap is outstanding
`dbicxlcStateChange`	`1.3.6.1.4.1.562.4.100.6.0.110`	Notification Type	One of the xLCs that the DBIC supports changed state.

7 Fault management

This chapter describes the fault management capabilities of the 1-Meg Modem Service. Refer to the chapter “Troubleshooting” in this document for information on troubleshooting faults, performance problems, and subscriber problems with the 1-Meg Modem Service.

Overview

Fault management is the process of continuous monitoring and testing of 1-Meg Modem Service components. A change in the condition of a component can change the operations of that component and the 1-Meg Modem Service.

The 1-Meg Modem Service uses several tools to monitor the network and help with fault management. Some of these tools follow:

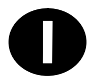
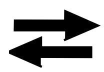
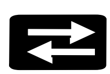
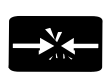
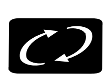
- light-emitting diode (LED) indicators at the 1-Meg Modem and data-enhanced bus interface card (DBIC)
- color indicators of status at the xEMS
- events that notify operating company personnel of specific conditions

LED indicators at modem

The 1-Meg Modem has LED indicators on the front of the modem to indicate the status of the modem. The color of these indicators identifies possible faults with modem operations and data transmission. Table 7-1 lists the LEDs and describes the color indicators for each LED.

> ***Note:*** The *1-Meg Modem User Guide* includes this information. The subscriber receives this document with the 1-Meg Modem.

Table 7-1 1-Meg Modem LEDs and color indicators

Name of LED		LED	LED colors and descriptions			
NTEX35AA	**NTEX35BA**		**Green**	**Yellow**	**Red**	**Off**
Modem Power	Modem Power		Power on			Power off
Loop Tx/Rx	Loop Transmission		Modem transmitting to data service provider	Simultaneous transmission and reception with data service provider	Modem receiving from data service provider	No data transfer
Loop Status	Loop Sync		Modem in sync with data service provider	Modem in process of synchronizing	Modem not receiving signal from data service provider	No information
Ethernet Tx/Rx Status	Ethernet Transmission			Modem transmitting data to computer	Modem receiving data from computer	No data transfer
Ethernet Collision	Ethernet Data Collision				Ethernet collision detected	
Ethernet Link Status	10bt Link Pulse Status		Ethernet connection active			No Ethernet connection

Refer to “Troubleshooting” in this document for information on troubleshooting modem faults.

LED indicators at DBIC

The DBIC has LED indicators that identify the status of the DBIC and communications with the transport network. Figure7-1 shows the LED indicators on the DBIC.

Figure 7-1 DBIC LED indicators

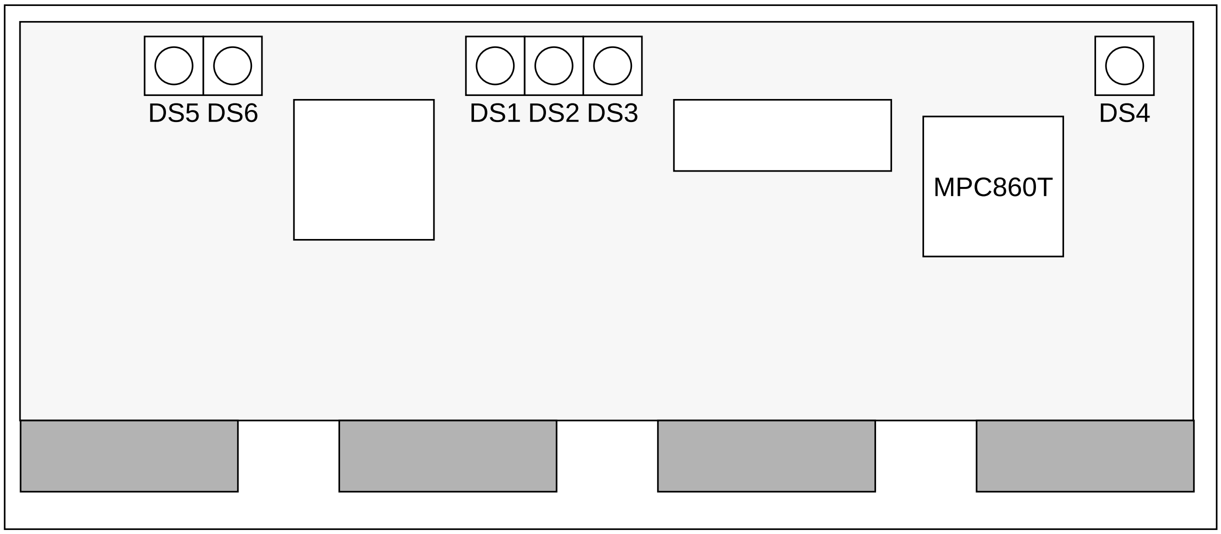


Table 7-2 lists the LEDs on the NTEX54AA and NTEX54AB DBIC.

Table 7-2 LED indicators on NTEX54AA and NTEX54AB DBIC

LED	Color	Description
DS2	Red	The DBIC is decompressing code to begin operations. The DBIC can take up to 30 seconds after a power-up or a reset to decompress code and begin operations. If the LED does not turn off after 30 seconds, the DBIC has a functional problem and is not operational.
DS3	Green	The 10BaseT port is active.

Table 7-3 lists the LEDs on the NTEX54BA and NTEX54CA DBIC.

Table 7-3 LED indicators on NTEX54BA and NTEX54CA DBIC

LED	Color	Description
DS1	Red	The Ethernet interface has a collision.
DS2	Red	The Ethernet interface is receiving data.
DS3	Red	The Ethernet interface is transmitting data.
DS4	Red	The DBIC is decompressing code to begin operations. The DBIC can take up to 5 seconds after a power-up or a reset to decompress code and begin operations. If the LED does not turn off after 5 seconds, the DBIC has a functional problem and is not operational.
DS5	Red	The Ethernet interface is operating at 100BaseT.
DS6	Red	The Ethernet interface is active.

xEMS fault indicators

This section describes the fault indicators at the xEMS.

Types of indicators

The xEMS uses three types of indicators to identify the operating condition of an object: color, status, and state.

- Color is the color of the symbol on the xEMS submap.
- Status is the status of the operating condition of the object. The color of the symbol, the symbol attributes, MIBs for the object, and events for the object display the status.
- State is the operating condition of the object. The MIBs and events for the object display the state.

Table 7-4 lists the colors, statuses, and states used in the 1-Meg Modem Service.

Table 7-4 Colors, statuses, and states in the 1-Meg Modem Service

Color	Status	State	Description
Green	Normal	inService	The object is in service or ready to send data traffic. All objects lower in the submap hierarchy are in normal condition.
Cyan	Warning	inService	The object is in service, but one object lower in the submap hierarchy has a trouble condition that affects service. For example, one DBIC in an LCM cannot pass data.
Yellow	Minor/Marginal	inService	The object is in service, but two or more objects lower in the submap hierarchy have a trouble condition that affects service. For example, two line cards in an LCM line drawer cannot pass data.
Orange	Major	inSrvTrouble	The object is in service or ready to pass data traffic, with a trouble condition that affects service. Two or more objects lower in the submap hierarchy are in a trouble condition.
Red	Critical	sysBusy lossOfSync	The object is out of service because of a trouble condition. The object cannot pass data traffic All objects lower in the submap are in a trouble condition.
Blue	Unknown	lmBusy CSideBusy	The xEMS cannot determine the state of the object.
Salmon	Testing	test	The object is undergoing a test.
Tan	Restricted	manBusy	A maintenance technician has manually busied the object. The object cannot pass data.
Brown	Disabled	offLine	A maintenance technician has removed the object from service. The object cannot pass data
Off-white	Unmanaged	notEquipped	The object is not configured for 1-Meg Modem Service. For example, the slot does not have an xLC. Do not monitor the object.

To view this information at the xEMS, select **Help:Display Legend** from the pull-down menu of any submap. Use the pull-down menu in the Legend window to select a legend to view.

HSTP-Network fault indicators

The HSTP-Network symbol resides in the Root submap. Table 7-5 lists the fault indicators for the HSTP-Network symbol.

Table 7-5 HSTP-Network fault indicators

Color	Status	State	Description
Green	Normal	inService	All DMSs in the network are in service with no trouble conditions.
Cyan	Warning	inService	All the DMSs in the network are in service, but one DMS has a trouble condition.
Yellow	Minor/Marginal	inService	All the DMSs in the network are in service, but two or more DMSs have a trouble condition.
Orange	Major	inSrvTrouble	One DMS in the network is in service with no trouble conditions. The remaining DMSs in the network have a trouble condition.
Red	Critical	sysBusy	One or more DMSs are in a critical state.

DMS fault indicators

The DMS symbol resides in the HSTP-Network submap. Table 7-6 lists the fault indicators for the DMS symbol.

Table 7-6 DMS fault indicators

Color	Status	State	Description
Green	Normal	inService	All LCMs in the DMS are in service with no trouble conditions.
Cyan	Warning	inService	All LCMs in the DMS are service, but one LCM has a trouble condition.
Yellow	Minor/Marginal	inService	All LCMs in the DMS are in service, but two or more LCMs have a trouble condition.
Orange	Major	inSrvTrouble	One LCM in the DMS is in service with no trouble conditions. The remaining LCMs in the DMS have a trouble condition.
Red	Critical	sysBusy	One or more LCMs in the DMS are out of service.

LCM fault indicators

The LCM symbol resides in the DMS submap. Table 7-7 lists the fault indicators for the LCM symbol.

Table 7-7 LCM fault indicators

Color	Status	State	Description
Green	Normal	inService	All the DBICs in the LCM are in service with no trouble conditions.
Cyan	Warning	inService	All the DBICs in the LCM are in service, but one DBIC in the LCM has a trouble condition.
Yellow	Minor/Marginal	inService	All the DBICs in the LCM are in service, but two or more DBICs in the LCM have a trouble condition.
Orange	Major	inSrvTrouble	One DBIC is in service. The remaining DBICs in the LCM have a trouble condition.
Red	Critical	sysBusy	One or more DBICs are out of service and cannot pass data.

LCM drawer fault indicators

The LCM drawer symbol resides in the LCM submap. Table 7-8 lists the fault indicators for the LCM drawer symbol.

Table 7-8 LCM drawer fault indicators

Color	Status	State	Description
Green	Normal	inService	The DBIC for the drawer is in service with no trouble conditions.
Orange	Major	inSrvTrouble	The DBIC for the drawer is in service with a trouble condition that could affect service. The trouble condition can be related to the DBIC or one of the xLCs that the DBIC supports.
Blue	Unknown	lmBusy	Communication is not available because of one of the following conditions: • The DBIC is down. • The network is down between the DBIC and the xEMS. This state changes all xLCs supported by the DBIC that are Normal/Up to Unknown. This state does not change xLCs supported by the DBIC that are out of service.
Salmon	Testing	test	An OOS test is being run on the DBIC. The DBIC cannot pass data.
Tan	Restricted	manBusy	An operating company technician has removed the DBIC from service. The DBIC cannot pass data. This condition does not affect xLCs supported by the DBIC.
Brown	Disabled	offLine	The DBIC for the drawer is not available for service. The DBIC cannot pass data. This condition does not affect xLCs supported by the DBIC.

DBIC fault indicators

The DBIC symbol resides in the LCM Drawer and Subscriber Loop submaps. Table 7-9 lists the fault indicators for the DBIC symbol.

Table 7-9 DBIC fault indicators

Color	Status	State	Description
Green	Normal	inService	The DBIC has no maintenance problems. The DBIC is ready to pass data.
Orange	Major	inSrvTrouble	The DBIC can pass data, but a trouble condition exists.
Red	Critical	sysBusy	A system fault has been detected. The DBIC cannot pass data.
Blue	Unknown	CSideBusy	The xEMS cannot communicate with the DBIC. The DBIC has a No Comm flag on the xEMS submap.
Salmon	Testing	test	The DBIC is undergoing an out-of-service (OOS) test.
Tan	Restricted	manBusy	A maintenance technician has manually busied the DBIC. The DBIC cannot pass data.
Brown	Disabled	offLine	A maintenance technician has removed the DBIC from service. The DBIC cannot pass data. All data communications on the subscriber loops is disabled.

xLC fault indicators

The xLC symbol resides in the LCM Drawer and Subscriber Loop submaps. Table 7-10 lists the fault indicators for the xLC symbol.

Table 7-10 xLC fault indicators

Color	Status	State	Description
Green	Normal	inService	A communications link exists between the DBIC and the xLC. The xLC is ready to pass data.
Orange	Major	inSrvTrouble	A problem exists with the subscriber loop. The speed of data transfer may be lower than the configured maximum speed.The xLC can pass data.
Red	Critical	sysBusy	A system fault has been detected. The xLC cannot pass data.
Blue	Unknown	lmBusy	The DBIC for the xLC is down or busy. The status of the xLC is unknown.
Salmon	Testing	test	A test is being performed on this xLC.
Tan	Restricted	manBusy	A maintenance technician has manually busied the xLC. The xLC cannot pass data.
Brown	Disabled	offLine	A maintenance technician has removed the xLC from service. The xLC cannot pass data.

CPE fault indicators

The CPE symbol resides in the Subscriber Loop submaps. Table 7-11 lists the fault indicators for the CPE symbol.

Table 7-11 CPE fault indicators

Color	Status	State	Description
Green	Normal	inService	The DBIC detects a CPE sync signal.
Red	Critical	lossOfSync	The DBIC does not detect a CPE sync signal. Possible reasons follow: • The CPE is not powered ON. • The CPE is faulty. • The link between the CPE and the xLC is faulty.
Blue	Unknown	lmBusy	The xLC for the CPE is OOS. In this state, the CPE cannot pass data.
Salmon	Testing	test	An OOS test is being run on the CPE. In this state, the DBIC cannot pass data.

PC fault indicators

The PC symbol resides in the Subscriber Loop submaps. Table 7-12 lists the fault indicators for the PC symbol.

Table 7-12 PC fault indicators

Color	Status	State	Description
Green	Normal	inService	The DBIC detects a link-beat signal from the PC.
Red	Critical/Down	lossOf Sync	The DBIC does not detect a link-beat signal from the PC. Possible reasons follow: • The PC is not powered ON. • The PC is faulty. • The link between the PC and the CPE is faulty. This state indicates the CPE is in Normal/Up state.
Blue	Unknown	lmBusy	The CPE for the PS is in an OOS state.

HP OpenView events and xEMS events

An HP OpenView event is like a DMS log. HP OpenView uses events to indicate that one of the conditions that follows occurs:

- A MIB exceeded a threshold limit.
- The network topology changed.
- An informational event or error occurred.
- The status of an object changed.
- The configuration of a node changed.
- An application event occurred.

The xEMS also uses events. Nortel xEMS events indicate conditions similar to HP OpenView conditions in the 1-Meg Modem Service. Some conditions that generate xEMS events follow:

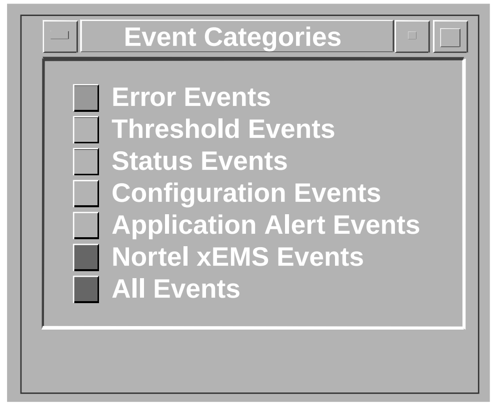
- A MIB exceeded a threshold limit.
- The configuration of a node changed.
- The status of a node changed.
- A node had a restart.
- An authorization failed.

Event categories and severity

Use the Event Categories window to view HP OpenView events and xEMS events. The xEMS displays the Event Categories window at start-up. The

Event Categories window displays the event categories and the current severity of each category. Figure 7-2 shows the xEMS Event Categories window.

Figure 7-2 Event Categories window



The button to the left of the category indicates the color of the most severe unacknowledged event in the category. Table 7-13 lists the possible colors in the Event Categories window and the severity of each color.

Table 7-13 Colors in Event Categories window

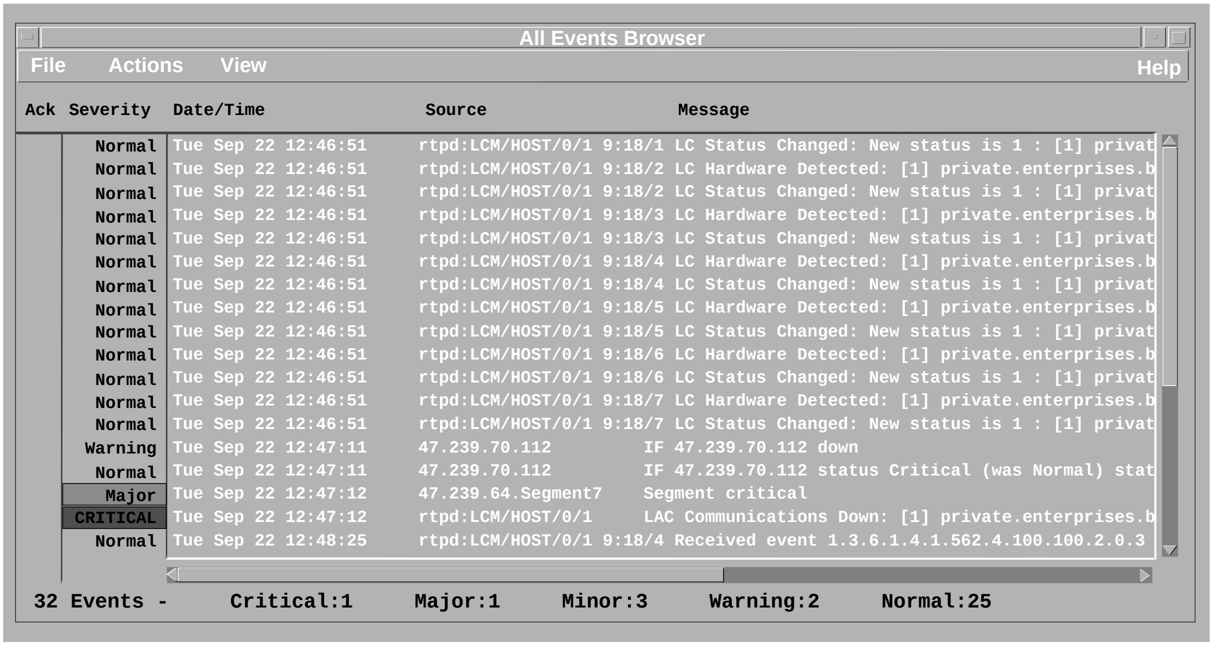
Color	Level of severity
Red	Critical
Orange	Major
Yellow	Minor
Cyan	Warning
Green	Normal

Event information and Event Browser window

To view the events in a category, double-click the button to the left of the category. The xEMS displays an Events Browser that lists the events in that category.

Figure 7-3 shows the Events Browser.

Figure 7-3 Events Browser



The Events Browser window displays each undeleted event for the category. Table 7-14 lists the information that the Events Browser window displays for each event.

Table 7-14 Information in Events Browser window

Column	Description
Ack	A checkmark in this column Indicates that someone has acknowledged the event.
Severity	The severity of the event
Date/Time	The day of the week, date, and time that the event occurred
Source	The name of the object affected by the event
Message	A brief description of the event. The message includes the name and value of the MIB that monitors the event.

To view the events for an object, select the symbol for the object and use the **Fault:Events** selection from the pull-down menu. The browser displays the events for the selected object.

The event browser displays all events until one of the following actions occurs:

- The browser collects the maximum number of events.
- One or more events is deleted.

The Events Browser launches automatically at startup. To control the startup of the Events Browser, use the **xnmevents-startup-control** tool. The command **xnmevents -D** disables the Events Browser. The command **xnmevents -E** enables the Events Browser.

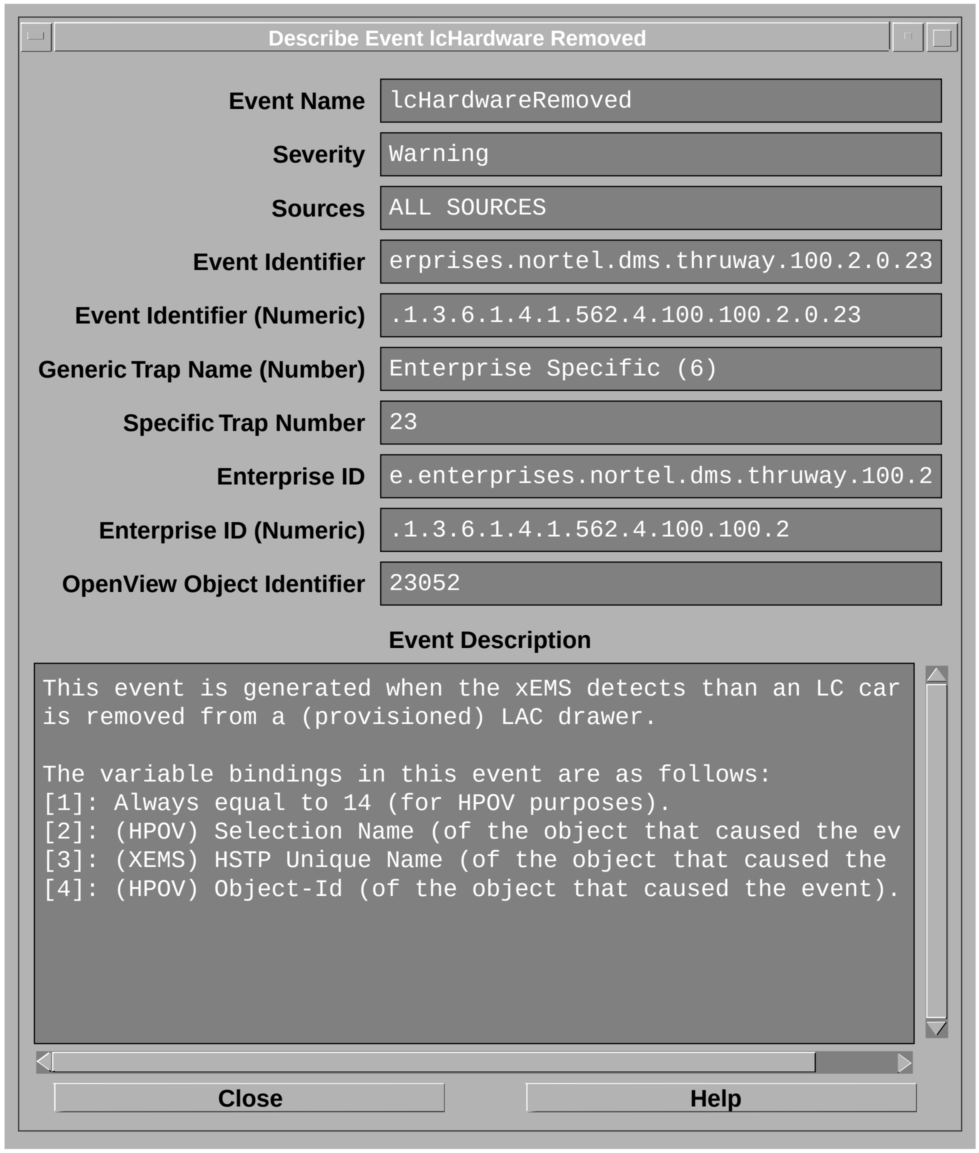
Event information and Describe Event window

To view descriptive information on an event, use the Describe Event selection from the View menu.

- Select the event in the Events Browser window.
- Select **View:Describe Event** from the pull-down menu.

The xEMS displays a generic description of the event. Figure 7-4 shows an event description.

Figure 7-4 Describe Event window



The top half of the window provides basic information about the event. The Event Description field in the bottom half of the window shows technical information on the variable bindings in the event.

Two bindingscan be helpful in troubleshooting events. Match the Selection Name and the status of the object to the information in the event.

Troubleshoot events

To go to the source of the event, double-click on the event. The xEMS displays the submap with the source of the event. From this submap, you can perform the necessary troubleshooting to address the event.

You can also use the MIB Browser to interpret MIB values for the event. Refer to the chapter “Performance Management” in this document.

Manage events

To change the maximum number of events, open the `$APP_DEFS/XNMevents` file and modify the `maxEvents` resource.

To delete an event, use one of the **Actions:Delete** selections from the pull-down menu in the event browser window. When you delete an event, you delete all references to that event in all windows.

xEMS critical events

This section provides the following information about xEMS critical events.

- name
- sample format
- description
- solution, if necessary

Event	dhcpdFailed
Format	Failed to restart DHCP daemon - LACs will not recover from restart:
Description	DCHP failed to restart after an LAC was provisioned. The configuration file (`/etc/dhcpd.conf`) is corrupt.
Action	

Event	lacDown
Format	`LAC Communications Down: <object_name>`
Description	xEMS detects a loss of communications to an LAC.
Action	

Table 7-15

Event	lacGlobalAlarmStatusEvent
Format	LAC Global Alarm. <alarm_info>
Description	xEMS detects a system fault. A restart trap can follow this trap.
Action	

xEMS major events

This section provides the following information about xEMS major events.

- name
- sample format
- description
- solution, if necessary

Event	cpeFirmwareDownloadFailedXemsEvent
Format	`CPE Firmware Download Failed`
Description	A firmware download to a CPE failed.
Action	

Event	databaseError
Format	Database Error: <object_name> : <error_type>
Description	The HSTPMON process detects a database (OVWDB) software error.
Action	Contact Nortel Networks technical assistance. Provide the following files: • the output of the command **${OV_BIN}/obovjprint** • `/var/opt/OV/share/log/trapd.log` • `/var/opt/OV/share/log/Nortel/HSTP/hstpmon-debug.log` • `var/adm/syslog/syslog.log` ***Note:*** Some offices and workstations can have `syslog.log` in a different directory.

Event	dbicHardwareIncapableXemsEvent
Format	`Hardware incapable:`
Description	A request not supported by current hardware has been made.
Action	

Event	lacColdRestart
Format	`LAC Cold Restart: <object_name>`
Description	An LAC performs a cold restart.
Action	

Event	lacConfigFailed
Format	`LAC Config Failed: <object_name>:<error>`
Description	The HSTPMON process fails to configure an LAC.
Action	Select **Misc:Nortel xEMS->LAC Force Synchronization** from the pull-down menu to force the xEMS to resynchronize with the LAC.

Event	lacTrapAckFailed
Format	`LAC: <object_name> Trap Ack Failed: <error>`
Description	The HSTPMON process fails to acknowledge a trap from an LAC.
Action	Select **Misc:Nortel xEMS->LAC Force Synchronization** from the pull-down menu to force the xEMS to resynchronize with the LAC.

Event	lacTrapConfigFailed
Format	`LAC Trap Config Failed: <object_name> : <error>`
Description	The HSTPMON process fails to configure the Trap Destination Table on an LAC.
Action	Select **Misc:Nortel xEMS->LAC Force Synchronization** from the pull-down menu to force the xEMS to resynchronize with the LAC.

Event	lacWarmRestart
Format	LAC Warm Restart: <object_name>
Description	An LAC performs a warm restart.
Action	

Event	lcConfigFailed
Format	LC Config Failed: <object_name>:<error>
Description	The HSTPMON process fails to configure a LC.
Action	Use the command **Misc:Nortel xEMS->LC Force Synchronization** from the pull-down menu to force the xEMS to resynchronize with the LC.

Event	snmpError
Format	SNMP Error: <object_name> : <error_type>
Description	The HSTPMON process detects an SNMP software error.
Action	Contact Nortel Networks technical assistance. Provide the following files: • the output of the command **${OV_BIN}/obovjprint** • `/var/opt/OV/share/log/trapd.log` • `/var/opt/OV/share/log/Nortel/HSTP/hstpmon-debug.log` • `/var/adm/syslog/syslog.log` ***Note:*** Some offices and workstations can have `syslog.log` in a different directory.

Event	undefinedSubnet
Format	`Bootptab daemon encountered an undefined subnet.`
Description	A DBIC was provisined without a default gateway and subnet mask. A temporary gateway has been assigned.
Action	Reprovision the device with a gateway and subnet mask.

xEMS minor events

This section provides the following information about xEMS minor events.

- name
- format
- description
- solution, if necessary

Event	dbicLoadMismatchEvent
Format	`LAC Load Mismatch: <user_id>`
Description	The provisioned LAC load does not match the load in the DBIC.
Action	

xEMS warning events

This section provides the following information about xEMS warning events.

- the name of the event
- a sample format of the event
- a description of the event
- if necessary, any action to resolve the event

Event	dbicPecCodeNotMatchedXemsEvent
Format	`DBIC provisioned PEC code does not match the actual PEC code:`
Description	The provisioned PEC of the DBIC does not match the actual PEC of the DBIC.
Action	

Event	lacHardwareRemoved
Format	`LAC Hardware Removed: <object_name>`
Description	HP OpenView detects loss of connection to an LAC for a configured length of time. The xEMS assumes that a loss of connection indicates removal of hardware and generates this event.
Action	

Event	lacUnknownButRecvd
Format	`Received Event from Unknown LAC: <object_name>`
Description	The xEMS receives a trap for an LAC that is unknown to the xEMS.
Action	

Event	lcHardwareRemoved
Format	`LC Hardware Removed: <object_name>`
Description	The xEMS detects that an LC is removed from a provisioned LAC drawer.
Action	

Event	lcPerformanceDown
Format	`LC: <object_name> Performance Degraded`
Description	An LAC automatically drops the adaption rate for an LC. The LAC could not maintain the previous adaption rate due to error conditions.
Action	

Event	lcUnknownButRecvd
Format	`Received Event for Unknown LC: <object_name>`
Description	The xEMS receives a trap for an LC that is unknown to the xEMS.
Action	

Event	snmpTimeout
Format	`SNMP timeout: <object_name>`
Description	An SNMP request to an object times out. The time-out value is too small.
Action	Increase the time-out value. Use the command **Options:SNMP Configuration** from the pull-down menu.
Description	An SNMP request to an object times out. The network between the xEMS and the object is down.
Action	Confirm the xEMS has IP connectivity to the object. Use the command **Fault:Ping** from the pull-down menu.
Description	An SNMP request to an object times-out. The SNMP community string on the DBIC is different from the SNMP community string on the xEMS.
Action	Confirm that the two community strings match. Open an SNMP MIB browser.

xEMS normal events

This section provides the following information about xEMS normal events.

- name
- sample format
- description

Note: The content of the event determines the user strategy. For example, an LAC state change from ISTb to InSv does not require user action. An LAC state change from InSv to ISTb requires user action.

Event	anProvisioned
Format	`AN <object_name> provisioned by <user_id>`
Description	An AccessNode is provisioned.

Event	anUnprovisioned
Format	`AN <object_name> unprovisioned by <user_id>`
Description	An AccessNode is unprovisioned.

Event	BootpTabUpdateRequest
Format	BootpTab Update Request: `<object_name>`
Description	The hstpmap/hstpprovdbic requests an update of bootptab.

Event	dmsProvisioned
Format	`DMS: <object_name> provisioned by <user_id>`
Description	A DMS is provisioned.

Event	dmsUnprovisioned
Format	`DMS: <object_name> unprovisioned by <user_id>`
Description	A DMS is unprovisioned.

Event	hstpNetwkProvisioned
Format	`HSTP Application Enabled: <object_name> provisioned by <user_id>`
Description	The xEMS is run for the first time. HP OpenView generates the event when it creates the HSTP-Network object.

Event	hstpNtwkUnprovision
Format	`HSTP Application Disabled last: <object_name> unprovisioned by <user_id>`
Description	The xEMS software no longer is used. HP OpenView generates the event when the HSTP-Network object is deleted.

Event	hstpProvisionChanged
Format	`HSTP_Network reprovisioned by <user_id>`
Description	HSTP network provisioning changes.

Event	lacDiscoveredByOv
Format	`LAC <object_name> discovered by netmon`
Description	HP OpenView auto-discovers, for the first time, the presence of LAC hardware for a provisioned LAC.

Event	lacHardwareDetected
Format	`LAC Hardware Detected: <object_name>`
Description	The xEMS detects for the first time LAC hardware for a newly provisioned DBIC.

Event	lacLinkPerformanceEvent
Format	`LAC Link Performance: <object_name>`
Description	The xEMS detects a persistent performance problem on the loop. Line noise or faulty hardware usually causes this problem. The xEMS generates the log for the following conditions: • The xEMS detects a degredation. • The LAC establishes a loop connection, but the maximum speed does not match the actual speed.

Event	lacNewMacLearnedEvent
Format	`LAC New Mac Learned: <object_name>`
Description	The LAC learns a new MAC address.

Event	lacProvisioned
Format	`LAC: <object_name> provisioned by <user_id>.`
Description	An LAC is provisioned.

Event	lacProvisionChanged
Format	`LAC: <object_name> reprovisioned by <user_id>`
Description	An LAC changes status.

Event	lacStatusChanged
Format	`LAC: <object_name> status changed to <new_status>.`
Description	An LAC changes status.

Event	lacSynchnronizedRequest
Format	`LAC Synchronized Request: <object_name>`
Description	The hstpmap process requests the hstpmon process to push and walk the LAC.

Event	lacTestResultChangeEvent
Format	`LAC Test Result Change: <object_name>`
Description	An LAC changes state because of a test. The `lacAlarmLevel` is critical if the state is Fail.

Event	lacUnprovisioned
Format	`LAC: <object_name> unprovisioned by <user_id>`
Description	An LAC is unprovisioned.

Event	lacUp
Format	`LAC Communications Up: <object_name>`
Description	The xEMS detects new data connectivity to an LAC.

Event	lacWalkRequest
Format	LAC Walk Request: `<object_name>`
Description	The process hstpmap requests hstpmon to walk LAC and LC.

Event	lcHardwareDetected
Format	LC Hardware Detected: `<object_name>`
Description	The xEMS auto-discovers the presence of an LC card in a provisioned LAC drawer.

Event	lcProvisioned
Format	`LC: <object_name> provisioned by <user_id>`
Description	An LC is provisioned.

Event	lcProvisionChanged
Format	LC: <object_name> reprovisioned by <user_id>
Description	An LC changes provisioning.

Event	lcSynchnronizedRequest
Format	LC Synchronized Request: <object_name>
Description	The hstpmap process requests the hstpmon process to push and walk the LC.

Event	lcUnprovisioned
Format	LC: <object_name> unprovisioned by <user_id>
Description	An LC is unprovisioned.

Event	lcStatusChanged
Format	LC: <object_name> Status Changed: New status is <status>.
Description	An LC changes status.

Event	lcmProvisioned
Format	LCM: <object_name> provisioned by <user_id>
Description	An LCM is provisioned.

Event	lcmStatusChanged
Format	LCM: <object_name> Status Changed: New state is <state>.
Description	An LCM changes status.

Event	lcmUnprovisioned
Format	LCM: <object_name> unprovisioned by (user_id>
Description	An LCM is unprovisioned.

Event	xEmsInfoLog
Format	xEms Info Log: <object_name>: <text>
Description	The HSTPMON process generates this xEMS information log.

Event	xlcInvalidVlanId
Format	LC: <object_name> Invalid VLAN Id:
Description	An xLC has an invalid VLAN ID 0.

ACK and UNACK messages

The xEMS and DBIC use acknowledge (ACK) and unacknowledge (UNACK) messages to confirm the delivery of traps.

1. The DBIC sends a trap to the xEMS.
2. The xEMS sends an ACK to the DBIC to confirm the delivery of the trap.

If the DBIC fails to receive an ACK in a period of time, the DBIC sends an UNACK to the xEMS. The period of time is 30 seconds, or a length of time the user configures. The DBIC repeats the UNACK until the xEMS acknowledges the original trap.

With Release 4, the DBIC repeats the UNACK after each period of time. For example, if the period of time is 30 seconds the DBIC sends an UNACK every 30 seconds. The DBIC suspends all other traps until the ACK is received.

With Release 5 and higher, the time period doubles after every UNACK message. For example, the DBIC sends the first UNACK after 30 seconds, the second UNACK after 60 seconds, and the third UNACK after 120 seconds.

The DBIC repeats the UNACK up to 32 times. The timeout returns to the original value when the DBIC receives the ACK. The DBIC suspends all other traps until the ACK is received.

Testing

The 1-Meg Modem Service supports the following testing methods:

- in-service tests
- out-of-service (OOS) tests
- loopback tests

In service tests

The xEMS automatically performs an in-service test on a DBIC when one of the following actions occur:

- The xEMS discovers a DBIC.
- A DBIC is bootstrapped. A bootstrap is software on the DBIC that causes additional software to be loaded. An recovery condition, such as a reset, can cause a DBIC to be bootstrapped.
- A DBIC returns to service.

The test runs until the test fails or someone manually stops the test. If the test fails, xEMS changes the status of the drawer to Major or ISTb.

OOS tests

Use the **Test** selection from the pop-up menu of a selected object to perform an OOS test.

DBIC

Do not perform an OOS test on a DBIC unless the DBIC is Restricted or ManB.

xLC

The **Test** selection for an xLC performs a loopback test that tests the data loop between the xLC and the 1-Meg Modem. A loopback test can help detect xLC hardware faults.

PING test

The PING utility in TCP/IP confirms that one PC can communicate with another PC. In xEMS, use the PING test to test communications between the xEMS workstation and a 1-Meg Modem Service component.

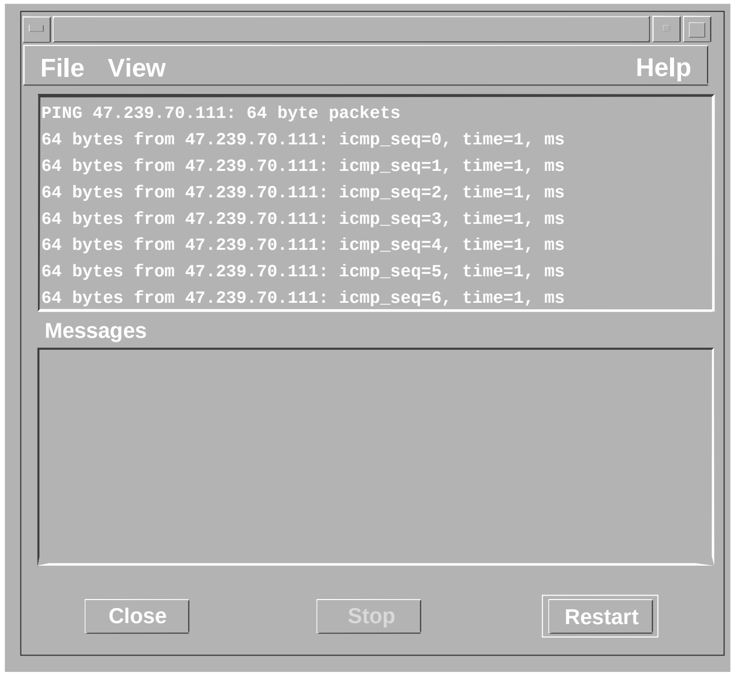
Perform the following steps to perform a PING test on an object:

1. Select the object.
2. Select **Fault:Ping** from the pull-down menu.

The xEMS displays a window with the real-time results of the PING test.

Figure 7-5 shows the results of a PING test.

Figure 7-5 Results of PING test



Loopback test

Use a loopback test to test the connection between an xLC and another part of the 1-Meg Modem Service. Data received from the loop by the xLC is looped back to the originating object, such as a DBIC.

To perform a loopback test on a selected xLC, use the **Test** selection from the pop-up menu.

Advanced loop debugging

This section describes how to diagnose problems in the subscriber loop.

The 1-Meg Modem Service provides loop statistics that can be helpful when you diagnose the loop problems that follow:

- a loop is not in sync
- a loop is not at the expected rate
- a loop is not passing traffic when the loop is in sync

Use the MIB Browser to review the loop statistics and address the problem.

1. Determine if the loop attempts to sync or rate adapt.

   Review the MIBs `xlcStatusRx` and `xlcStatusTx`. The MIB `xlcStatusRx` monitors the status of the xLC in the receiver, or upstream, direction. The MIB `xlcStatusTx` monitors the status of the xLC in the transmitter, or downstream, direction. The upstream and downstream status may one of the conditions that follow:

   - continually changes at regular intervals while the xLC attempts to reach the expected state
   - remains constant

     Table 7-16 describes each rate status.

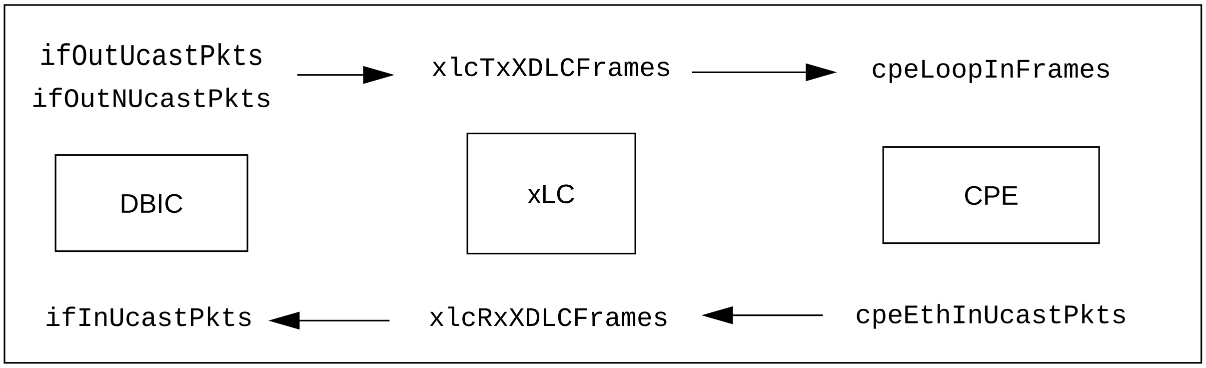
Table 7-16 xLC upstream and downstream status

Constant status	Description	Changing status	Description
Up	Loop is operating normally.	Up and configuring	Loop is having difficulty achieving maximum rate.
Down	Loop is not adapting.	Down and configuring	Loop cannot achieve base rate.
Degraded	Loop is operating below maximum rate and not adapting.	Degraded and configuring	Loop is attempting to achieve a better rate
PowerSave	Loop is offLine or a line card test is active.	PowerSave and configuring	Loop cannot achieve base rate.

