hp StorageWorks
network storage router M2402

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The HP StorageWorks Network Storage Router M2402 provides bi-directional connectivity in either a Fibre Channel Switched Fabric or a Fibre Channel Arbitrated Loop environment, supporting Fibre Channel and SCSI devices.

This user guide provides instructional information for installing and configuring the router.

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A Serial and Ethernet Pin Assignments

B Controller LUN Commands

This user guide provides information to help you:

■ Install the Network Storage Router M2402

■ Configure the Network Storage Router M2402

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Overview

This section covers the following topics:

■ Intended Audience

■ Prerequisites

Intended Audience

This guide is intended for administrators with a moderate knowledge level about network environments.

Prerequisites

Before you install this product, make sure you consider the items below.

■ Knowledge of operation system

■ Knowledge of related hardware/software

■ Previous version of the product/firmware

Conventions

Conventions consist of the following:

- Document Conventions
- Text Symbols
- Equipment Symbols

Document Conventions

The document conventions included in Table 1 apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Figure 1
Key and field names, menu items, buttons, and dialog box titles	**Bold**
File names, application names, and text emphasis	*Italics*
User input, command and directory names, and system responses (output and messages)	`Monospace font` `COMMAND NAMES` are uppercase monospace font unless they are case sensitive
Variables	`<monospace, italic font>`
Website addresses	Underlined sans serif font text: http://www.hp.com

Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings.

> ⚠ **WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.

> **Caution:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

> **Note:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment Symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings.

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.

Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack Stability

Rack stability protects personal and equipment.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:
- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- In single rack installations, the stabilizing feet are attached to the rack.
- In multiple rack installations, the racks are coupled.
- Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website: http://www.hp.com.

HP Technical Support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Note: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website under support: http://www.hp.com.

Be sure to have the following information available before calling:

■ Technical support registration number (if applicable)

■ Product serial numbers

■ Product model names and numbers

■ Applicable error messages

■ Operating system type and revision level

■ Detailed, specific questions

HP Storage Website

The HP website has the latest information on this product, as well as the latest drivers. Access storage at: http://www.hp.com. From this website, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP website for locations and telephone numbers: http://www.hp.com.

Introduction

1

The HP StorageWorks Network Storage Router M2402 provides bi-directional connectivity for up to twelve Narrow/Wide Fast/Ultra-2 SCSI buses in either a Fibre Channel Switched Fabric (FC-SW) or a Fibre Channel Arbitrated Loop (FC-AL) environment.

This chapter introduces the following topics:

- External features overview
  - Power modules
  - Fan modules
  - Fibre Channel modules
  - SCSI Modules
  - Ethernet port / standby power button
  - Serial port
- Functional overview
  - Fibre Channel to SCSI protocol process
  - SCSI to Fibre Channel protocol process
  - LAN-free backup and restore
  - Server-free data movement
  - Physical requirements

External Features Overview

Figure 1 and Figure 2 show front and back views of the router.
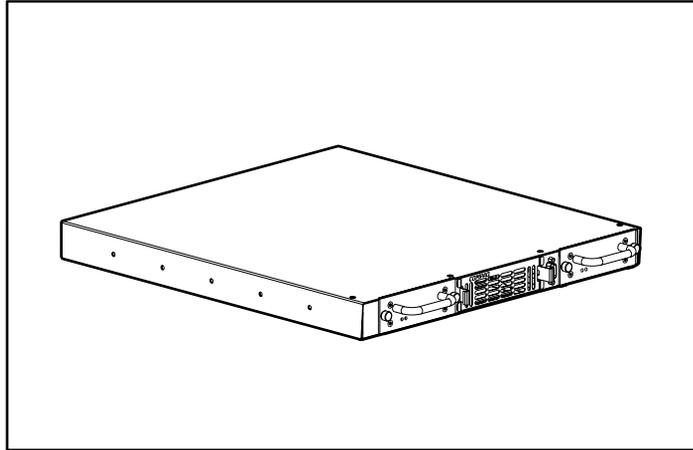
Figure 1: Front-side view

The air intake vents on the front-side, shown in Figure 1, must remain unobstructed. The power supply modules (with fault and power LED) are serviceable from the front-side of the router. The serial port is also located on the front-side for local management of configuration settings and firmware upgrades.
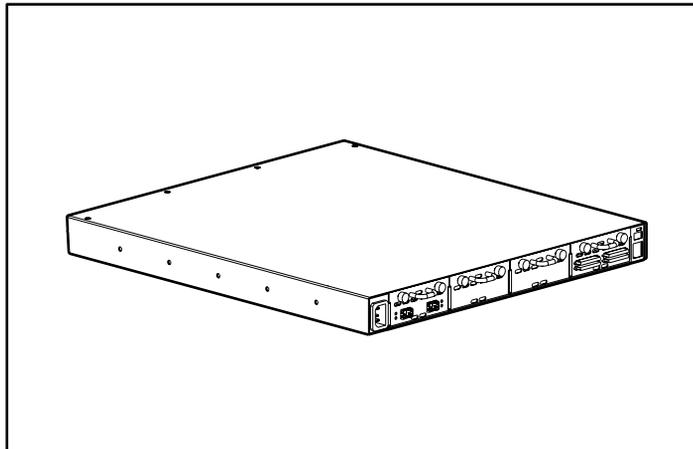
Figure 2: Back-side view

The air exhaust vents on the back-side, shown in Figure 2, must remain unobstructed. The SCSI, Fibre Channel, and Ethernet ports are found on the back-side of the router. Each port has LEDs that provide bus activity and link status information. A single power connector and single power button are located on the back-side.

Power Modules

The router is equipped with one power supply and has the capability of a redundant power supply being added.
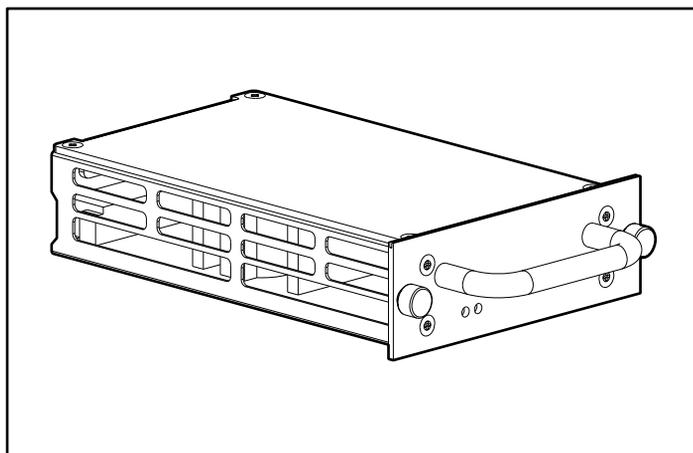
Figure 3: Power module

Power supply LED definition:

> **Green** - Power has been applied to this module
>
> **Yellow** - Power-On Self-Test (POST) in process or processor problems

Fan Modules

The router is equipped with three fans mounted in a single module.
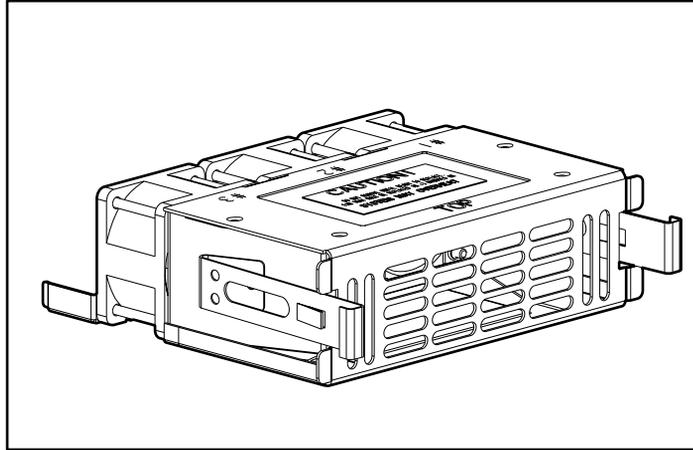
Figure 4: Fan module

If one of the three fans fails, the router will continue to operate on the two remaining fans until a replacement fan module can be installed.

If the fan is not cooling the router properly, a temperature warning message is displayed in the Home Page of the Web-based user interface.

Fan module functionality can be verified from both the Serial/Telnet user interface and the Web-based user interface.

Note: The Web-based user interface is also called Visual Manager. Visual Manager is discussed in Chapter 4, "Visual Manager User Interface." The Serial/Telnet user interface is discussed in Chapter 5, "Serial/Telnet User Interface."

Fibre Channel Modules

Multiple Fibre Channel modules can be added to the router.
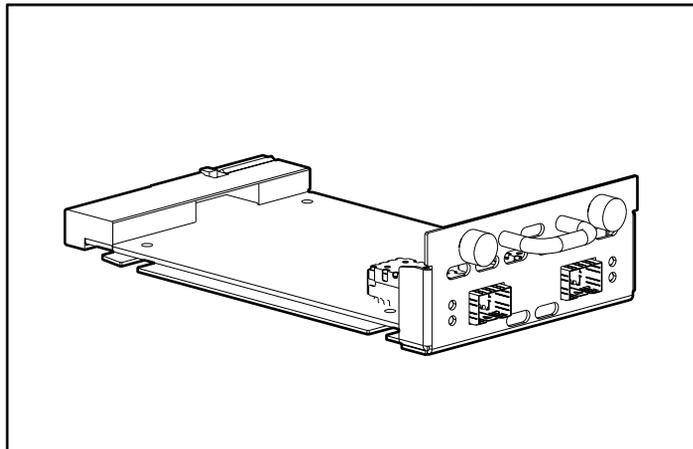
Figure 5: Fibre Channel module

Fibre Channel module LED definition:

Green (ACT) - Fibre Channel port activity

Green (LINK) - Valid Fibre Channel link

SCSI Modules

Multiple SCSI modules can be added to the router.
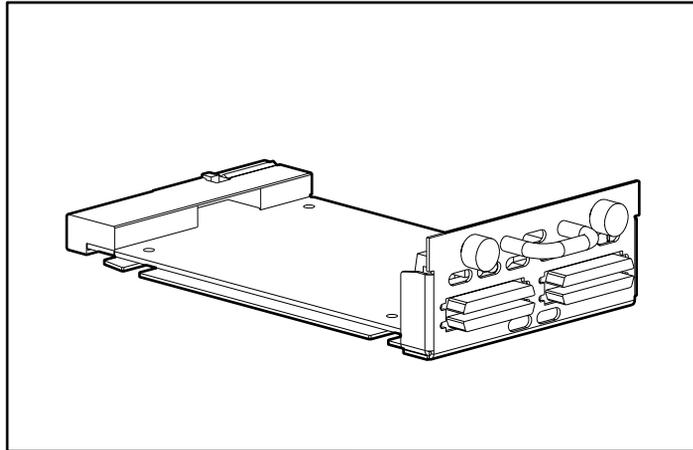
Figure 6: SCSI module

SCSI module LED definition:

> **Green** - SCSI bus activity on corresponding port

Ethernet Port/Standby Power Button

The router is equipped with one Ethernet port and a standby power button with LED indicators. See Figure 7 for an illustration.

Note: The Standby Power button engages/disengages system power supplied from the power modules. This button does not remove power to the power module(s). To remove power to the power module(s), unplug the router from electrical source.

Note: The standby power button has a 10-second delay after disengaging power before power can be re-engaged.
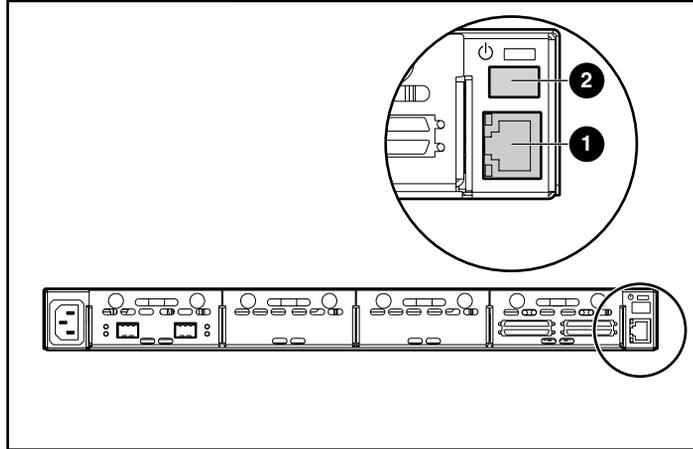
Figure 7: Ethernet port / standby power button

Item	Description
❶	Ethernet port
❷	Standby power button

Ethernet port LED definition:

Activity - Port activity

Link - Valid Ethernet link

Standby power button LED definition:

Green - System power is on

Amber - System fault condition is indicated

Alternating Green/Amber - System in Beaconing mode

Serial Port

The router is equipped with one serial port. See Figure 8 for an illustration.

The serial port can be used to access the serial/Telnet user interface, which is used to locally manage and configure the router.
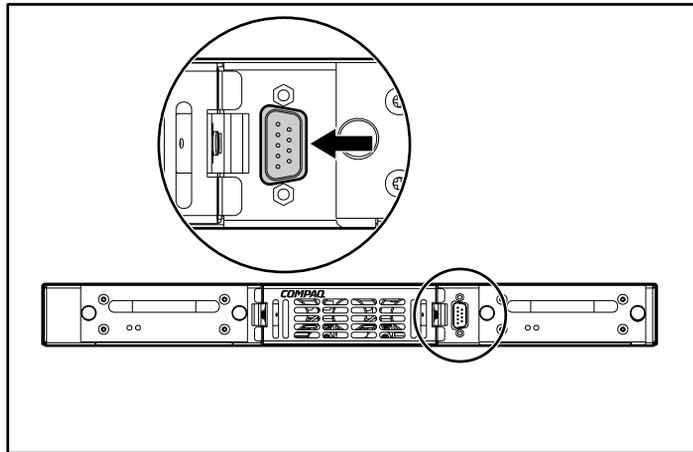
Figure 8: Serial port

Functional Overview

The router translates the Fibre Channel Protocol (FCP) to and from the SCSI Protocol. It transfers commands, data, and status information to and from Fibre Channel controllers and SCSI devices.

Supported devices include:

- Initiator Devices – Fibre Channel and SCSI hosts
- Direct Access Devices – RAID Controllers, Disk drives, JBODs
- Sequential Access Devices – Tape drives
- Changer Devices – Tape and Magneto-Optical Libraries