2. Isolate where frames are lost.

   If a subscriber can ping or pass traffic, you may have a fault in the 1-Meg Modem Service system. Use frame counters to observe traffic at select points in the system. Figure 7-6 shows the frame counters to use.

Figure 7-6 Frame counters in 1-Meg Modem Service



Note: The MIB `cpeEthInUcastPkts` also counts broadcast packets.

You do not have to count the packets. You only need to watch the counters increment. The ability to count the number of packets requires an in-depth knowledge of protocols. For example, one ping can send between two and six packets due to the current protocol state.

3. Review key error counters.

   Table 7-17 lists some of the error counters that you can use to diagnose loop problems.

Table 7-17 Error counters for use in loop diagnostics

Counter or gauge	Description
`xlcRxErrors`	Upstream errors. If FEC is on this indicates how many times FEC was unable to correct errors.
`ifInErrors`	Upstream errors detected in frame by datapath
`ifOutDiscards`	Downstream frames discarded
`xlcDSLoopErrorRate` `xLcUSLoopErrorRate`	Gauge that varies from 0 to 100 indicating impulse noise on the loop. At 100% the loop will adapt to a lower rate.
`xlcRxSyncFound`	Number of times sync is detected by xLC
`cpeLoopInErrors`	Total downstream errors
`cpeLoopSyncFound`	Number of times loop sync is detected by CPE

Do not continuously collect error counter statistics. Continuous collection may degrade normal traffic performance.

Command-line tools

Command line tools are available to perform basic maintenance and view LAC information.

Basic maintenance

Use the **hstpmaint** command to maintain 1-Meg Modem Service objects from the UNIX command line.

The syntax for the **hstpmaint** command follows:

```
>hstpmaint <device-type> <device-name> [help] [<options>...]

>hstpmaint [-stop-on-error [=<N>]]

>hstpmaint help
```

where N is an integer

Table 7-18 lists the parameters for the **hstpmaint** command.

Note: Option names and values are case-sensitive.

Table 7-18 Parameters for hstpmaint command

Parameter	Value	Description
<device-type>	**dbic**	
	xlc	
	cpe	
<device-name		The HSTP unique name or HP OpenView selection name
<options>		The device-specific option. Refer to the device-specific information in this chapter.
Note: With xEMS Release 4 and higher, only warm restarts are available. You can use **-restart** as a parameter without a **<restart-type>**, to perform a warm restart. The values **warmReset** and **coldReset** remain to support existing scripts. Both values perform a warm restart. Win xEMS Release 3 or lower, specify a **<restart-type>**		

DBIC

This section provides syntax and parameters for the **hstpmaint** command when used for DBIC maintenance.

Syntax

The syntax for the hstpmaint command for DBIC maintenance follows:

```
>hstpmaint dbic <dbic-name> <mtc-action>
```

Parameters

Table 7-19 lists the parameters for the **hstpmaint** command for DBIC maintenance.

> ***Note:*** Option names and values are case-sensitive. Do not type spaces between the equals (=) signs.

Table 7-19 DBIC parameters for hstpmaint command

Parameter	Values	Parameter	Value
<dbic-name>	The HSTP unique name or HP OpenView selection name		
<mtc-action>	**[-test]**		
	[-state=<state>	**<state>**	**inservice**
			manbusy
			offline
	[-restart[=<restart-type>]]	**<restart-type>**	**warmReset**
			coldReset
	[-force]		
	[-fcache]		
Note: The xEMS only supports cold restarts. Use **-restart** as a parameter, without a **<restart-type>**, to perform a cold restart. The values **warmReset** and **coldReset** remain to support existing scripts. Both values perform a cold restart.			

The **-test** parameter performs a single out-of-service (OOS) test on the DBIC. The DBIC must be manually busy.

When you execute a command, the operating system checks the state of the 1-Meg Modem Service object in the local database. If the command can cause an illegal state transition, the operating system rejects the command. The **-force** parameter bypasses state transition checking.

The **-fcache** parameter flushes the cache of learned MAC addresses on a DBIC.

Examples

An example of a DBIC maintenance command follows:

```
hstpmaint dbic SNFCCA01DS0:LCM/HOST/00/1:5 -restart=warmReset
```

xLC

This section provides syntax and parameters for the **hstpmaint** command when used for xLC maintenance.

Syntax

The syntax for the **hstpmaint** command for xLC maintenance follows:

```
>hstpmaint xlc <xlc-name> <mtc-action>
```

> ***Note:*** Option names and values are case-sensitive.

Parameters

Table 7-20 lists the parameters for the **hstpmaint** command for xLC maintenance.

Table 7-20 xLC parameters for hstpmaint command

Parameter	Values	Parameter	Value
<xlc-name>	The HSTP unique name or HP OpenView selection name		
<mtc-action>	**[-test]**		
	[-state=<state>	**<state>**	**IDL**
			MB
			INB

The **-test** parameter performs a single out-of-service test on the xLC. The xLC must be manually busy.

Examples

An example of an xLC maintenance command follows:

```
hstpmaint xlc SNFCCA01DS0:LCM/HOST/00/1:5:2/0 -state=MB
```

CPE

This section provides syntax and parameters for the **hstpmaint** command when used for CPE maintenance.

Syntax

The syntax for the hstpmaint command for CPE maintenance follows:

```
>hstpmaint cpe <cpe-name> <mtc-action>
```

> ***Note:*** Option names and values are case-sensitive.

Parameters

Table 7-21 lists the parameters for the **hstpmaint** command for CPE maintenance.

Table 7-21 CPE parameters for hstpmaint command

Parameter	Values	Parameter	Value
<cpe-name>	The HSTP unique name or HP OpenView selection name		
<mtc-action>	**[-test]**		
	[-reset]		
	[-loopback=<test-type>]	**<test-type>**	**internal**
			external
			none
	[-load=<loadfile-path>]	**<loadfile-path>**	The location of the CPE firmware load
	[-stopload]		Stop the firmware load operation

The **-test** parameter performs out-of-service tests on the CPE. The xLC must be manually busy to perform this test. To view test results, check the MIB `cpeTestResult`.

The **-reset** parameter resets the CPE and interrupts communications.

The **-loopback** parameter controls the interface loopback on the CPE. An internal loopback enables the internal modem loopback, which echoes data received from the loop back onto the loop. An external loopback tells the CPE to ignore collisions so you can place a loopback connector on the CPE's Ethernet port. The value **none** is the default mode and disables all loopback modes.

Examples

An example of a CPE maintenance command follows:

```
hstpmaint cpe SNFCCA01DS0:LCM/HOST/00/1:5:2/CPE
-loopback=internal
```

View LAC information

The command **checkLacLoad** displays the status and firmware version of one or more LACs. The command uses SNMP messaging to query the objects directly. The syntax of the command is c**heckLacLoad <object_name>**. The ALL parameter displays all LACs in the network. Table 7-22 lists examples of the command.

Table 7-22 Examples of checkLacLoad command

Example	Description
checkLacLoad ALL	Displays the firmware load and status of all LACs on the LCM
checkLacLoad SNFCCA01DS0:LCM/HOST/1/0	Displays the firmware load and status of all LACs on the LCM
checkLacLoad SNMCCA01DS0:LCM/Host/1/0:2	Displays the firmware load and status of a specific LAC

8 Troubleshooting

This chapter provides information on troubleshooting issues with the 1-Meg Modem Service.

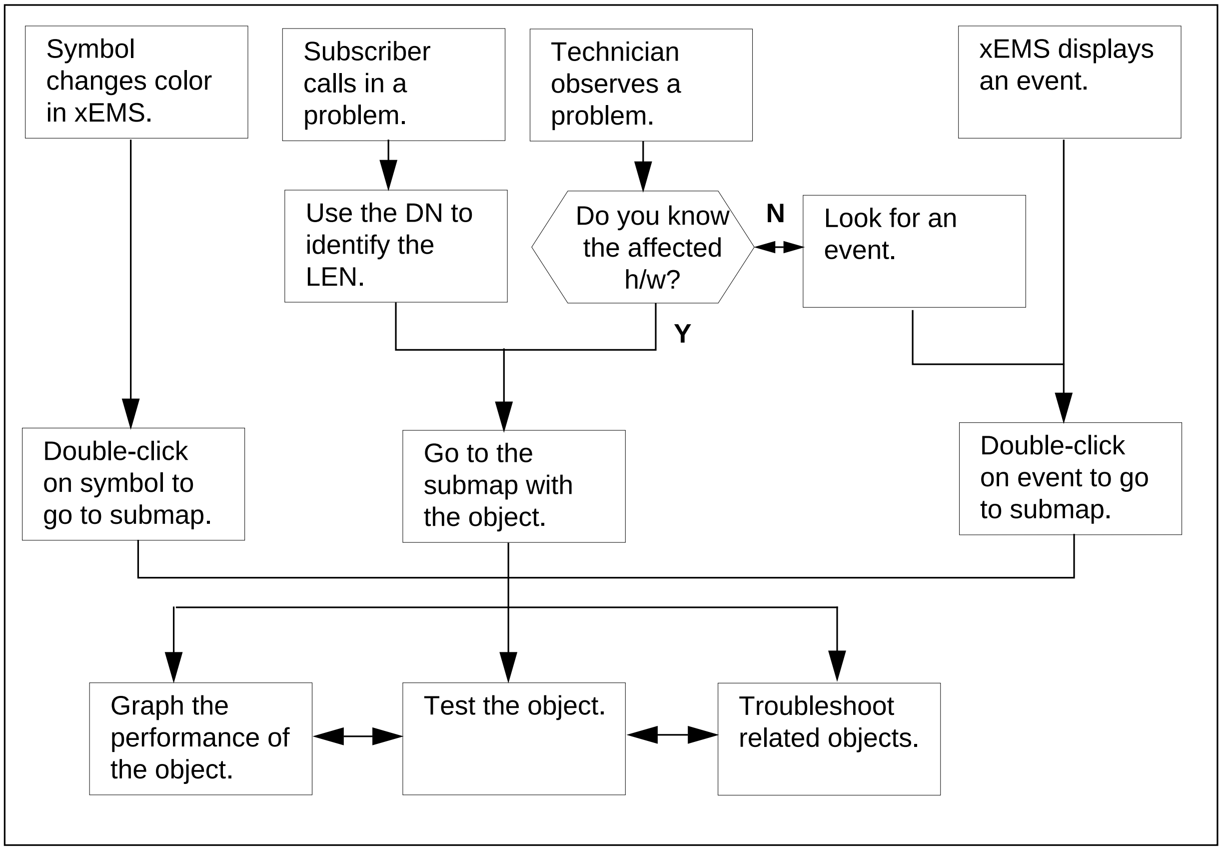
Introduction

The 1-Meg Modem Service provides several functions to help in troubleshooting faults. Some of these functions follow:

- Events that track changes in status, maintenance, and provisioning
- symbol colors at the xEMS that reflect the status of an object
- graphs at the xEMS that allow you to monitor the real-time performance of a 1-Meg Modem Service object

Figure 8-1 shows the troubleshooting process for the 1-Meg Modem Service.

Figure 8-1 1-Meg Modem Service troubleshooting

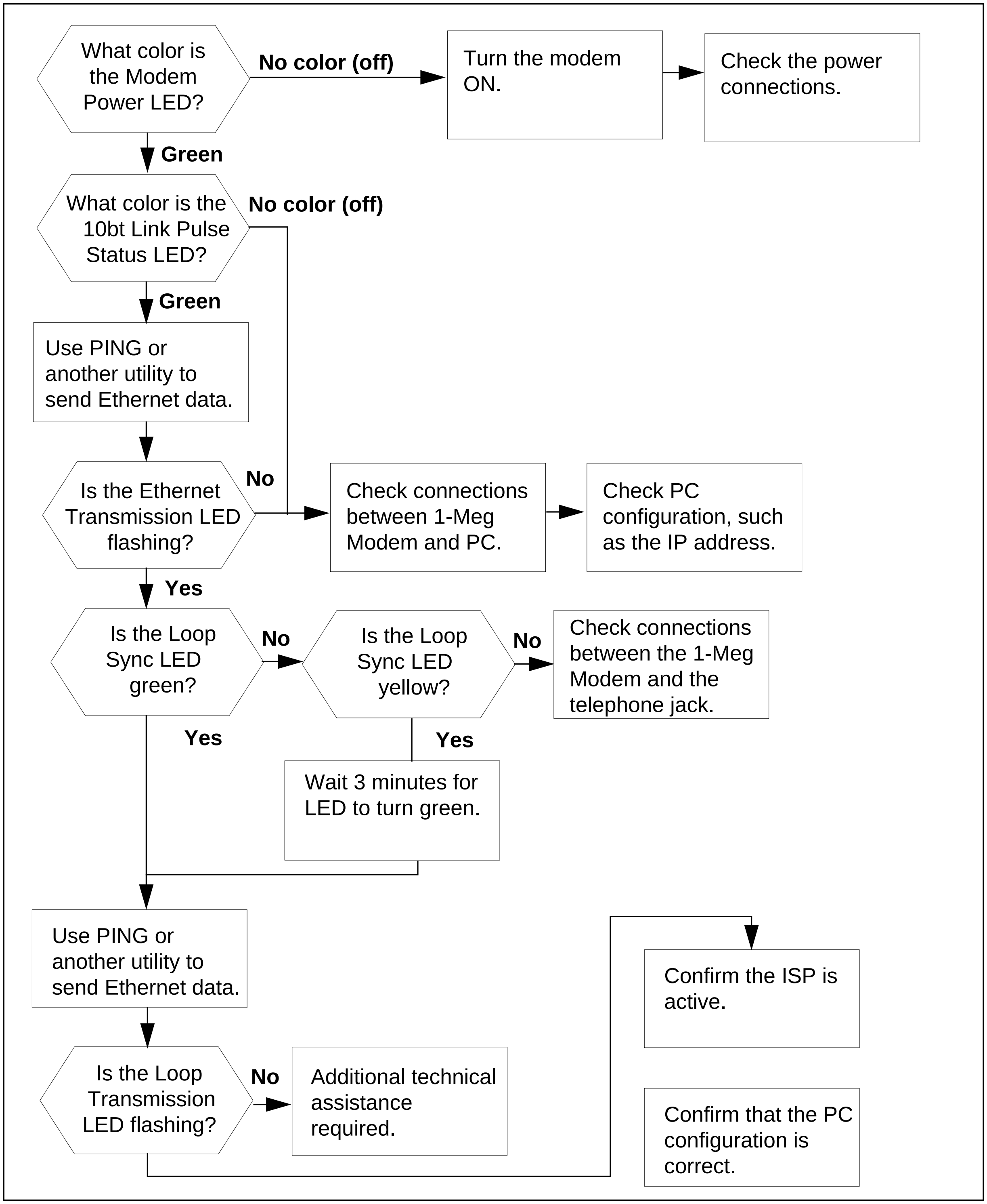


1-Meg Modem and subscriber issues

For many 1-Meg Modem issues, the first phase of troubleshooting can be the receipt of the subscriber call. Since the 1-Meg Modem is a plug-and-play device, many 1-Meg Modem issues can be related to the subscriber location or the installation of the 1-Meg Modem.

Figure 8-2 shows the process to troubleshoot 1-Meg Modem subscriber issues. If you complete this process and you are unable to troubleshoot the problem, go to “1-Meg-Modem does not work” or the appropriate issue in this chapter.

Figure 8-2 1-Meg Modem troubleshooting



Possible issues related to the 1-Meg Modem that can require troubleshooting follow.

Ethernet Link Status or 10bt Link Pulse Status LED does not turn green

Ask the subscriber to inspect the connection between the 1-Meg Modem and the Ethernet card in the PC. If the connection is good, the cable could be bad.

1-Meg Modem does not sync to maximum rate

Perform the following actions to troubleshoot this problem:

1. Check the length of the subscriber loop. Refer to "Subscriber loop specifications" in the chapter "Performance management" in this document for more information.
2. Check the characteristics of the loop. Refer to "Subscriber loop specifications" in the chapter "Performance management" in this document for more information.
3. Check for noise sources. Refer to "Subscriber loop specifications" in the chapter "Performance management" in this document for more information.

1-Meg Modem does not work

A subscriber can report a general problem with the 1-Meg Modem and the 1-Meg Modem Service. A general problem can be a modem worked one day but not another day.

These general problems can indicate a problem at the subscriber location, central office, or Internet service provider (ISP). Perform the following actions to troubleshoot the problem:

- Ask the subscriber if the Modem Power LED is green. If the Modem Power LED is not green, the 1-Meg Modem has no power. Ask the subscriber to perform the following actions:
  - — If the subscriber has an NTEX35AA, make sure the power switch on the back of the 1-Meg Modem is in the ON position.
  - — Make sure the 1-Meg Modem power supply connects to the back of the 1-Meg Modem.
  - — Make sure all power strips and surge protectors for the 1-Meg Modem are on.
  - — Make sure the 1-Meg Modem power supply connects to the wall socket.
  - — Make sure the wall socket has power.
- Ask the subscriber if the Ethernet Link Status or 10bt Link Pulse Status LED is green. If the Ethernet Link Status or 10bt Link Pulse Status LED is not green, check the PC's Ethernet configuration.
- Ask the subscriber to inspect the PC configuration.
- Ask the subscriber to attempt to connect to another web site.

- Inspect the status of the subscriber line.
  - From the DMS, confirm that the line has dial tone.
  - From the xEMS, confirm that the loop is in-service.
- From the xEMS, confirm that the DBIC and xDSL line card (xLC) for the subscriber is in-service.
- Test the DBIC and xLC. Use the **Test** selection for the DBIC or xLC from the Test pop-up menu.
- If the tests pass, look at on the subscriber configuration, transport network, and ISP.
  - Examine the configuration of the transport network.
  - Ask the ISP if service is still available to the subscriber.
  - Confirm that the office has assigned an xLC to the subscriber.
  - Confirm that the xLC is wired correctly.

Audible noise on extension telephone

A subscriber may report audible noise on the extension telephone when the 1-Meg Modem is in use. If off-hook detect is available on the loop, confirm that off-hook is provisioned in the xLC as **On**. Off-hook detect is available in offices with xEMS Release 3 or higher and on loops with an NTEX35BA or higher 1-Meg Modem and an NTEX17BA or higher xLC.

If off-hook detect is not available, or off-hook detect does not solve the problem, ask the subscriber to perform the following actions.

- Place a Nortel Networks-approved telephone filter between the extension telephone and the wall jack.
- Inspect the position of any installed filters.
- Swap the telephone with a telephone that does not have the problem.

CPE symbol with no sync flag

The `no sync` flag for a CPE symbol at the xEMS workstation indicates that communications may be down between the CPE and the PC. The xEMS workstation displays the flag when both of the following conditions occur:

- The xEMS workstation does not have a valid learned MAC address for the CPE.
- The xEMS detects no synchronization between the CPE and the PC.

Audible noise on 1-Meg Modem-connected telephone

Audible noise on a 1-Meg Modem-connected telephone indicates a problem with the 1-Meg Modem. Replace the 1-Meg Modem.

Connection problems with analog modem

Ask the subscriber to connect a Nortel Networks-approved telephone filter to the analog modem. Remove the filter if the filter does not solve the connection problem.

Connection problems with ISP

Perform the following steps to troubleshoot a connection problem between a subscriber and the subscriber's ISP.

1. Ask the subscriber to make sure the 1-Meg Modem's Loop Status or Loop Sync LED is green.
2. Ask the subscriber to make sure the 1-Meg Modem's Ethernet Link Status or 10bt Link Pulse Status LED is green. If the LED is not green, have the subscriber check the Ethernet cable to the PC.
3. Ask the subscriber to confirm that the following information is valid:
   - IP address of ISP
   - Gateway address of ISP
   - DNS address of ISP
4. Ask the subscriber to check the network card. Within Windows 95, the subscriber can perform the following tasks.
   - From the Task Bar, open **Settings->Control Panels...**.
   - Double-click the System icon.
   - Click the Device Manager tab.
   - Locate Network adapters in the list of devices. If the entry has a **X** or **!,** the device is not operating properly.
5. Examine the CO configuration for the ISP. For example, the transport network may not be configured.
6. Ask the subscriber to attempt to connect to another web site.
7. The DBIC may have learned an incorrect MAC address for the PC. Another device at the subscriber location, such as an Ethernet printer, can pass its MAC address to the DBIC. The previous actions will clear the upstream communications path from the 1-Meg Modem to the DBIC.

   To clear the learned MAC addresses for the DBIC, set the aging time for to 0. Set the DBIC MIB `dbicSwitchingTableTimeout` to **0**.

If you do not have access to an xEMS workstation, ask the subscriber to perform the following actions:

a. Power down all equipment.

b. Wait about 15 minutes.

> ***Note:*** The default time to clear MAC addresses in the 1-Meg Modem Service is 15 minutes. Offices can provision this value to a different length of time.

c. Power up all the equipment, beginning with the PC.

8. Make sure that the subscriber has the correct number of Ethernet devices connected to the 1-Meg Modem. If the office does not support Multi-PC Networking, the subscriber can connect one Ethernet device to the 1-Meg Modem. If the office supports Multi-PC Networking and uses xEMS Release 3 or lower, the subscriber can connect two Ethernet devices to the 1-Meg Modem. If the office supports Multi-PC Networking and uses xEMS Release 4 or higher, the subscriber can connect four Ethernet devices to the 1-Meg Modem.
9. Call the ISP. A busy network can time out the TCP/IP connection.

Connection problems with neighbor

A connection problem between a subscriber and a neighbor can be caused by one of the following conditions:

- The CO does not allow local switching at the DBIC. Only campus type environments allow local switching at the DBIC. The ISP must perform the connection if the CO does not allow local switching.
- The neighbor does not allow the connection.
- The neighbor turned the connection off.

Difference in voice quality

The subscriber can have too many filters in the location. Each location can support up to seven filters.

Ethernet Collision or Ethernet Data Collision LED flashes constantly

A constant flashing Ethernet Collision or Ethernet Data Collision LED indicates a condition at the subscriber location. Table 8-1 lists conditions that can cause the Ethernet Collision or Ethernet Data Collision LED to flash constantly.

Table 8-1 Possible causes of constant flashing Ethernet Collision or Ethernet Data Collision LED

Cause	Solution
1-Meg Modem is connected to a LAN.	Ask the subscriber to disconnect the 1-Meg Modem from the LAN. The *1-Meg Modem User Guide* describes the correct configurations for the 1-Meg Modem.
The subscriber has a faulty PC.	Ask the subscriber to troubleshoot the PC.
The subscriber has a faulty 1-Meg Modem.	Ask the subscriber to obtain a replacement for the 1-Meg Modem.

Firmware download fails

Perform the steps that follow if a CPE firmware download fails.

- Check the hardware configuration. Make sure the configuration supports a firmware download. See the section “Available functionality” in the “Introduction” chapter of this document for more information. If the configuration supports firmware downloads, attempt a second download.
- If the second attempt fails, limit the data rate of the user to 320 kbit/s downstream and 80 kbit/s upstream. Attempt a third download.
- If the third attempt succeeds, restore the data rates to the original values. If the third attempt fails, the modem could be faulty.

Firmware download takes long time

A long download time could reflect normal operations. A CPE firmware download can take up to four minutes for a single user.

Frequent resyncs

A subscriber may report the 1-Meg Modem frequently resyncs when one of the following actions occurs to the telephone:

- taken off-hook
- placed on-hook
- rings

A resync due to these events is a result of normal operations.

If the modem frequently resyncs outside these events, the subscriber should add a phone filter. Noise on the loop can cause frequent resyncs.

Look at the global cutoff in the CO. Field global_cutoff_on_disconnect in table OFCENG identifies the global cutoff. The value is in tens, and the disconnect should be no more than 800 ms.

Loop Status or Loop Sync LED flashes yellow

A Loop Status or Loop Sync LED that flashes yellow can indicate one of the following conditions:

- normal operations
- 1-Meg Modem cannot hold a stable sync
- loop performance problems

Normal operations

The 1-Meg Modem may need to synchronize to a downstream data signal. A flashing yellow Loop Status or Loop Sync LED indicates the 1-Meg Modem is synchronizing to a downstream data signal.

Wait a few minutes for the Loop Status or Loop Sync LED to turn green. If the Loop Status or Loop Sync LED does not turn green, the 1-Meg Modem cannot hold a stable sync.

1-Meg Modem cannot hold a stable sync

During normal operations, a loop may not reach the allowed maximum rate. The problem occurs if a loop is on the threshold of achieving a higher rate and the modem constantly switches between the higher rate and the lower rate.

If the office uses xEMS Release 3 or lower, you may notice the that the 1-Meg Modem Service periodically attempts to reach the higher rate. These attempts are part of normal operations. If a loop can not initially reach the allowed maximum rate, the 1-Meg Modem Service periodically attempts to reach the maximum rate. The time of the attempts can range from four minutes to one hour.

The problem can occur for downstream rates or upstream rates. For example, the 1-Meg Modem may be resyncing at a downstream rate of 640 kilobit per second (kbit/s) and the provisioned rate is 960 kbit/s. When the 1-Meg Modem reaches 640 kbit/s, the 1-Meg Modem attempts to resync at the provisioned rate of 960 kbit/s.

To temporarily establish a stable sync, set the subscriber's maximum rate to a lower value. The modem will stop trying to achieve the higher rate.

At the xEMS, determine if the 1-Meg Modem is trying to resync either the downstream or upstream speed to a level lower than the provisioned speeds. Perform the following steps.

1. Determine the provisioned speed.
    a. From the LCM drawer submap, select the DBIC for the 1-Meg Modem.
    b. Select **Misc:SNMP MIB Browser** from the pull-down menu.
    c. Select `private` under MIB Object ID.
    d. Use the Down Tree button to navigate through the following MIB Object IDs.
        - `enterprises`
        - `nortel`
        - `dms`
        - `thruway`
        - `xlc`
        - `xlctable`
        - `xclentry`
    e. Double-click `xlcentry`.
    f. Select the MIB `xlcLoopMaxSpeedDown`.
    g. Click the MIB Instance field and enter the value of the MIB instance. The value is a number from 1 to 16 that corresponds to slots 0 to 15 in the LCM line drawer.
    h. Click the Start Query button. The MIB Values field will display the provisioned downstream speed.
    i. Select the MIB `xlcLoopMaxSpeedUp`.
    j. Click the MIB Instance field and enter the value of the MIB instance.
    k. Click the Start Query button. The MIB Values field will display the provisioned upstream speed
2. View the actual speed.
    a. Select the MIB `xlcSpeedDownstream`.
    b. Click the MIB Instance field and enter the value of the MIB instance.

c. Click the Graph button. If the 1-Meg Modem is trying to sync at a lower speed than the provisioned speed, the graph displays the following 1-Meg Modem trends:

   - starts at a low speed
   - climbs to the provisioned speed
   - drops immediately back to the lower speed
   - starts to climb back to the provisioned speed

d. Select the MIB `xlcSpeedUpstream`.

e. Click the MIB Instance field and enter the value of the MIB instance.

f. Click the Graph button. If the 1-Meg Modem is trying to sync at a lower speed than the provisioned speed, the graph will display the following 1-Meg Modem trends:

   - starts at a low speed
   - climbs to the provisioned speed
   - drops immediately back to the lower speed
   - starts to climb back to the provisioned speed

3. If the 1-Meg Modem is trying to sync at a speed lower than the provisioned speed, reprovision the 1-Meg Modem to the lower speed.

These steps provide a temporary solution to a stable loop. For a permanent solution, troubleshoot the loop to determine why the loop could not maintain a stable sync. Possible causes include noise on the loop and loop length.

Loop performance problems

If the Loop Status or Loop Sync LED continues to flash yellow, a problem in the subscriber loop could be the cause. Refer to "Subscriber loop specifications" in the chapter "Performance management"in this document.

Loop Status or Loop Sync LED is red

A red Loop Status or Loop Sync LED can be a temporary condition. Periodic interference on the line can cause the 1-Meg Modem to lose sync, which causes a yellow LED.

If the Loop Status or Loop Sync LED remains red, troubleshoot the problem. A red LED means that the 1-Meg Modem does not detect a downstream signal.

Table 8-2 lists possible causes and solutions for a red Loop Status or Loop Sync LED.

Table 8-2 Possible causes of red Loop Status or Loop Sync LED

Cause	Solution
The 1-Meg Modem is not receiving a data signal from the CO.	Ask the subscriber to confirm the following: • The 1-Meg Modem is connected to the telephone wall jack with the RJ-11 modular telephone cord. • Both ends of the cord are firmly seated in their respective jacks. To confirm the end-to-end connectivity of the loop, have the subscriber call from a phone plugged in the filter port of the modem. If the 1-Meg Modem is properly connected, confirm that data service is on the first line, or center two pins, of the RJ-11 connector.
The subscriber installed a telephone filter between the 1-Meg Modem and the telephone wall outlet.	Ask the subscriber to perform the following steps. 1. Remove the filter. 2. Connect the 1-Meg Modem directly to the wall outlet.
The 1-Meg Modem Service is turned off at the central office.	Determine why service is off.
The xLC is faulty.	Test the xLC. If necessary, replace the card.

Loop Status or Loop Sync LED is yellow

The modem is synchronizing with the data service provider. The light turns green in about three minutes.

Multiple attempts to get valid MIB object

As part of normal operations, the xEMS makes two attempts to get a valid MIB object for a 1-Meg Modem. However, an attempt to get a MIB object for a 1-Meg Modem takes about five seconds. During the five seconds, xEMS returns the previous known value and sends a request to the 1-Meg Modem to update the current value.

No data transfer

Perform the following steps to troubleshoot a data transfer problem with the 1-Meg Modem:

- Ask the subscriber to confirm the 1-Meg Modem is turned ON.
- Ask the subscriber to confirm the 1-Meg Modem is in sync.

- Ask the subscriber to confirm the 1-Meg Modem is properly connected to the Ethernet card in the PC.
- Examine the condition of the subscriber line. The line should be in-service and capable of handling voice calls.
- Navigate through the node in xEMS. Check the status of each object.
- Ping the DBIC.
- Ask the subscriber to examine the configuration of the PC.
- Ask the subscriber to download information from a different site. The original site could be down.
- Check the xEMS BOOTP log for the invalid request. In some networks, the FID may have an incorrect MAC address for the line card.

No power

If a subscriber reports the 1-Meg Modem has no power, ask the subscriber to perform the following actions:

- Make sure the power switch on the back of the 1-Meg Modem is in the ON position.
- If the subscriber has an NTEX35AA, make sure the 1-Meg Modem power supply connects to the back of the 1-Meg Modem.
- Make sure all power strips and surge protectors for the 1-Meg Modem are on.
- Make sure the 1-Meg Modem power supply connects to the wall socket.
- Make sure the wall socket has power.

If the problem continues, ask the subscriber to return the modem to the operating company for service.

Sidetone on telephone

The subscriber could have too many filters in the location. Each location can have up to seven filters.

Slow data transfer

If a subscriber experiences a slow data transfer speed, the problem can be a temporary condition. If a loop cannot reach the maximum allowed transfer speed, the 1-Meg Modem Service will periodically attempt to reach the maximum speed. These attempts can range from every four minutes to every hour.

Wait for the 1-Meg Modem Service to reach the maximum data transfer. If the problem continues, perform the following actions:

1. Determine if the current data rate reflects traffic speed.
2. Determine if the signal quality meets the requirements in the chapter "Performance management"in this document.
3. If the signal quality meets the requirements to go to a higher data rate, the bit error rate (BER) could be the cause of the slow data transfer rate. Monitor the loop. The 1-Meg Modem Service will periodically attempt to switch to a higher data rate. The attempts will come at periods of 4 minutes, 16 minutes, and 64 minutes.

   Note: While off-hook, the maximum rates are 960 kbit/s downstream and 240 kbit/s upstream.

4. If the loop has an NTEX17BA or higher XLC, confirm that forward error correction (FEC) is turned on.

If the data transfer speed does not increase, troubleshoot the problem. Table 8-3 lists possible causes and solutions for slow data transfer speed.

Table 8-3 Possible causes of slow data transfer speed

Cause	Solution
The line has temporary noise.	Wait a few minutes for the noise to clear.
The 1-Meg Modem is within 12 inches of the PC monitor or CPU.	Ask the subscriber to move the 1-Meg Modem away from the PC monitor or CPU.
The xEMS configuration limits the speed of the data transfer.	Reset the speed to a higher level.
The subscriber loop does not meet the 1-Meg Modem Service specifications.	Refer to the section on "Subscriber loop specifications" in the chapter "Performance management" in this document.
The subscriber loop features poor characteristics, such as permanent line noise.	Analyze the characteristics of the line. Troubleshoot any problems or contact the next level of support.
A physical change in one of the following: • subscriber location, such as a new phone, answering machine, telephone jack, or phone location • outside plant wiring, such as water in lines or a temperature change in the aerial lines • CO, such as new HDLC lines	
Subscriber is transferring data from a slow Internet site.	Tell the subscriber the site is operating at a speed slower than the 1-Meg Modem.
A 1-Meg Modem or xLC is experiencing trouble or has failed. Check the xEMS Event Browser.	Replace the 1-Meg Modem or xLC.
If two PCs are connected to one 1-Meg Modem, two users can simultaneously use the 1-Meg Modem Service.	This situation occurs during normal operations. If two users simultaneously use the 1-Meg Modem Service, the1-Meg Modem Service provides each user half the available bandwidth.
The subscriber installed a telephone filter between the 1-Meg Modem and the telephone wall outlet.	Ask the subscriber to perform the following steps. 1. Remove the filter. 2. Connect the 1-Meg Modem directly to the wall outlet.

A slow speed could be part of normal operations. The xEMS may be configured to a lower speed, or the subscriber loop may only support a low rate. Not all users will achieve the maximum transfer rate.

Test failure

Perform the following actions to troubleshoot this issue.

1. Ask the subscriber to confirm the 1-Meg Modem is correctly connected.
2. Confirm the 1-Meg Modem did not loose sync during the test.

xEMS and HP OpenView issues

Following are possible issues related to the xEMS and HP OpenView that can require troubleshooting.

> ***Note:*** Nortel Networks technical support may ask you to run the tool **xemsSnapshot**. The tool captures xEMS technical information into a file in the `/tmp` directory.

Cannot add object

During provisioning, you may not be able to add an object to a submap. Table 8-4 lists causes for this issue.

Table 8-4 Possible causes of inability to add object

Cause	Solution
Disk is full.	Free up disk space.
The submap is be a read-only submap.	Add the object to a read-write submap.
The object is not be acceptable for the submap.	Add an acceptable object to the submap.

Cannot communicate with DBIC

Perform the following actions to troubleshoot this issue:

- Confirm that the xEMS can ping the DBIC.
- Confirm that the SNMP community string names are valid.
- Confirm that the transport network can pass SNMP messages.
- Confirm that the IP security has the correct IP address.
- Examine the MIB object `dbicSourceAddFilterIP`. If the problem is with the DBIC, power down and power up the DBIC to clear the security configuration. Be sure to correct the configuration problem first.
- Enter the command **ovstatus -c** at the UNIX command line to verify that the snmpCollect is running.

Cannot display Subscriber Loop Submap

You may be unable to open the Subscriber Loop submap when you double-click an xLC symbol. The cursor changes to an hourglass and the submap never opens. If you select the xLC symbol again, the cursor returns to the default pointer. However, you will not be able to open the Subscriber Loop submap.

Due to the large size of the grey selection area, you may have clicked in the selection area but outside the xLC symbol. Close and reopen the submap, and make sure you click the area in the xLC symbol.

Cannot drag symbol to submap

You may have used the left mouse button. Use the middle mouse button to drag a symbol to a submap.

> ***Note:*** If your mouse is programmed for the left hand, you may have used the right mouse button.

Cannot perform maintenance command

If a maintenance command fails on a DBIC or xLC, the xEMS may display an error message like the following:

```
HSTP Maintenance: Bad Syntax: bad argument: Bad DBIC name: DBIC
```

The command fails because the Selection Name of the DBIC or xLC was provisioned with a space. Reprovision the object without a space in the Selection Name.

Cannot provision an object

If you cannot provision an object, the symbol for the object may be deleted. An object can remain in the xEMS database when the object's symbol is deleted.

To correct this issue, create a new map. You can also perform the following steps.

1. Unprovision the object.
2. Reprovision the object and create a new symbol.

Cannot start HP OpenView after xEMS is readdressed

If the xEMS is readdressed, you may not be able to start HP OpenView. The HP OpenView database was updated to the system’s new IP address.

Following are solutions to this problem:

- Reinstall HP OpenView.
- Reinstall xEMS.
- Reinstall the DBIC MIBs.
- Delete the existing HP OpenView database. Use the following procedure:

> ***Note:*** This procedure does not affect the HP OpenView license. The HP OpenView license uses hostid and hostname, not IP address.

Procedure 8-1 Delete existing HP OpenView database

At the xEMS workstation

1 Shut down HP OpenView and all HP OpenView processes. Use the following command.

`ovstop`

2 Change the IP address of the system.

3 Remove the HP OpenView database. Use the following commands.

`cd $OV_DB/openview`

`rm -rf $OV_DB/openview/*`

4 Remove all current events. Use the following commands.

`cd $OV_LOG/xnmevents.*`

`rm $OV_LOG/trapd.log*`

5 Clear the SNMP cache. Use the following command.

`xnmsnmpconf -clearCache`

6 Re-register the HP OpenView fields. Use the following commands.

`ovstart ovwdb`

`ovw -fields`

7 Restart NNM. Use the following commands.

`ovstart`

`ovw`

Conflicts in line status

Occasionally xEMS indicates that a line is down when the line is up and synchronized at a single, stable speed. Table 8-5 lists causes for this conflict in line status.

Table 8-5 Possible causes of conflicts in line status

Cause	Solution
Polling could be slow	Wait a few minutes for xEMS to display the line as in-service.
The disk could be full and MIBs are not updated.	Free up disk space.
The loop does not meet the standards for 1-Meg Modem Service performance.	Check the loop length and characteristics. Refer to "Subscriber loop specifications" in the chapter "Performance management" in this document.

Corrupt HP OpenView fonts

HP-UX Motif Patch PHSS-12374, “XIMotif Runtime Sept97 Periodic Patch,” has a bug that corrupts the fonts in some displays. You will see this corruption on one the following displays:

- the initial HP OpenView splash screen
- field labels in the describe/modify dialog boxes

To solve the issue, perform one of the following actions:

- Remove patch PHSS-12374.
- Install a later Motif patch such as PHSS-13113, "XI Motif Nov97 Runtime Patch."

Data loss greater than allowed

While a 1-Meg Modem is in sync, xEMS can record a data loss greater than the allowed 10^{-7} bit error rate. Some reasons for this data loss follow:

- The subscriber has connected too many PCs to the 1-Meg Modem.If the office does not use Multi-PC Networking, the subscriber can connect only one PC to the 1-Meg Modem. If the office uses Multi PC Networking, the subscriber can use a 10BaseT Ethernet hub to connect up to four PCs.

> ***Note:*** The allowable number of PCs depends on the xEMS Release in the office. See the section Multi-PC Networking in the “Installation” chapter of this document.

- The 1-Meg Modem is located close to a noise-generating machine, such as an electric pencil sharpener or a computer monitor.
- The phone is constantly going on-hook and off-hook.
- The subscriber connected more than 10 telephones to the same telephone line.
- The transport network introduced errors.
- The 1-Meg Modem is trying to sync at a speed lower than the provisioned speed.

Database size message

Network Node Manager (NNM) generates this message. Table 8-6 lists possible causes of this message.

Table 8-6 Possible causes of database size message

Cause	Solution
The HP OpenView license is limited to 250 nodes.	Check the HP OpenView license. If necessary, get an unlimited full license.
The database is too large.	Perform the following steps. 1. Turn off auto-discovery. 2. Delete all non-1-Meg Modem Service objects to free disk space.

Displays object after unprovisioning

When a DBIC is unprovisioned, the xEMS removes that DBIC's IP address from the BOOTP server and attempts a DBIC cold restart. If the network is down, the DBIC will not be restarted. The DBIC continues to operate even though the DBIC is unprovisioned. This issue also applies to unprovisioning of xLCs.

To prevent this issue from occurring, perform the following actions after you unprovision the object:

- Offline the DBIC and xLC hardware.
- Remove the DBIC and xLC hardware.

HP OpenView license expires

Occasionally you may receive a message that indicates the HP OpenView license has expired. Table 8-7 lists causes of this message.

Table 8-7 Possible causes of HP OpenView license expiration

Cause	Solution
The license has expired.	Obtain a new HP OpenView license.
The system cannot recognize a valid license.	Reload HP OpenView.

HP OpenView searches all nodes in the network

Perform the following actions to troubleshoot this issue.

1. Turn off auto-discovery. Use the selection **Options->Network Polling Configuration:IP** to open the Network Polling Configuration dialog box.
2. Confirm that HSTPMON is running. Enter the command **ovstatus -c** at the UNIX command line. This command displays the status of processes running on xEMS. If you need to manually start HSTPMON, enter the command **ovstart hstpmon** at the UNIX command line.

Locate selections displays incorrect or duplicate information

The selections under the Locate pull-down menu allow you to search for objects with a variety of criteria. The results of some searches can display incorrect or duplicate information. Examples follow:

- A list of DBICs includes two entries for each DBIC and an entry for the DBIC’s LCM.
- The **Locate by Attribute** selection does not display all objects.
- The results of the **Locate by Attribute** list are displayed in a random order.

Use the Event Browser and the Inventory selection to locate the required objects.

NNM license expires

Occasionally you may receive a message that indicates the NNM license has expired. This message is incorrect. The NNM license is a permanent license.

To solve this problem, reinstall the NNM license. If you have additional questions, contact your HP OpenView support group.

No communication between components

This issue can be a result of normal operations. Following are possible causes of this issue:

- A DBIC is rebooting.
- A DBIC is provisioned, but the hardware is not installed in the LCM line drawer.
- A PC is turned OFF.
- A DBIC is not using the correct software load.