The router provides multiple Fibre Channel to SCSI I/O configurations. A sample configuration is illustrated in Figure 9.
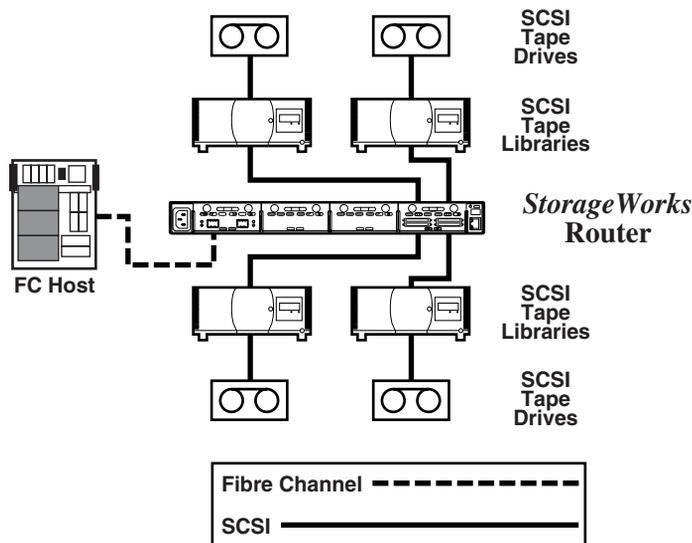
Figure 9: Example configuration

Figure 9 shows that a Fibre Channel host on the Fibre Channel bus can access a tape drive and library through the appropriate SCSI bus of the router I/O module.

Fibre Channel to SCSI Protocol Process

This section describes the steps the router uses to convert Fibre Channel host protocol to SCSI device protocol. Figure 10 and the supporting table illustrate and define this process.
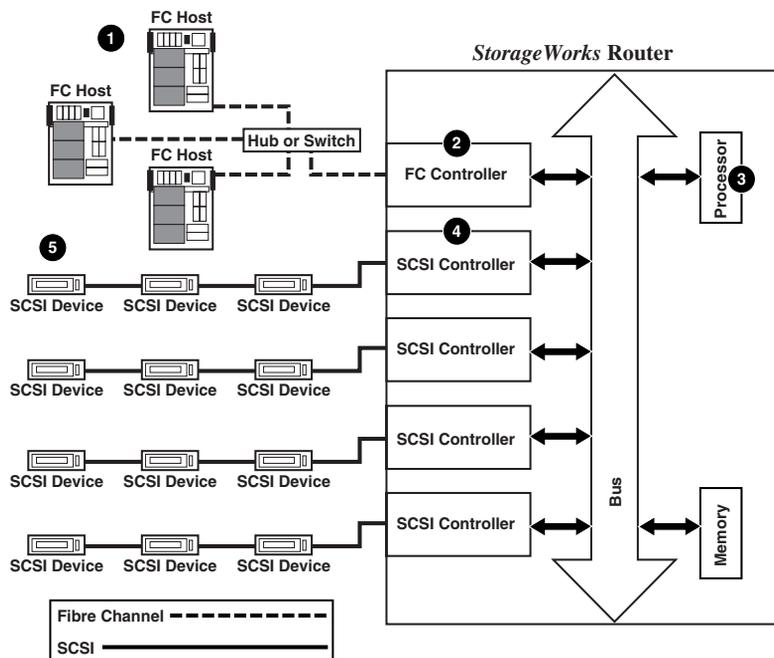
Figure 10: Converting Fibre Channel to SCSI process

Item	Process
❶	A Fibre Channel host issues an encapsulated FCP protocol command packet to the router
❷	The router Fibre Channel controller interprets the Fibre Channel information, and places the packet in buffer memory.
❸	The router interprets the Fibre Channel information packet and programs the router SCSI controller to process the transaction.
❹	The router SCSI controller sends the command to the SCSI device (target).
❺	The SCSI target interprets the command and executes it.

SCSI to Fibre Channel Protocol Process

In this example, a SCSI host (initiator) on the SCSI bus issues commands and the information is passed through the router to a target on the Fibre Channel Storage Area Network (FC-SAN). Figure 11 is an illustration of the process and the supporting table define each step.
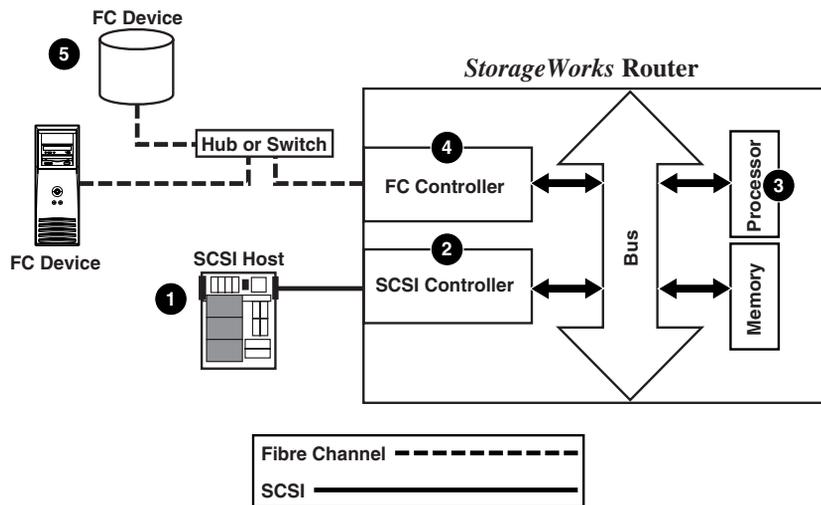
Figure 11: Converting SCSI to Fibre Channel Protocol Process

Item	Process
❶	A SCSI host issues a command to the router.
❷	The SCSI controller in the router interprets the command and places it in buffer memory.
❸	The router processor interprets data and programs the router Fibre Channel controller to process the transaction.
❹	The router Fibre Channel controller translates data into an FCP protocol packet and sends it to the Fibre Channel target.
❺	The Fibre Channel target interprets the FCP protocol packet and executes the command.