If all DBICs drop off at once, troubleshoot the transport network.

No hardware flag for DBIC

The xEMS displays a no hardware flag for a DBIC under the following conditions:

- The xEMS did not receive a restart command from a DBIC after the DBIC was provisioned.
- The DBIC was provisioned before the hardware was installed.
- The hardware was in place but not provisioned.

To remove the no hardware flag, install the DBIC hardware. If the DBIC hardware is present, NNM is not aware of the presence of the DBIC. Perform the following actions:

- Use the **loadhost** command at the UNIX command line to forcefully add the DBIC IP address to the topology database.
- Redefine the auto-discovery filter.
- Manually add the DBIC address to the IP map.

PC symbol does not show a MAC address

At the Subscriber loop submap, the PC symbol may not show the PC's MAC address. The address changes to `??` when the xEMS loses communications with the DBIC.

This condition is temporary and does not affect service. The DBIC will detect the PC and the PC's MAC address. The DBIC will provide the xEMS with the correct address.

PC symbol is red

A red PC symbol can indicate normal operations. The PC symbol turns red if the 1-Meg Modem does not receive a sync signal from the PC's Ethernet card. However, some Ethernet cards do not issue this signal.

PC symbol with MAC address of 000000000000

This issue occurs during normal operations. The name of the PC symbol include the name of a learned MAC address. If the xEMS has only one learned MAC address for the subscriber loop, one PC symbol displays the learned MAC address and one PC symbol displays a MAC address of 000000000000. If the xEMS has no learned MAC addresses for the subscriber loop, both PC symbols display a MAC address of 000000000000.

xLC symbol disappears

Occasionally an xLC symbol intermittently disappears and reappears on a submap. This problem occurs because the DBIC fails to continually detect the xLC. Perform the following actions to troubleshoot the problem:

- Determine if other xLCs have the same problem. Analyze other xLCs on the same DBIC and other xLCs on the same XPM.
- If other xLCs on the DBIC have the problem, the DBIC could be the source of the problem.
  - Perform a warm reset on the DBIC.
  - If the xLC symbol continues to disappear, perform a cold reset on the DBIC.
- If other xLCs on the same XPM have the problem, the clock and frame-timing signals from the XPM could be the source of the problem.
  - Perform a warm SWACT between the two XPM units.
  - If the xLC symbol continues to disappear, the DBIC could be the source of the problem.
  - Perform a warm reset on the DBIC.
  - If the xLC symbol continues to disappear, perform a cold reset on the DBIC.
- If you troubleshoot the DBIC and XPM and the xLC symbol continues to disappear, ask the network administrator about the integrity of the transport network.

DBIC issues

Possible issues related to the DBIC that can require troubleshooting follow.

Cannot ping to DBIC from xEMS

Perform the following actions to troubleshoot this issue:

- Confirm the DBIC hardware is installed.
- Verify the DBIC has power. Check the power to the LCM shelf.
- Verify the DBIC hardware is physically connected to the network.
- Verify the DBIC is not in the process of restarting.

- If the this problem began with the installation of an xLC, reseat the xLC. If the problem continues, replace the xLC.
- Confirm the xEMS has the correct IP address for the DBIC. The BOOTP and the DHCP servers reside in the xEMS.
- Determine if the xEMS is working properly. Try pinging to another DBIC.
  - If this second ping operation is successful, the xEMS and the transport network are functioning correctly. The problem exists between the transport network and the DBIC.
  - If you could not ping to another DBIC, perform the following actions:
    - Verify the BOOTP server in running.
    - Verify network connectivity to the BOOTP server.
- Verify the IP address was sent from the xEMS to the DBIC.
- Confirm the xEMS has access to the management network.
- Confirm the transport network is configured properly.
- Confirm the management network is configured correctly. The management network consists of the xEMS, a portion of the transport network, and the DBICs.
- Determine if the DBIC hardware is faulty.
- Check cable connections.
- Monitor the SYSLOG.LOG file to determine if a BOOTP request from the DBIC was sent to and received by the xEMS. These requests are issued randomly within a 60-second period. Use the following command at the UNIX command line:

  ```
  tail -f /var/adm/syslog/syslog.log
  ```

  > ***Note:*** Some offices and workstations can have `syslog.log` in a different directory.

  You may need to issue a hard DBIC reset, which will send the request within a couple seconds.
- If a BOOTP request is being issued, confirm the xEMS is sending a reply back to the DBIC. If the xEMS is not sending a reply, troubleshoot the xEMS. Confirm the xEMS is configured with the correct DBIC MAC address.
- Confirm with a network analyzer that a BOOTP request is being received, or ensure the BOOTP debug flag is turned ON.
- If the xEMS receives a BOOTP request from the DBIC, and the DBIC receives a reply from the xEMS, attach an analyzer to the DBIC to determine if the DBIC is the source of the problem. If the DBIC checks

out, call the network administrator and check the status of the transport network.

If the analyzer points to the DBIC as the source of the problem, ask the network administrator to confirm that the DBIC is configured with the correct IP address, subnet mask, and the default gateway.

If the DBIC checks out, try pinging toward the xEMS from the DBIC. If the ping is unsuccessful, check the transport network. As a last resort, replace the DBIC.

- If the DBIC was working, then determine if anything was changed in the management network. If the network appears to be operating correctly, focus on the DBIC.
- Try pinging other elements near the DBIC, such as the router near the DBIC, or the router near the transport network.

Cannot reboot

Perform the following actions to troubleshoot this issue:

1. Confirm the new load name is different from the load currently used in the DBIC.
2. Confirm the new load name is correctly entered in xEMS.
3. Confirm that a valid software load was placed in xEMS in the correct directory.
4. Verify the xEMS TFTP server is running.
5. If the status of the MIB variable `dbicBootResult` is `tftpFail`, check the network connections and the xEMS TFTP server.
6. If the status of the MIB variable `dbicBootResult` is `recoveryFail`, replace the DBIC.

Cannot reset DBIC MIB counters

This problem reflects normal operations. The Simple Network Management Protocol (SNMP) guidelines do not allow DBIC MIB counters to be reset. You can get relative values through subtraction at the xEMS.

1. Record the value of the MIB counter.
2. After a period of time, record the new value of the MIB counter.
3. Subtract the difference between the two counts.

Does not send traps

Perform the following actions to troubleshoot this issue:

- Verify the DBIC can be pinged.
- Verify the MIB `dbicManagerTable` has the correct IP address for xEMS.
- Verify the MIB `dbicManagerTable` has MIB `dbicTrapUnackedControl` enabled.
- Verify the MIB `dbicTrapTable` has valid information.
- Verify the MIB `dbicTrapTable` does not filter all traps. Use the UNIX commands **OVtrapd** and **OVactiond**.

If the problem continues, the DBIC may be booting off a network server other than xEMS. Contact the administrator of the transport network.

Long time to restart or reboot

This problem typically occurs at the end of a software load. Normally, a restart or reboot takes about 2 1/2 minutes. If a DBIC restart or reboot takes longer than 2 1/2 minutes, reload the DBIC software.

Multiple attempts to get valid MIB objects

As part of normal operations, the xEMS makes two attempts to retrieve a valid MIB object for a 1-Meg Modem. However, an attempt to get a MIB object for a 1-Meg Modem takes about 5 seconds. During the 5 seconds, xEMS returns the previous known value and sends a request to the 1-Meg Modem to update the current value.

Reboots with previous load

Occasionally a DBIC cannot reboot with an updated load. Instead, the DBIC reboots with a previous load. Table 8-8 lists possible causes for this problem.

Table 8-8 Possible causes for DBIC reboot with previous load

Cause	Solution
xEMS TFTP has an invalid load name for the DBIC.	Perform the following actions: • Reconfigure xEMS TFTP. • Verify the new load is valid in terms of date and byte count.
The new load was corrupted during the FTP transfer to xEMS. The load may have been transferred in ASCII mode.	Transfer the new load again in binary mode.
Excessive errors in the transport network caused the new load to fail.	Perform the following actions: • Ask the network administrator about the integrity of the network. • Verify the BOOTP relay agent is working.

Test failure

Replace the DBIC if the DBIC fails an in-service or out-of-service test. Refer to the card replacement procedure in this document and the Nortel Networks technical publication (NTP) *Card Replacement Procedures* for your release.

xLC cannot receive data from DBIC

Test the xLC to troubleshoot this issue. Perform the following actions to test the xLC:

1. Go to the submap with the xLC.
2. Select the xLC.
3. Busy the xLC.
4. Test the xLC.
5. Return the xLC to service.

xLC issues

Possible issues related to the xLC that can require troubleshooting follow.

Long sync time after power up

Operating company personnel may report that an xLC takes a long amount of time to sync after the xLC is powered up. Reasons why an xLC can take a long time to sync after a power up follow:

- The loop is be impaired.
- The system is rate-adapting. The xLC is syncing to a lower-than-provisioned data transfer speed.

xEMS cannot detect an xLC

Occasionally, the xEMS cannot detect an xLC. The xLC may disappear from the xEMS submap or appear with incorrect information.

Perform the following actions to troubleshoot this issue:

1. Confirm the xLC is properly seated.
2. Confirm the card in the xLC slot is an xLC. A POTS line card could be installed in the slot.
3. Verify the clocks from the LCM's serving XPM. Perform a warm SWACT between the two XPM units.

xLC cannot pass data from DBIC to 1-Meg Modem

During troubleshooting data transfer problems, you may discover the xLC cannot pass data from the DBIC to the 1-Meg Modem. Perform the following actions to troubleshoot this issue:

1. Confirm the xLC is in-service.
2. Confirm the CPE is in-service.
3. Confirm the xLC is in sync.
4. Confirm the xLC has obtained at least the minimum speed.
5. Confirm the value in the MIB variable `dbicSwitchingTable` is valid.
6. Confirm the MIB variable `dbicSwitchingTable` has the correct learned MAC address.
7. If the VLAN state is **disabled**, confirm the provider MAC address was learned. If the provider MAC address was not learned, check the PC configuration and the network configuration.

   Note: You can verify the VLAN state from the xEMS workstation. Select the object and select **Describe->Modify Object** from the pull-down menu.

xLC fails loopback test

If an xLC fails a loopback test, perform the loopback test again. The issue can be due to a temporary condition.

If the xLC fails the second loopback test, troubleshoot the issue. A second failure could indicate a faulty xLC or a problem in the line card bus in the backplane.

Perform the following actions to troubleshoot the issue:

1. Determine if the xLC can provide voice services. If the xLC cannot provide voice services and fails a loopback test, the card is faulty. Replace the card.
2. If the problem can provide voice services, the clock and frame-timing signals from the serving XPM could be the source of the problem. Perform a warm switch activity (SWACT) between the two XPM units.
3. If the problem continues after the SWACT, replace the DBIC.
4. If the problem continues after you replace the DBIC, replace the line drawer.

Network issues

Possible issues related to the 1-Meg Modem Service network that can require troubleshooting follow.

Failure of Ethernet link from FID to DBIC

If the 1-Meg Modem Service looses connectivity between the DBIC and an Alcatel OmniSwitch* or OmniStack* FID, the following symptoms can occur:

- HP OpenView will display the loss of connectivity.
- The xEMS Event Browser will display the loss of connectivity.
- X-Vision will display the loss of connectivity.
- The Ethernet LED on the front panel of the Ethernet port will go out.

When you restore the link, HP OpenView and xEMS will not display the recovered link until you perform one of the following tasks:

- Reset the DBIC.
- Statistically configure the maintenance VLAN in the OmniSwitch or OmniStack FID.

Failure of link between FID and ATM hub

If the 1-Meg Modem Service looses connectivity between the FID and ATM hub, the ATM hub will generate an alarm or error messages. Check the documentation for the ATM hub to identify and clear the alarm or error condition.

Resets and restarts

As you troubleshoot possible faults in the 1-Meg Modem Service, you may need to restart a DBIC. Types of restarts follow:

- Reset button on card
- Warm restart on xEMS Release 3 or lower
- Cold restart on xEMS Release 3 or lower
- Restart on xEMS Release 4 or higher

Reset button on card

The DBIC has a small reset button. When you press the button, you perform a cold reset on the DBIC. A cold reset resets all hardware and software.

Warm restart

If the office has xEMS Release 3 or lower, you can perform a warm restart through an xEMS menus selection or the **hstpmaint** parameter **-restart** at the command line. A warm restart performs the actions that follow:

- resets all hardware
- resets all software
- preserves parameter RAM (PRAM), which store provisionable values such as the values that follow:
  - desired state of xLCs
  - configured loop speeds
  - VLAN options
  - bridging options

A warm restart from the xEMS reconfigures PRAM values.

Restart

If the office has xEMS Release 4 or higher, you can perform a cold restart through the xEMS or the **hstpmaint** command at the command line. A cold restart resets all hardware and software. The parameter **<restart_type>** at the command line supports the values **warmReset** and **coldReset**. However, each parameter performs a cold restart.

System recovery

The following section describes 1-Meg Modem Service operations in a recovery scenario.

Loss of xEMS communication

Recovery from a loss of communication with the xEMS occurs automatically. Alarms are not lost during such events and user traffic is not affected.

Loss of communication between the xEMS and a DBIC indicates that no modifications can be made to the DBIC set-up. However, if the data path is still operational, traffic for existing users will continue.

Any alarms or traps sent by the DBIC are resent at regular intervals until the xEMS acknowledges the trap. This process ensures that important alarms are not lost. When xEMS communication is re-established, the xEMS will poll all counters to clear them, because the counters could have wrapped around during the loss of communication.

Loss of data path

Loss of data path occurs when a network element, such as a router or switch, experiences one of the following conditions:

- a fault
- an OOS maintenance state
- a physical connection is broken, such as a broken or unplugged cable

The office selects the protection for these devices. The office is responsible for the recovery plan of the transport network, although the xEMS will provide the standard information and capabilities to help isolate faults.

If the DBIC loses the data path to the network, upstream data will be buffered until the buffers run out. At this point, new user frames will overwrite the oldest frames in the buffer. Once the data path to the network is re-established, the DBIC will begin sending data out the 10BaseT or 100BaseT port as before.

Recovery from loss of data path is automatic in regards to the 1-Meg Modem Service components. Loss of data is expected, especially if the data path is down for a significant amount of time. Most upper layers, such as TCP, have retransmission algorithms which allow full recovery from short data path down time. Longer losses can have more visible repercussions on the user such as loss of TCP connections.

Loss of power

Following a loss of power to the xEMS, operating company personnel must manually start-up the xEMS software. The xEMS automatically re-synchronizes with the network. All important parameters are stored in non-volatile memory on the xEMS to allow full recovery.

> **CAUTION**
> **Backing-up an active database causes corruption**
> Always execute the **ovstop** command at the UNIX command line before backing up the system. Shut your database down properly before using the backup procedure to avoid corrupting the database.

Recovery from loss of power to the DBIC and xLC takes two forms:

1. Reconfigure from xEMS.
2. Use parameters in non-violative store (flash eeprom).

The xEMS defines the recovery method based on the initial configuration of the DBIC. The factory default is to reconfigure from the xEMS.

Power failure during download

If the 1-Meg Modem Service experiences a power failure during a download, the 1-Meg Modem Service reverts to the previous load to maintain system integrity. The DBIC data subsystem goes out-of-service and performs a restart to install a new load.

Non-volatile store

During normal operation, the 1-Meg Modem Service saves crucial configuration parameters such as MIB variables in non-volatile (NV) store. This process allows the DBIC to start-up and provide the same data path. At start-up, the SNMP agent reads the NV store and updates the local RAM. If the xEMS changes a value, the 1-Meg Modem Service updates NV store to reflect the change.

Note: The IP address of the DBIC is not stored in NV memory, so the DBIC cannot communicate immediately with the xEMS. The DBIC must follow the normal BOOTP process to obtain an IP address.

State changes

Maintenance actions and changes in the states of some MIBs can affect the states of other MIBs. An example follows:

1. A technician manually busies a DBIC.
2. The MIB `dbicDrawerStatus` for the DBIC changes state to manBusy.
3. The MIB `xlcState` for each of the xLCs in the drawer changes state to lmBusy.
4. Each xLC in the drawer changes color to Blue and status to Unknown at the xEMS.

A state change table shows the effect of maintenance actions and MIB state changes on a MIB. This section provides state change tables for the MIBs that follow:

- `xlcState`
- `xlcDesiredState`
- `xlcLoopbackTest`
- `cpeTest`
- `cpeDownloadControl`
- `cpeState`

Use these tables for advanced troubleshooting and MIB analysis. The left side of the table lists each maintenance action or MIB with a state change. The right side of the table lists possible state changes for the affected MIB based on the original state of the MIB. For example, table 8-9 shows that the MIB `xlcState` will change state from inService to notEquipped if you the remove the line card from the drawer.

`xlcState`

Table8-9 lists the effects of maintenance actions on the MIB `xlcState`.

Table 8-9 Effect of maintenance actions on `xlcState`

	Current and new state in `xlcState`					
Action	**notEquipped**	**offLine**	**manBusy**	**inService**	**test**	**lmBusy**
Remove line card	notEquipped	notEquipped	notEquipped	notEquipped	notEquipped	notEquipped
Insert line card	offLine	offLine	offLine	offLine	offLine	offLine
CPE loses sync	notEquipped (chan off)	offline (chan off)	manBusy (chan off)	inService	test (testing) (chan on)	chan off
CPE finds sync	notEquipped (chan off)	offline (chan off)	manBusy (chan off)	inService	test (testing) (chan on)	chan off

Note: The term *fail* indicates the process fails. The term *chan* indicates the XLBUS channel between the xLC and DBIC.

Table8-10 lists the effects of MIB changes on the MIB `xlcState`.

Table 8-10 Effect of MIB state changes on `xlcState`

MIB and new state		Current and new state in `xlcState`					
MIB	**State**	**notEquipped**	**offLine**	**manBusy**	**inService**	**test**	**lmBusy**
`xlc Desired State`	offLine	notEquipped	offLine	offLine	offLine	test (fail)	offLine
	manBusy	notEquipped	manBusy	manBusy	manBusy	test	lmBusy
	inService	notEquipped	inService	inService	inService	test (fail)	lmBusy
`xlc Loopback Test`	stop	notEquipped	offLine	manBusy	inService	manBusy	lmBusy
	start	notEquipped (fail)	offLine (fail)	test (testing off) (chan off)	inService (fail)	test	lmBusy (fail)
`cpeTest`	stop	notEquipped	offLine	manBusy (chan off)	inService	manBusy	lmBusy
	start	notEquipped (fail)	offLine (fail)	test (testing off) (chan on)	inService (fail)	test	lmBusy (fail)
`cpe Download Control`	stop	notEquipped	offLine	manBusy (testing off) (chan off)	inService	manBusy	lmBusy
	start	notEquipped (fail)	offLine (fail)	manBusy (testing off) (chan on)	inService (fail)	test	lmBusy (fail)
`dbic Drawer Status`	inService	notEquipped	offLine	manBusy	inService	test	`xlc Desired State`
	manBusy	notEquipped	offLine	lmBusy	lmBusy	test (fail)	lmBusy
	offLine	notEquipped	offLine	lmBusy	lmBusy	test (fail)	lmBusy

Note: The term *fail* indicates the process fails. The term *chan* indicates the XLBUS channel between the xLC and DBIC.

`xlcDesiredState`

Table8-11 lists the effects of maintenance actions on the MIB `xlcDesiredState`.

Table 8-11 Effects of maintenance actions on `xlcDesiredState`

	Current and new state in `xlcDesiredState`		
Action	**offLine**	**manBusy**	**inService**
Remove line card	offLine	manBusy	inService
Insert line card	offLine	manBusy	inService
CPE loses sync	offLine	manBusy	inService
CPE finds sync	offLine	manBusy	inService

Table8-12 lists the effects of MIB changes on the MIB `xlcDesiredState`.

Table 8-12 Effects of MIB state changes on `xlcDesiredState`

MIB and new state		Current and new state in `xlcDesiredState`		
MIB	**State**	**offLine**	**manBusy**	**inService**
`xlcDesiredState`	offLine	offline	offline	offline
	manBusy	manBusy	manBusy	manBusy
	inService	inService	inService	inService
`xlcLoopbackTest`	stop	offline	manBusy	inService
	start	offline (fail)	manBusy	inService (fail)
`cpeTest`	stop	offline	manBusy	inService
	start	offline (fail)	manBusy	inService (fail)
`cpeDownloadControl`	stop	offline	manBusy	inService
	start	offline (fail)	manBusy	inService (fail)
`dbicDrawerStatus`	inService	offline	manBusy	inService
	manBusy	offline	manBusy (fail)	inService
	offLine	offline	manBusy (fail)	inService
Note: The term *fail* indicates the process fails.				

`xlcLoopbackTest`

Table8-13 lists the effects of maintenance actions on the MIB `xlcLoopbackTest`.

Table 8-13 Effects of maintenance actions on `xlcLoopbackTest`

	Current and new state in `xlcLoopbackTest`	
Action	**start**	**stop**
Remove line card	start	stop
Insert line card	start	stop
CPE loses sync	start (fail) (chan off)	stop
CPE finds sync	start (chan on)	stop
Note: The term *fail* indicates the process fails. The term *chan* indicates the XLBUS channel between the xLC and DBIC.		

Table8-14 lists the effects of MIB changes on the MIB `xlcLoopbackTest`.

Table 8-14 Effects of MIB state changes on `xlcLoopbackTest`

MIB and new state		Current and new state in `xlcLoopbackTest`	
MIB	**State**	**start**	**stop**
`xlcDesiredState`	offLine	start (fail)	stop (fail)
	manBusy	start	stop
	inService	start (fail)	stop
`xlcLoopbackTest`	stop	stop	stop
	start	start	stop
`cpeTest`	stop	start	stop
	start	start (fail)	stop
`cpeDownloadControl`	stop	start	stop
	start	start (fail)	stop
`dbicDrawerStatus`	inService	start (fail)	stop
	manBusy	start (fail)	stop
	offLine	start (fail)	stop
Note: The term *fail* indicates the process fails.			

`cpeTest`

Table8-15 lists the effects of maintenance actions on the MIB `cpeTest`.

Table 8-15 Effect of maintenance actions on `cpeTest`

	Current and new state in `cpeTest`	
Action	**start**	**stop**
Remove line card	start	stop
Insert line card	start	stop
CPE loses sync	start (fail) (chan off)	stop
CPE finds sync	start (chan on)	stop

Note: The term *fail* indicates the process fails. The term *chan* indicates the XLBUS channel between the xLC and DBIC.

Table8-16 lists the affects of MIB changes on the MIB `cpeTest`.

Table 8-16 Effect of MIB state changes on `cpeTest`

MIB and new state		Current and new state in `cpeTest`	
MIB	**State**	**start**	**stop**
`xlcDesiredState`	offLine	start (fail)	stop
	manBusy	start	stop
	inService	start (fail)	stop
`xlcLoopbackTest`	stop	start	stop
	start	start (fail)	stop
`cpeTest`	stop	stop	stop
	start	start	stop
`cpeDownloadControl`	stop	start	stop
	start	start (fail)	stop
`dbicDrawerStatus`	inService	start (fail)	stop
	manBusy	start (fail)	stop
	offLine	start (fail)	stop

Note: The term *fail* indicates the process fails.

`cpeDownloadControl`

Table8-17 lists the effects of maintenance actions on the MIB `cpeDownloadControl`.

Table 8-17 Effect of maintenance actions on `cpeDownloadControl`

	Current and new state in `cpeDownloadControl`	
Action	**start**	**stop**
Remove line card	start	stop
Insert line card	start	stop
CPE loses sync	start(fail) (chan off)	stop
CPE finds sync	start (chan on)	stop
Note: The term *fail* indicates the process fails. The term *chan* indicates the XLBUS channel between the xLC and DBIC.		

Table8-18 lists the affects of MIB changes on the MIB `cpeDownloadControl`.

Table 8-18 Affect of MIB state changes on `cpeDownloadControl`

MIB and new state		Current and new state in `cpeDownloadControl`	
MIB	**State**	**start**	**stop**
`xlcDesiredState`	offLine	fail	stop
	manBusy	start	stop
	inService	start (fail)	stop
`xlcLoopbackTest`	stop	start	stop
	start	start (fail)	stop
`cpeTest`	stop	start	stop
	start	start (fail)	stop
`cpeDownloadControl`	stop	start	stop
	start	start	start
`dbicDrawerStatus`	inService	start (fail)	stop
	manBusy	start (fail)	stop
	offLine	start (fail)	stop
Note: The term *fail* indicates the process fails.			

`cpeState`

Table8-19 lists the affects of maintenance actions on the MIB `cpeState`.

Table 8-19 Affect of maintenance actions on `cpeState`

	Current and new state in `cpeState`			
Action	**lossOfSync**	**inService**	**test**	**lmBusy**
Remove line card	lossOfSync	lossOfSync		
Insert line card	lossOfSync	lossOfSync		
CPE loses sync	lossOfSync	lossOfSync		
CPE finds sync	inService	inService		

Table8-20 lists the affects of MIB changes on the MIB `cpeState`.

Table 8-20 Affect of MIB state changes on `cpeState`

MIB and new state		Current and new state in `cpeState`			
MIB	**State**	**lossOfSync**	**inService**	**test**	**lmBusy**
`xlcDesiredState`	offLine	lossOfSync	lossOfSync		
	manBusy	inService	inService		
	inService	inService	inService		
`xlcLoopbackTest`	stop	lossOfSync	inService		
	start	lossOfSync	lmbusy		
`cpeTest`	stop	lossOfSync	inService		
	start	lossOfSync (fail)	test		
`cpeDownloadControl`	stop	lossOfSync	inService		
	start	lossOfSync (fail)	lmbusy		
`dbicDrawerStatus`	inService				
	manBusy				
	offLine				
Note: The term *fail* indicates the process fails.					

State change rules

The state change rules that follow apply to all objects in the HSTP-Network submap hierarchy.

- An object must be manually busy before you can test the object.

9 Card replacement

This chapter provides the following information:

- line concentrating module (LCM) frame, shelf, and drawer layouts
- a procedure to replace the data-enhanced bus interface card (DBIC) in a LCM drawer
- a procedure to replace the xDSL line card (xLC) in a LCM drawer

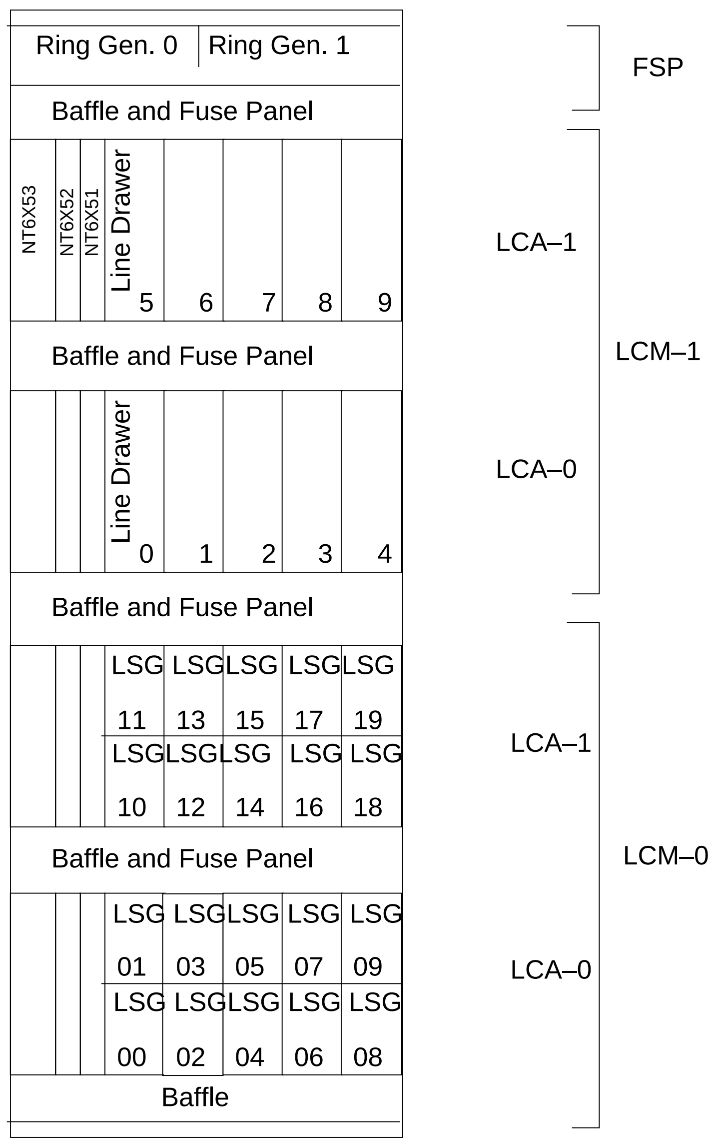
This information is also available in the Nortel Networks technical publication (NTP) *Card Replacement Procedures* for your release.

LCM frame, shelf, and drawer layouts

Application

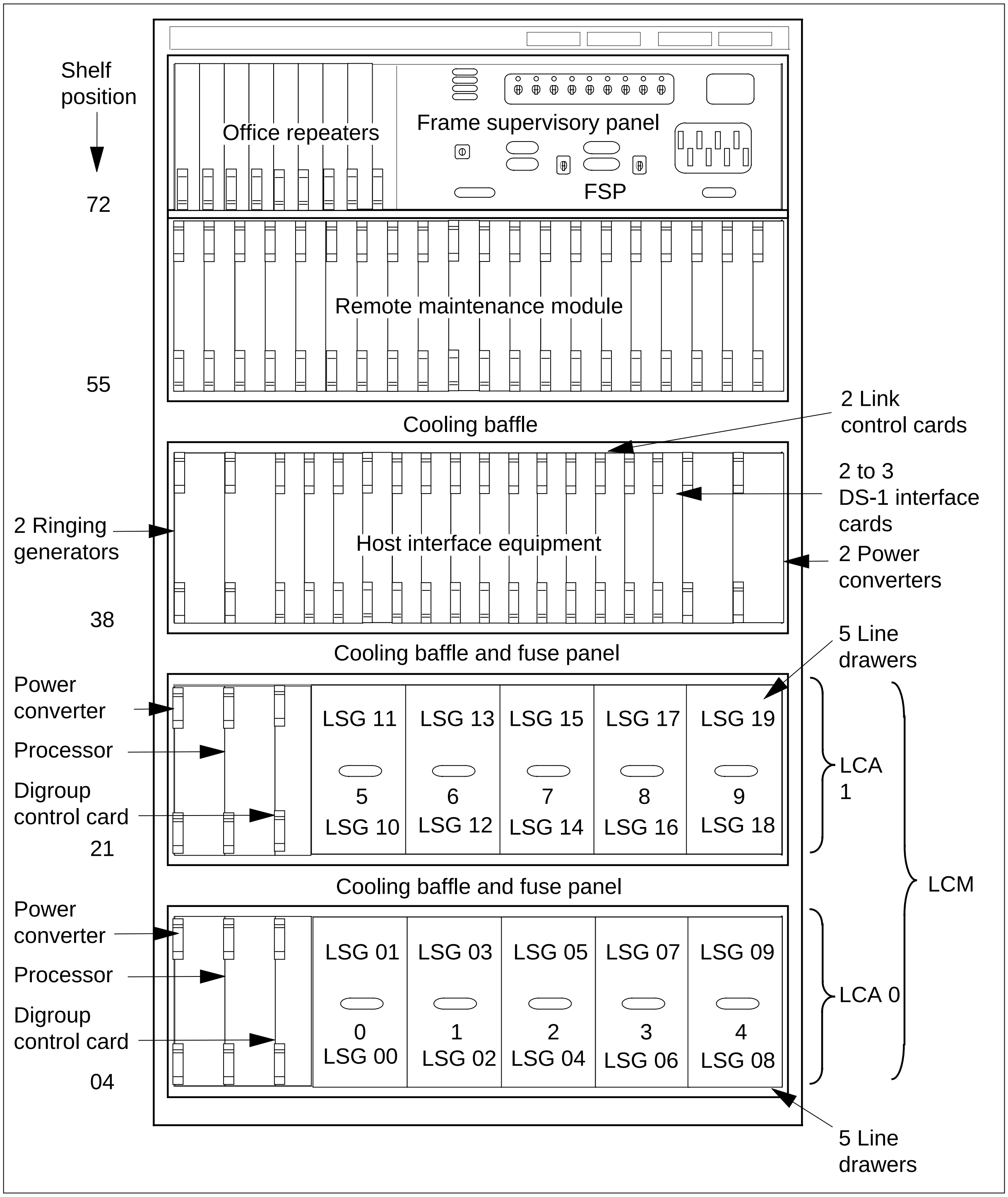
This section provides frame, shelf, and drawer layouts for line concentrating equipment (LCE). This section shows standard layouts. The LCE in your office can have a different layout.

Frame layout for LCE



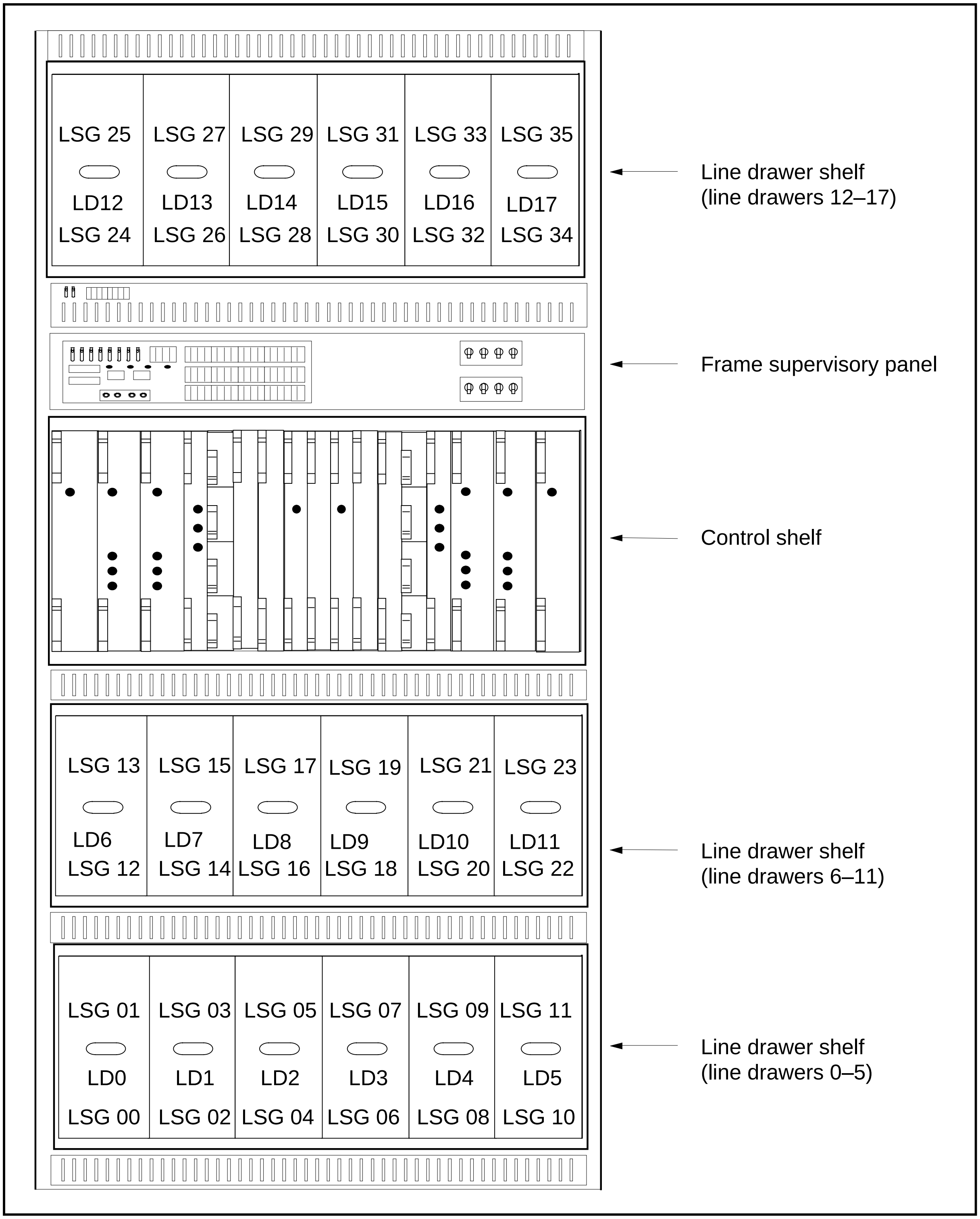
LCM frame, shelf, and drawer layouts (continued)

Frame layout for RLCM



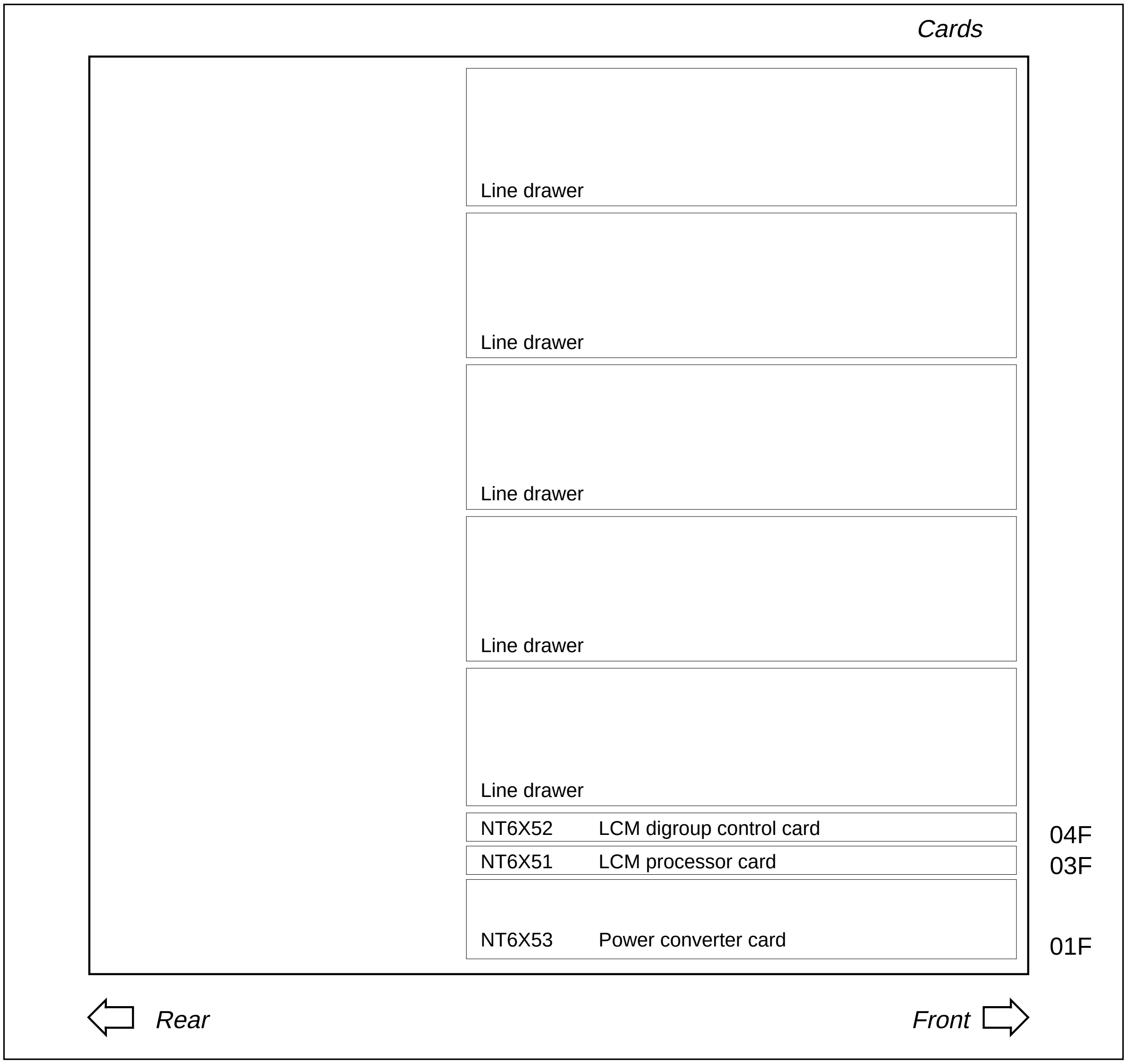
LCM frame, shelf, and drawer layouts (continued)

Frame layout for Star Remote Hub



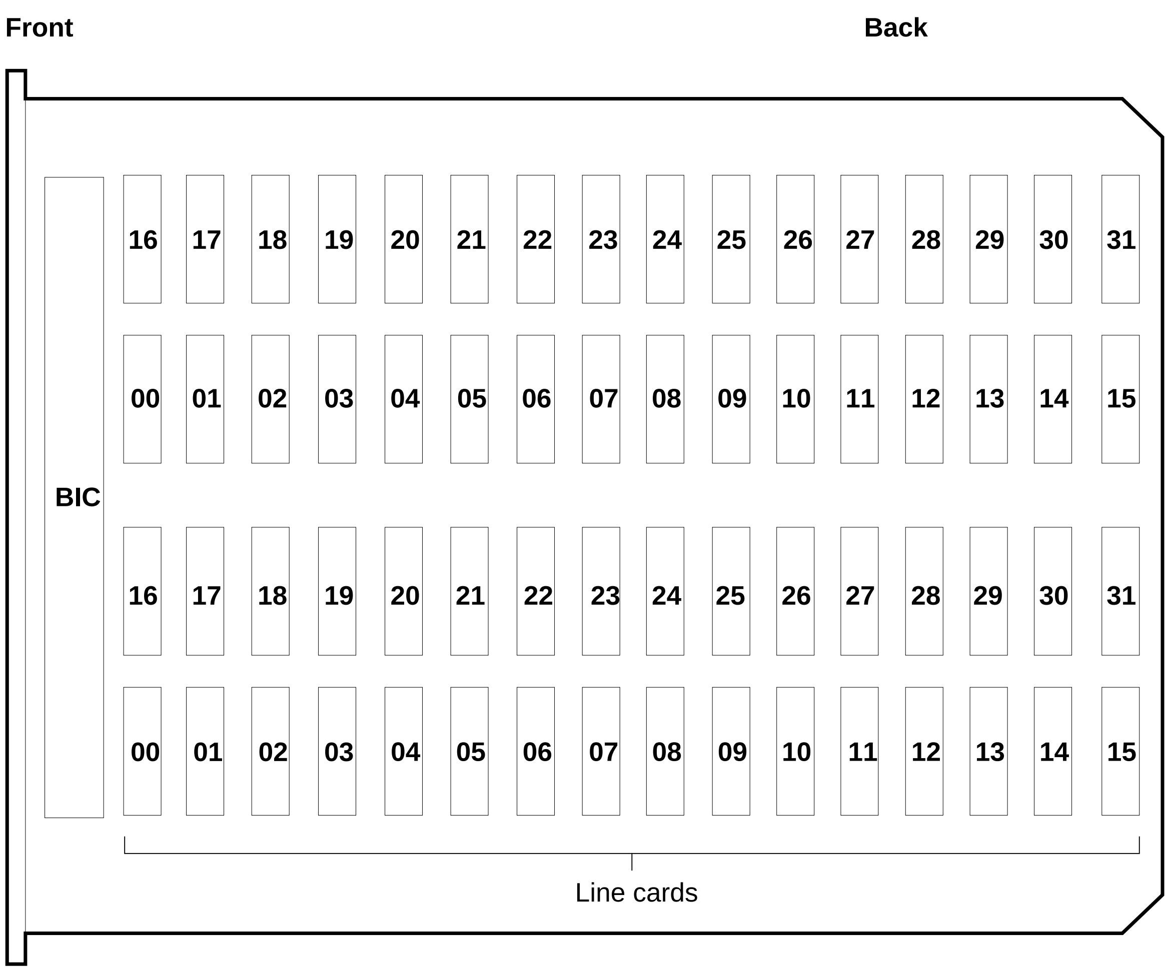
LCM frame, shelf, and drawer layouts (continued)

LCA layout



LCM frame, shelf, and drawer layouts (end)

Line drawer layout



Legend:
BIC Bus interface card

NTEX17 in an LCM line drawer

Application

Use this procedure to replace an NTEX17 card in a line concentrating module (LCM) line drawer. This procedure supports the cards that follow:

- NTEX17AA
- NTEX17BA
- NTEX17CA
- NTEX17DA

Common procedures

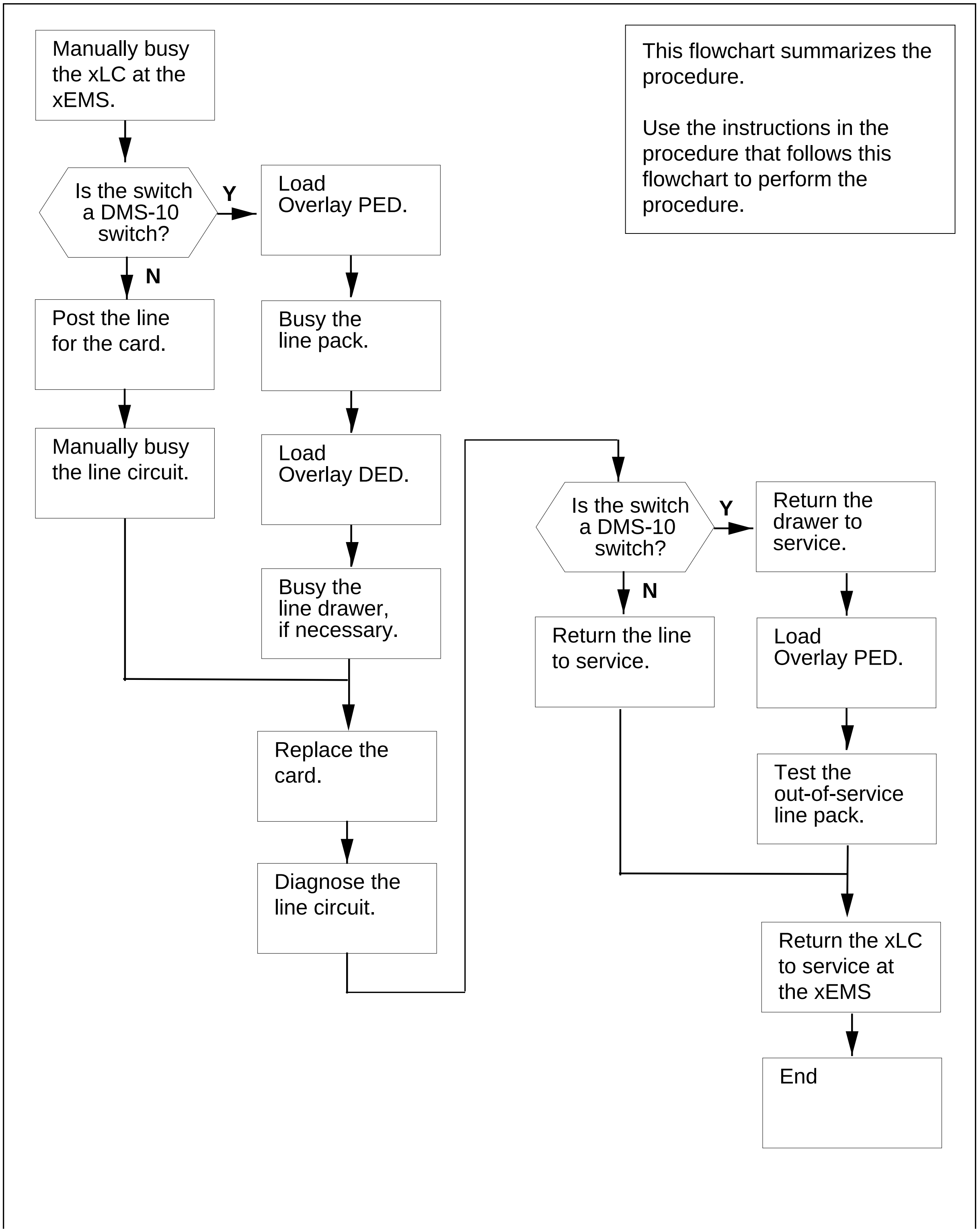
This procedure does not use any common procedures.

Action

This procedure contains a flowchart and a list of steps. The flowchart is a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NTEX17 in an LCM line drawer (continued)

Summary of replacing an NTEX17 in an LCM line drawer



NTEX17 in an LCM line drawer (continued)

Replacing an NTEX17 in an LCM line drawer

At your current location

1

> **CAUTION**
> **Loss of service**
> This procedure directs you to manually busy a minimum of one line. Removal of a line from service can cause the system to drop calls in progress. Perform this procedure only if you need to restore out-of-service components. Unless it is urgent, perform this procedure during periods of low traffic only

Obtain a replacement card. Make sure that the replacement card and the card that you remove have the same PEC and PEC suffix.

At the xEMS workstation

2 Go to the submap of the LCM line drawer with the NTEX17 card that you will replace.

3 Busy the card.

a Use the left mouse button to select the card that you will replace.

Note: If your mouse is programmed for the left hand, use the right mouse button.

b Use the right mouse button to open the pop-up menu.

Note: If your mouse is programmed for the left hand, use the left mouse button.

c Select

`Maintenance->XLC->MB`

If the switch is a	Do
DMS-10 switch	step 4
DMS-100 switch	step 12

At the tty

4 Load Overlay PED. Type

`>OVLY PED`

and press the Enter key.

NTEX17 in an LCM line drawer (continued)

5 Busy the line pack. Type

>BUSY LPK (site) IE/LCE b s lsg l

and press the Enter key.

where

(site) is the name of the site of a remote DMS-10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

1 is the number of the line with the NTEX17

6 Confirm the line pack state as BUSY. Type

>STAT LPK (site) IE/LCE b s lsg l

and press the Enter key.

where

(site) is the name of the site of a remote DMS10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

1 is the number of the line with the NTEX17

7 Load Overlay DED. Type

>OVLY DED

and press the Enter key.

8 Determine the state of the line drawer. Type

>STAT LSGD (site) IE/LCE b s lsg

and press the Enter key.

where

(site) is the name of the site of a remote DMS10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

NTEX17 in an LCM line drawer (continued)

9 Busy the line drawer. Type

>BUSY LSGD (site) IE/LCE b s lsg

and press the Enter key.

where

(site) is the name of the site of a remote DMS10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

10 Confirm that the line drawer is BUSY. Type

>STAT LSGD (site) IE/LCE b s lsg

and press the Enter key.

where

(site) is the name of the site of a remote DMS10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

11 Go to step 18.

At the MAP terminal

12 Access the LTP level of the MAP display. Type

>MAPCI;MTC;LNS;LTP

and press the Enter key.

Example of a MAP display:

```
POST        DELQ            BUSYQ         PREFIX

LCC PTY RNG .....LEN..........    DN    STA F S LTA  TE
RESULT
```

Note: If you worked at the LTP level of the MAP display, a posted line can be present. A posted line does not interfere with this maintenance procedure.

NTEX17 in an LCM line drawer (continued)

13 Post the line for the card. Type

>POST L site_name frame_no unit_no drawer_no slot_no

and press the Enter key.

where

site_name is the PM location (alphanumeric)

frame_no is the frame number (0 to 511)

unit_no is the PM unit number (0 or 1)

drawer_no is the logical drawer number (0 to 19)

slot_no is the card slot number (0 to 31)

Example of a MAP display:

```
LCC PTY RNG .....LEN..........     DN    STA F S LTA  TE
RESULT
1FR         HOST 01 0 01 01     621 1134 IDL<
```

14 Determine the state of the posted line.

If the state of the line	Do
is CPB,CPD	step 15
is CUT, HAZ, IDL, LO, PLO, SB	step 16
is MB	step 17
is NEQ	To determine why the component is offline or not equipped, consult operating company personnel. Continue as directed by operating company personnel.
is DEL, DMB, INB, LMB	Contact the next level of support.

15 Wait until the line state changes. Go to step 14.

16 Manually busy the line circuit. Type

>BSY

and press the Enter key.

Example of a MAP display:

```
LCC PTY RNG .....LEN..........     DN    STA F S LTA  TE
RESULT
1FR         HOST 01 0 01 01     621 1134 MB
```

Note: Observe that the state that appears under the STA header changed to MB.

If BSY command	Do
passed	step 17
failed	Contact the next level of support.

NTEX17 in an LCM line drawer (continued)

17 Display the cabinet location of the line card. Type

>CKTLOC

and press the Enter key.

Example of a MAP display:

```
Site Flr RPos  Bay_id   Shf  Description    Slot     EqPEC
HOST  01  B04  LCE  01   04  LCM  01 0      01:00 EX17CA

GRD START   2DB LOSS   BAL NETWORK   MAN OVR SET
  NO          NO       NON LOADED        NO
```

Note: In the example MAP display, the line card is an NTEX17CA and the location of the card is:

Site: in the HOST office

Flr: on the 1st floor

RPos: row B is the location of the line equipment bay 04

Bay_id: in line concentrating equipment, bay 01

Shf: in shelf 04

Description: in hardware device LCM, bay 01

Slot: in line drawer 01, slot 00

NTEX17 in an LCM line drawer (continued)

At the shelf

18

> **DANGER**
> **Risk of electrocution**
> Proceed only if a step in a maintenance procedure directs you here. If you perform this procedure without permission, personal injury can occur.

> **WARNING**
> **Static electricity damage**
> Wear a wrist strap that connects to a wrist-strap grounding point to handle circuit cards. The wrist-strap grounding point is on a frame supervisory panel (FSP) or a modular supervisory panel (MSP). The wrist strap protects the cards against static electricity damage.

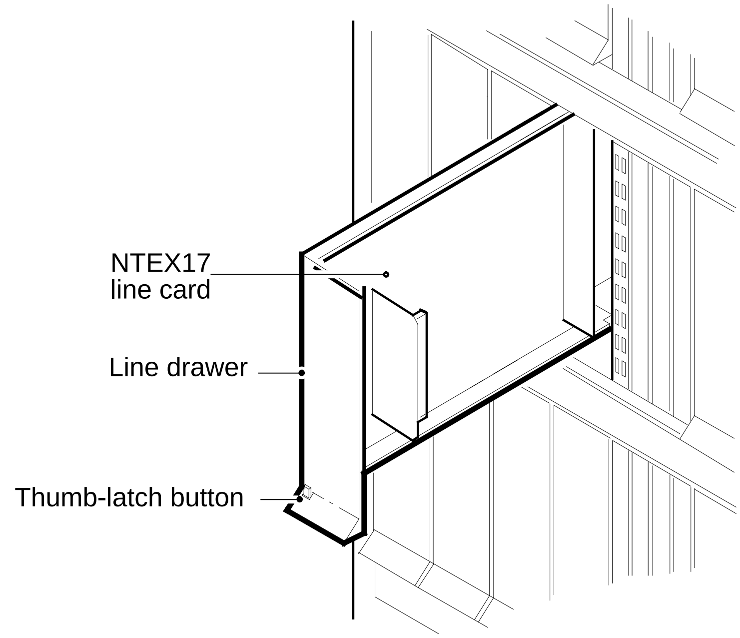
> **WARNING**
> **Risk of equipment damage**
> Proceed only if a step in a maintenance procedure directs you here. If you perform this procedure without permission, equipment damage can occur.

Put on a wrist strap.

19 Use the information you obtained in step 13 to locate the physical location of the line card.

NTEX17 in an LCM line drawer (continued)

20 Pull the drawer out.



21

DANGER
Risk of personal injury
Make sure you handle the line card carefully. The line feed resistor can be very hot. To avoid injury, use the insertion/withdrawal tool to remove the card.

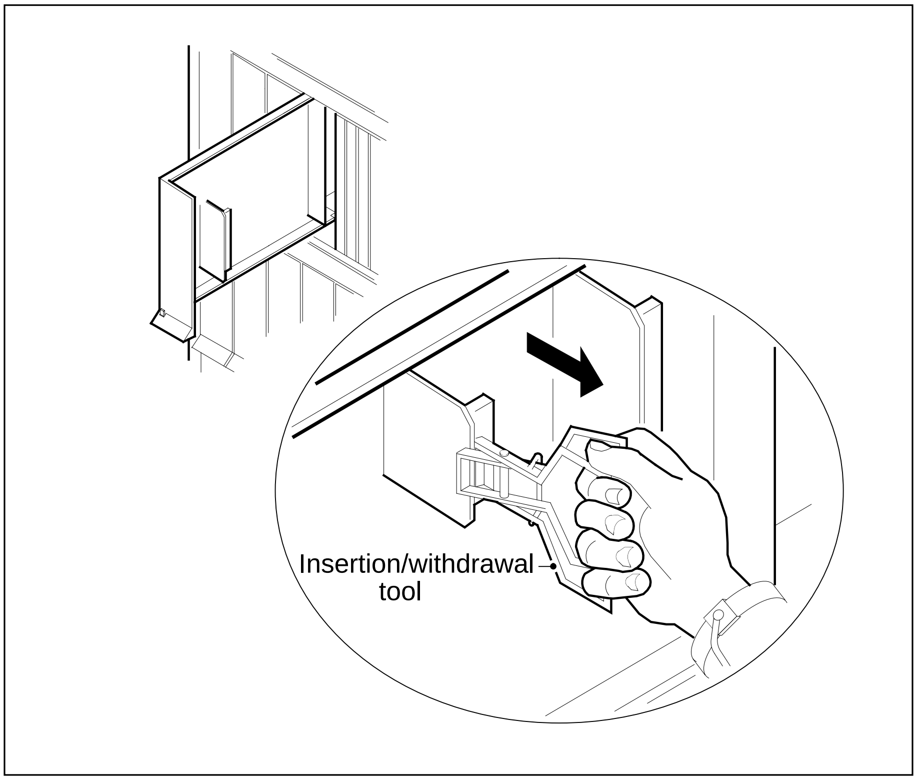
Remove the card from the drawer as follows:

a Clamp the insertion/withdrawal tool to the front edge of the card as shown in the following figure.

Note: A card removal tool is required to remove the NTEX17 card from the line drawer. The apparatus code for the grip tool is QTH57A,

NTEX17 in an LCM line drawer (continued)

and the common product code is A0298292. You can also use the grip tool ITA9953.



b Carefully pull the card out of the slot.

c Place the card in a protective container for an electrostatic discharge (ESD).

22 Remove the replacement card from the ESD protective container. Make sure the replacement card and the card you removed have the same PEC and PEC suffix.

23 Clamp the insertion/withdrawal tool to the front edge of the replacement card. Insert the card into the slot. Make sure you seat the card firmly in the slot.

24 Close the line card drawer.

If the switch is a	Do
DMS-10 switch	step 25
DMS-100 switch	step 30

NTEX17 in an LCM line drawer (continued)

At the tty

25 In Overlay DED, return the drawer to service. Type

>RTS LSGD (site) IE/LCE b s lsg

and press the Enter key.

where

(site) is the name of the site of a remote DMS10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

26 Load Overlay PED. Type

>OVLY PED

and press the Enter key.

27 Test the out of service line pack. Type

>TEST LPK (site) IE/LCE b s lsg l

and press the Enter key.

where

(site) is the name of the site of a remote DMS10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

1 is the number of the line with the NTEX17

If the test	Do
passes	step 28
fails	Contact the next level of support.

28 Return the line pack to service. Type

RTS LPK (site) IE/LCE b s lsg l

and press the Enter key

where

(site) is the name of the site of a remote DMS10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

1 is the number of the line with the NTEX17

29 Go to step 32.

NTEX17 in an LCM line drawer (end)

At the MAP terminal

30 Perform a diagnostic test on the line. Type

>DIAG

and press the Enter key.

Example of a MAP response:

```
ECOME004AH ***+LINE100 DEC17 10:04:26 0200 PASS LN_DIAG
        LEN HOST 01 0 11 02       NO DIRN
        DIAGNOSTIC RESULT   Card Diagnostic OK
        ACTION REQUIRED  None
        CARD TYPE EX17CA
```

If the DIAG command	Do
passes	step 31
fails	Contact the next level of support.

31 To return the line to service, type

>RTS

and press the Enter key.

If the RTS command	Do
passes	step 32
fails	Contact the next level of support.

At the xEMS workstation

32 Go to the submap of the LCM line drawer with the NTEX17 card that you replaced

33 Return the card to service.

a Use the left mouse button to select the card.

Note: If your mouse is programmed for the left hand, use the right mouse button.

b Use the right mouse button to open the pop-up menu.

Note: If your mouse is programmed for the left hand, use the left mouse button.

c Select

Maintenance->XLC->IDL

34 The procedure is complete.

NTEX54 in an LCM line drawer

Application

Use this procedure to replace an NTEX54 card in a line concentrating module (LCM) line drawer. This procedure supports the cards that follow:

- NTEX54AA
- NTEX54AB
- NTEX54BA
- NTEX54CA

Common procedures

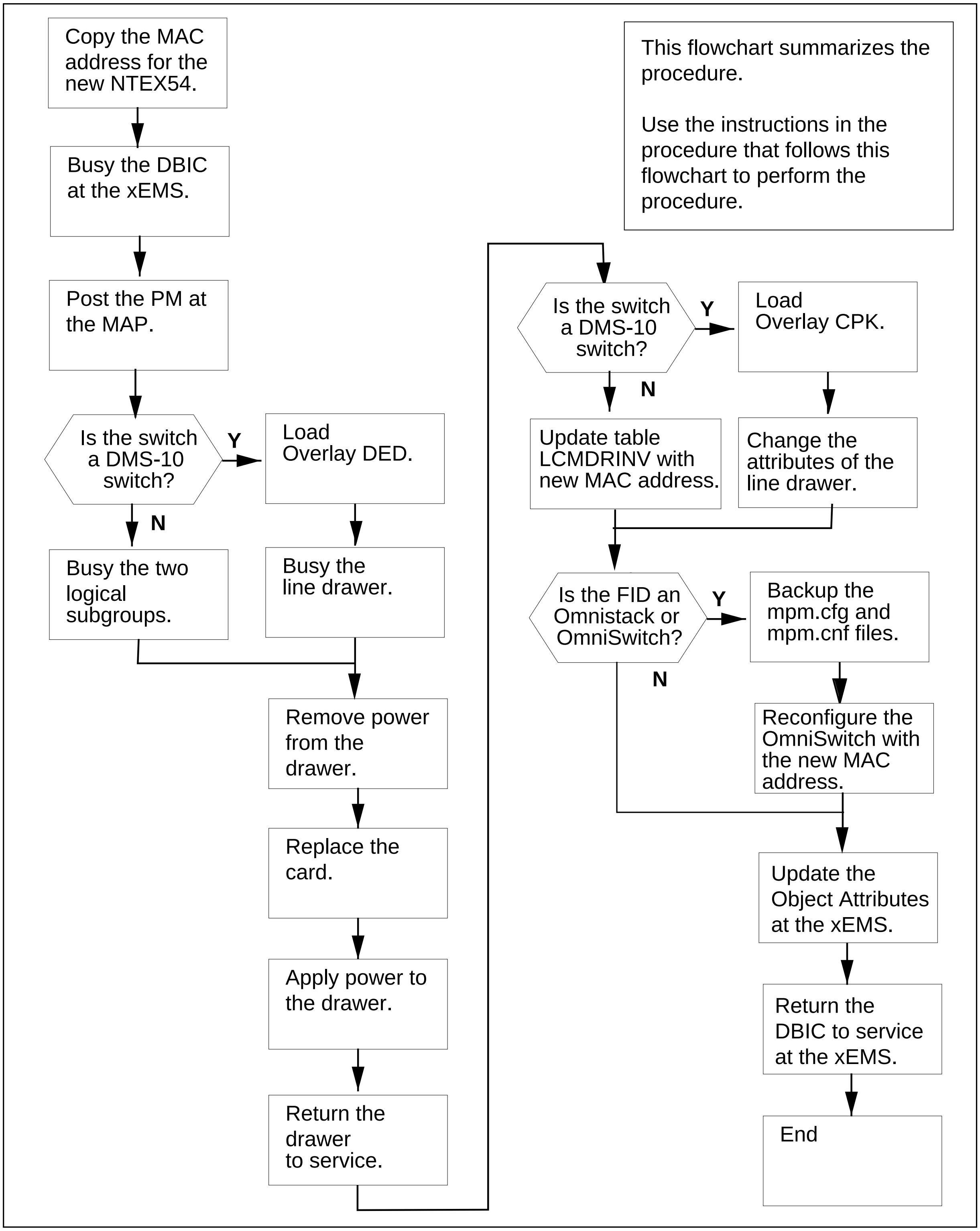
This procedure does not reference any common procedures.

Action

This procedure contains a flowchart and a list of steps. The flowchart is a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NTEX54 in an LCM line drawer (continued)

Summary of replacing an NTEX54 in an LCM line drawer



NTEX54 in an LCM line drawer (continued)

Replacing an NTEX54 in an LCM line drawer

At your current location

1

> **CAUTION**
> **Loss of service**
> This procedure directs you to manually busy a line drawer. Removal of a line drawer from service can cause the system to drop calls in progress. Perform this procedure only if you need to restore out-of-service components. Unless it is urgent, perform this procedure during periods of low traffic.

Obtain a replacement card. Make sure that the replacement card and the card that you remove have the same PEC and PEC suffix.

2

> **CAUTION**
> **Transport network must know new MAC address**
> Work with the network administrator during this procedure. The transport network must know the MAC address of the new DBIC before the DBIC can support 1-Meg Modem Service.

Write down the 12-digit number stamped on the new NTEX54 card. This number is the media access control (MAC) address. You will use the MAC address later in this procedure.

At the xEMS workstation

3 Go to the submap of the LCM line drawer with the NTEX54 card that you will replace.

4 Busy the card.

a Use the left mouse button to select the card that you will replace.

Note: If your mouse is programmed for the left hand, use the right mouse button.

b Use the right mouse button to open the pop-up menu.

Note: If your mouse is programmed for the left hand, use the left mouse button.

NTEX54 in an LCM line drawer (continued)

c Select
`Maintenance->DBIC->ManB`

If the switch is	Do
a DMS-10 switch	step 5
not a DMS-10 switch	step 10

At the tty

5 Load Overlay DED. Type

`>OVLY DED`

and press the Enter key.

6 Determine the state of the line drawer. Type

`>STAT LSGD (site) IE/LCE b s lsg`

and press the Enter key.

where

(site) is the name of the site of a remote DMS-10
b is the name of the bay with the LCM line drawer
s is the number of the shelf with the LCM line drawer
lsg is the number of the line subgroup with the LCM line drawer

7 Busy the line drawer. Type

`>BUSY LSGD (site) IE/LCE b s lsg`

and press the Enter key.

where

(site) is the name of the site of a remote DMS-10
b is the name of the bay with the LCM line drawer
s is the number of the shelf with the LCM line drawer
lsg is the number of the line subgroup with the LCM line drawer

8 Confirm that the line drawer is BUSY. Type

`>STAT LSGD (site) IE/LCE b s lsg`

and press the Enter key.

where

(site) is the name of the site of a remote DMS-10
b is the name of the bay with the LCM line drawer
s is the number of the shelf with the LCM line drawer
lsg is the number of the line subgroup with the LCM line drawer

9 Go to step 17.

At the MAP terminal

10 Go to the PM level of the MAP display. Type

>MAPCI;MTC;PM

and press the Enter key.

Example of a MAP display:

```
               SysB   ManB   OffL   CBsy   ISTb   InSv
PM                0      0      2      0      1     71
```

11 Post the LCM with the NTEX54 card to be replaced. Type

>POST pm_type site_name frame_no pm_no

and press the Enter key.

where

pm_type is LCM or ILCM

site_name is the PM location (alphanumeric)

frame_no is the equipment frame number (00 to 511)

pm_no is the number of the PM (0 or 1) in the frame

Example of a MAP display:

```
LCM  HOST 01 1   ISTb   Links OOS: Cside  0 Pside  0
Unit0: ISTb                 /RG: 0
Unit1: ISTb  Mtce           /RG: 1  Ring gen Test
                       11  11  11  11  11  RG: Pref 1 InSv
Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 InSv
       ..  ..  ..  ..  MM  ..  ..  ..  ..  ..
```

12 Record the numbers of the logical drawers for the NTEX54.

> ***Note:*** Logical drawers configure in pairs for the physical drawer. The NTEX54 services the physical drawer. Both logical drawers become manually busy during this card replacement procedure.

13 Check the state of the affected logical drawers.

If the state for	Do
one or both logical drawers is I, S, or . (dot)	step
both logical drawers is M	step 17
one or both logical drawers is 0 or -	Determine why the drawer is offline. If necessary, contact the next level of support.

NTEX54 in an LCM line drawer (continued)

14

> **ATTENTION**
> Make sure the drawer is not processing calls before you perform this step.

Manually busy the logical drawer. Type

>BSY DRWR drwr_no

and press the Enter key.

where

drwr_no is the logical drawer number (0 to 23)

Example of a MAP response:

```
LCM HOST 01 1  Drwr 0 will be taken out of service
Please confirm (“YES”, “Y”, “NO”, or “N”):
```

15 Confirm the command. Type

>YES

and press the Enter key.

Example of a MAP response:

```
LCM HOST 01 1 Drwr 0 Bsy Passed
```

If	Do
you must busy the other logical drawer of the pair	step 16
both logical drawers are now M	step 17

16 Busy the other logical drawer of the pair. Type

>BSY DRWR drwr_no

and press the Enter key.

where

drwr_no is the logical drawer number (0 to 23)

Example of a MAP response:

```
LCM HOST 01 1 Drwr 0 Bsy Passed
```

NTEX54 in an LCM line drawer (continued)

At the shelf

17

> **DANGER**
> **Potential equipment damage**
> Note the fuses that you remove from the fuse panel. If you do not insert fuses in the correct location on the fuse panel, equipment damage occurs.

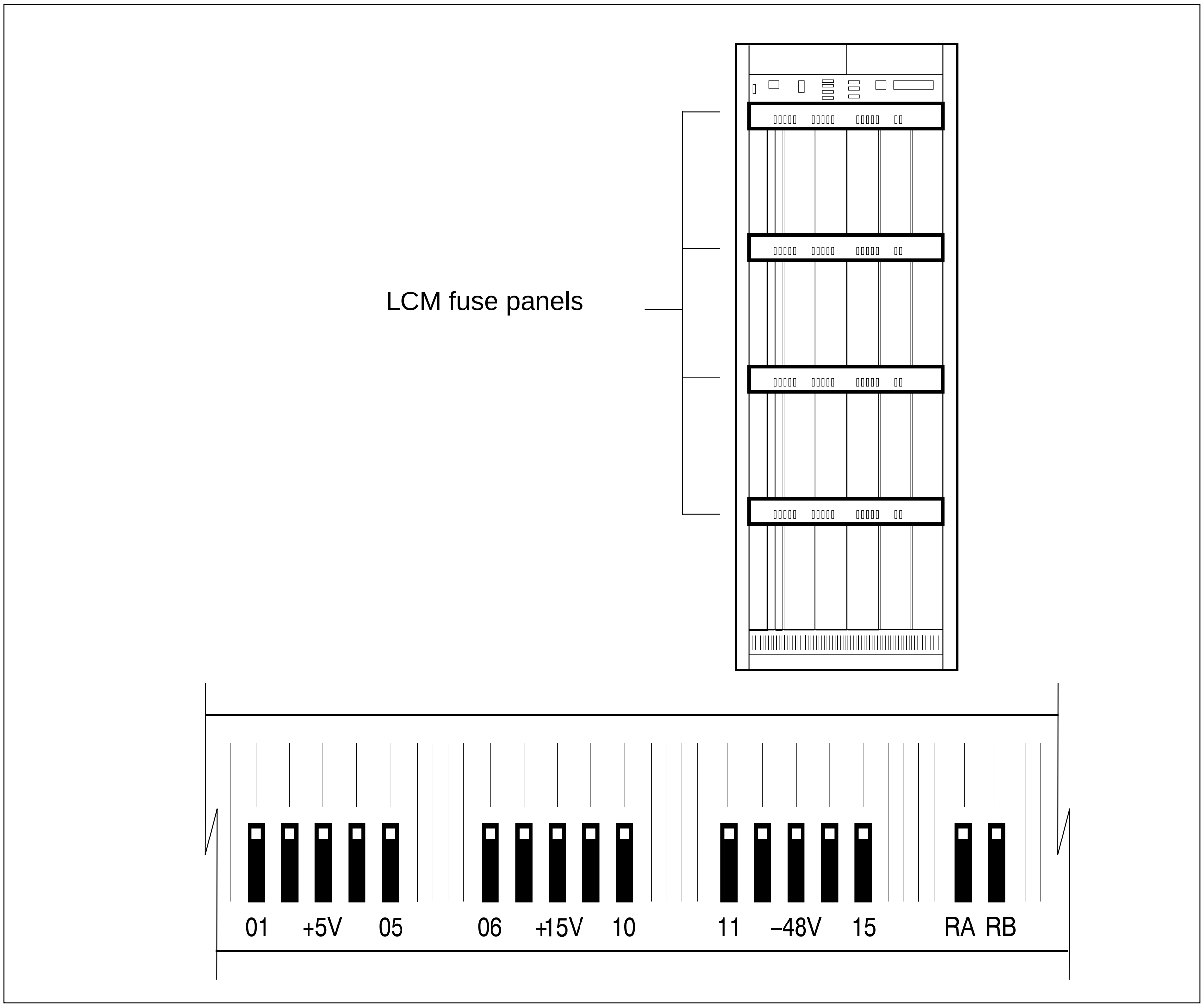
> **WARNING**
> **Static electricity damage**
> Wear a wrist strap that connects to the wrist-strap grounding point to handle circuit cards. The wrist-strap grounding point is on a frame supervisory panel (FSP) or a modular supervisory panel (MSP). The wrist strap protects the cards against static electricity damage.

> **ATTENTION**
> Fuse markings do not always identify voltage. Make sure that you note the fuses and the location of the fuses in the fuse panel.

Remove fuses for the LCM. Refer to the following figures.

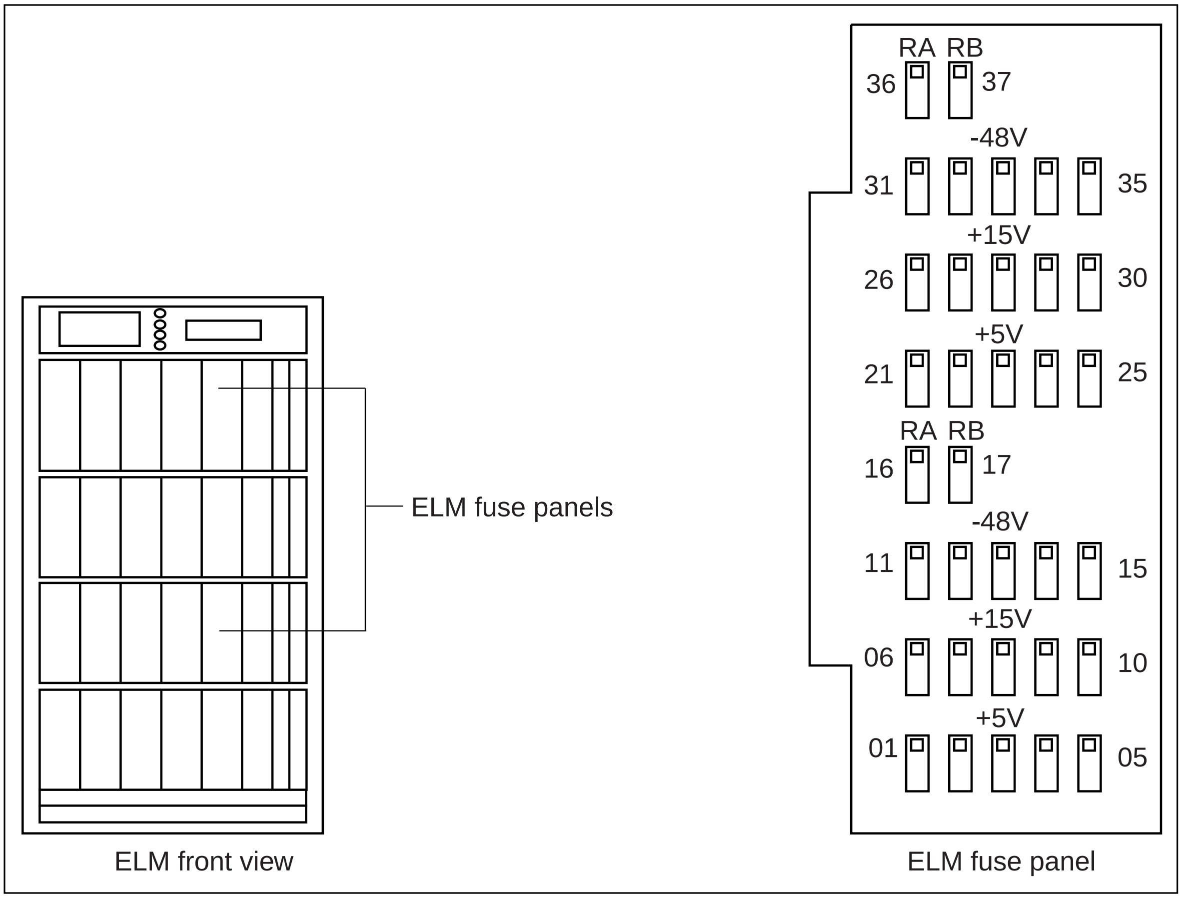
NTEX54 in an LCM line drawer (continued)

LCM fuse panel



NTEX54 in an LCM line drawer (continued)

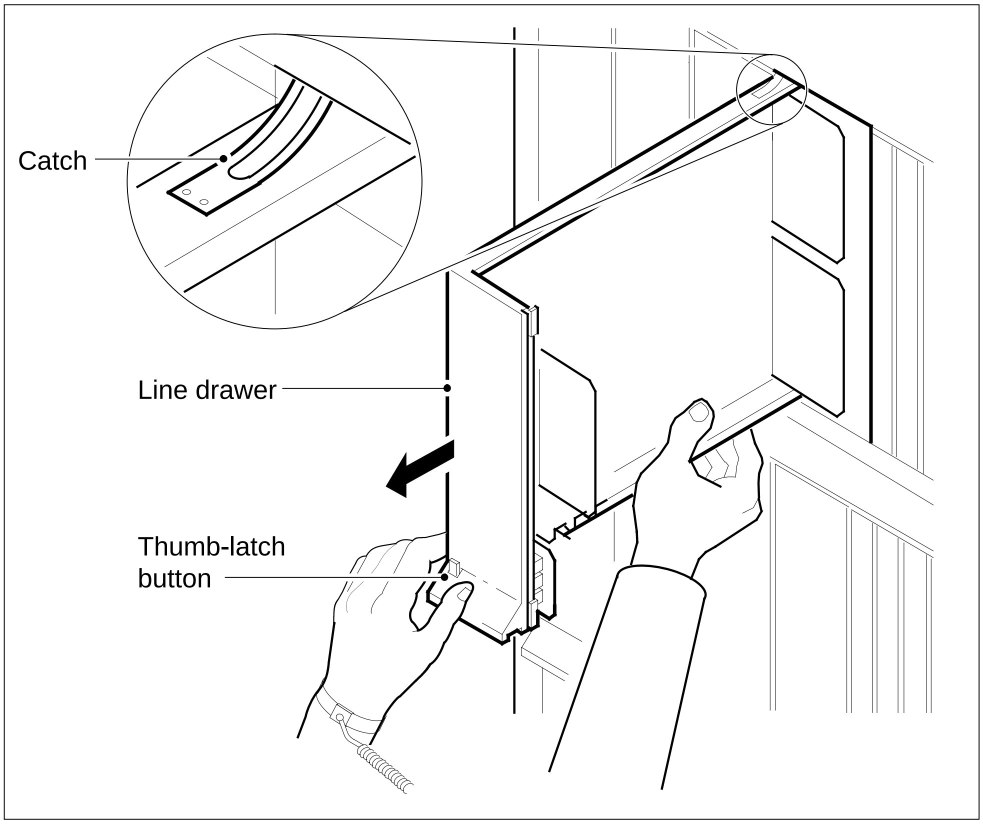
ELM fuse panel



- **a** Remove the -48V fuse for the line drawer that contains the DBIC you replace.
- **b** Remove the +15V fuse for the line drawer that contains the DBIC you replace.
- **c** Remove the +5V fuse for the line drawer that contains the DBIC you replace.

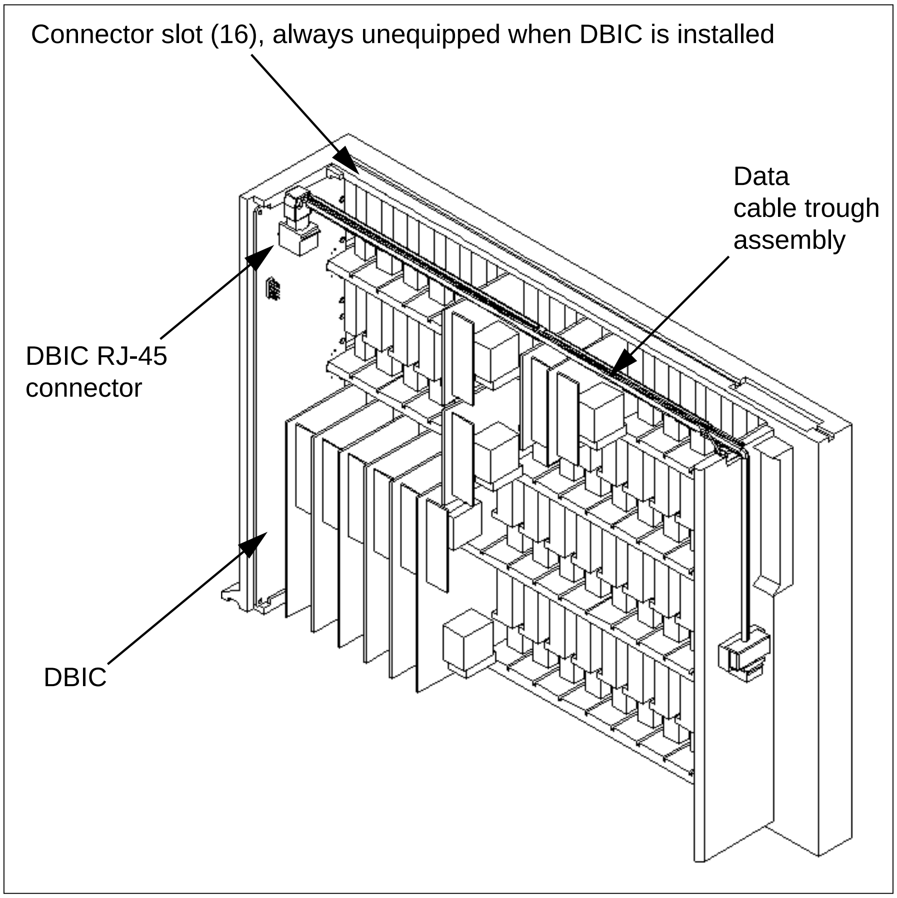
NTEX54 in an LCM line drawer (continued)

18 Identify the drawer. Press the small thumb-latch button on the lower left edge of the drawer. Pull the drawer out. To secure the drawer in a steady horizontal position, tip the drawer until the catch rests on the line drawer track.



NTEX54 in an LCM line drawer (continued)

19 Remove the data cable from the RJ-45 connector on the DBIC. The RJ-45 connector is located at slot location 16 of the odd LSG (connector slot). Refer to the following figure.