LAN-free Backup and Restore

The router can enable LAN-free backup/restore to allow the bulk of data traffic to be moved from the LAN to the storage area network (SAN). See Figure 12 for an illustration of this process.
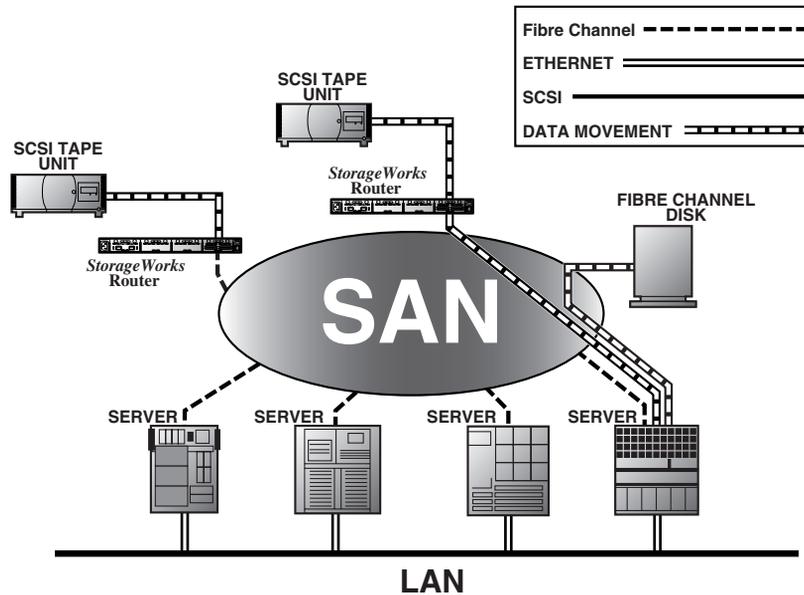
Figure 12: LAN-free backup and restore

Server-free Data Movement

Used with server-free application software, Copy Manager allows the server to off load data movement to the router and free up server resources. See Figure 13.
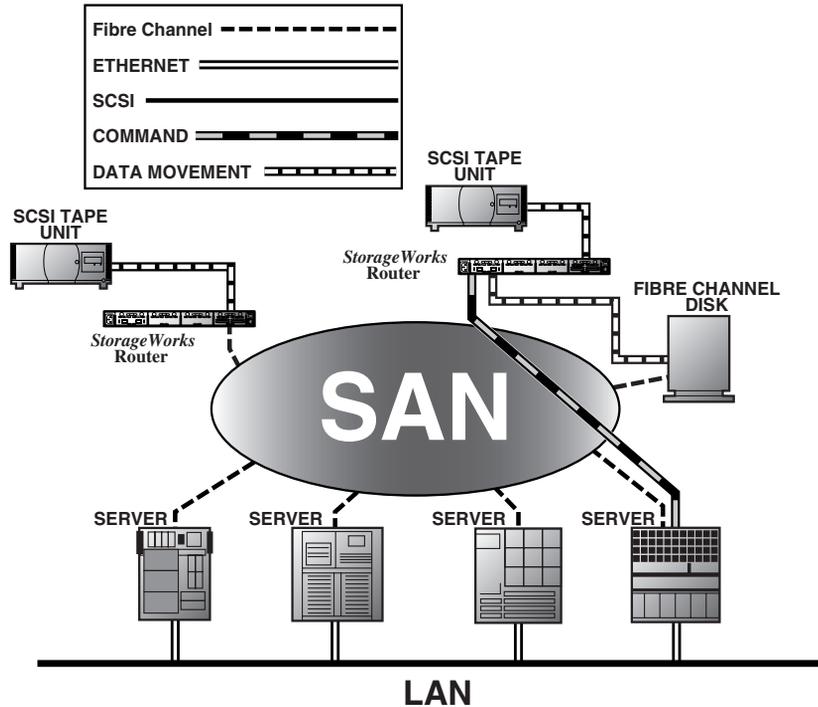
Figure 13: Server-free data movement

Note: The router implementation of Extended copy does not support the SNMP protocol.

Note: Copy Manager can perform simultaneous Extended Copy commands.

> **Note:** Server-free backup can be activated using the Active Fabric Configuration menu option. When activated, the router is enabled for both server-free and LAN-free capabilities. When deactivated, only LAN-free capabilities are supported.

> **Note:** The router implementation of the Extended Copy command is available to application programmers. See Appendix B " Controller LUN Commands," for additional information.

Physical Requirements

The router has the following physical dimensions:

- Width: 17.00 inches
- Depth: 20 inches
- Height: 1.70 inches, 1U
- Weight: approx. 18 lbs.