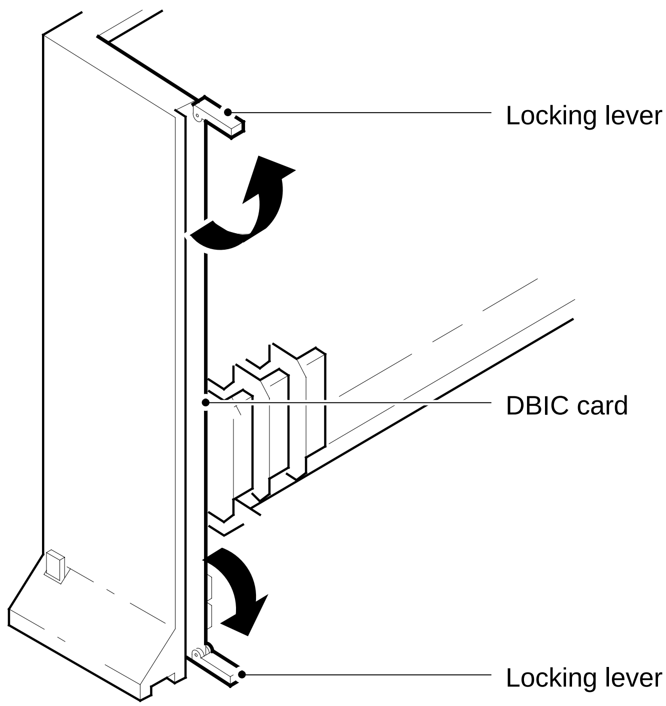


NTEX54 in an LCM line drawer (continued)

20

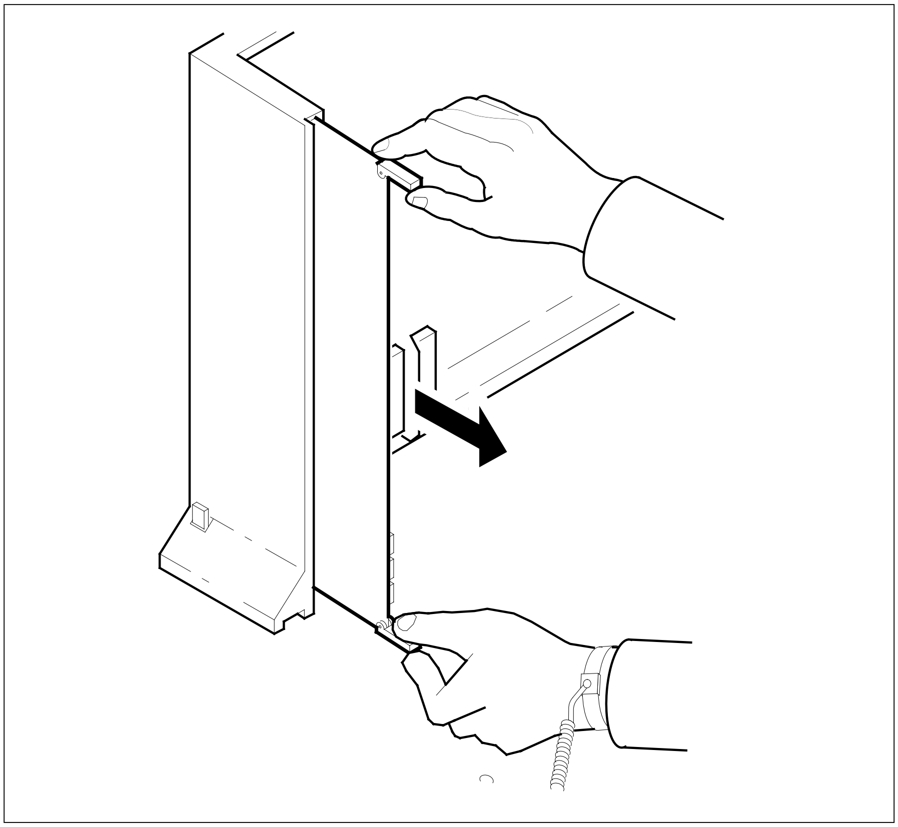
DANGER
Do not hold the card by the levers only
If you hold a card by the locking levers only, the levers can break. Pull the card half way out of the slot. Carefully grasp the card from below for more support. Continue to remove the card from the drawer. Make sure that you do not touch any wires or internal parts on the card.

Open the locking levers on the face of the card.



NTEX54 in an LCM line drawer (continued)

21 Grasp the locking levers. Carefully pull the card toward you until the card clears the drawer.



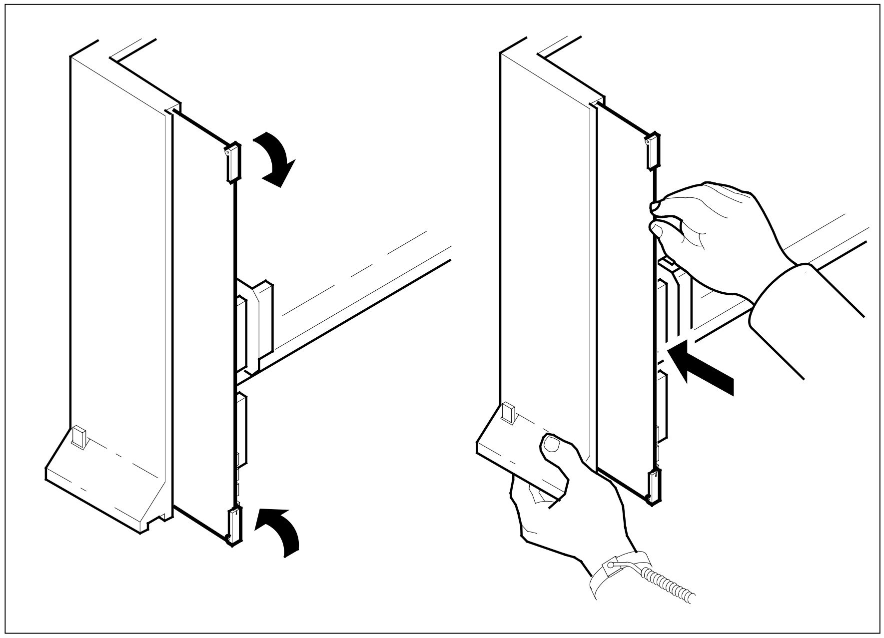
22 Place the card that you removed in an electrostatic discharge (ESD) protective container.

23 Make sure that the replacement card and the card that you remove have the same PEC and PEC suffix.

24 Close the locking levers on the replacement card. Align the card with the pin slots in the drawer. Carefully slide the card into the drawer.

NTEX54 in an LCM line drawer (continued)

25 Support the drawer with your left hand. Use your right hand to push on the upper and lower edges of the card. Make sure that the card sits completely in the drawer.



26 Replace the data cable RJ-45 connector that you removed in step 19.

27 Close the line drawer.

28

DANGER
Potential equipment damage
Note the fuses that you remove from the frame. If you do not insert fuses in the correct location on the fuse panel, equipment damage occurs.

ATTENTION
Fuses are coded for position. The color square on the face of the fuse identifies the top edge.

Insert the fuses that you removed in step 17.

a Insert the +5V fuse.

b Insert the +15V fuse.

NTEX54 in an LCM line drawer (continued)

c Insert the -48V fuse.

If the switch is	Do
a DMS-10 switch	step 29
not a DMS-10 switch	step 34

At the tty

29 In Overlay DED, return the drawer to service. Type

>RTS LSGD (site) IE/LCE b s lsg

and press the Enter key.

where

(site) is the name of the site of a remote DMS-10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

30 Confirm that the line drawer is in-service. Type

>STAT LSGD (site) IE/LCE b s lsg

and press the Enter key.

where

(site) is the name of the site of a remote DMS-10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

If the line drawer is	Do
INS	step 31
not INS	Contact the next level of support.

31 Load Overlay CPK. Type

>OVLY CPK

and press the Enter key.

NTEX54 in an LCM line drawer (continued)

32 Change the attributes of the line drawer to support 1-Meg Modem Service and the new MAC address. Type

`CHG LSGD (site) IE/LCE b s lsg FCTN 1MMS MAC “mac_address”`

and press the Enter key.

where

(site) is the name of the site of a remote DMS-10

b is the name of the bay with the LCM line drawer

s is the number of the shelf with the LCM line drawer

lsg is the number of the line subgroup with the LCM line drawer

“mac_address” is the MAC address of the new NTEX54

Note: You must include quotation marks with the MAC address.

If the FID is	Do
an OmniSwitch or OmniStack	step 37
not an OmniSwitch or OmniStack	step 48

At the MAP terminal

33 A maintenance flag (Mtce) can appear. This flag indicates that system-initiated maintenance tasks are in progress. To stop the system-initiated maintenance tasks, type

`>ABTK`

and press the Enter key.

34 Return the logical drawer to service. Type

`>RTS DRWR drwr_no`

and press the Enter key.

where

drwr_no is the logical drawer number (0 to 19)

Example of a MAP response:

```
OSvce Tests Initiated
LCM HOST 00 0 Drwr 0 Tst Passed
LCM HOST 00 0 Drwr 0 Rts Passed
```

If the RTS command	Do
passed, and you must return the other logical drawer to service	step 35
passed, and the other logical drawer is in service	step 36
failed	Contact the next level of support.

35 Repeat step 34 for the other logical drawer in the pair.

NTEX54 in an LCM line drawer (continued)

36

> **ATTENTION**
> Refer to the chapter "Translations and data schema" for examples of datafill for table LCMDRINV.

Update table LCMDRINV.

a Open table LCMDRINV. Type

>TABLE LCMDRINV

and press the Enter key.

b Position on the tuple for the LCM. Type

>POS site_name frame_no lcm_no

and press the Enter key.

where

site_name is the name of the site

frame_no is the number of the frame

lcm_no is the number of the LCM

c Begin changing the tuple. Type

>CHA

and press the Enter key.

d Continue processing.Type

>Y

and press the Enter key.

e Press the Enter key to scroll through the fields until you reach the field with the MAC address.

f Enter the new MAC address. Type

>drwr_id card_pec drwr_pec mac_address

and press the Enter key.

where

drwr_id is the physical number of the drawer

card_pec is NTEX54AA, NTEX54AB, or NTEX54BA

drwr_pec is the PEC of the drawer

mac_address is the MAC address of the new NTEX54

g Press the Enter key to scroll through remaining fields.

NTEX54 in an LCM line drawer (continued)

h Confirm the change. Type

>Y

and press the Enter key.

i Exit the table. Type

>QUIT

and press the Enter key.

If the FID in the 1-Meg Modem Service network is	Do
an OmniSwitch or OmniStack	step 37
not an OmniSwitch or OmniStack	step 48

From an xterm window at the X-Vision workstation

37 View the status of BOOTP. Type

`tail -f /var/adm/syslog/syslog.log`

and press the Enter key.

> ***Note:*** Some offices and workstations can have `syslog.log` in a different directory.

You will not see a successful load until you complete the steps in this procedure to change the OmniSwitch configuration.

38 Access the OmniSwitch through the local console. The settings follow:

Item	Setting
Baud rate	9600
Data bits	8
Stop bits	1
Flow control	none

39 Use an ftp session to back up the OmniSwitch `mpm.cfg` and `mpm.cnf` files.

40 Perform a quick backup on the flash. Type the following

`cp mpm.cfg mpm.cfg-`

and press the Enter key.

`cp mpm.cnf mpm.cnf-`

and press the Enter key.

NTEX54 in an LCM line drawer (continued)

41

> **ATTENTION**
> The examples in steps 41 through 47 use OmniSwitch software 2.2.5. Later versions of OmniSwitch software may have different commands and responses.

In the OmniSwitch, find the port rule on the management VLAN for the NTEX54 that you replaced. In the following example, the base MAC address of the DBIC is 006038:303AE8, so the rule is in Group 33 VLAN 1.

Example

```
% viatrl

VLAN  VLAN   Rule  Rule     Rule             Rule
Group:ID     Num   Type     Status           Definition
-----------------------------------------------------

33             1  MAC Rule    Enabled        006038:303AE8
                  2  MAC Rule   Enabled    006038:303697

34             1  MAC Rule    Enabled        006038:303698
                                [...16 rules total...]
                                             006038:3036A1

               2 MAC Rule    Enabled         006038:303AEE
                                   [...16 rules total...]
                                             006038:303AF8
```

42 Delete the rule.

Example

```
/VLAN/Auto-Tracker % modatvl 33:1

Group 33 is defined as:

1.      Description      = Management Group
2.      Admin Status     = Enabled
3.      Rule Definition

        Rule Num    Rule Type     Rule Status
        1           MAC Rule      Enabled
        2           MAC Rule      Enabled

Available options:
1.      Set VLAN Admin Status
2.      Set VLAN Description
3.      Add more rules
4.      Delete a rule
5.      Set rule Admin Status
6.      Quit

Option = 4

Enter rule number to delete: 1
```

NTEX54 in an LCM line drawer (continued)

Note: *The modatvl* `Option=` *prompt will appear.*

43 Add a new rule in the VLAN for the new DBIC. In the following example, the base MAC address is 006038:31f472.

Example

```
1.   Description   = New Mobile Group 2
     2.   Admin Status   = Enabled
     3.   Rule Definition

     Rule Num   Rule Type   Rule Status
      2         Mac Rule    Enabled

Available options:
     1.     Set VLAN Admin Status
     2.     Set VLAN Description
     3.     Add more rules
     4.     Delete a rule
     5.     Set rule Admin Status
     6.     Quit

Option = 3

Select rule type:
 1. Port Rule
 2. MAC Address Rule
 3. Protocol Rule
 4. Network Address Rule
 5. User Defined Rule
 6. Binding Rule
 7. DHCP PORT Rule
 8. DHCP MAC Rule

Enter rule type (1): 2
Set Rule Admin Status to [(e)nable/(d)isable] (d): e

Enter the list of MAC addresses (AABBCC:DDEEFF) in
Canonical format.(Enter save to end): 006038:31f472
save

    1.   Description    = New Mobile Group 2
    2.   Admin Status   = Enabled
    3.   Rule Definition
```

NTEX54 in an LCM line drawer (continued)

```
          Rule Num   Rule Type   Rule Status
            1          Mac Rule    Enabled
            2          Mac Rule    Enabled


Available options:
     1.     Set VLAN Admin Status
     2.     Set VLAN Description
     3.     Add more rules
     4.     Delete a rule
     5.     Set rule Admin Status
     6.     Quit

Option = 6
```

44 Find the block of rules that corresponds to the user data entries for the DBIC you replaced. In the following example, the rules have MAC addresses of 006038:303AEE through 006038:303AF8, so the rule is in Group 34, implied VLAN 1, rule 2.

Example

```
% viatrl

VLAN  VLAN  Rule  Rule     Rule            Rule
Group:ID    Num   Type     Status          Definition
--------------------------------------------------------

33             1  MAC Rule    Enabled         006038:304F72
               2 MAC Rule    Enabled          006038:303697

34             1  MAC Rule    Enabled         006038:303698
                                       [...16 rules total...]
                                                006038L3036A1

                2 MAC Rule    Enabled         006038:303AEE
                                       [...16 rules total...]
                                                006038:303AF8
```

45 Delete the rule.

NTEX54 in an LCM line drawer (continued)

Example

```
/VLAN/Auto-Tracker % modatvl 34:1

Group 34 is defined as:

1.      Description      = Data Service
2.      Admin Status     = Enabled
3.      Rule Definition
        Rule Num    Rule Type     Rule Status
        1           MAC Rule      Enabled
        2           MAC Rule      Enabled

Available options:
1.      Set VLAN Admin Status
2.      Set VLAN Description
3.      Add more rules
4.      Delete a rule
5.      Set rule Admin Status
6.      Quit

Option = 4

Enter rule number to delete: 2
```

Note: *The modatvl Option= prompt will appear.*

46 Add a new rule in the VLAN for the new DBIC. In the following example, the base MAC addresses are 006038:304f74 through 006038:304f82.

Example

```
     1.   Description    = Data Service
     2.   Admin Status   = Enabled
     3.   Rule Definition

     Rule Num   Rule Type   Rule Status
      1         Mac Rule    Enabled

Available options:
     1.     Set VLAN Admin Status
     2.     Set VLAN Description
     3.     Add more rules
     4.     Delete a rule
     5.     Set rule Admin Status
     6.     Quit

Option = 3
Select rule type:
 1. Port Rule
 2. MAC Address Rule
 3. Protocol Rule
 4. Network Address Rule
 5. User Defined Rule
 6. Binding Rule
 7. DHCP PORT Rule
 8. DHCP MAC Rule

Enter rule type (1): 2
```

NTEX54 in an LCM line drawer (continued)

```
Set Rule Admin Status to [(e)nable/(d)isable] (d): e

Enter the list of MAC addresses (AABBCC:DDEEFF) in
Cannonical format.(Enter save to end): 003060:31f473
006038:31f474
006038:31f475
006038:31f476
006038:31f477
006038:31f478
006038:31f479
006038:31f47a
006038:31f47b
006038:31f47c
006038:31f47d
006038:31f47e
006038:31f47f
006038:31f480
006038:31f481
006038:31f482
save


    1.   Description = Data Service
    2.   Admin Status   = Enabled
    3.   Rule Definition

         Rule Num   Rule Type   Rule Status
           2         Mac Rule    Enabled
           2         Mac Rule    Enabled


Available options:
     1.     Set VLAN Admin Status
     2.     Set VLAN Description
     3.     Add more rules
     4.     Delete a rule
     5.     Set rule Admin Status
     6.     Quit

Option = 6
```

47 Verify the new settings.

Example

```
% viatrl

VLAN  VLAN  Rule  Rule     Rule            Rule
Group:ID    Num   Type     Status          Definition
-------------------------------------------------------

33            1  MAC Rule    Enabled        006038:31f472

              2  MAC Rule    Enabled        006038:303697
```

NTEX54 in an LCM line drawer (continued)

```
34              1  MAC Rule    Enabled          006038:303698
                                                006038:303699
                                                006038:30369A
                                                006038:3036A2
                                                006038:30369B
                                                006038:3036A3
                                                006038:30369C
                                                006038:3036A4
                                                006038:30369D
                                                006038:3036A5
                                                006038:30369E
                                                006038:3036A6
                                                006038:30369F
                                                006038:3036A7
                                                006038:3036A0
                                                006038:3036A1

                2  MAC Rule    Enabled          006038:31F474
                                                006038:31F475
                                                006038:31F476
                                                006038:31F477
                                                006038:31F478
                                                006038:31F479
                                                006038:31F473
                                                006038:31F47A
                                                006038:31F47B
                                                006038:31F47C
                                                006038:31F47D
                                                006038:31F47E
                                                006038:31F47F
                                                006038:31F480
                                                006038:31F481
                                                006038:31F482
```

At the xEMS workstation

48 Go to the submap of the LCM line drawer with the new NTEX54 card.

49 Change the attributes of the object.

a Use the left mouse button to select the card.

> ***Note:*** If your mouse is programmed for the left hand, use the right mouse button.

b Use the right mouse button to open the pop-up menu.

> ***Note:*** If your mouse is programmed for the left hand, use the left mouse button.

c Select

`Describe/Modify Object`

The Object Description dialog box appears.

d From the Object Description dialog box, select HSTP Application from the fields under Object Attributes.

e Select View/Modify Object Attributes.

NTEX54 in an LCM line drawer (end)

f Enter the new MAC address in the LAC MAC Address field.

g Click the Verify button to verify the information.

h Click the OK button to close the Attributes dialog box.

i Click OK to close the Object Description dialog box.

50

CAUTION
Transport network must know new MAC address
Before you return the DBIC to service, you must provide the MAC address for the DBIC to the transport network. Contact the network administrator for assistance.

To return the card to service, select

`Maintenance->DBIC->Rts`

from the pop-up menu.

51 You have successfully completed this card replacement procedure.

10 Logs

This chapter provides information on log report PM181. Activities in the 1-Meg Modem Service can generate this log.

> ***Note:*** This chapter does not apply to DMS-10 switches. This chapter applies to other DMS-100 family switches that support 1-Meg Modem Service.

PM181

Explanation

> **ATTENTION**
> This section provides PM181 information specific to the 1-Meg Modem Service. Refer to the *Log Reports Reference Manual* for your release for a complete description of PM181.

The peripheral module (PM) subsystem generates PM181 when an indicated step occurs in a PM function. The PM181 reports the occurrence of a PM exception.

Format

The format of the PM181 log report follows:

```
PM181 mmmdd hh:mm:ss ssdd INFO
   pmid
   Node : statxt
   opttxt
```

Example

Examples of PM181 log reports related to 1-Meg Modem Service functions follow:

Example 1

In the following example, an xDSL line card (xLC) was added to table LNINV. The drawer for the table does not support the high speed data traffic of the 1-Meg Modem Service. The line installed functions as a standard voice line only.

```
PM181 JUL17 21:24:40 5700 INFO
LCM HOST 00 1 Unit 0      xDSL ENGINEERING RULES VIOLATED
LEN =  HOST 00 1 00 12   PHYSICAL DRWR 0 DOES NOT SUPPORT
xDSL DATA TRAFFIC
```

Example 2

In the following example, an xLC was added to table LNINV. The drawer for the table supports the high speed data traffic of the 1 MMS. The line drawer contains more xLCs than the xDSL engineering rules allow. The installed xLC functions as an xDSL line.

```
PM181 JUL17 21:24:40 5700 INFO
LCM HOST 00 1 Unit 0      xDSL ENGINEERING RULES VIOLATED
LEN = HOST 00 1 00 12     MAXIMUM NO (30) OF xDSL LINES PER
PHYSICAL DRWR EXCEEDED  MEMBERS PER PHYSICAL DRWR EXCEEDED
```

Example 3

In the following example, an xLC was added to table LNINV. The drawer contains more xLCs in a vertical row than the xDSL engineering rules allow. The installed xLC functions as an xDSL line.

```
PM181 JUL17 21:24:40 5700 INFO
LCM HOST 00 1 Unit 0      xDSL ENGINEERING RULES VIOLATED
LEN = HOST 00 1 00 12  MAXIMUM NO OF xDSL LINES PER VERT ROW
EXCEEDED MAX MEMBERS (2) of xDSL LINES PER VERT ROW EXCEEDED
```

Field descriptions

The following table explains each of the fields in the log report:

Fields in PM181 log report

Field	Value	Description
pmid	alphanumeric	Identifies the PM.
Unit n	0 or 1	Identifies the PM unit that generates the report.
statxt	InSv, ISTb, Cbsy, SysB, and ManB	Defines the current state of the PM node. Examples are: C-side busy (Cbsy), system busy (SysB), manual busy (ManB).
opttxt	Character string	Provides additional information to help software troubleshooting technicians isolate problems.

Action

Actions for each log example related to 1-Meg Modem Service functions follow:

Example 1

This example requires no action.

PM181 (end)

Example 2

The whole line drawer is at risk of failure because the drawer is operating beyond its thermal and electrical limits. Operating company personnel receive warning of the xDSL engineering rules breach at the time of the addition. You can perform the following actions to correct the condition:

- Use the **QXNET EXPANDALL** command to locate another LCM that supports xDSL and has room for expansion
- Upgrade another LCM line drawer with a data-enhanced bus interface card (DBIC) and move this xDSL line card to that drawer
- Use the **QXNET VERIFY <site> <frame> <unit> <drawer>** command to verify the xDSL line card assignments

Example 3

The whole line drawer is at risk of failure because the drawer is operating beyond the thermal and electrical limits. Operating company personnel receive warning of the xDSL engineering rules breach at the time of the addition. These personnel can perform the following actions to correct the condition:

- Use the **QXNET EXPAND <site> <frame> <unit> <drawer>** command to locate another row in the same drawer for the xDSL line card
- Use the **QXNET EXPANDALL** command to locate another LCM that supports xDSL

Associated OM registers

None

Additional information

None

11 Translations and data schema

This chapter provides the following information:

- an introduction to 1-Meg Modem Service translations
- data schema information on table LCMDRINV
- data schema information on table LNINV

This information is also available in the Nortel Networks technical publication (NTP) *Translations Guide* or *Customer Data Schema Reference Manual* for your release.

> ***Note:*** For DMS-10 switches, refer to service operating procedure 0204 *Set up 1-Meg Modem Service* in *Data Modification Manual*, 297-3401-311.

HSTP0 DMS ADSL Capability

Ordering codes

Functional group ordering code: HSTP0002

Functionality ordering code: Not Applicable

Release applicability

CCM07 and up

HSTP0 DMS ADSL Capability was introduced in CCM07.

Prerequisites

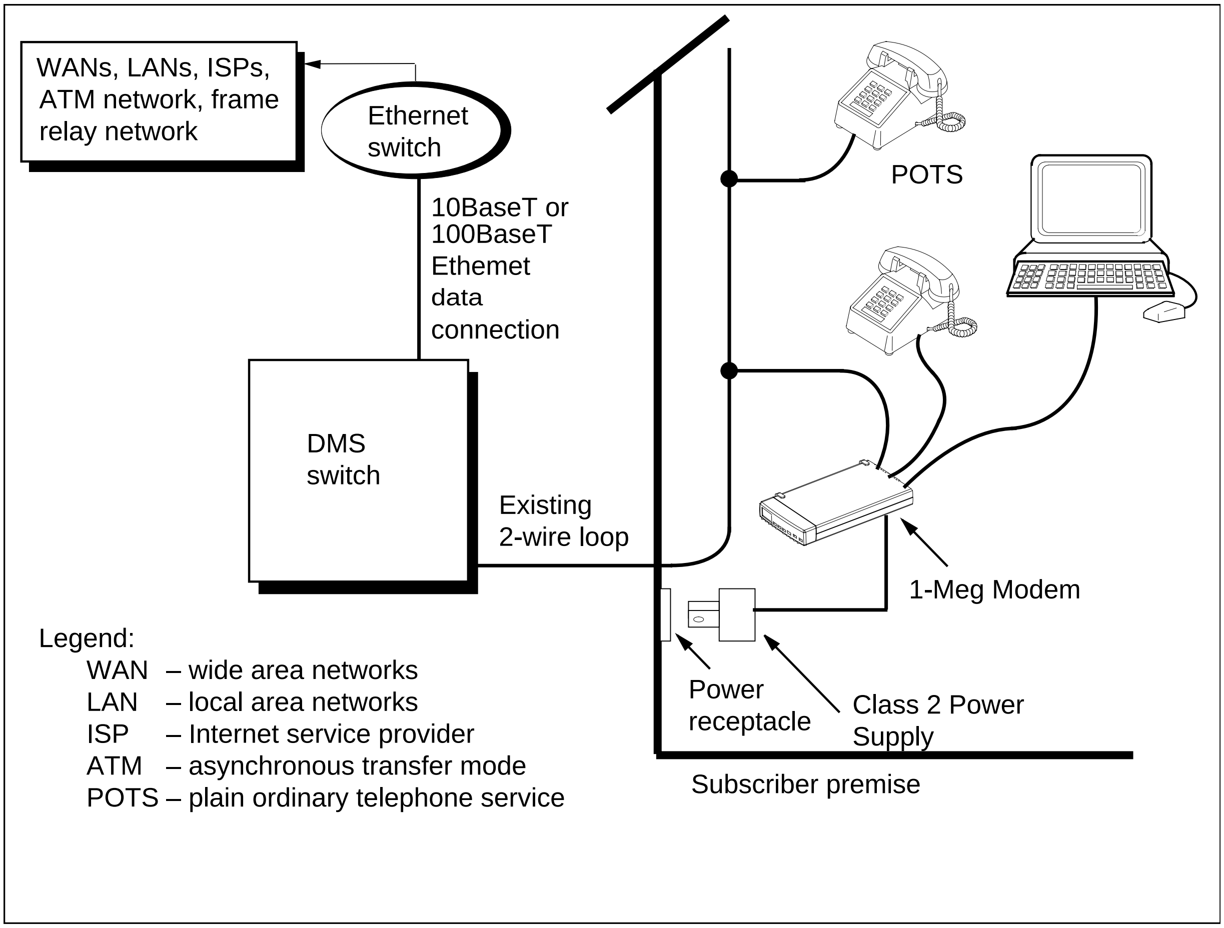
HSTP0 DMS ADSL Capability has no prerequisites.

Description

HSTP0 DMS ADSL Capability provides the computing module (CM) software changes that allow an office to provision and maintain 1-Meg Modem Service hardware. The following figure shows the 1-Meg Modem Service.

HSTP0 DMS ADSL Capability (continued)

1-Meg Modem Service network



Operation

Before this enhancement, LCM subscribers were limited to analog modem speed rates of 56 kilobit per second (kbit/s). With analog modems, the subscriber cannot use POTS and data services at the same time. Additionally, data calls typically have longer holding times that reduce the operating company's traffic call hundredth seconds (CCS) values. HSTP0 DMS ADSL Capability addresses these limitations by:

- supports simultaneous use of data and all voice services
- increases data transmission rates
  - up to 1280 kbit/s downstream
  - up to 320 kbit/s upstream
- routing data traffic away from the DMS-100, to reduce the impact on the office's CCS values

HSTP0 DMS ADSL Capability (continued)

Components

The 1-Meg Modem Service includes the following components:

- The 1-Meg Modem is customer-premise equipment (CPE) that connects the telephone line, extension telephone, and PC. To the subscriber, the modem installs like a regular voice band modem, except the modem uses a 10BaseT Ethernet connection to the computer or hub. Voice and data circuits are kept separate on the loop. This allows simultaneous voice and data traffic with no impact to other telephony features.
- A new xDSL line card (xLC) replaces the subscriber's line card in an existing line concentrating module (LCM) drawer. The card provides full voice service in parallel with high-speed data communication with the 1-Meg Modem.
- A new data-enhanced bus interface card (DBIC) replaces the existing bus interface card (BIC) in the existing LCM drawer. The card provides a concentrating function for the voice and data connections within a single LCM drawer. The card also separates the voice and data traffic for routing to the appropriate networks.
- The xDSL Element Management System (xEMS) provides operations, administration, maintenance, and provisioning (OAM&P) functions from a Hewlett-Packard (HP) or Sun workstation. Based on HP OpenView, the xEMS is a graphical user interface (GUI) that uses icons and pull-down menus.

The DBIC and xLCs are backwards compatible with the current bus interface (BIC) and line card (LC) architecture. You can add either component without affecting existing subscriber features or services. The LCM handles all 1-Meg Modem Service voice traffic like existing plain old telephone service (POTS) calls.

Human machine interface (HMI)

This feature introduces a new command interpreter (CI) command: **QXNET**. Use **QXNET** query the engineering rules validation routines and format the output.

Translations table flow

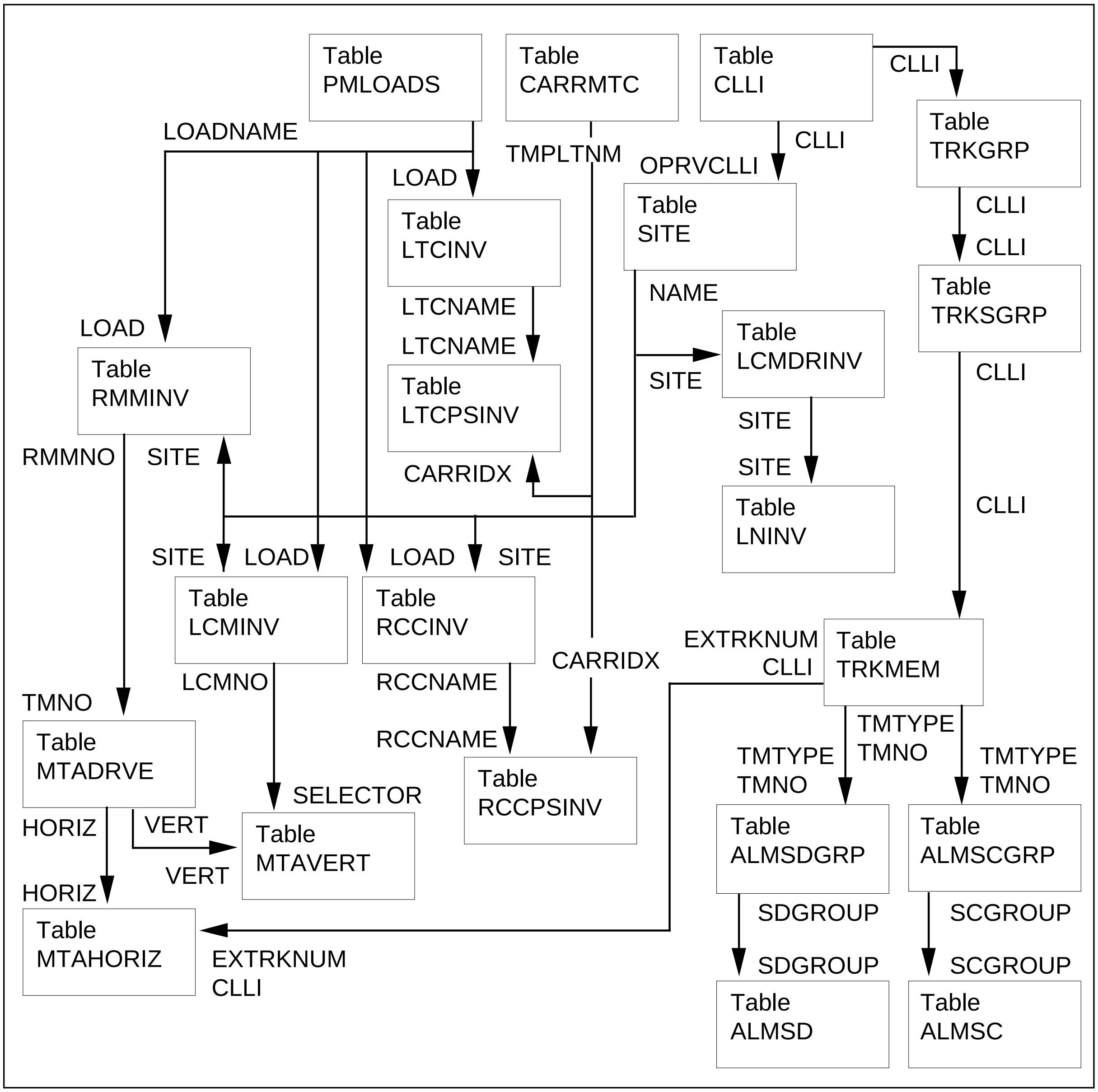
The HSTP0 DMS ADSL Capability translations tables are described in the following list:

- Table LCMDRINV
- Table LNINV

HSTP0 DMS ADSL Capability (continued)

The following figure shows the HSTP0 DMS ADSL Capability translation process.

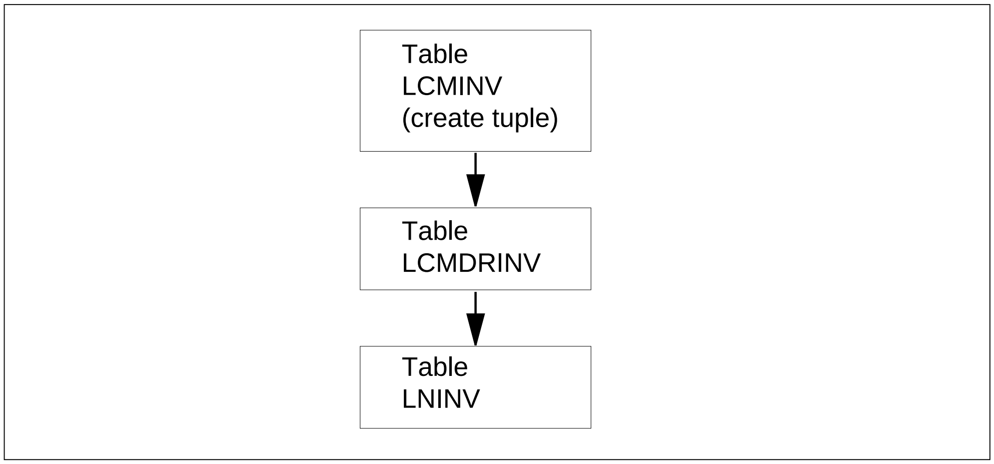
Translations process for HSTP0 DMS ADSL Capability



HSTP0 DMS ADSL Capability (continued)

The following figure shows the table flow to datafill HSTP0 DMS ADSL Capability.

HSTP0 DMS ADSL Capability table flow



The datafill content for the tables in the previous flowchart follows:

- Table LCMINV lists data assignments for each bay with an LCM or a remote LCM (RLCM). Field SITE in table LCMINV matches the NAME tuple from table SITE. This field identifies the equipment for the switching unit and for all remote locations connected to the unit. Field LOAD in table LCMINV matches the LOADNAME tuple from table PMLOADS. This field stores the device location of each PM load file.
- Table LCMDRINV lists the LCM name, physical drawer numbers, product equipment code (PEC) of the drawers, drawer load name, and media access control (MAC) address for each LCM and LCM variant in the host office. The line drawer applications use the information in this table to determine the functionality supported in each physical drawer.

  Table LCMDRINV only supports change operations and does not support manual additions or deletions. The switch automatically adds and deletes tuples to this table when a matching entry is made in table LCMINV.
- Table LNINV lists the site name with the line equipment number (LEN), and other data for each line card circuit in an office.

Limitations and restrictions

The following limitations and restrictions apply to HSTP0 DMS ADSL Capability:

- Each drawer entered in table LCMDRINV to support HSTP0 DMS ADSL Capability must have a DBIC.
- Each drawer with a DBIC must have an xLC to support HSTP0 DMS ADSL Capability. If the drawer does not have a DBIC, the xLC will only provide voice services.
- The 1-Meg Modem Service subscriber must have a 1-Meg Modem.
- When a tuple is added or deleted in table LCMINV, a corresponding tuple is automatically added or deleted in table LCMDRINV.

Interactions

HSTP0 DMS ADSL Capability has no functionality interactions.

Activation/deactivation by the end user

HSTP0 DMS ADSL Capability requires no activation or deactivation by the end user.

Billing

HSTP0 DMS ADSL Capability does not affect billing.

Station Message Detail Recording

HSTP0 DMS ADSL Capability does not affect Station Message Detail Recording (SMDR).

Datafilling office parameters

HSTP0 DMS ADSL Capability does not affect office parameters.

Datafill sequence

The following table lists the tables that require datafill to implement HSTP0 DMS ADSL Capability. The tables are listed in the order in which they are to be datafilled.

Datafill tables required for HSTP0 DMS ADSL Capability

Table	Purpose of table
LCMDRINV	Line Concentrating Module Drawer Inventory. Lists data assignment for each drawer for an LCM unit.
LNINV	Line Circuit Inventory. Lists the data for each line card slot.

HSTP0 DMS ADSL Capability (continued)

Datafilling table LCMDRINV

Verify the following datafill related to HSTP0 DMS ADSL Capability for table LCMINV. The following table only lists the fields that apply to HSTP0 DMS ADSL Capability. Refer to the *Translations Guide* or the *Customer Data Schema Reference Manual* for a description of the other fields.

Datafilling table LCMDRINV (Sheet 1 of 2)

Field	Subfield or refinement	Entry	Explanation and action
LCMNM			LCM name. Entry made up of subfields SITE PM_type and PM_no.
	SITE	HOST	Site name. Enter the name of the site of this LCM.
	FRAME	0 to 511	Frame number. Enter the LCM frame number.
	PM_NO	0 to 255	Peripheral module number. Enter PM number for this LCM.

Note 1: Changes to fields with multiple entries should be made in the PROMPT mode only. In non-prompt mode it is possible to leave out existing entries.

Note 2: Enter the continuation mark (+) in fields with multiple possible entries when more data is specified on the next line or more records will be entered. Enter the end mark ($) in fields with multiple possible entries after the last entry.

HSTP0 DMS ADSL Capability (continued)

Datafilling table LCMDRINV (Sheet 2 of 2)

Field	Subfield or refinement	Entry	Explanation and action
DRWRTAB			Drawer table. This field is made up of subfields PHYDRNO, DRWRPEC, LDCPEC, and LOADNAME.
	PHYDRNO	0 to 9	The physical drawer number
	DRWRPEC	NILDRWR, NT6X05AA, NT6X05BA, NT6X05CA, NT6X05DA, NT6X05EA, NT6X05HA, NTBX32BA	The physical line drawer PEC
	DRWRSEL	NTEX54AA, NTEX54AB, NTEX54BA, NTEX54CA	Drawer select. Enter the PEC code of the DBIC.
	MACADDRESS	12 hexadecimal digits	Media Access Control (MAC) layer address. The Ethernet address, also known as the hardware physical address, obtained from stamping on the DBIC. This number must be unique and correspond to the number on the DBIC.
	IPADDR	4 digits, with each digit ranging from 0 to 255	IP Address. The Internet Protocol (IP) address of the LCM line drawer. The default is 0 0 0 0. This subfield only applies when you use the 1MMS option in SERVORD to provision 1-Meg Modem Service. The value in this subfield can be the default (0 0 0 0) or any IP value If you do not use SERVORD to provision 1-Meg Modem Service. ***Note:*** Field IPADDR is only available in offices with CCM11 or higher software.

Note 1: Changes to fields with multiple entries should be made in the PROMPT mode only. In non-prompt mode it is possible to leave out existing entries.

Note 2: Enter the continuation mark (+) in fields with multiple possible entries when more data is specified on the next line or more records will be entered. Enter the end mark ($) in fields with multiple possible entries after the last entry.

HSTP0 DMS ADSL Capability (continued)

Datafill example for table LCMDRINV

The following example shows sample datafill for table LCMDRINV for the 1-Meg Modem Service if the office uses a PCL based on CCM10 or lower.

MAP display example for table LCMDRINV (PCL at CCM10 or lower)

```
TABLE LCMDRINV

LCMNM DRWRTAB
________________________________________________________

RLGH 00 0
(0 NT6X54AA NT6X05AA) (1 NILDRWR) (2 NTEX54BA NT6X05EA
EEFF00010203) (3 NILDRWR) (4 NTEX54BA NT6X05EA FF0001020304)
(5 NILDRWR) (6 NILDRWR) (7 NILDRWR) (8 NTEX54BA NT6X05EA
010203040506) (9 NILDRWR )$
```

The following example shows sample datafill for table LCMDRINV for the 1-Meg Modem Service if the office uses a PCL based on CCM11 or higher.