The router must be operated in the following environment:

- Temperature: 0 to 50°C
- Relative Humidity: 5 to 80% (non-condensing)

If the router is to be shipped or stored, the following environment must be maintained:

- Temperature: -40 to +55°C
- Relative Humidity: 0 to 92% (non-condensing)

The router must be supplied the following power:

- VAC: 100 - 240 (auto sensing)
- 50/60 Hz, 2.0 Amps (each power supply)

Installation

2

This chapter describes how to unpack and install the StorageWorks Network Storage Router M2402. The router can be set up in either a desktop or a rack configuration.

Note: Read this chapter carefully and completely before configuring the router.

The following considerations and procedures are included in this chapter:

- Selecting a location
- Unpacking the box
- Mounting the router on a desktop
- Installing the router in a rack
- Connecting the power cord
- Connecting the interfaces
    — Fibre Channel connections
    — SCSI connections
    — Ethernet connections
    — Serial port connections
- Setting up serial port communications

$\triangle$ **Caution:** To prevent static shock, which can damage electrical equipment, use industry accepted handling practices when unpacking and moving the router and its components. See Appendix F, "Electrostatic Discharge," for more information.

Selecting a Location

The router can be placed on a desktop or mounted in a standard 19-inch rack. When considering a location for the router, make sure the airflow area surrounding the front and the back of the router is unobstructed.

Unpacking the Box

Unpack the router as follows:

1. Remove all items from the shipping container. Check each one for damage. Keep the router in the protective bag until ready to install.

2. Refer to the packing slip or contents list to make sure all the equipment was received. If an item is missing, contact your sales representative immediately.

Mounting the Router on a Desktop

1. Remove the router from the protective bag.

> **Caution:** Place the router onto a smooth surface away from any potential exposure to direct sunlight, liquids or vapors, excessive heat, or risk of accidental dropping or other damage.

2. Attach the stick-on feet to the bottom four corners of the unit.

3. Place the router on the table or desktop, ensuring the intake and exhaust vents are clear of obstructions.

Installing the Router in a Rack

The following items in the router kit are used to rack-mount the router:

- Mounting rails
- Extender brackets
- Bag of mounting hardware (8 #M6x12 Phillips screws, 4 #6-32x.312 Phillips screws)
- Bezel blank

Note: The installation process requires a #2 Phillips and a #2 flat-head screwdriver.

To install the router in the rack:

1. Remove the router from its protective bag.

Note: Before installing the router, make sure that all modules are properly installed. For information about the removal or installation of modules, refer to Chapter 7, "Hardware Module Replacement."

⚠ **Caution:** Place the router onto a smooth surface away from any potential exposure to direct sunlight, liquids or vapors, excessive heat, or risk of accidental dropping or other damage.

2. Determine where the router will be mounted, ensuring that the air-flow vents remain clear of obstructions.

3. Separate the inner rail from the outer-rail assemblies.

    See Figure 14 for an illustration.

    a. Place a thumb or finger over the circular grasping hole at the front-end of the inner rail.

    b. Extend the inner rail out from the outer-rail assembly until it locks into place.

    c. Press the spring-latch on the back-side of the inner rail to release the lock. While holding down the spring-latch, extend the inner rail until the two rails separate.
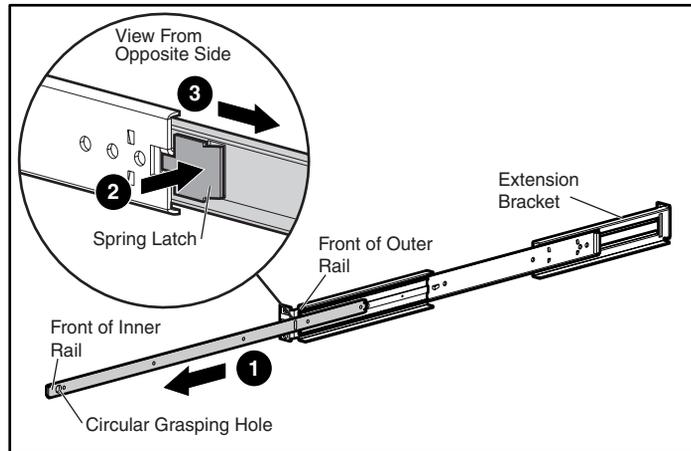
Figure 14: Separating the inner and outer rails

    d.   Repeat Step 3 to separate the other set of rails.

4.   Attach the front-end and back-end of each outer-rail assembly to the rack.

    a.   Determine the location in the rack for the router.

Note: The size of the router and its rail assembly is 1U.

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    b.   Align the three screw-holes on the front-end of the outer-rail assembly with the equally spaced holes on the front of the rack.