MAP display example for table LCMDRINV (PCL at CCM11 or higher)

```
TABLE LCMDRINV

LCMNM DRWRTAB
________________________________________________________

RLGH 00 0
(0 NT6X54AA NT6X05AA) (1 NILDRWR) (2 NTEX54BA NT6X05EA
EEFF00010203 0 0 0 0) (3 NILDRWR) (4 NTEX54BA NT6X05EA
FF0001020304 0 0 0 0) (5 NILDRWR) (6 NILDRWR)
(7 NILDRWR) (8 NTEX54BA NT6X05EA 010203040506 0 0 0 0)
(9 NILDRWR )$
```

Error messages for table LCMDRINV

The following error messages apply to table LCMDRINV.

Error messages for table LCMDRINV

Error message	Explanation and action
`Tuple Addition occurs when the corresponding entry is added into the LCMINV table.`	An attempt was made to manually add a tuple entry into table LCMDRINV.
`Tuple Deletion occurs when the corresponding entry is deleted from the LCMINV table.`	An attempt was made to manually delete a tuple entry from table LCMDRINV.

Datafilling table LNINV

Table LNINV matches the site name from table SITE to each physical line circuit in the LCM. This table defines the LEN of a line and indicates the software location and its hardware characteristics. Each line card in the LCM has a tuple in table LNINV.

The subfields used to identify the line card are changed so a LEN can identify an LCM line card. In a LEN for an LCM, the fields for the LEN are defined as follows:

- SITE
- FRAME
- UNIT
- SUBGROUP
- CIRCUIT

Note the following table interactions:

- The line assignment for coin lines is made in table LENLINES. The LNATTIX field matches to the line class, code, coin first (CCF), coin dial tone first (CDF), or coin semi-postpay (CSP), in table LINEATTR.
- POTS lines LCMLSG do not have matching tuples in keyset-type tables.
- For Meridian business sets (MBS), the VARTYPE in table LCMINV must be NTPROP.

The following table shows the datafill related to HSTP0 DMS ADSL Capability for table LNINV. The table only lists those fields that apply directly

HSTP0 DMS ADSL Capability (continued)

to HSTP0 DMS ADSL Capability. Refer to the *Translations Guide* or the *Customer Data Schema Reference Manual* for a description of the other fields

For a description of the other fields, refer to the data schema section of this document.

Datafilling table LNINV (Sheet 1 of 2)

Field	Subfield or refinement	Entry	Explanation and action
LEN		alphanumeric	Line equipment number. This field contains the following subfields: SITE, FRAME, UNIT, SUBGROUP, and CIRCUIT.
	SITE	alphanumeric	Site. Enter the location of the LCM (four-character alphanumeric). This entry is not optional, and there is no default value assigned to it.
	FRAME	0 to 511	LCM frame. Enter the LCM frame number, which is not a physical frame but a software entity that represents the group the LCM belongs to at the site.
	UNIT	0 to 1	LCM unit. Enter the number representing the LCM unit within the group.
	SUBGROUP	0 to 19	LCM subgroup. Enter the number of subgroups in the line drawers.
	CIRCUIT	0 to 31	LCM circuit. Enter the number of circuits in the subgroups. The range is 0-31.
CARDCODE		EX17AA, EX17BA, EX17CA, EX17DA	Card code. Enter the PEC of the line card or line card carrier.
PADGRP		STDLN, UNBAL, PPHON, LRLM, NPDGP and ONS	Pad group. Enter the name of the pad group assigned to the line circuit in the pad data table. The values include STDLN, UNBAL, PPHON, LRLM, NPDGP, and ONS.

HSTP0 DMS ADSL Capability (continued)

Datafilling table LNINV (Sheet 2 of 2)

Field	Subfield or refinement	Entry	Explanation and action
STATUS		HASU, WORKING, UNEQUIP, CUTOFF, and RESERVED.	Status. Enter the line inventory availability status. The values include HASU, WORKING, UNEQUIP, CUTOFF, and RESERVED.
GND		Y *or* N	Ground. Where line is ground start, enter Y. Otherwise, enter N (for loop start).
BNV		L *or* NL	Balanced network value. Enter L when line circuit is configured for a loaded network. Otherwise, enter NL (for nonloaded network).
MNO		Y *or* N	Manual override. Enter Y when on-hook balance network test is to be prevented from updating field BNV in this table. Otherwise, enter N to allow off-hook balance network test to update field BNV in this table.
CARDINFO		NIL	Card information. The NIL value is the default. The values are NIL, SSLCC, or ISLCC.

Datafill example for table LNINV

The following example shows sample datafill for table LNINV.

HSTP0 DMS ADSL Capability (end)

MAP display example for table LNINV

LEN	CARDCODE	PADGRP	STATUS	GND	BNV	MNO	CARDINFO
HOST 00 0 0 01	EX17CA	STDLN	HASU	N	NL	N	NIL
HOST 00 0 0 02	EX17CA	STDLN	HASU	N	NL	N	NIL
HOST 00 0 0 03	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST 00 0 0 04	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST 00 0 0 05	EX17CA	STDLN	HASU	N	NL	N	NIL
HOST 00 0 0 06	EX17CA	STDLN	HASU	N	NL	N	NIL
HOST 00 0 0 07	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST 00 0 0 08	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST 00 0 0 09	6X17BA	STDLN	HASU	N	NL	N	NIL
HOST 00 0 0 10	6X17BA	STDLN	HASU	Y	NL	N	NIL
HOST 00 0 5 00	6X17BA	STDLN	HASU	N	NL	N	NIL
HOST 00 0 5 01	6X17BA	STDLN	HASU	N	NL	N	NIL

Translation verification tools

HSTP0 DMS ADSL Capability tables LCMINV and LCMDRINV support 1-Meg Modem Service specific checks through the table control commands:

>check

>check all

SERVORD

HSTP0 DMS ADSL Capability SERVORD rejects attempts to add the cut-off-on-disconnect (COD) to an xDSL line. Operation of the cut-off-relay interrupts data services on an xDSL line including the COD feature.

LCMDRINV

Table name

> **ATTENTION**
> This section provides data schema information specific to the 1-Meg Modem Service. Refer to the *Translations Guide* or *Customer Data Schema Reference Manual* for your release for a complete description of table LCMDRINV.

Line Concentrating Module Line Drawer Inventory Table

Functional description

Table LCMDRINV lists the data assignments for each line drawer in a line concentrating module (LCM). The types of line drawers follow:

- standard POTS line drawer (NT6X05AA)
- standard POTS line drawer with provisionable data-enhanced bus interface card (NT6X05EA or NT6X05HA)

The data assignments are as follows:

- the LCM name which includes:
  - site—the physical location of the LCM
  - frame—the frame number for the LCM
  - unit—the unit number of the LCM in the frame
- the drawer table (DRWRTAB), a multiple of up to twelve of the following:
  - physical drawer number (PHYDRNO)
  - product engineering code (PEC) of the line drawer control card (LDCPEC)
  - PEC of the physical line drawer (DRWRPEC)
  - drawer load name, which consists of up to eight characters or NILLOAD if a load name is not required

Datafill sequence and implications

The following tables must be datafilled in the listed sequence:

- LCMINV
- LCMDRINV
- LNINV

LCMDRINV (continued)

Table size

0 to 254 tuples

Datafill

The following table lists datafill for table LCMDRINV.

LCMDRINV field descriptions (Sheet 1 of 2)

Field	Subfield or refinement	Entry	Explanation and action
LCMNM		see subfield	Line concentrating module name. This field is the key field and includes subfield LINE_MOD.
	LINE_MOD	see subfield	Line module key. This subfield includes subfields SITE and FRAME, and subfield unit.
	SITE	alphabetical (up to four characters) or blank	Site. If the office parameter USINGSITE in table OFCOPT and the office parameter UNIQUE_BY_SITE_NUMBERING in table OFCENG are both equal to Y (yes), and the line is remote from the host, enter the site name assigned to the remote location. Otherwise, if the line is located at the host, leave the subfield blank and SITE is datafilled by default with HOST. If the office parameter USINGSITE in table OFCOPT is equal to Y and the office parameter UNIQUE_BY_SITE_NUMBERING in table OFCENG is equal to N (no)—numbering is unique to office—the entry in subfield SITE is optional. If the entry is SITE, the switch checks for a match in one of the tables where lines are assigned. If office parameter USINGSITE in table OFCOPT is set to N, leave this subfield blank.
	FRAME	0 to 511	Line module frame number. Enter the number of the frame with the line card. The maximum frame number is 511 for SuperNode switches.

LCMDRINV (continued)

LCMDRINV field descriptions (Sheet 2 of 2)

Field	Subfield or refinement	Entry	Explanation and action
	UNIT	0 to 1	Line module unit number. Enter the unit number with the line card.
DRWRTAB		see subfield	Drawer table. This field is a multiple of up to 12 entries in subfields PHYDRNO, DRWRPEC, LDCPEC, and LOADNAME.
	PHYDRNO	0 to 9	The physical drawer number. Physical drawer 0 includes logical drawers 0 and 1.
	LDCPEC	NTEX54AA, NTEX54AB, NTEX54BA, NTEX54CA	The line drawer control card PEC.
	DRWRPEC	NT6X05AA NT6X05EA NT6X05HA	The physical line drawer PEC.
	LOADNAME	alphanumeric (vector of up to eight characters)	Load. Enter the name given to the peripheral module (PM) software load.
	MACADDRESS	12 hexadecimal digits	Media Access Control layer address. The Ethernet address, also known as the hardware physical address, obtained from stampings on the data enhanced bus interface card (DBIC). This number must be unique and correspond to the number on the DBIC.
	IPADDR	4 digits, with each digit ranging from 0 to 255	IP Address. The Internet Protocol (IP) address of the LCM line drawer. The default is 0 0 0 0. This subfield only applies when you use the 1MMS option in SERVORD to provision 1-Meg Modem Service. The value in this subfield can be the default (0 0 0 0) or any IP value If you do not use SERVORD to provision 1-Meg Modem Service. ***Note:*** Field IPADDR is only available in offices with CCM11 or higher PCL software.

LCMDRINV (end)

Datafill example

The following example shows sample datafill for table LCMDRINV for the 1-Meg Modem Service if the office uses a PCL release based on CCM10 or lower.

MAP display example for table LCMDRINV (PCL at CCM10 or lower)

```
 TABLE LCMDRINV

 LCMNM DRWRTAB
 ________________________________________________________

RLGH 00 0
(0 NT6X54AA NT6X05AA) (1 NILDRWR) (2 NTEX54BA NT6X05EA
EEFF00010203) (3 NILDRWR) (4 NTEX54BA NT6X05EA FF0001020304)
(5 NILDRWR) (6 NILDRWR) (7 NILDRWR) (8 NTEX54BA NT6X05EA
010203040506) (9 NILDRWR )$
```

The following example shows sample datafill for table LCMDRINV for the 1-Meg Modem Service if the office uses a PCL release based on CCM11 or higher.

MAP display example for table LCMDRINV (PCL with CCM11 or higher)

```
 TABLE LCMDRINV

 LCMNM DRWRTAB
 ________________________________________________________

RLGH 00 0
(0 NT6X54AA NT6X05AA) (1 NILDRWR) (2 NTEX54BA NT6X05EA
EEFF00010203 0 0 0 0) (3 NILDRWR) (4 NTEX54BA NT6X05EA
FF0001020304 0 0 0 0) (5 NILDRWR) (6 NILDRWR)
(7 NILDRWR) (8 NTEX54BA NT6X05EA 010203040506 0 0 0 0)
(9 NILDRWR )$
```

Supplementary information

None

Table name

> **ATTENTION**
> This section provides data schema information specific to the 1-Meg Modem Service. Refer to the *Translations Guide* or *Customer Data Schema Reference Manual* for your release for a complete description of table LNINV.

Line Circuit Inventory Table.

Functional description

Table LNINV lists the data for each line card slot for the following peripheral module (PM) types:

- asynchronous interface module (AIM)
- digital line module (DLM)
- enhanced line concentrating module (LCME)
- intelligent peripheral equipment (IPE)
- international line concentrating module (ILCM)
- ISDN line concentrating module (LCMI)
- line concentrating module (LCM)
- line digital trunk (LDT)
- line module (LM)
- remote carrier urban (RCU)
- remote concentrator SLC-96 (RCS)
- remote concentrator terminal (RCT)
- remote digital terminal (RDT)
- remote line concentrating module (RLCM)
- remote switching center SONET (RSC-S)
- server service (SVR)
- small remote unit (SRU)
- virtual line concentrating module (VLCM)

For information on line testing, refer to the *Lines Maintenance Guide*.

LNINV (continued)

Datafill sequence and implications

You must datafill the following tables before table LNINV:

- LMINV
- LCMINV
- LCMDRINV
- LDTINV
- LNTDM
- ISGTDM

You must datafill field LEN in the PM inventory tables (for example, RDTINV) before you datafill table LNINV.

Table size

0 to 32, 767 tuples.

Memory is automatically allocated.

Datafill

The following table lists datafill for table LNINV.

LNINV field descriptions (Sheet 1 of 2)

Field	Subfield or refinement	Entry	Explanation and action
LEN		see subfields	Line equipment number. This field defines the physical location of the equipment that connected to a telephone line. Field LEN consists of subfields SITE, FRAME, UNIT, DRAWER or LSG, SHELF, SLOT, and CIRCUIT.
CARDCODE		NTEX17AA NTEX17BA NTEX17CA NTEX17DA	Card code. Enter the product engineering code (PEC) of the line card. Refer to the switch range for a complete list of entry values.
PADGRP		alphanumeric	Pad group. Enter the name of the pad group that is assigned to the line circuit in table PADDATA.

LNINV (continued)

LNINV field descriptions (Sheet 2 of 2)

Field	Subfield or refinement	Entry	Explanation and action
STATUS		CUTOFF, HASU, RESERVED, UNEQUIP, or WORKING	Line inventory availability status. Enter the line inventory availability status. Valid entries are CUTOFF (cutoff), HASU (hardware assigned/software unassigned), RESERVED (reserved), UNEQUIP (unequipped), and WORKING (working). To disable configuration alarms, make sure that every line for a line card carrier has the state of UNEQUIP. To return to an alarm status, you can perform one of the following: • Change field STATUS of a line to HASU through the table editor. • Add the directory number (DN) and change field STATUS to WORKING through the Service Order System (SERVORD). If the status of a line and the line configuration are correct, a configuration alarm is not raised.
GND		Y or N	Ground. If the line is ground start, enter Y (yes). If the line is loop start, enter N (no).
BNV		L or NL	Balanced network value. Enter L for a loaded network. Enter NL for a non-loaded network.
MNO		Y or N	Manual override. Enter Y to prevent the on-hook balance network test from updating field BNV in table LNINV. Enter N to allow the off-hook balance network test to update field BNV.
CARDINFO		see subfield	Card information. This field consists of subfield CARDTYPE and its refinements.
	CARDTYPE	NIL	Card type. The NIL value is the default.

Datafill example

The following example shows sample datafill for table LNINV with 1-Meg Modem Service.

LNINV (end)

MAP display example for table LNINV

	LEN	CARDCODE	PADGRP	STATUS	GND	BNV	MNO	CARDINFO
HOST	00 0 00 00	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 01	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 02	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 03	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 04	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 05	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 06	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 07	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 08	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 09	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 10	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 11	6X17AA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 12	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 13	EX17CA	STDLN	WORKING	N	NL	N	NIL
HOST	00 0 00 14	EX17CA	ONS	WORKING	N	NL	Y	NIL
HOST	00 0 00 15	6X17AA	NPDGP	WORKING	N	NL	Y	NIL

Supplementary information

You can configure the xDSL line card (xLC) to any LCM variant that supports 1-Meg Modem Service. A check is done to determine if the drawer of the LCM supports the 1-Meg Modem Service. The switch displays a warning message with a confirmation request if the LCM does not support the 1-Meg Modem Service.

The xLC is a two-slot card that requires customer premise equipment (CPE) to interface the subscriber's line to extension telephones and a personal computer when used as a POTS and data line. The xLC does not require CPE when used only as a POTS line.

The xLC requires a DBIC in the LCM line drawer. Before you enter an xLC in table LNINV, you must install the DBIC and enter the card in table LCMDRINV. The switch displays an error message if the LCM drawer does not support the 1-Meg Modem Service.

12 Network model

This chapter describes the network configuration and model for the 1-Meg Modem Service. The 1-Meg Modem Service uses the VLAN MAC network configuration and the PVC-Based High-Speed Data Connectivity model.

VLAN MAC configuration

The VLAN MAC configuration uses the following capabilities:

- virtual LAN (VLAN) capability of the transport network
- media access control (MAC) address translation capabilities of the data-enhanced bus interface card (DBIC)

VLANs provide a limited broadcast and unicast traffic domain within the switched network. All traffic within a VLAN remains in the VLAN. You can establish a VLAN at different network layers. For this configuration, the MAC layer hosts the VLAN.

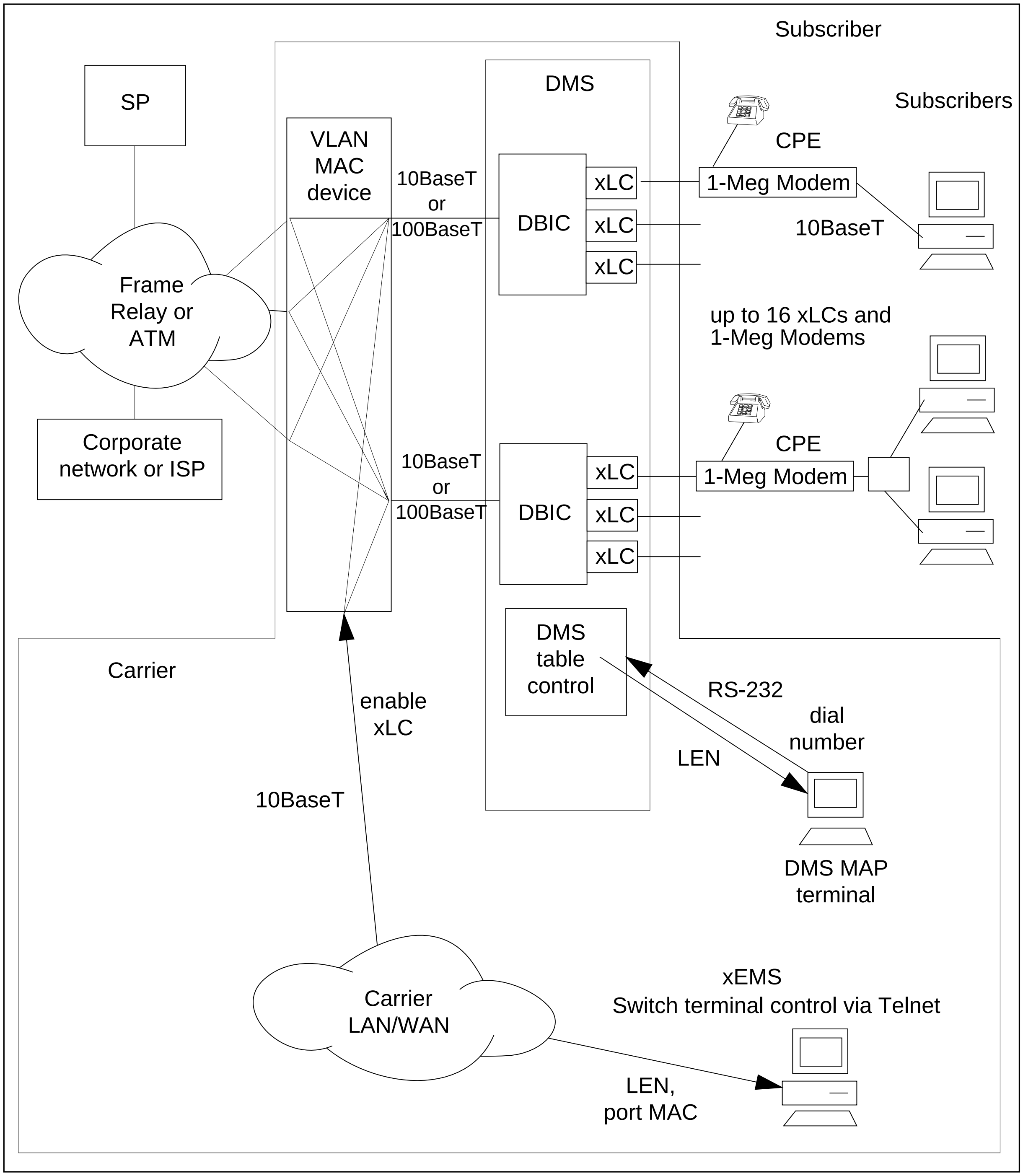
Features

Characteristics of the VLAN MAC configuration follow:

- subscriber isolation security
- protection from outside interference
- xDSL Element Management System (xEMS) security
- Internet Protocol (IP) traffic only
- per subscriber configuration for data service provider
- advanced VLAN configuration
- Carrier-to-data service provider connection can transport a complete Ethernet frame to a single port at the data service provider. For example, data service providers can terminate bridged encapsulation of Ethernet over frame relay or over asynchronous transfer mode (ATM).
- A subscriber cannot communicate with another subscriber on the same data link connection identifier/virtual channel identifier (DLCI/VCI). The data service provider must provide subscriber-to-subscriber communications.

Figure 12-1 shows a VLAN MAC configuration.

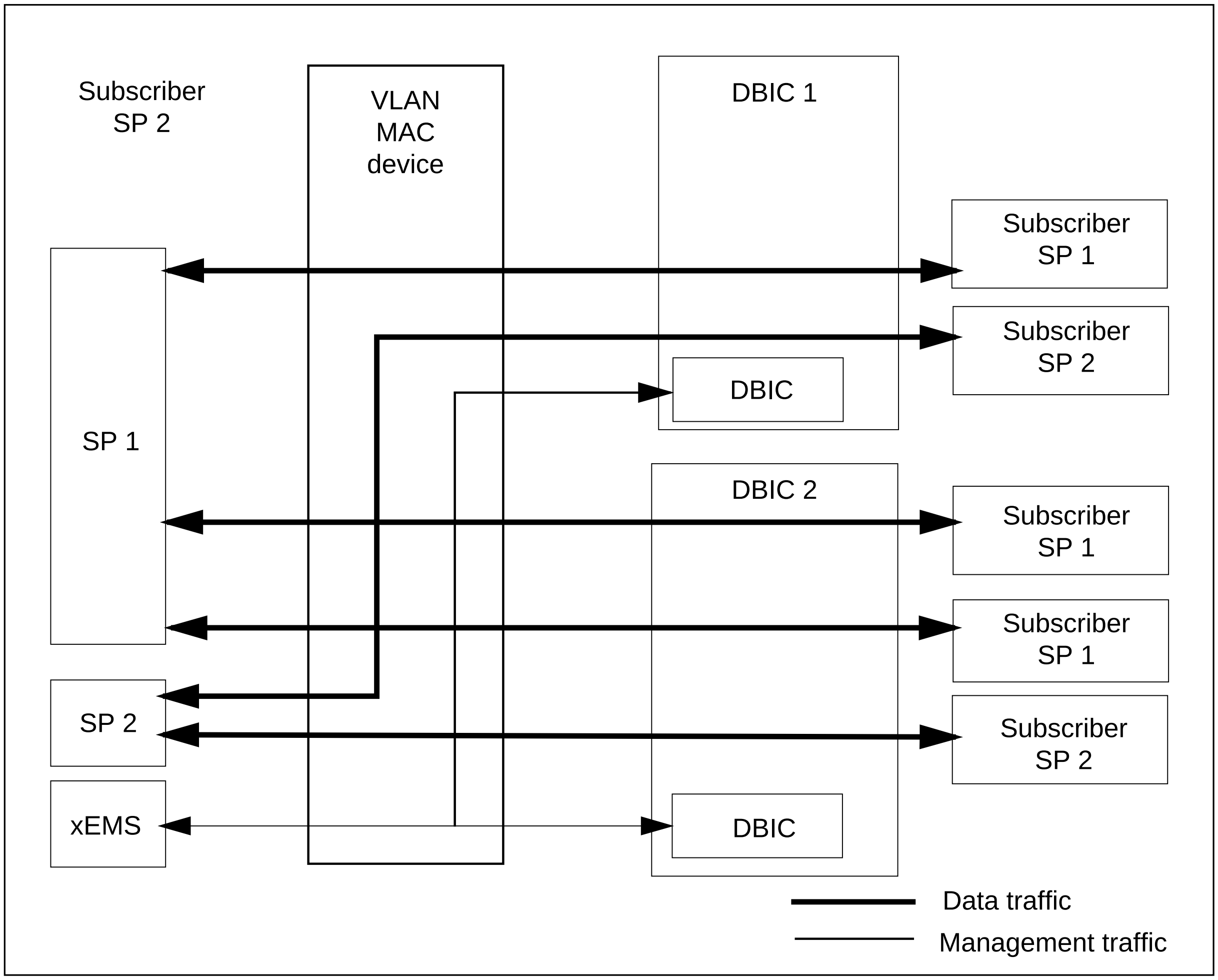
Figure 12-1 VLAN MAC configuration



Traffic flow

Figure 12-2 shows the traffic flow in a VLAN MAC configuration that includes multiple data service providers.

Figure 12-2 Traffic flow in VLAN MAC configuration



Characteristics of traffic flow in the VLAN MAC configuration follow:

- traffic separated from each subscriber
- management traffic separated from subscriber traffic

Table 12-1 lists configuration information for the DBIC, VLAN MAC device, and data service provider in a VLAN MAC configuration.

Table 12-1 Values for 1-Meg Modem Service items in VLAN MAC configuration

1-Meg Modem Service item	Configuration item	Value	Note
DBIC	Local switching	Disabled	
	ARP filtering	Optionally increase	Expected broadcast in this model is low increase from default value to increase address resolution protocol (ARP) success rate.
	Broadcast filtering	Upstream and downstream enabled	Enabled recommended. Disable for more protocol support.
	MAC translation	Enabled	
VLAN MAC device	Group	DBIC port or virtual router port or data service provider DLCI/VCI	More than one data service provider can be in a group.
	VLAN		Each subscriber has a VLAN, which isolates a subscriber to a exact data service provider.
	Management group or virtual router group (See note.)	DBIC port or subnet (See note.)	If the device allows multiple groups for each port, the device does not need a virtual router. Each DBIC port is in a management group. If the device does not allow multiple groups per port, the device needs a virtual router. Each group must have a port for each DBIC from that router. This grouping provides management communications to all DBICs.
Data service provider	Subnets	1 per DLCI/VCI	
	DHCP server	xLC MAC addresses	Assume MAC translation is enabled. You will need Information on the data service provider and subscriber to configure the Dynamic Host Configuration Protocol (DHCP) server.

Note: Switches that do not support multiple groups for each port require a virtual router to handle management traffic.

Subnetworks

Because each DBIC has a DLCI/VCI, each data service provider router typically has a single subnet for each DBIC. Each DLCI/VCI can be placed in a subnet for the subscribers on that DBIC. The data service provider selects the size of the subnet to increase their IP address space. Each data service provider can have a subnet of its subscribers.

DHCP services

This configuration supports DHCP subscriber services. Subscriber DHCP client requests go directly to the data service provider.

PVC-Based High-Speed Data Connectivity model

The PVC-Based High-Speed Data Connectivity model provides a continuous high-speed data connection that is nailed-up over a PVC between a subscriber and a DSP or corporate network. The model provides operating companies with the following benefits:

- scalable architecture
- support for multiple data service providers
- isolated payload and management traffic
- isolated end-user traffic
- reduced PVC provisioning

Service parameters

The service parameters of PVC-Based High-Speed Data Connectivity follow:

- voice and data service delivered to subscriber on a single, twisted pair
- continuous Ethernet connection between subscriber's PC or small home office (SOHO) router and data service provider or corporate network
- subscriber-to-data service provider connection through network provider
- multiple data service providers, with provisioned access to one data service provider per subscriber
- peer-to-peer subscriber connectivity through data service provider router enabled with subnet mask
- data service provider connection through multiple ATM PVCs using RFC1483 bridged encapsulation over multiple DS3 or OC-3 links
- data service provider connection through multiple Frame Relay PVCs using RFC1490 bridged encapsulation over multiple DS1 links
- best effort bandwidth
  - — engineered quality of service for backbone network
  - — quality of service not guaranteed on a per subscriber basis

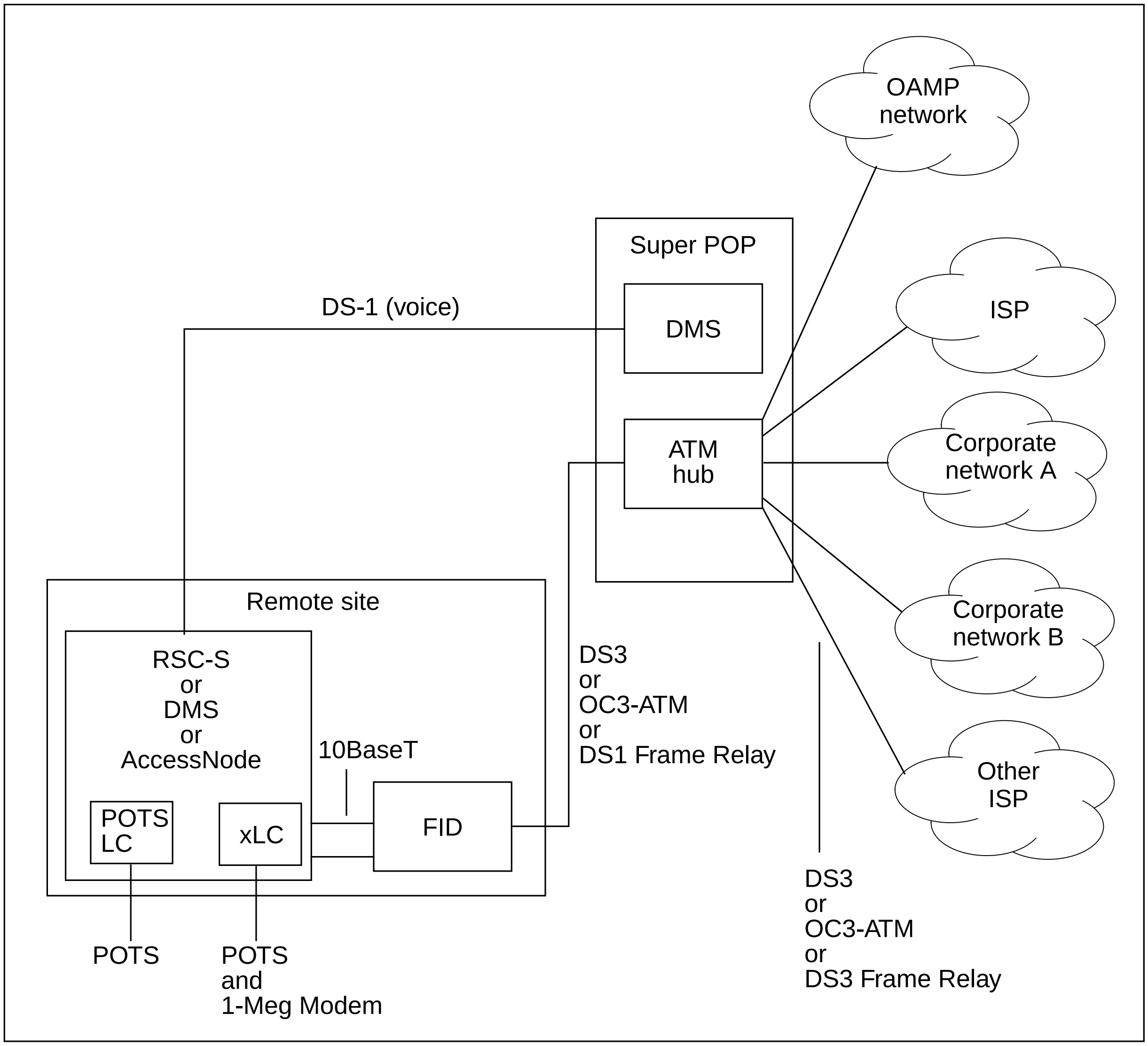
- flat rate billing
  - Network provides no detailed accounting information.
  - data service providers can bill for discretionary services through normal process.
- support for static and dynamic IP address assignment

  Dynamic IP address assignment from the data service provider address pool uses the data service provider DHCP server.
- security
  - The data service provider is responsible for subscriber-level authentication.
  - This model isolates OAMP systems to prevent subscriber attacks.
  - This model supports port mapping.
- all traffic carried via IP
- individual OAMP workstations for each network component to manage network traffic
- link redundancy available, based on network engineering

Network architecture

Figure 12-3 shows the architecture of PVC-Based High-Speed Data Connectivity.

Figure 12-3 Architecture of PVC-Based High-Speed Data Connectivity



Components

The components of PVC-Based High-Speed Data Connectivity follow:

- CPE
  - 1-Meg Modem
  - Diamond MM NIC
- access and switching products:
  - xLC
  - DBIC
  - one of the following switches for voice service
    - DMS-100 with NA008 or higher
    - DMS-500 with LLT008 or higher
    - AccessNode Express VM with AN15 or higher
    - SL100 with MSL008 or higher
    - DMS-10 with 411.20 or higher
- one of the following devices as the FID:
  - Alcatel* OmniSwitch* Omni-5 series with load 3.4.8
  - Alcatel OmniSwitch Omni-9 series with load 3.4.8
  - Alcatel OmniStack* with load 3.4.8

  Note: Contact Nortel Networks customer support if you want to upgrade to any other load.

- one of the following switches as the ATM hub:
  - Magellan Passport* Model 7480
  - customer supplied and managed switch

    Note: If the ATM hub is an existing device, you are responsible for all network configurations and connections.

- a Cisco* router with integrated routing and bridging load as the data service provider router
- one or more of the following OAMP workstations:
  - xDSL Element Management System (xEMS) workstation for 1-Meg Modem Service
  - X-Vision for the OmniSwitch or OmniStack FID
  - Open Management System for Passport (OMS-P) or Network Management System (NMS) for Magellan Passport hubs

Optional components

Office configurations and subscriber needs can require changes to the components in PVC-Based High-Speed Data Connectivity. Some of the optional components of this model follow:

SOHO router A subscriber can use a SOHO router to provide communications to multiple PCs. The router provides a single MAC address to the network.

The router must have an IP address that is compatible with the associated VLAN subnet defined by the data service provider router. A typical router will not support a network mask of 127.255.255.255. Provision the router with a more typical mask of 255.255.255.252 to provide a small subnet for the router. The BVI interface would also require a secondary IP address with the same mask and subnet to provide the correct IP connectivity.

The devices behind the SOHO router require IP addresses provisioned by the data service provider with a static or dynamic routing entry on the data service provider router. These IP addresses are transparent to the 1 MMS network. With this configuration, set DBIC broadcast filtering downstream to none for dynamic routing protocols like OSPF.

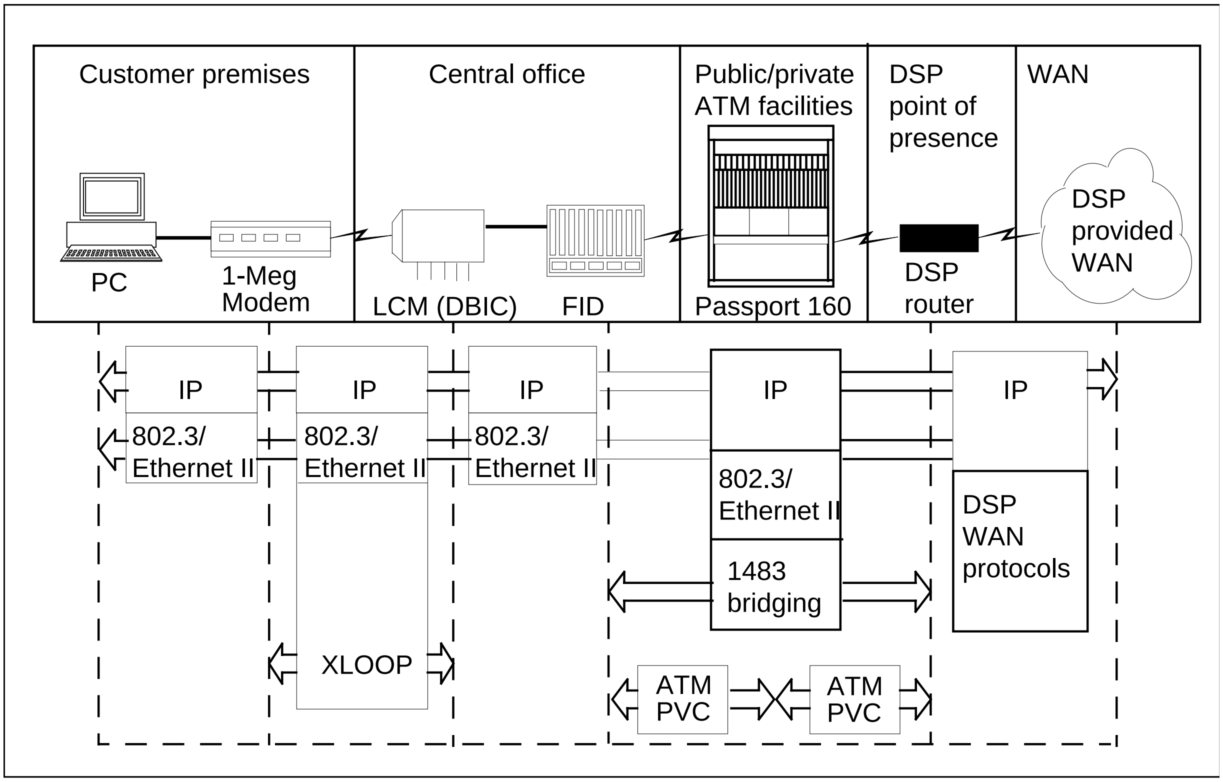
OC-3 Express You can use OC-3 Express as a FID in small sites that do not justify an OmniSwitch or OmniStack. However, you must have an OC-3 Express system at both ends of the loop.

The OC-3 Express supports either copper or fiber. You can use the OC-3 Express with the Ethernet Inverse Mux (EIM) card to extend the Ethernet connection from the DBIC to a remote site.

Network protocols

Figure 12-4 shows the network protocols in the data plane for PVC-Based High-Speed Data Connectivity.

Figure 12-4 Protocols in network



VLAN characteristics

Characteristics of PVC-Based High-Speed Data Connectivity follow:

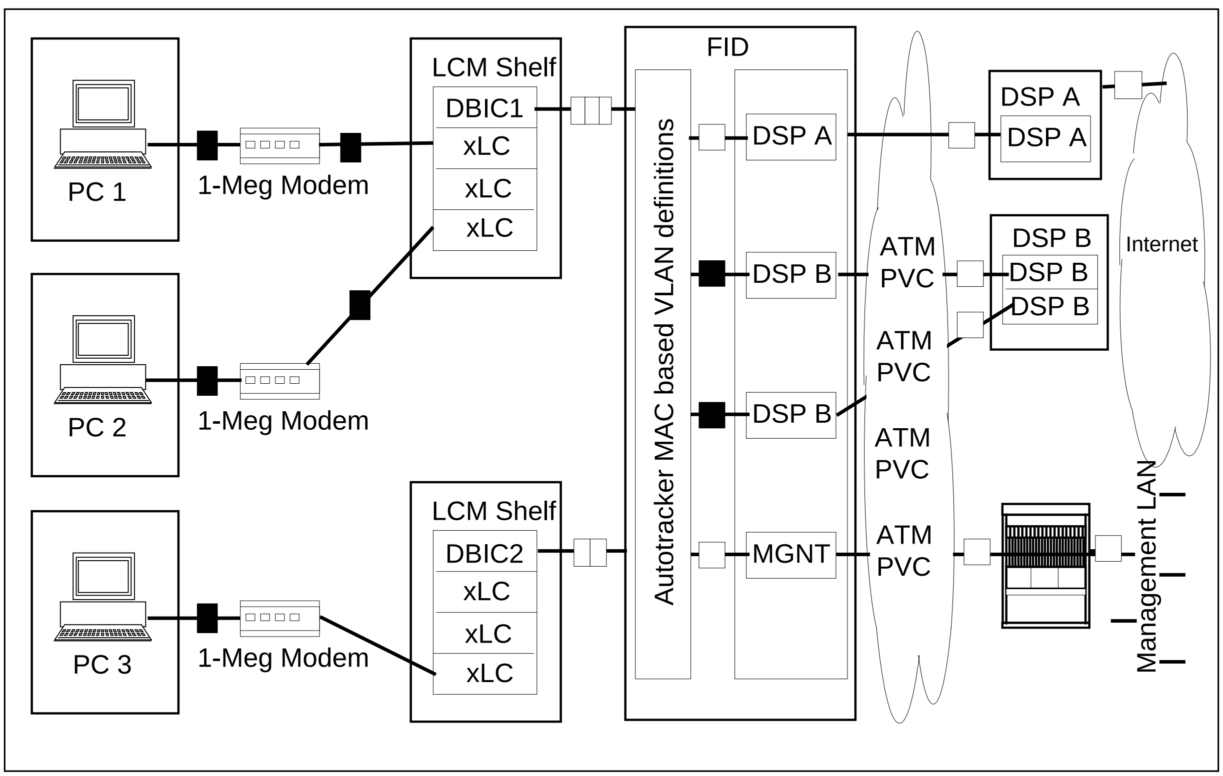
- One VLAN for every 240 users of a data service provider is created on the OmniSwitch or OmniStack. User membership in these VLANs is set by the OmniSwitch or OmniStack administrator on a MAC address basis. The administrator configures a table of MAC addresses per VLAN.
- Most users will directly connect their individual PCs to dedicated 1-Meg Modems. SOHO users with a small LAN can also connect their LAN to a 1-Meg Modem by using a router. This will give all PCs on the LAN access via the 1-Meg Modem.
- The OmniSwitch or OmniStack determines a user’s VLAN when the first Ethernet frame is received from the user’s PC or SOHO router.
- ATM PVCs are used to connect the OmniSwitch or OmniStack with data service provider routers. A VLAN-to-PVC association is configured on the OmniSwitch or OmniStack, which sets up a data service

provider-to-VLAN association. For example, VLAN 34 maps to PVC34 which maps to a given data service provider.

- All user traffic is routed by the data service provider router, including user-to-user traffic within the same VLAN. The DBIC itself does not switch traffic locally from one xLC to another. Port to port Ethernet switching is disabled on the OmniSwitch or OmniStack. All user traffic is forced to the router by the use of a special purpose mask on the users PC.
- User PCs will have static IP address assignments. All PCs within a given VLAN share an IP subnet. Alternatively, DHCP can be used to assign IP addresses to user PCs. In this case, each PC will be allocated an IP subnet.
- One ATM PVC per VLAN connects the OmniSwitch or OmniStack to data service provider Cisco routers. Up to 240 users are members of each VLAN and share the use of the ATM PVC. RFC 1483 Bridged Encapsulation is used on the ATM PVCs, effectively extending each VLAN to touch the data service provider Cisco router. The transition from layer 2 bridging to layer 3 IP routing occurs at the data service provider Cisco router.

Figure 12-5 shows the VLAN configuration in PVC-Based High-Speed Data Connectivity.

Figure 12-5 VLAN configuration



IP address plan

The network for 1-Meg Modem Service subscribers is an OSI layer 2 network that uses bridging techniques. The IP addresses are within the data service provider router and subscriber's PC environment. However, the use of VLANs places restrictions on the IP address plan. All members of a VLAN must be in the same IP address segment. For cases such as SOHO routers, multiple subnets can exist on the same VLAN.

Each VLAN defined on the OmniSwitch or OmniStack has the following features:

- one uplink ATM PVC to the data service provider router using 1483 Bridging
- a number of users based on the DBIC-generated MAC address

For a single ISP application, limit the number of users to 240 per VLAN. This number results in 15 DBICs and 16 users per VLAN.

With efficient use of a Class C size subnet, you can place the 240 users and the router connected to the OmniSwitch or OmniStack in the same IP subnet. For example, the router could have an IP address of 206.172.196.1 with a mask of 255.255.255.0. The subscribers could have addresses of 206.172.196.2 to 206.172.196.241 inclusive, with a mask of 127.255.255.255. With a mask of 127.255.255.255 and a gateway address of the router, each subscriber's traffic is forced to the router if the destination subscriber is in the same subnet.

DBICs normally do not allow communication within the DBIC between subscribers on the same DBIC. In the previous example, PVC-Based High-Speed Data Connectivity provides this communication by forcing the data to and from the router using the 127.... mask and router gateway address.

PVC-Based High-Speed Data Connectivity also uses this approach for subscribers on different DBICs and the same VLAN. The OmniSwitch or OmniStack FID provides port mapping that prevents users on the same VLAN from directly communicating with each other. Port mapping prevents communication between Ethernet ports, which forces all traffic between the Ethernet port and the ATM PVC.

A subscriber who changes the network mask will not be able to talk to anyone on his own subnet. This loss of communication is due to the DBIC configuration or port mapping. If the subscriber changes the IP address of another subscriber, the subscriber can interrupt service to the second subscriber.

Since all user traffic is forced to the router, the router controls communication between users.

A typical subscriber on a traditional VLAN could communicate with another subscriber on the same VLAN and other subscribers outside the VLAN. Table 12-2 represents a typical routing table for this configuration.

Table 12-2 Sample routing table

Network address	Netmask	Gateway address	Interface
0.0.0.0	0.0.0.0	206.130.7.9	206.130.7.107
206.130.7.0	255.255.255.0	206.130.7.107	206.130.7.107
206.130.7.107	255.255.255.255	127.0.0.1	127.0.0.1
206.130.7.255	255.255.255.255	206.130.7.107	206.130.7.107
127.0.0.0	255.0.0.0	127.0.0.1	127.0.0.1
224.0.0.0	224.0.0.0	206.130.7.107	206.130.7.107
255.255.255.255	255.255.255.255	206.130.7.107	0.0.0.0

The second entry in the table indicates the PC uses the local network, rather than the router, to communicate with users on the same subnet. This configuration does not force all data traffic to the router. If the second entry was deleted, the first entry would be used to force all traffic to the router (206.130.7.9). If “route delete” is used to delete the entry, the entry is either not deleted or is automatically added again.

To avoid this problem, use a mask of 127.255.255.255 rather than the more common 255.255.255.0 mask. Table 12-3 represents a routing table with a mask of 127.255.255.255.

Table 12-3 Sample routing table with 127.255.255.255 mask

Network address	Netmask	Gateway address	Interface
0.0.0.0	0.0.0.0	206.130.7.9	206.130.7.107
206.130.7.0	255.255.255.255	127.0.0.1	127.0.0.1
206.130.7.107	255.255.255.255	206.130.7.107	206.130.7.107
206.130.7.255	127.255.255.255	206.130.7.107	206.130.7.107
127.0.0.0	255.0.0.0	127.0.0.1	127.0.0.1
224.0.0.0	224.0.0.0	206.130.7.107	206.130.7.107
255.255.255.255	255.255.255.255	206.130.7.107	0.0.0.0

With this routing table, all traffic except loopback traffic and one IP address (78.130.7.107) is forced to the router (206.130.7.9).

> ***Note:*** The PC would ARP one other IP address. For a PC with an IP address of 206.172.193.30, the address would be 78.172.193.20 (206 - 128 = 78). If proxy ARP was set on the router, the router would respond to the ARP request and allow connectivity.

The management VLAN also should have its own IP address segment whose members consist of the following:

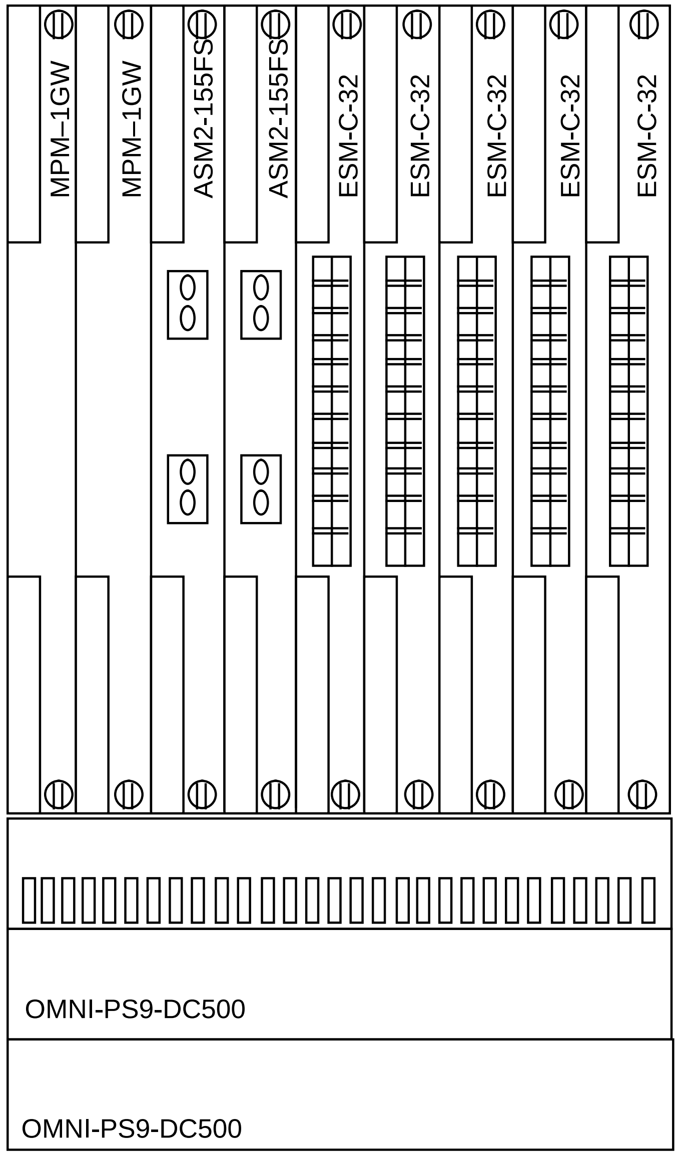
- the DBICs
- an IP address on the VLAN for X-Vision access
- an IP address on the termination of the uplink ATM PVC

OmniSwitch or OmniStack

The recommended device for PVC-Based High-Speed Data Connectivity is OMNI-9wx with a firmware load of 3.4.8. Smaller offices with limited growth potential can use an OMNI-5wx chassis with 5 slots.

Figure 12-6 shows the layout for an OMNI-9wx.

Figure 12-6 OMNI-9wx layout



The Omni-9wx contains nine slots for the management processor module (MPM) and switching modules. Slots are numbered from 1 to 9 starting from the left slot. Slots for two power supplies, either ac or dc, are located at the bottom of the chassis. A separate removable fan tray that contains four fans is located above the power supply module bays.

A fully loaded chassis weighs approximately 90 pounds and is rack mounted in a 19 inch cabinet. The chassis is 24.5 inches high, 16.6 inches wide, and 13.25 inches deep. The chassis has no rear access. You can access all connections, including power, from the front.

The OMNI-9wx uses the MPM-1GW module in slot 1. You can install a second redundant module in slot 2. The switching module has a male DB9 connector for local console access. To connect a PC with a COM1 port, use a straight-through cable with 9 pin male to female DB9 connectors.

The 10BaseT Ethernet module ESM-C-32W with 32 ports provides connectivity to the DBICs. The 32 RJ-45 ports connect to an unshielded twisted pair (UTP), typically Category 5 cable, and operate to a full 10 Mbit/s bandwidth in either full or half duplex. For the DBIC connections half duplex is used. Install up to five Ethernet modules to provide connectivity to a maximum of 160 DBICs. Reserve one Ethernet port for temporary management functions, such as connecting a local PC for downloading new software to the OmniSwitch or OmniStack. Note the ESM-C-32W is a mammoth-based Ethernet card which supports various features like 802.1Q tagging.

The Ethernet module ports consist of four banks of eight ports. Ports are numbered from 1 to 8 in each of the four banks, and the four banks are labelled A, B, C, and D. This grouping simplifies the display of light-emitting diodes (LED) which indicate link status and activity. Note that within the configuration, the ports of a slot are numbered from 1 to 32.

- 1 on the upper left of the card
- 16 on the bottom left of the card
- 17 on the upper right of the card
- 32 on the bottom right of the card

The other two slots of the chassis are used for ATM uplinks to the ATM network. Use individual customer requirements, traffic, and redundancy to select these cards. Table 12-4 lists some of the available cards.

Table 12-4 Cards for ATM uplink

Card	Description
ASM-DS3-1W	Single port ATM DS3 card
ASM-DS3-2W	Dual port ATM DS3 card
ASM2-155FS-1W	Single mode, single port ATM OC3 card
ASM2-155FS-2W	Single mode, dual port ATM OC3 card
ASM2-155FM-1W	Multimode, single port ATM OC3 card
ASM2-155FM-2W	Multimode, dual port ATM OC3 card

Provisioning

Provision the OmniSwitch or OmniStack through the following:

- the local console port (Default, 8N1, 9600bps) with a terminal emulation package on a PC
- telnet through a PC locally connected on one of the Ethernet ports
- an ATM connection
- the X-Vision software package

Provisioning involves three types of components:

- A group with its associated VLAN defines which source MAC addresses are members of the VLAN.
- An ATM PVC defines the connection between the OmniSwitch or OmniStack and the data service provider router.
- A service links the group and the ATM PVC together.

In default group 1, all Ethernet ports and uplink connections are initially assigned and remain unless assigned to a new group. For 1-Meg Modem Service, group 33 is created for management and groups 34 to X are created for each data service provider connection. Each group and the associated default VLAN within that group are a spanning tree and a broadcast domain.

All groups from 33 to X are defined as mobile groups, with the membership defined by an Autotracker* MAC-based rule and a port-based rule. The mobile group feature of the OmniSwitch or OmniStack allows individual Ethernet frames on the device to dynamically become members of different groups based on a set of rules. Autotracker is the feature that defines these rules. The 1-Meg Modem uses MAC-based rules and port-based rules. Use the GMCFG command to enable group mobility on the device. Group mobility is set to off by default.

Members of group 33, the management VLAN, are the DBIC MAC addresses and Ethernet ports as a port-based rule. With up to 32 ports and five cards, the group can contain up to 160 MAC addresses. A rule defined with Autotracker can have more than one member and each group can have multiple rules. Each rule can only be managed as a complete unit, so restrict the management group to one rule for each DBIC.

Members of group 34 to X, the user VLANs, are the 16 line card MAC addresses for each DBIC and the Ethernet ports as a port-based rule. Provision up to 240 MAC address members within each VLAN for each data service provider connection. The 240 members make it easier for the data service provider to use a Class C-sized subnet for each VLAN. With MAC address translation enabled on the DBIC, the 16 MAC addresses from each DBIC are in sequence, starting with one higher than the DBIC.

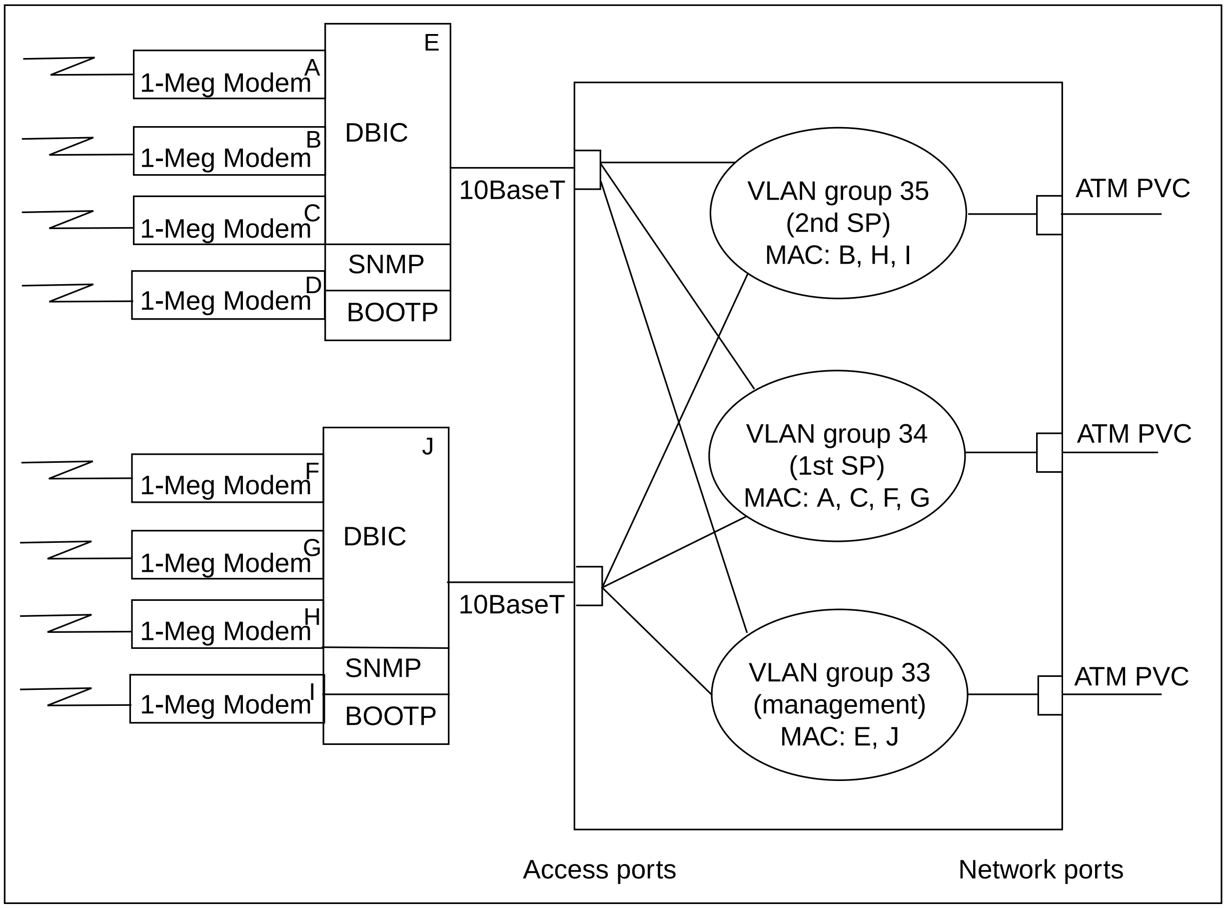
Use a VCI value of 33 for the management VLAN and values of 34 and up for the data service provider VLANs. The ATM network and data service provider routers must agree on these values.

The last component to be provisioned is a service. Use a service to link the created groups and ATM PVCs. Provision one service for each PVC and at least one service for each group. If you have a requirement for a redundant link to the data service provider, a new PVC or a different physical link and associated service are created and linked to the same group. The result is two services and two PVCs in the same data service provider for the group. The spanning tree protocol running on the group will detect a loop on the two uplink PVCs and will not forward on one of the uplink PVCs. If the uplink fails, the spanning tree algorithm will use the alternate uplink PVC.

Note: A value of 0 for VPI is currently supported.

Figure 12-7 shows the VLAN configuration for the FID in PVC-Based High-Speed Data Connectivity.

Figure 12-7 VLAN configuration in FID



Data service provider routers

Nortel Networks verified the following routers for PVC-Based High-Speed Data Connectivity:

- Cisco 7513 with an OC3 ATM interface
- Cisco 3620 with a frame relay interface, with a Magellan Passport switch providing the ATM conversion from the FID

PVC-Based High-Speed Data Connectivity uses the integrated routing and bridging functionality in the Cisco routers. This functionality provides for the termination of an ATM 1483 bridged or a Frame Relay 1490 bridged connection linked to a bridged virtual interface. The BVI is provisioned with an IP address, which provides the link between the bridged and routed components.

A sample Cisco router configuration follows:

```
interface Hssi2/0.2 point-to-point
description DLCI 34 to XYLAN RFC 1490 Bridged
frame-relay interface-dlci 34
bridge-group 34
!
interface ATM9/0/0.4 point-to-point
description VCD 103 to XYLAN RFC 1483 Bridged
atm pvc 103 0 35 aal5snap
bridge-group 35
!
interface BVI34
description RFC 1490 bridging to XYLAN
ip address 192.168.1.1 255.255.255.0
no ip redirects
!
interface BVI35
description RFC 1483 bridging to IP routing
ip address 192.168.2.1 255.255.255.0
no ip redirects
!
bridge irb
bridge 34 protocol ieee
bridge 34 route ip
bridge 35 protocol ieee
bridge 35 route ip
```

Each of the BVI34 and BVI35 connections corresponds to one of the VLANs on the FID. The IP addresses on the BVI interfaces are in the same subnet as the IP addresses provided to the subscriber's PC. The IP address on the BVI interface is the gateway or router address for the subscriber's PC.

Since only one interface is a member of each bridge group, the router does not provide bridging between two interfaces. However, since the bridged interface has an IP address, IP packets are routed between the two interfaces.

X-Vision

X-Vision is a suite of management software that provides an integrated solution for switch management. X-Vision includes the following windows:

- Switch Management
- VLAN
- Services
- Event and Statistics

Switch Management window

The Switch Management window provides comprehensive switch management. Network managers can use the Switch Management window to configure, control, monitor and manage the switches on their networks, locally or remotely, using SNMP. Switch Manager offers network managers a powerful, sophisticated, standards-based solution for managing medium-switched and large-switched enterprise LANs from a single console.

VLAN window

The VLAN window provides policy-based VLAN planning and management. Using the VLAN window, administrators can create VLANs that span a floor, building, LAN, campus, or even the WAN. The VLAN window allows administrators to create next-generation VLANs that can be based on the physical port, MAC address, layer-three address, protocol type, multicast address, authenticated user, custom bit mask and/or a combination of these VLAN types. These VLANs reduce the administration costs associated with network moves, adds, and changes. Users are placed into VLANs based on the policies defined by an administrator. Users retain their membership regardless of location.

The VLAN window is a graphical VLAN planning and management application. VLANs are created using familiar windows-style wizards. Once established, VLAN assignments can be modified and managed using the VLAN window's simple drag-and-drop features. When the administrator has defined and accepted a set of VLAN policies, those standards are downloaded into every switch on the network and maintained within the switch's management processor.

Services window

The Services window includes service and connection management. The Services window provides an interface that allows administrators to configure and control their media and technologies, providing them with a comprehensive view of their networks. The Services window adds simplicity to the management of each network connection by providing the user with a complete snapshot of the services and connections that are currently available and in use. Every ATM connection on a FID can be individually configured and managed. Since ATM is a connection-oriented technology that often requires more configuration than legacy LAN protocols, this type of comprehensive management is extremely important.

The Services window provides a consistent graphical user interface (GUI) for network services and connections including LAN, ATM, and WAN. This simple, easy-to-use interface allows the user to manage and maintain connections and services of any media through a single, fully featured interface.

Events and Statistics windows

The Events and Statistics windows are proactive network monitors that show events and statistics   The Events and Statistics windows use SNMP to gather data from FIDs throughout the enterprise, allowing organizations to proactively manage their networks. The windows can monitor frames from any legacy LAN media including Ethernet, token ring, FDDI, CDDI, and Fast Ethernet. They can also monitor ATM cells and frame relay data.

Using criteria set by network administrators, these windows gather events or statistical data from FIDs throughout the LAN and WAN.

System requirements for PC workstation

Install X-Vision on a Pentium PC, 166MHz or greater, equipped with the following:

- 64 MB RAM
- SVGA video card capable of high color
- 17 inch monitor, 1024 x 768 resolution recommended
- 300 MB free disk space
- Microsoft Windows NT 4.0 with Service Pack 3, or Microsoft Windows 95 OSR 2.1 (950B), with DCOM and Winsock2. DCOM and Winsock2 installation are included as part of the X-Vision installation.
- CD ROM drive
- network interface card
- TCP/IP stack

System requirements for UNIX workstation

At a minimum, you must install X-Vision on a UNIX workstation equipped with the following:

- 64 MB RAM
- Sun or HP workstation
- Solaris 2.5 or higher, on Sun or HPUX 10.10 or higher
- X11R5/Motif 1.2
- CD ROM drive
- HP OpenView version 5.01 (optional)
- 300 MB free disk space

Capacity and performance

PVC-Based High-Speed Data Connectivity will operate at the following capacity:

- 16 users per DBIC
- 160 DBICs per OmniSwitch or OmniStack (5 x 32 ports; less if spare Ethernet card required)
- 2560 users per OmniSwitch or OmniStack

- 240 users per VLAN
- 1 management VLAN
- 11 VLANs with 11 ATM PVCs (last VLAN has only 160 users)
- 30 kbit/s average throughput for each user
- 76,800 kbit/s for each OmniSwitch or OmniStack
- 2 ATM OC3 or 3 DS3 uplinks (more if redundancy required)

Note: The number of VLANs and the number of its members may change due to the number and mix of data service provider connections.

Deployment checklists and recommendations

Following are checklists and recommendations from Nortel Networks for the deployment of PVC-Based High-Speed Data Connectivity.

Checklist

Verify all items on this list before to any Nortel Networks personnel arrive on site. This verification will help ensure that work is successfully accomplished with minimal interruptions.

1. Provide written approval to the Nortel Networks project manager for all work.
2. Provide a list of all essential contacts.
3. Confirm that all necessary cards and cables are installed. Refer to the "Recommended card layout" section in this chapter.
4. Get the most recent CI document.
5. Review current network diagrams, such as the IP address plan, frame relay or ATM plan, and the physical layout.
6. Get a list of root passwords for all devices that need to be accessed.
7. Verify that all components are running the appropriate software. Table 12-5 lists the recommended software for each component.

Table 12-5 Recommended software (Sheet 1 of 2)

Component	Software version
OmniSwitch or OmniStack	3.4.8
DBIC	1.04 or higher
Passport	4.2(5) BD02S5F or higher
xEMS	104 or higher

Table 12-5 Recommended software (Sheet 2 of 2)

Component	Software version
Cisco	11.2 or higher
X-Vision	3.2.3 or higher
HP OpenView NNM	5.01

8. Confirm the availability of console access to all components. You can install the Zmodem console emulation program on a laptop or PC.
9. Create a tool kit of various console cables, with appropriate pin outs for all components. Include straight-through and cross-over Ethernet cables.
10. Confirm that OmniSwitch or OmniStack, Passport, and Cisco connectors match the supplied ATM service.
11. Confirm that all necessary hardware peripherals for the management station, such as the CD drive, are available.
12. Check the HP OpenView license agreement.
13. Confirm that all required network address space assignments are available.

Recommended card layout

Table 12-6 lists the recommended card layout for the Magellan Passport switch in PVC-Based High-Speed Data Connectivity.

Table 12-6 Integrated Passport ILS and ATM switch card layout

Slot	Card Type
0	CP
1	ILS-FWDR
2	Ethernet
3	OC-3/DS-3 ATM
4-14	Not in use
15	CP

Table 12-7 lists the recommended card layout for the OmniSwitch or OmniStack in PVC-Based High-Speed Data Connectivity.

Table 12-7 Card layout for OmniSwitch or OmniStack

Slot	Card Type
1	MPM
2	MPM
3	ASM
4	ASM
5-9	ESM

Recommended configurations

Recommendations from Nortel Networks for OmniSwitch or OmniStack configuration in PVC-Based High-Speed Data Connectivity follow:

- Xylanname = central office name + switch number
- Vlan# = VCI #
- The WAN interface description field includes the name of the Passport ATM hub, the slot number, and the port number.
- Enter the MAC addresses individually in the CAM table. See the section "OmniSwitch or OmniStack FID configuration" in this chapter.
- Enable group mobility.
- Limit the users for each VLAN to 240.
- Enable port mapping.
- *ServiceName = Group Name = PVC Description
- Management VCC should always start with VCI 33. If the same Passport has more than one management link, the next management VCI would be 133.
- Mobile group # = VCI #.

Table 12-8 lists a standard VCC configuration for an OmniSwitch or OmniStack.

Table 12-8 Standard VCC configuration

VCC	Allocation	Mobile Group	Group Name (see ServiceName)
--	DefaultGroup	1	
0.33	Management	33	(1MMMGMT)
0.34	DSP1	34	(VLAN 34 to “*DSP Name*”)
0.35	DSP2	35	(VLAN 35 to “*DSP Name*”)

Data service provider router

Recommendations from Nortel Networks for the data service provider router in PVC-Based High-Speed Data Connectivity follow:

- When possible, bridge groups should be the same as mobile groups (VCD = VCI = BG).
- Allow no IP redirection.

Passport

Recommendations from Nortel Networks for the Passport ATM hub in PVC-Based High-Speed Data Connectivity follow:

- The following Active Version List (AVL) should be on the Passport.

  ```
  ip_BD02S5F
  atmBearerService_BD02S5F
  bridge_BD02S5F
  base_BD02S5F
  networking_BD02S5F
  frameRelay_BD02S5F
  ```

- Recommended logical processor types (LPT) and corresponding feature lists follow:
  - atmswitch
    - atmMpe
    - atmBearerService
  - ilsfwdr
    - ip
    - atmMpe
    - bridge
  - lan
    - ip
    - bridge
- Table 12-9 lists the recommended naming convention for protocol port

name for each type of connection.

Table 12-9 Naming conventions for protocol port names

Connection	Naming convention (if applicable)	Example
Ethernet connection to OMS-P workstation		omsp01_eth_0
Ethernet connection to X-Vision workstation		xvision01_eth_1
Ethernet connection to xEMS workstation		xems01_eth_2
Cluster Bridge connection		1mmmgnt_eth_3
WAN connected to data service provider	DSP Name+ CardType+slot/port	Istar_DS3_40
WAN connected to FID	FID nodename+ CardType+slot/port	Xylan1_OX3_30

- Name the media type instances, such as LA/x and ATMIF/x, based on the logical processor and port of the instance (lp/3 enet/0, lp/4 port/0). Examples of names of media type instances follow:
  - — la/30 = lp/3 enet/0
  - — la/31 = lp/3 enet/1
  - — ATMIF/40 (LP/4 & port/0)
  - — SNMP system name "passport nodename"

  The VCCs should be consistent end to end.

DBIC

Recommendations from Nortel Networks for the DBIC in PVC-Based High-Speed Data Connectivity follow:

- The description of each DBIC interface must include a field with the switch name of the FID connected to the DBIC.
- Enable MAC address translation.

OmniSwitch or OmniStack FID configuration

The configuration of the OmniSwitch or OmniStack in PVC-Based High-Speed Data Connectivity involves the following tasks:

- Set the correct date and time.
- Confirm the version of the software load.

- Configure each device for 1-Meg Modem Service support.
- Confirm switch information.

Set correct date and time

The following console session shows how to set the correct date and time on an OmniSwitch or OmniStack for PVC-Based High-Speed Data Connectivity.

```
Welcome to the Xylan OmniSwitch! Version 3.4.8
login   : admin
password: switch

/ % dt

Current date and time: 07/22/98 13:51:18
Please enter new date and time (07/22/98 13:51:18) :
New date and time: 07/22/1998 13:51:18
/ %
```

Confirm the version of the software load

The OmniSwitch or OmniStack must have a software load of 3.4.8. If you need another software load, contact Nortel Networks customer support.

The following console session shows how to check the software load on an OmniSwitch or OmniStack for PVC-Based High-Speed Data Connectivity.

```
/ %slot

     Module-Type Adm-Status  HW      Board      Mfg     Firmware-Version
Slot Part-Number Oper-Status Rev   Serial #    Date     Base-MAC-Address
---- ----------- ----------- ----- ---------- -------- -----------------
1*        MPM 1G Enabled     B29     93483262 09/19/99 3.4.8
         5014313 Operational                           00:20:da:e5:7d:a0

2         MPM 1G Enabled     B28     92530239 07/01/99 3.4.8
         5014318 Redundant                             00:20:da:e4:08:90
3           HSM2 Enabled      D9     93482077 09/08/99 3.4.8
         5011006 Operational                           00:20:da:fe:65:60
                                                       00:20.da.fe.65.70
3-1    WSMPRI_T1              A9     93780523 09/10/99 3.4.8.00 (PR 1.11)
         5014806                                       REV C 03/12/98 1303

3-2    WSMPRI_T1              A9     93780516 09/10/99 3.4.8.00 (PR 1.11)
         5014806                                       REV C 03/12/98 1303


4          Empty

5    ESM 100C 32 Enabled       A     92580507 06/24/99 3.4.8
         5026208 Operational                           00:20:da:dc:68:10
                                                       00:20:da:dc:68:20

6          Empty


7          Empty


8          Empty


9          Empty
```

If the load is not 3.4.8, load the latest software through Zmodem console access or ftp as described in the OmniSwitch manuals. The following files must be available:

- `mpm.cmd`
- `mpm.cnf`
- `asm.img`
- `diag.img`
- `dni.img`
- `ds3edrv.img`
- `mesm.img`
- `mpm.img`

- `mpm.cfg`
- `mpm.cnf`

An example of the `mpm.cmd`/`mp4.cmd` file follows.

```
cmDoDump=1
wait=!cmIf Master()
taskDelay(600*wait)
gm_stp_check=0
flashAccessChecks=0
move_from_def=0
cmInit
pmmapping_enabled=1
```

Note 1: Transfer the file in ASCII.

Note 2: Make sure the order of the lines in the file matches the previous example.

For new installations, use a default configuration for each OmniSwitch. Delete two files on the switch and reboot. The following console session shows this task.

```
/ %rm mpm.cfg
mpm.cfg is a configuration file - if you remove this file,
parameters will not be saved until you reboot; do you want to
remove this? (n) y
/ % rm mpm.cnf
mpm.cnf is a configuration file - if you remove this file, parameters will not
be saved until you reboot; do you want to remove this? (n) y
/ % reboot
/ % (n) y/
%
```

Configure each device for 1-Meg Modem Service support

The configuration of the OmniSwitch or OmniStack for 1-Meg Modem Service support involves the following steps:

1. Enable group mobility for the switch.
2. Create a group for DBIC management with Autotracker MAC-based rules.
3. Configure the ATM OC-3 card in port 1 to be an ATM PVC.
4. Create a service for the slot 3 ATM OC-3 card in port 1 that will logically link the group to an ATM VCC.
5. Create a group for the first data service provider with Autotracker MAC-based rules.

6. Create a service for the slot 3 ATM OC-3 card in port 1 that will logically link the DSP group to an ATM VCC.
7. Enable port mapping.

Ensure group mobility for the switch.

The following console session shows how to ensure group mobility for the switch.

```
/%gmcfg
Group Mobility is Disabled. Enable Group Mobility ? [yes/no] (no):
ymove_to_def is set to Disabled. Set to Enable ?[yes/no](no): <CR Return>
def_group is set to Enable. Set it to Disable ?[yes/no](no): <CR Return>
```

Create a group for DBIC management

The following console session shows how to create a group for DBIC management with Autotracker MAC-based rules. This MAC address is read from the DBIC card. An IP address is configured to allow X-Vision management.

```
/ % crgp

    GROUP Number (  2) : 33
    Description (no quotes) : 1MMMGMT
    Enable WAN Routing? (n):<CR Return>
    Enable ATM CIP? (n): <CR Return>
    Enable IP (y) : y
    IP Address : 172.16.2.254
    IP Subnet Mask(0xffff0000) : <CR Return>
    IP Broadcast Address (172.16.255.255  ) : <CR Return>
    Description (30 chars max)              : <CR Return>
    Disable routing?                    (n) : <CR Return>
    Enable NHRP?                        (n) : <CR Return>
    IP RIP mode {Deaf(d), Silent(s),
                 Active(a),Inactive(i)} (s) : i
    Default framing type {Ethernet II(e),
                          fddi(f),
                          token ring(t),
                     Ethernet 802.3 SNAP(8),
            source route token ring(s)} (e) : <CR Return>
    Enable IPX? (y): n

Enable Group Mobility on this Group ? [y/n](n): y
Enable User Authentication for this Group [y/n](n): n
Enable Spanning Tree for this group [y/n](y): n
Do you wish to configure the interface group for this Virtual LAN at this time?
(y) n

GROUP 33 has been added to the system.

You may add interfaces to this group using the addvp command at a later date.
```

```
For now, the GROUP is inactive until you add interfaces.

Configure Auto-Activated LEC service ? [y/n](y): n
Configure AutoTracker rules for this group [y/n](y): y

Select rule type:

 1.  Port Rule
 2.  MAC Address Rule
 3.  Protocol Rule
 4.  Network Address Rule
 5.  User Defined Rule
 6.  Binding Rule
 7.  DHCP PORT Rule
 8.  DHCP MAC Rule

Enter rule type (1): 2
Set Rule Admin Status to [(e)nable/(d)isable] (d): e
Enter the list of MAC addresses (AABBCC:DDEEFF) in Canonical format.

(Enter save to end): 006038:302102
save

Configure more rules for this vlan [y/n] (n): y
Select rule type:
 1.  Port Rule
 2.  MAC Address Rule
 3.  Protocol Rule
 4.  Network Address Rule
 5.  User Defined Rule
 6.  Binding Rule
 7.  DHCP PORT Rule
 8.  DHCP MAC Rule
Enter rule type (1): 1
Set Rule Admin Status to [(e)nable/(d)isable] (d): e
Enter the list of ports in Slot/Interface format: 5/1
Configure more rules for this vlan [y/n] (n): <CR Return>

VLAN  33: 1 created successfully
```

Configure the slot 3 ATM OC-3 card in be an ATM PVC

The following console session shows how to configure the slot 3 ATM OC-3 card in port 1 to be an ATM PVC.

```
/ % map 3/1

Slot 3 Port 1 Configuration


1)  Description (30 chars max)                    : ATM PORT
2)  Conn Type { PVC(1), SVC(2) }                  : SVC
```

```
    30) Sig version { 3.0(1) 3.1(2) }           : 3.0
    31) Signaling VCI (0..1023)                 : 5
    32) ILMI Enable {(False(1),True(2)}         : True
    33) ESI (12 hex-chars)                      : 0020da9bbedd
    34) ILMI VCI (0..1023)                      : 16
3)  Max VCCs (1-1023)                           : 1023
4)  Max VCI bits (1..10)                        : 10
5)  UNI Type                                    : Private
6)  Tx SAR Buffer Size (2048-131072)            : 16384
7)  Rx SAR Buffer Size (2048-131072)            : 16384
8)  Tx Frame Buffer Size (1800-16384)           : 4600
9)  Rx Frame Buffer Size (1800-16384)           : 4600
10) Pl Scramble {(False(1),True(2)}             : True
11) Timing Mode {(Loop(1),Local(2)}             : Local
12) Loopback Config { NoLoop(1), DiagLoop(2),
                     LineLoop(3) }              : NoLoop
13) Phy media { SONET(1),SDH(2)}                : SONET

Enter (option=value/save/cancel) : 2=1

Slot 3 Port 1 Configuration

1)  Description (30 chars max)                  : ATM PORT
2)  Conn Type { PVC(1), SVC(2) }                : PVC
3)  Max VCCs (1-1023)                           : 1023
4)  Max VCI bits (1..10)                        : 10
5)  UNI Type                                    : Private
6)  Tx SAR Buffer Size (2048-131072)            : 16384
7)  Rx SAR Buffer Size (2048-131072)            : 16384
8)  Tx Frame Buffer Size (1800-16384)           : 4600

9)  Rx Frame Buffer Size (1800-16384)           : 4600
10) Pl Scramble {(False(1),True(2)}             : True
11) Timing Mode {(Loop(1),Local(2)}             : Local
12) Loopback Config { NoLoop(1), DiagLoop(2),
                     LineLoop(3) }              : NoLoop
13) Phy media { SONET(1),SDH(2)}                : SONET

Enter (option=value/save/cancel) : save

Reset all services on slot 3 port 1 (n)?  : y
Resetting port, please wait...
```

Create a service for the OC-3 card to link the group to an ATM VCC

The following console session shows how to create a service for slot 3 ATM OC-3 ASM port 1 that logically links the group (1MMMGMT 33) to an ATM VCC 33 that will be created automatically.

```
/VLAN % cas 3/1

Slot 3 Port 1 Service 2 Configuration
```

```
1)  Description (30 chars max)        : PTOP Bridging Service 2
2)  Service type { LANE client(1),
                   Trunking (4),
                   Classical IP(5),
                   PTOP Bridging(6),
                   VLAN cluster(7)  } : PTOP Bridging
    10) Encaps Type { Private(1),
                      RFC1483(2) }    : Private
3)  Connection Type { PVC(1),
                      SVC(2) }        : PVC
4)  PTOP Group                        : 1
5)  PTOP connection                   : none
6)  Admin Status { disable(1),
                   enable(2) }        : Enable
7)  BandWidth Group (1-8)             : 1

Enter (option=value/save/cancel) : 10=2

Slot 3 Port 1 Service 2 Configuration
1)  Description (30 chars max)        : PTOP Bridging Service 2
2)  Service type { LANE client(1),
                   Trunking (4),
                   Classical IP(5),
                   PTOP Bridging(6),
                   VLAN cluster(7)  } : PTOP Bridging
    10) Encaps Type { Private(1),
                      RFC1483(2) }    : RFC1483
3)  Connection Type { PVC(1),
                      SVC(2) }        : PVC
4)  PTOP Group                        : 1
5)  PTOP connection                   : none
6)  Admin Status { disable(1),
                   enable(2) }        : Enable
7)  BandWidth Group (1-8)             : 1

Enter (option=value/save/cancel) : 1=1MMMGMT

Slot 3 Port 1 Service 2 Configuration
1)  Description (30 chars max)        : 1MMMGMT

2)  Service type { LANE client(1),
                   Trunking (4),
                   Classical IP(5),
                   PTOP Bridging(6),
                   VLAN cluster(7)  } : PTOP Bridging
    10) Encaps Type { Private(1),
                      RFC1483(2) }    : RFC1483
3)  Connection Type { PVC(1),
                      SVC(2) }        : PVC
4)  PTOP Group                        : 1
5)  PTOP connection                   : none
```

```
6)  Admin Status { disable(1),
                   enable(2) }        : Enable
7)  BandWidth Group (1-8)             : 1

Enter (option=value/save/cancel) : 4=33

Slot 3 Port 1 Service 2 Configuration
1)  Description (30 chars max)        : 1MMMGMT
2)  Service type { LANE client(1),
                   Trunking (4),
                   Classical IP(5),
                   PTOP Bridging(6),
                   VLAN cluster(7)  } : PTOP Bridging
    10) Encaps Type { Private(1),
                      RFC1483(2) }    : RFC1483
3)  Connection Type { PVC(1),
                      SVC(2) }        : PVC
4)  PTOP Group                        : 33
5)  PTOP connection                   : none
6)  Admin Status { disable(1),
                   enable(2) }        : Enable

7)  BandWidth Group (1-8)             : 1

Enter (option=value/save/cancel) : 5=33

Conn VCI 33 doesn't exist, VCI 33 will be created w/ default values!

Enter (option=value/save/cancel) : save
Creating service, please wait...
Enabling service...
```

Create a group for the first data service provider

The following console session shows how to create a group for the first data service provider with Autotracker MAC-based rules. These MAC addresses are configured in hexadecimal format. The addresses range from with 1 plus the hardware MAC address from the DBIC through 16 MAC addresses.

```
/VLAN % crgp

GROUP Number (  2) : 34
Description (no quotes) : DSP1
Enable WAN Routing? (n): <CR Return>
Enable ATM CIP? (n): <CR Return>
Enable IP (y) : n
Enable IPX? (y): n
Enable Group Mobility on this Group ? [y/n](n): y
Enable User Authentication for this Group [y/n](n): <CR Return>
Enable Spanning Tree for this group [y/n](y): n
Do you wish to configure the interface group for this Virtual LAN at this time?
(y) n
```

```
GROUP 34 has been added to the system.

You may add interfaces to this group using the addvp command at a later date.

For now, the GROUP is inactive until you add interfaces.
Configure Auto-Activated LEC service ? [y/n](y): n
Configure AutoTracker rules for this group [y/n](y): y

Select rule type:

 1.  Port Rule
 2.  MAC Address Rule
 3.  Protocol Rule
 4.  Network Address Rule
 5.  User Defined Rule
 6.  Binding Rule
 7.  DHCP PORT Rule
 8.  DHCP MAC Rule
Enter rule type (1): 2
Set Rule Admin Status to [(e)nable/(d)isable] (d): e
Enter the list of MAC addresses (AABBCC:DDEEFF) in Canonical format.
(Enter save to end): 006038:302103
006038:302103
006038:302104
006038:302105
006038:302106
006038:302107
006038:302108
006038:302109
006038:30210A
006038:30210B
006038:30210C
006038:30210D
006038:30210E
006038:30210F
006038:302110
006038:302111
006038:302112
save

Configure more rules for this vlan [y/n] (n): y
Select rule type:
 1.  Port Rule
 2.  MAC Address Rule
 3.  Protocol Rule
 4.  Network Address Rule
 5.  User Defined Rule
 6.  Binding Rule
 7.  DHCP PORT Rule
 8.  DHCP MAC Rule
```

```
Enter rule type (1): 1
Set Rule Admin Status to [(e)nable/(d)isable] (d): e
Enter the list of ports in Slot/Interface format: 5/1
Configure more rules for this vlan [y/n] (n): <CR Return>
VLAN  34: 1 created successfully
```