       All three holes must be aligned exactly. If the holes do not exactly match up, the outer-rail assembly is not positioned correctly on the rack. See Figure 15 for an example of rack front styles and hole alignments.
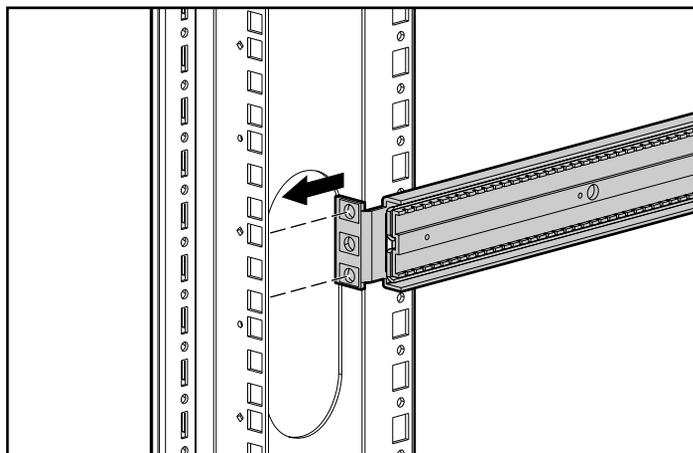
Figure 15: Aligning the bracket face with the rack

c. With the outer-rail assembly face flush against the inside front of the rack-mounting holes, insert and tighten the top and bottom screws of the bracket face. Use two of the M6x12 Phillips screws.

Do not insert a screw in the center hole of the bracket face. This hole will be used when the front bezel blank is mounted to the rack.

d. Loosen the flathead screw on the rear extension bracket of the outer-rail assembly.

e. While holding the outer-rail assembly level, extend the rear extension bracket to the inside rear of the rack.

⚠ **WARNING:** To reduce injury or equipment damage, the rails must be level. If the rails are not level, the router cannot be installed correctly and could fall.

f. Attach the rear extension-bracket face to the rear of the rack, using two of the M6x12 Phillips screws.

g. With the outer-rail assembly in place, tighten the flathead screw that connects the rear extension bracket to the outer rail.

h. Repeat Step 4 to attach the other outer-rail assembly to the other side of the rack.

5. Attach an inner rail to each side of the router.

   See Figure 16 for an illustration.

   a. With the spring-latch facing away from the router and the circular grasping hole facing the front-side of the router, align the front-most screw-hole on the router with the center screw-hole on the rail.

      Using this alignment, two screw holes will be aligned and the rail will extend out from the front-side of the router approximately 8 inches.

   b. Secure the rail to the router using two #6-32x.312 Phillips screws.
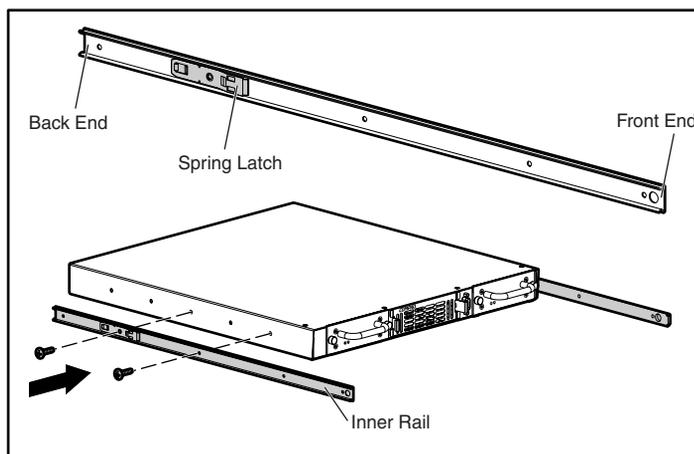
Figure 16: Attaching inner rails to the router

   c. Repeat Step 5 to attach the inner rail to the other side of the router.

6. Install the router in the rack.

   See Figure 17 for an illustration.

   a. Move the ball-bearing slide on each of the outer rails towards the front of the rack.

   b. From the front-side of the rack with the front-side of the router facing out, align the inner and the outer rails and slide the inner rail into the outer rail.

   c. When the rails lock in place, press in the spring-latches on each of the inner-rails and push in the rest of the way.
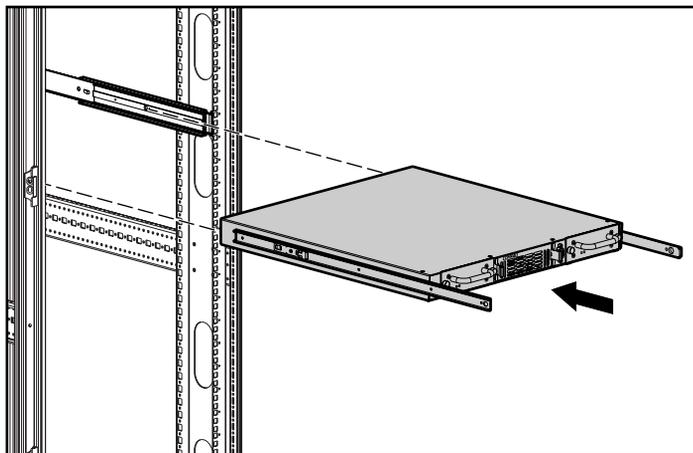
Figure 17: Installing the router into the rack

7. Attach the bezel blank to the front-side of the rack.

   See Figure 18 for an illustration.

   a. Align the bezel blank over the unused center hole of the bracket faces on the rack.