Create a service for the ATM OC-3 card to link the DSP group to an ATM VCC

The following console session shows how to create a service for slot 3 ATM OC-3 ASM Port 1 that will logically link the group (DSP1 34) to an ATM VCC 34 which is created automatically.

```
/VLAN % cas 3/1

Slot 3 Port 1 Service 2 Configuration
1)  Description (30 chars max)        : PTOP Bridging Service 2
2)  Service type { LANE client(1),
                   Trunking (4),
                   Classical IP(5),
                   PTOP Bridging(6),
                   VLAN cluster(7)  } : PTOP Bridging
    10) Encaps Type { Private(1),
                      RFC1483(2) }    : Private
3)  Connection Type { PVC(1),
                      SVC(2) }        : PVC
4)  PTOP Group                        : 1
5)  PTOP connection                   : none
6)  Admin Status { disable(1),
                   enable(2) }        : Enable
7)  BandWidth Group (1-8)             : 1

Enter (option=value/save/cancel) :10=2

Slot 3 Port 1 Service 2 Configuration
1)  Description (30 chars max)        : PTOP Bridging Service 2
2)  Service type { LANE client(1),
                   Trunking (4),
                   Classical IP(5),
                   PTOP Bridging(6),
                   VLAN cluster(7)  } : PTOP Bridging
    10) Encaps Type { Private(1),
                      RFC1483(2) }    : RFC1483
3)  Connection Type { PVC(1),
                      SVC(2) }        : PVC
4)  PTOP Group                        : 1
5)  PTOP connection                   : none
6)  Admin Status { disable(1),
                   enable(2) }        : Enable
7)  BandWidth Group (1-8)             : 1
```

```
Enter (option=value/save/cancel) : 1=DSP1

   Slot 3 Port 1 Service 2 Configuration
1)  Description (30 chars max)        : DSP1

2)  Service type { LANE client(1),
                   Trunking (4),
                   Classical IP(5),
                   PTOP Bridging(6),
                   VLAN cluster(7)  } : PTOP Bridging
    10) Encaps Type { Private(1),
                      RFC1483(2) }    : RFC1483
3)  Connection Type { PVC(1),
                      SVC(2) }        : PVC
4)  PTOP Group                        : 1
5)  PTOP connection                   : none
6)  Admin Status { disable(1),
                   enable(2) }        : Enable
7)  BandWidth Group (1-8)             : 1

Enter (option=value/save/cancel) : 4=34

   Slot 3 Port 1 Service 2 Configuration
1)  Description (30 chars max)        : DSP1
2)  Service type { LANE client(1),
                   Trunking (4),
                   Classical IP(5),
                   PTOP Bridging(6),
                   VLAN cluster(7)  } : PTOP Bridging
    10) Encaps Type { Private(1),
                      RFC1483(2) }    : RFC1483
3)  Connection Type { PVC(1),
                      SVC(2) }        : PVC
4)  PTOP Group                        : 34
5)  PTOP connection                   : none
6)  Admin Status { disable(1),
                   enable(2) }        : Enable

7)  BandWidth Group (1-8)             : 1

Enter (option=value/save/cancel) : 5=34

Conn VCI 34 doesn't exist, VCI 34 will be created w/ default values!

Enter (option=value/save/cancel) : save
Creating service, please wait...
Enabling service...
```

Enable port mapping

The following console session shows how to enable port mapping to prevent peer-to-peer connectivity.

```
/ % pmapping

port mapping sets:
empty  :  empty
add(a)/del(d) or /view(v)/save(s)/quit(q)?
/vlan/port-mapping: a
enter port map. (e.g. 2/1-3,3/5 : 4/6-8)
/vlan/port-mapping:5/1-32:3/1

port mapping sets:
5/1 5/2 5/3 5/4 5/5 5/6 5/7 5/8 5/9 5/10 5/11 5/12 5/13 5/14 5/15 5/16
5/17 5/18 5/19 5/20 5/21 5/22 5/23 5/24 5/25 5/26 5/27 5/28 5/29 5/30
5/31 5/32   :  3/1
add(a)/del(d) or /view(v)/save(s)/quit(q)?
/vlan/port-mapping: save

port mapping sets:
5/1 5/2 5/3 5/4 5/5 5/6 5/7 5/8 5/9 5/10 5/11 5/12 5/13 5/14 5/15 5/16 5/17
5/18 5/19 5/20 5/21 5/22 5/23 5/24 5/25 5/26 5/27 5/28 5/29 5/30 5/31 5/32  :
3/1
add(a)/del(d) or /view(v)/save(s)/quit(q)?
/vlan/port-mapping: quit
/ %
```

Confirm device information

Use the **viatrl** and **gp** commands after you configure the OmniSwitch or OmniStack to display switch information. The following console session shows sample output.

```
/VLAN/Auto-Tracker % viatrl
VLAN  VLAN   Rule Rule          Rule     Rule
Group:Id     Num  Type          Status   Definition
----------------------------------------------------------
   33         1  MAC RULE     Enabled   006038:302102

              2  PORT RULE    Enabled   5/1/Brg/1

   34         1  MAC RULE     Enabled   006038:302103
                                         006038:302104
                                         006038:302105
                                         006038:302106
                                         006038:302107
                                         006038:302108
                                         006038:302109
                                         006038:30210A
                                         006038:30210B
                                         006038:30210C
                                         006038:30210D
```

```
                                        006038:30210E
                                        006038:30210F
                                        006038:302110
                                        006038:302111
                                        006038:302112

              2  PORT RULE   Enabled   5/1/Brg/1

/ % gp
Group                             Network Address  Proto/
ID    Group Description           IP Subnet Mask)  Encaps
(:VLAN ID)                        or (IPX Node Addr)
===== ==========================  =============== ========
    1 Default GROUP (#1)          192.168.10.1      IP  /(ff.ff.ff.00 ) ETH2
   33 1MMMGNT                     172.16.2.254      IP  /(ff.ff.00.00 ) ETH2
   34 DSP1
/ %
```

Cisco data service provider router configuration

Table 12-10 lists the steps to configure a Cisco router for PVC-Based High-Speed Data Connectivity.

Table 12-10 Steps to configure Cisco router (Sheet 1 of 2)

Step	Description	Configuration commands
1	Enable integrated routing and bridging on a router wide basis.	**bridge irb**
2	Configure one IEEE bridge per VLAN. Enable IP routing to and from this bridge within the router. ***Note:*** The recommended bridge numbering convention is Bridge# = VLAN#.	**bridge 34 protocol ieee** **bridge 34 route ip**
3	Configure one logical “irb” interface for each VLAN. Add a description, an IP address and mask. The mask must be from the VLAN’s IP address block. ***Note:*** The BVI interface number must be the same as the associated bridge number (34).	**interface bvi 34** **description 1483 bridging to IP routing for BG 34** **ip address 192.168.1.1.255.255.255.0**
	Disable ICMP redirects on the interface.	**noip redirects**
	Enable IP fast switching on the interface.	**ip route-cache same-interface**

Table 12-10 Steps to configure Cisco router (Sheet 2 of 2)

Step	Description	Configuration commands
4	Configure the ATM physical interface (VIP2 shown).	**int atm9/0/0**
	Add an appropriate description	**description ATM OC3 Circuit # xxxxxxxxxxx**
	Enable distributed switching locally with VIP card.	**ip route-cache distributed**
5	Add one sub-interface per VLAN (or, each ATM PVC).	**int atm9/0/0.1 point-to-point**
	Add an appropriate description.	**description PVC from VLAN 34 on XYLAN**
	Configure PVC parameters, such as vcd, vpi, and encapsulatn ***Note:*** The recommended PVC numbering convention is VCD# = VCI#=VLAN#. The VPI# is always zero.	**atm pvc 34 0 34 aal5snap**
	Specify the appropriate bridge group.	**bridge-group 34**
6	End configuration and save to NVRAM.	c**opy running-config startup-config**

The following console session shows the configuration sequence on a Cisco 7513 equipped with an OC3VIP2 interface.

```
Router> enable
Password: xxxxxxx
Router#  config t
Router(config)# bridge irb
Router(config)# bridge 34 protocol ieee
Router(config)# bridge 34 route ip
Router(config)# int bvi 34
Router(config-if)# description RFC 1483 bridging to IP routing for VLAN 34
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no ip redirects
Router(config-if)# ip route-cache same-interface
Router(config-if)# int atm9/0/0
Router(config-if)# description ATM OC3 circuit # xxxxxxxxxxxxxx
Router(config-if)# ip route-cache distributed
Router(config-if)# int atm9/0/0.1 point-to-point
Router(config-subif)# description ATM PVC from VLAN 34 on XYLAN FID
Router(config-subif)# atm pvc 34 0 34 aal5snap
Router(config-subif)# bridge-group 34
Router(config-subif)# ^Z
Router# copy running-configuration startup-configuration
Router#
```

xEMS configuration

This section provides information on the xEMS configuration.

xEMS system requirements

Refer to the chapter “Installation” in this document for xEMS system requirements.

xEMS installation

Refer to *1 Meg Modem Service xEMS Release Notes* for instructions on xEMS installation instructions.

HP OpenView licensing

When HP OpenView Network Node Manager starts for the first time, the software creates a temporary license. The temporary license allows operating company personnel to run Network Node Manager for a limited period of time, usually 60 days, without a permanent password. The permanent license is based on the host id and tied to a server or system.

Request permanent license

Use the on-line form in HP OpenView NNM to request your permanent license password. Complete the following steps.

1. Use the vi text editor to open the following file

   `$OV_CONF/OVLicense/forms/nnm/product`

2. Complete required information, such as the following:

   - user name
   - company
   - HP order number
   - license server host name
   - license server host id
   - operating system

3. Save the form under a new file name.

4. Run the verification tool to verify the file has the necessary information for a permanent license password. Use the following command:

   `$OV_CONF/OVLicense/forms/OVLCheckForm filename`

   The verification tool reports any errors or omissions. When the tool finds no errors, the file is saved under the following filename:

   `$OV_CONF/OVLicense/forms/product.mm.dd.yy`

The verification tool may print the form to the default printer or ask you to email the file.

5. Forward the verified form to the HP Password Delivery Center. The FAX address for the center follows:

   FAX: 317-361-5342

   Phone: 317-361-5332

   Hours: 8 a.m. to 8 p.m. EST.

You should receive your permanent license password within 48 hours.

Install permanent license

Use one of the following methods to install your permanent license password:

- Follow the instructions on your Entitlement Certificate.
- Use the on-line template that comes with HP OpenView NNM.
- Use email.

When you install the permanent license password from a hard copy, use the on-line templates. The following steps describe how to use the on-line template.

1. Copy the template. Use the following command.

   ```
   cp $OV_CONF/OVLicense/pw_tools/nnm.template/tmp
   ```

2. Use the text editor to edit the file. Enter the following information from your certificate between the quotation marks (“ ”) marks in the template.
   - VENDOR_PASSWORD
   - PRODUCT_NAME
   - PRODUCT_PASSWORD
   - ANNOTATION_STRING
   - SERVER
   - TYPE
3. Save the file.
4. Make the file an executable file. Use the following command.

   ```
   chmod +x /tmp/nnm.template
   ```

5. Execute the file to install the license password. Use the following command.

   ```
   ./tmp/nnm.template
   ```

Passport ATM hub provisioning

For management traffic, configure cluster bridging on the Passport ATM hub to connect the two bridged WAN ATM VCCs from the FID with the Ethernet interfaces of the OAMP workstations. Enable transparent bridging on the two WAN FID switch protocol ports, and create a virtual port on the Passport to cluster bridge the ports together. This configuration allows bridging and routing between the three OAMP workstations and the bridged ATM interfaces.

Following is a list of commands to provision a Passport as an ATM hub in PVC-Based High-Speed Data Connectivity.

1. **set sw avl ip_BD02S5D atmBearerService_BD02S5D bridge_BD02S5D base_BD02S5D networking_BD02S5D atmNetworking_ BD02S5D frameRelay_ BD02S5D**
2. **set mod nodename “xxxxx”**
3. **set mod namsid “xxxxx”**
4. **set mod nodeid “xxxxx”**
5. **set rtg dpn moduleid “x”**
6. **set rtg dpn routingid “y”**
7. **add lp/1**
8. **add lp/2**
9. **add lp/3**
10. **add lp/1 ilsfwdr/0**
11. **add lp/2 enet/0**
12. **add lp/2 enet/1**
13. **add lp/2 enet/2**
14. **add lp/3 sonet/0**
15. **add lp/3 sonet/1**
16. **set sh ca/1 cardtype ilsforwarder**
17. **set sh ca/2 cardtype ethernet**
18. **set sh ca/3 cardtype oc3s**
19. **set lp/1 maincard sh ca/1**
20. **set lp/2 maincard sh ca/2**
21. **set lp/3 maincard sh ca/3**
22. **add sw lpt/atmswitch**
23. **add sw lpt/lan**

24. **add sw lpt/ilsfwdr**
25. **set sw lpt/atmswitch fl atmMpe atmBearerService**
26. **set sw lpt/ilsfwdr fl ip atmMpe bridge**
27. **set sw lpt/lan fl ip atmMpe bridge**
28. **set lp/1 lpt sw lpt/ilsfwdr**
29. **set lp/2 lpt sw lpt/lan**
30. **set lp/3 lpt sw lpt/atmswitch**
31. **check provisioning**

    Note: Box will reboot.

32. **save provisioning**
33. **activate provisioning**
34. **confirm provisioning**
35. **commit provisioning**
36. **add la/200**
37. **add la/201**
38. **add la/202**
39. **set la/200 framer interfacename lp/2 enet/0**
40. **set la/201 framer interfacename lp/2 enet/1**
41. **set la/202 framer interfacename lp/2 enet/2**
42. **add atmif/300**
43. **add atmif/301**
44. **add atmif/300 vcc/0.33**
45. **add atmif/300 vcc/0.34**
46. **add atmif/300 vcc/0.33 nep**
47. **add atmif/300 vcc/0.34 nrp**
48. **add atmif/301 vcc/0.34**
49. **add atmif/300 vcc/0.34 nrp**
50. **set atmif/300 vcc/0.34 nrp nexthop atmif/301 vcc/0.34 nrp**
51. **set atmif/300 interfacename lp/3 sonet/0 path/0**
52. **set atmif/301 interfacename lp/3 sonet/1 path/0**
53. **set atmif/300 ca minAutoSelectedVciForVpiZero 500**

54. **set atmif/301 ca minAutoSelectedVciForVpiZero 500**
55. **add cb**
56. **add vr/1**
57. **add vr/1 ip**
58. **add vr/1 br**
59. **add vr/1 ip bootp**
60. **add vr/1 br tb**
61. **add vr/1 br tb stp/1**
62. **add vr/1 pp/xems01**
63. **add -s vr/1 pp/xems01 ipp log/192.168.11.13**
64. **add vr/1 pp/xems01 ipp bootp**
65. **set vr/1 pp/xems01 ipp log/192.168.11.13 netmask 255.255.255.252**

    Note: Accept the default.

66. **set vr/1 pp/xems01 ipp log/192.168.11.13 broadcast 192.168.11.15**

    Note: Accept the default.

67. **add vr/1 pp/omsp01**
68. **add -s vr/1 pp/omsp01 ipp log/192.168.11.5**
69. **set vr/1 pp/omsp01 ipp log/192.168.11.5 netmask 255.255.255.252**
70. **set vr/1 pp/omsp01 ipp log/192.168.11.5 broadcast 192.168.11.7**
71. **add vr/1 pp/xvision01**
72. **add -s vr/1 pp/xvision01 ipp log/192.168.11.9**
73. **set vr/1 pp/xvision01 ipp log/192.168.11.9 netmask 255.255.255.252**
74. **set vr/1 pp/xvision01 ipp log/192.168.11.9 broadcast 192.168.11.11**
75. **add vr/1 pp/cluster**
76. **add -s vr/1 pp/cluster ipp log/172.16.0.1**
77. **set vr/1 pp/cluster ipp log/172.16.0.1 netmask 255.255.0.0**
78. **set vr/1 pp/cluster ipp log/172.16.0.1 broadcast 172.16.255.255**
79. **add vr/1 pp/cluster ipp bootp**
80. **set vr/1 pp/cluster ipp bootp relayaddress 192.168.11.14**
81. **add vr/1 pp/cluster tbcl**
82. **add vr/1 pp/xylanmgnt**

83. **add vr/1 pp/xylanmgnt tbp**
84. **set vr/1 pp/xems01 linktomedia la/200**
85. **set vr/1 pp/xvision01 linktomedia la/201**
86. **set vr/1 pp/omsp01 linktomedia la/202**
87. **set vr/1 pp/cluster linktomedia cb**
88. **add vr/1 ip arp host/172.16.1.254**
89. **set vr/1 ip arp host 172.16.1.254 physaddress 00-60-38-30-21-03**
90. **add atmmpe/30**
91. **set atmmpe/30 ilsforwarder lp/1 ilsfwdr/0**
92. **set atmmpe/30 linktoprotocolport vr/1 pp/xylanmgnt**
93. **set atmmpe/30 ac/1 atmconnection atmif/300 vcc/0.33 nep**
94. **add vr/1 snmp**
95. **set vr/1 snmp alarmsastraps enabled**
96. **set vr/1 snmp system name “nodename”**
97. **set vr/1 snmp system location “xxxxx”**
98. **set vr/1 snmp system contact “xxxxx”**
99. **add vr/1 snmp view/1,1**
100. **add vr/1 snmp community/1**
101. **set vr/1 snmp community/1 string "public"**
102. **set vr/1 snmp community/1 viewindex 1**
103. **set vr/1 snmp community/1 accessmode readwrite**
104. **add vr/1 snmp community/1 manager/1**
105. **set vr/1 snmp community/1 manager/1 transportaddress 192.168.11.6-162**
106. **set vr/1 snmp community/1 manager/1 privileges sets gets v1trap**
107. **check provisioning**
108. **save provisioning**
109. **activate provisioning**
110. **confirm provisioning**
111. **commit provisioning**

List of terms

1-Meg Modem

Subscriber's customer premise equipment (CPE) that connects to a telephone line, an extension telephone, and a personal computer. The Nortel 1-Meg Modem Service provides continuous data connectivity to the Internet and simultaneous voice and data communication through the Nortel 1-Meg Modem. To the subscriber, this device looks and acts like a regular voice band modem with the exception of providing a 10BaseT Ethernet interface to the access network instead of a serial RS-232 interface.

1-Meg Modem Service

Provides high-speed, data-over-voice communications over standard telephone lines. Consists of the 1-Meg Modem, the xDSL line card, the data-enhanced bus interface card, the xDSL Element Management System, and the access network.

10BaseT

An Ethernet LAN that works on twisted pair wiring similar to telephone cabling. The abbreviation is derived from the following description: 10 megabit per second BaseT and Ethernet over twisted pair.

100BaseT

A networking standard that supports data transfer rates up to 100 megabits per second. 100BaseT is ten times faster than 10BaseT. The term Fast Ethernet refers to 100BaseT.

additive white gaussian noise (AWGN)

Noise having a frequency spectrum that is continuous and uniform over a specified frequency band. Gaussian noise or white noise is typical of most thermal and solid-state noise.

advanced remote node (ARN)

A BayStack access router with multiple LAN interfaces. Slots for WAN adapter modules provide WAN connectivity and facilitate remote network management.

ARN
See advanced remote node (ARN).

AWGN
See additive white gaussian noise.

address resolution protocol (ARP)
A Transmission Control Protocol/Internet Protocol (TCP/IP) protocol that dynamically binds a Network-Layer IP address to a Data-Link-Layer physical hardware address, such as an Ethernet address. The 1-Meg Modem Service uses this protocol to learn a MAC address from an IP address.

American National Standards Institute (ANSI)
Organization supported by U.S. industry to establish uniformity of standards.

American wire gauge (AWG)
The standard instrument of measurement for copper, aluminum, and other conductors.

ANSI
See American National Standards Institute.

ARP
See address resolution protocol.

ADSL
See asymmetrical digital subscriber line.

asynchronous transfer mode (ATM)
A transfer mode where information is organized into cells. The mode is asynchronous in that recurrence of cells depends on the required or instantaneous bit rate. You can use statistical and deterministic values to qualify the transfer mode.

ATM
See asynchronous transfer mode.

asymmetrical digital subscriber line (ADSL)
A standard allowing digital broadband (over 6 M/bits) signals and plain old telephone service to be transmitted up to 12,000 feet over a twisted copper pair.

AWG
See American wire gauge.

backplane

Connector blocks and special wiring on the rear of a shelf. Printed circuit board modules normally mount in front of the backplane.

BIC

See bus interface card.

BOOTP

See Bootstrap protocol.

BOOTP relay agents

Processes that exist on gateways to forward BOOTP requests between subnets. This is needed because, by default, a BOOTP request is only broadcast to the immediately connected subnet.

Bootstrap protocol

Protocol used by nodes, when booted, to learn about its own IP address and/or the IP address of the server it must contact to download the load it should boot.

bus interface card (BIC)

A hardware interface that connects two 32-channel digroup to a maximum of 64 line cards. This card is located in the drawer of the line concentrating module.

c-side busy (CBsy)

Central side of a peripheral module that activates as the result of call processing or as the result of a command.

carrier-serving area (CSA)

An area served by several facilities from a single network element.

CBsy

See C-side busy.

central office (CO)

A switching office arranged for terminating subscriber lines. A switching office is provided with switching equipment and trunks for establishing connections to and from other SOs. Also known as local office.

central processing unit (CPU)

The hardware unit of a computing system that contains the circuits that control and perform the execution of instructions.

CLCE

See cabinetized line concentrating equipment.

CLLI

See common language location identifier.

CM

See computing module.

CO

See central office.

common language location identifier (CLLI)

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

`aaaa bb xx yyyy`

where

`aaaa` is the city code

`bb` is the province or state code

`xx` is the trunk group identifier

`yyyy` is the trunk number

computing module (CM)

The processor and memory of the dual-plane combined core used by the DMS SuperNode. Each CM consists of a pair of central processor units (CPU) with memory that operate in a synchronous-matched mode on two separate planes. Only one plane is active. It maintains overall control of the system while the other plane is on standby.

CPE

See customer premises equipment.

CPU

See central processing unit

cron

The UNIX daemon that executes commands at specified dates and times.

crosstalk

The unwanted transfer of energy from one circuit, known as the disturbing circuit, to another circuit, known as the disturbed circuit.

CSA

See carrier-serving area.

customer premises equipment (CPE)

Equipment, such as ISDN terminals and 1-Meg Modem, located on the subscriber's premises.

daemon
An agent program which continuously operates on a UNIX server and provides resources to client systems on the network. A background process used for handling low-level operating system tasks.

data-enhanced BIC (DBIC)
Bus interface card enhanced to accommodate data traffic. Each DBIC has an Ethernet interface.

data service provider (DSP)
The provider of access to a data service, such as a corporate network or the Internet

DBIC
See data-enhanced BIC.

DHCP
See Dynamic Host Configuration Protocol.

dialog box
An interactive message box. A dialog box displays information on an object and allows you to change or enter information.

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

digital signal level 3
A digital transmission format in which seven digital signal level two are time-division multiplexed together.

DMS
See Digital Mulitplex System.

downstream (DS)
The signal path for a cell stream in reference to its destination.

DS
See downstream.

DS3
See digital signal level 3.

DSP
See data service provider.

dynamic host configuration protocol (DHCP)

Protocol used to dynamically assign and unassign an IP address to a host. This is an extension to BOOTP. The DHCP servers will also accept and respond to BOOTP requests.

EIU

See Ethernet interface unit.

Ethernet

A local area network that is a physical layer and data link control layer protocol definition.

Ethernet interface unit (EIU)

A data networking interface device that provides Ethernet protocol communication between a central control complex and local area network.

Ethernet switch

A device that connects multiple Ethernet segments together into a star configuration. The Ethernet switch is a wiring hub with added switching capability.

event

An event is a notice that a change or problem has occurred. Following are examples.

- A MIB exceeded a threshold limit.
- The network topology changed.
- An object's status changed.
- An error occurred.
- A node configuration changed.
- An application event occurred.

far-end crosstalk (FEXT)

Crosstalk where the coupling occurs at or near to the end of the line furthest from the transmitter.

FCAPS

Fault, configuration, accounting, performance, security

fan in device (FID)

A fan in device performs the following functions:

- consolidates wire center traffic to one or more WAN links to transport
- maps a loop to a VLAN and a PVC for a service network
- isolates OAMP traffic from payload

FID

See fan in device.

FEXT

See far-end crosstalk.

File Transfer Protocol (FTP)

A software protocol that operates over the Internet or other wide area networks. When called, it connects to a specified server or site that is set up to utilize FTP protocol. Files and information are retrieved by the connecting server.

Forward error correction (FEC)

A system of data transmission in which redundant bits generated at the transmitted end are used at the receiving terminal to detect, locate and correct any transmission errors before delivery to the local data communications link.

frame relay

A statistically multiplexed interface protocol for packet-switched data communications.

FTP

See File Transfer Protocol.

graphical user interface (GUI)

A display format that allows the user to choose commands, start programs, and see lists of files. A GUI is a visual metaphor which uses icons representing actual desktop objects for the user to access and manipulate with a pointing device.

GUI

See graphical user interface.

HDLC

See High Level Data Link Control

High Level Data Link Control (HDLC)

A data link protocol that stipulates the format of frames.

HP

Hewlett-Packard

HP OpenView

The family of network management products from Hewlett Packard. In this document, references to HP OpenView actually refer to the specific HP OpenView product called Network Node Manager (NNM), a telecommunications network management application. See Network Node Manager (NNM).

HSTP

High-speed twisted pair.

IDL

See idle.

idle (IDL)

Condition of a resource that is free to be seized.

input/output controller (IOC)

A Digital Multiplex System (DMS) equipment shelf that provides an interface between the central message controller and as many as 36 input/output devices.

in-service (INSV)

An indication that some element of the network is carrying traffic or is ready to carry traffic.

in-service trouble (ISTb)

A status imposed on a unit that has trouble indications but can still process calls.

INSV

See in-service.

integrated services digital network (ISDN)

A set of standards proposed by the ITU to establish compatibility between the telephone network and various data terminals and devices.

interleaving

The transmission of pulses from two or more digital sources in time-division sequence over a single path.

International Organization for Standardization (ISO)

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

Internet

A worldwide interconnection of individual networks operated by government, industry, academic, and private parties.

Internet providers

The Internet providers control access of Internet users, manage IP addressing and, if necessary, maintain service subscription accounts for each user. In the context of 1-Meg Modem Service, Internet providers include Internet service providers (ISP), Internet access providers (IAP) and corporate LAN networks.

Internet Protocol (IP)

The Internet Protocol is part of TCP/IP and is a connectionless OSI layer 3 routing commonly used to interconnect LANs (an internet). Each packet of data is routed independently through the network. The IP packets commonly can travel over LANs, X.25, frame relay virtual circuits, ATM or leased lines from the source to the destination. The IP routing function uses a protocol to determine the best route through the network to the destination.

IOC

See input/output controller.

IP

See Internet Protocol.

ISDN

See integrated services digital network.

ISO

See International Organization for Standardization.

ISTb

See in-service trouble.

LAN

See local area network.

LC

See line card.

LCM

See line concentrating module.

LD

See line drawer.

LED

See light-emitting diode.

LEN

See line equipment number.

light-emitting diode (LED)

A semiconductor diode that emits light when a current is passed through it.

line card (LC)

A line circuit (LC) card in a line drawer.

line concentrating module (LCM)

A peripheral module that connects the line trunk controller or line group controller and up to 640 subscriber lines using two to six DS30A links.

line drawer

A hardware device in the line module and line concentrating module that contains line circuit cards.

line module busy (LMB)

A section of the call processing software that is temporarily out of service.

line equipment number (LEN)

A seven-digit functional reference that identifies line circuits. The LEN provides physical location information on equipment such as site, frame number, unit number, line subgroup (shelf) and circuit pack.

LM

See line module.

LMB

See line module busy.

line module (LM)

A peripheral module that provides speech and signaling interfaces for up to 640 subscriber lines. The LM consists of line drawers, a line module controller, and a frame supervisory panel.

link peripheral processor (LPP)

An equipment frame that provides connectivity between peripheral equipment and network through peripheral modules.

local area network (LAN)

A network that permits the interconnection and intercommunication of multiple computers, primarily for sharing resources such as data storage devices and printers.

LPP

See link peripheral processor.

MAC address

See media access control address.

main distribution frame (MDF)

A frame containing terminal blocks where cables from outside plant and office equipment are terminated. Outside plant equipment is terminated on vertical columns of blocks and office equipment on horizontal rows. Cross-connection of flexibility and organization is provided by jumper pairs between horizontal and vertical terminal blocks.

maintenance and administration position (MAP)

A group of terminals that are connected to one or more central office switches to monitor their status.

management information base (MIB)

A collection of objects that can be accessed using a network management protocol. In an SNMP-managed network, an MIB is a database of objects representing the characteristics and status of the managed devices.

map

A collection of display screen windows on the xEMS workstation that portray elements and connections in the network using icon symbols. An xEMS session displays only one map to the user at a time. Multiple xEMS maps can be created to accommodate user-specified tailored variations of the xEMS interface to the user. Refer to the HP OpenView documentation for more information on maps. See MAP command interpreter for information on the DMS MAP.

MAP

See maintenance and administration position.

MAPCI

MAP command interpreter.

MAP command interpreter

A group of components that provide a user interface between operating company personnel and the DMS-100 Family switches. The interface consists of a visual display unit and keyboard, a voice communications module, test facilities, and special furniture. The MAP terminal uses the command interpreter as the main interface for performing maintenance by entering operation, administration, maintenance and provisioning commands.

MDF

See main distribution frame.

media access control (MAC) address

A unique data-link layer address for a particular network device.

menu

A list of items that you select to perform tasks. A menu can be a pull-down menu or a pop-up menu.

MIB

See management information base.

near-end crosstalk (NEXT)

Crosstalk where the coupling occurs at or near to the transmitter.

NEXT

See near-end crosstalk.

NETMON

The name of the background daemon process in NNM that automatically discovers and monitors the presence of data connectivity to IP capable nodes in the network. Filters could be specified to restrict which nodes NETMON discovers.

Network Management System (NMS)

A network management software system for controlling, provisioning, and monitoring Magellan Passport networks. It consists of a set of applications supported by a common user interface running on a UNIX operating system.

Network Node Manager (NNM)

A customizable commercial network management system offered by HP OpenView to monitor, maintain and manage a telecommunications network. The functionality reflects the fault, configuration, accounting, performance, security (FCAPS) open interface menu structure for remote network management.

NMS

See Network Management System.

NNM

See Network Node Manager.

OAM&P

See operation, administration, maintenance and provisioning (OAM&P).

object

A specific entity in the network. An object can be a physical entity, such as a peripheral module, or a logical entity, such as a group of PMs. Each object has a specific set of attributes and actions.

OFFL

See offline.

OC-3

See optical carrier level 3.

OC-3 Express

A network element which transports up to 3 DS3 signals or 84 DS1 signals.

offline (OFFL)

In communications, computer, data processing, and control systems, pertaining to the operation of a functional unit when it is meets one of the following conditions:

- not under the direct control of the system where it is assigned
- not available for immediate use on demand by the system
- able to be independently operated
- in need of human intervention to bring the unit on-line.

OMS-P

See Open Management System for Passport.

OOS

See out of service.

Open Management System for Passport (OMS-P)

A set of fault management and configuration management applications for Passport that can be integrated in an umbrella network management system such as HP Openview, IBM Netview, or Cabletron Spectrum.

Open Systems Interconnection (OSI)

A suite of communication protocols, network architectures, and network management standards produced by the International Organization for Standardization.

operation, administration, maintenance and provisioning (OAM&P)

All tasks necessary for providing, maintaining, or modifying the services provided by the switching system. These tasks include provisioning hardware, initializing subscriber service, verification of new service, and recognizing and clearing fault conditions.

optical carrier level 3

An optical carrier signal in the SONET optical format which is three times the OC-1 rate.

OSI

See Open Systems Interconnection.

OSI model

An abstract description of the digital communications between application processes running in distinct systems. The model employs a hierarchical structure of seven layers. Each layer performs value-added service at the request of the adjacent higher layer and, in turn, requests more basic services from the adjacent lower layer.

Passport

A Magellan data communication switch with hybrid features: voice, data, and ATM.

out of service (OOS)

Pertaining to a state where equipment is removed from service either automatically (by the system) or manually (by personnel), or not carrying traffic.

PC

See personal computer.

peripheral module (PM)

Any hardware module in the DMS-100 Family switches that provides an interface between external line, trunk, or service facilities. A PM contains peripheral processors, which perform local routines, thus relieving the load on the central processing unit (CPU).

permanent virtual circuit (PVC)

A virtual circuit that provides the equivalent of a fixed path between two users.

personal computer (PC)

A self-contained, stand-alone computer, usually with sufficient internal and external storage capacity to run a variety of software programs.

PIC

See plastic-insulated cable.

PING

A protocol function in TCP/IP that tests the ability of a computer to communicate with a remote computer by sending a query and receiving a confirmation response.

plain ordinary telephone service (POTS)

Basic telephone service with no special features.

plastic-insulated cable (PIC)

A twisted-pair cable insulated by a layer of solid, expanded, or foam-skin polyolefin insulation over each conductor. The cable can be an air-core cable or a filled cable. This cable has become the standard for distribution cable other than large-pair-count duct cables.

PM

See peripheral module.

product equipment code (PEC)

An eight-digit alphanumeric code that identifies a Nortel Networks hardware or software product.

POTS

See plain ordinary telephone service.

PVC

See permanent virtual circuit.

quadrature amplitude modulation (QAM)

Quadrature modulation where the two carriers are amplitude modulated.

QAM

See quadrature amplitude modulation.

random access memory (RAM)

Memory where data can be written and read. A solid state memory device used for transient memory stores. Information can be entered and retrieved from any storage position.

RAM

See random access memory.

remote cluster controller (RCC)

A dual-shelf peripheral module that provides a master controller for all units at the remote switching center, and is, in turn, controlled by the host line trunk controller.

remote cluster controller 2 (RCC2)

A remote cluster controller for the remote switching center-SONET (RSC-S). The RCC2 is an enhanced RCC that provides the central control of the RSC-S. The RCC2 is connected to the host by metallic or fiber connections. The RCC2 is a single-shelf peripheral module that provides the same functions for all units at the RSC.

remote line concentrating module (RLCM)

An equipment frame that provides the interface between two to six DS-1 links (from the line group controller at the host office) and up to 640 subscriber lines (connected locally). An RLCM is equipped with one line concentrating module, a remote maintenance module, and a host interface equipment shelf.

remote switching center (RSC)

A remote common peripheral module that provides an interface with a large number of analog lines, digital trunking, or both at a remote location. The RSC also handles remote-off-remote connections from other remote sites.

remote switching center-SONET (RSC-S)

An enhanced version of the remote switching center. The RSC-S is a remote common peripheral module that provides all the functions and features of the existing RSC, but with increased capacity and the option of fiber optic connectivity.

RCC

See remote cluster controller.

RCC2

See remote cluster controller 2.

return to service (RTS)

An action that allows an out-of-service unit or piece of equipment to process calls.

RLCM

See remote line concentrating module.

RJ-45

A connector with eight conductors. The most common telephone connector with unshielded twisted pair wire.

RS-232

A popular standard used for asynchronous, serial communication over short distances between a personal computer and a modem or ASCII terminal. RS-232 precedes each character with a start bit, follows each character with an idle period at least one bit long, and sends each bit in exactly the same length of time.

RSC

See remote switching center.

RSC-S

See remote switching center-SONET.

RTS

See return to service.

S/DMS AccessNode

A digital transmission system that connects terminal devices located in homes and office buildings to service nodes residing at a central office (CO). S/DMS AccessNode is the access vehicle used for both integrated (connected with the DMS-100 switch) and nonintegrated configurations.

service order system

A user interface consisting of commands used to change, add, or delete subscriber lines.

SERVORD

See service order system.

Simple Network Management Protocol (SNMP)

The most popular and widely implemented management protocol. Typically, simple network management protocol (SNMP) is a request/reply protocol where a network management application polls server agents with data inquiries and the server agent replies. There are exceptions to polling when the server agent informs the network management system asynchronously of a change of state called a trap.

The SNMP defines the format of the requests and replies exchanged between the network management application and the server agent. The SNMP manages objects that are collected in a database called the Management Information Base or MIB. In the xEMS context, this is the protocol is used to communicate with the DBIC in order to manage it.

small office home office (SOHO)

A small office located in a home that includes a small number of users.

SNMP

See Simple Network Management Protocol.

SOHO

See small office home office.

Star Remote

A line concentrating module based remote product that supports up to 16 DS-1 links and 1152 subscriber lines.

status

The operating or administrative condition of the object. The color of the symbol represents the status of the object.

straight Ethernet cable

A standard straight through 8 wire unshielded twisted pair (10 BaseT UTP) cable. See UTP.

submap

A collection of related symbols that are displayed in a single graphical window.

subscriber

A customer who, against payment of a pre-established fee at regular intervals, acquires the right to use a telecommunication service for a fixed or undetermined contractual period. In the context of this document, the subscriber is the user of the Nortel 1-Meg Modem Service provided by the operating company.

symbol

A graphical representation of an object. A symbol can be an icon symbol or a connection symbol. An icon symbol represents a single object, such as the 1-Meg Modem. A connection symbol represents the connection between two objects, such as the Ethernet connection between the modem and a personal computer.

SysB

See system busy.

system busy (SysB)

A busy state that is automatically imposed by equipment in response to a fault condition, such as one where trunk circuits failed tests performed by the automatic trunk testing facilities.

TCP

See Transmission Control Protocol.

TCP/IP

See transmission control protocol/Internet protocol

TFTP

See Trivial File Transfer Protocol.

Transmission Control Protocol (TCP)

A data transport protocol that provides reliable, connection-oriented data delivery in the TCP/IP protocol stack.

Transmission Control Protocol/Internet Protocol (TCP/IP)

A protocol stack, designed to connect different networks, on which the Internet is based.

transport network

An Internet access network that interfaces the 1-Meg Modem Service system to an Internet provider. For the xElement Management System (xEMS) deployment, the access network uses either a Layer 2 or a Magellan Passport switch.

trap

An asynchronous message from the SNMP server agent to a network management application. In the xEMS context, this is how fault event data collection is triggered.

Trivial File Transfer Protocol (TFTP)

A protocol used to download BOOTP files, similar to File Transfer Protocol, but without the security. TFTP uses User Datagram Protocol instead of Transmission Control Protocol.

UDP

See User Datagram Protocol.

uniform resource locator (URL)

A standardized way of representing different documents, media and network services on the World Wide Web.

UNIX

Powerful and complex computer operating system for running data processing and telephone systems. Provides multi-tasking, multi-user capabilities that allow both multiple programs to be run simultaneously and multiple users to use a single computer.

unshielded twisted pair (UTP)

A standard telephone cable made up of insulated 24-gauge solid copper wires that are twisted together in pairs. The pairs of cable are bundled together in a insulating wrapper. The cable is not covered with a metal shield.

upstream (US)

The signal path for a cell stream in reference to its destination.

URL

See uniform resource locator.

US

See upstream.

User Datagram Protocol (UDP)

The UDP is the transport protocol used for packet delivery service. It is a lightweight protocol because it does not have the overhead of creating connections and verifying delivery.

UTP

See unshielded twisted pair.

VC

See virtual channel.

VLAN

See virtual local area network.

Virtual

Pertaining to a functional unit that appears to be real, but whose functions are accomplished by other means.

virtual local area network (VLAN)

A VLAN is a broadcast domain that ties together any group of devices on a switched network at wire speed. A VLAN is a logical group of devices that can be located anywhere on the network. VLANs are software-defined group of networked end-stations that communicate as if they were on the same LAN segment, even though they are distributed across different segments. The VLAN functionality is embedded in the switch and membership in the VLAN is usually specified by the MAC address, switch port number or both. In the xEMS context, the VLAN functionality of the transport network uses the MAC address to provide the subscriber with 1-Meg Modem Service features.

WAN

See wide area network.

wide area network (WAN)

A network that provides communication services to a geographic area larger than that served by a local area network or a metropolitan area network. A WAN can use or provide public communication facilities.

xDSL

See x digital subscriber line.

x digital subscriber line (xDSL)

A generic name for asymmetrical digital subscriber line equipments and services. Digital subscriber line technology provides high-speed digital bit stream over the same wires used for analog connection.

xDSL Element Management System (xEMS)

The graphical user interface (GUI) on an HP OpenView or Sun workstation used to manage the 1-Meg Modem Service.

xDSL line card (xLC)

The xDSL line card (xLC) is a two-slot line card installed in a line concentrating module line drawer to replace a regular POTS voice line card for each subscriber to 1-Meg Modem Service. The xLC card contains the necessary interface circuitry for simultaneous voice service and high-speed data communication provided by the 1-Meg Modem Service.

xEMS

See xDSL Element Management System.

xLC

See xDSL line card.

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