   b. Attach the bezel blank to the rack, using the thumbscrews.
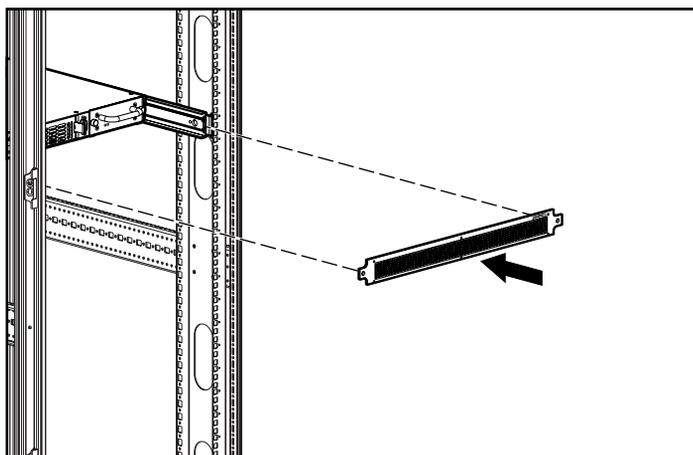
Figure 18: Attaching the bezel to the rack

Connecting the Power Cord

The internal power supply will support 100 - 240 VAC (Auto Sensing). The power cord shipped with the router is a 120 VAC three-conductor power cord for use in the United States and Canada. If the router is being installed outside the United States or Canada, the appropriate power cord should be purchased.

To connect the power cord to the router:

1. Connect the power cord to the power connector on the back-side of the router.
2. Connect the power cord to a grounded voltage source.
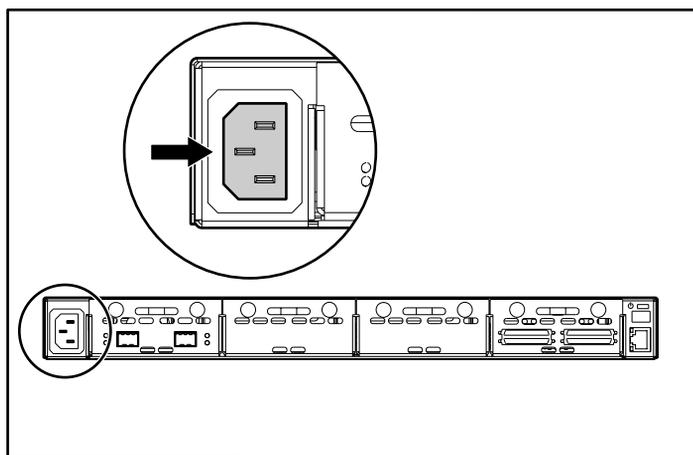
Figure 19: Power connector

⚠️ **WARNING:** To reduce the risk of electric shock or damage to the equipment:

■ Do not disable the power-cord grounding-plug. The grounding plug is an important safety feature.

■ Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.

■ Disconnect power from the router by unplugging the power cord from either the electrical outlet or the router.

Connecting the Interfaces

There are four types of interfaces to connect on the router:

- Fibre Channel Connections
- SCSI Connections (HVD or LVD/SE)
- Ethernet Connections
- Serial Port Connections (RS-232)

Figure 20 is an illustration of the port locations on the router.
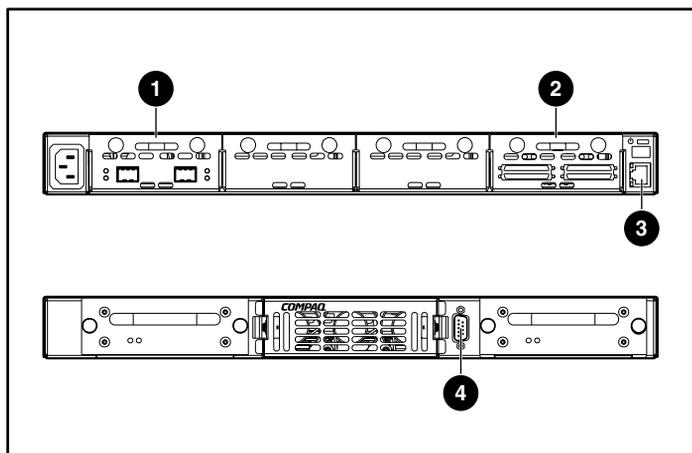
Figure 20: Back-side and front-side port locations

Item	Port Type
❶	Fibre Channel
❷	SCSI
❸	Ethernet
❹	Serial

For convenience in configuring ports, key information is indicated on a label located on the underside of the router.

```
WWNN: 100000E00200N000
WWPN: 100000E00Y00N000
ENET MAC ID: 00:E0:02:00:00:XY
```
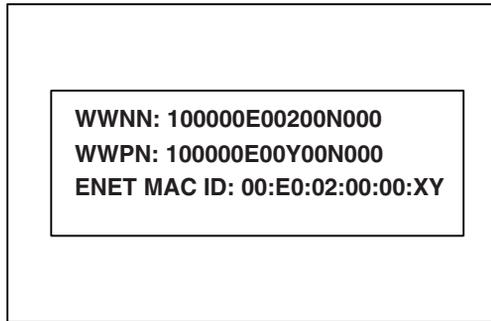
Figure 21: WWN/MAC ID label

Fibre Channel Connections

In typical installations, the router may be connected to:

- Arbitrated Loop (AL) – the router can be directly attached to the Fibre Channel host adapter in a point-to-point configuration.

- Private loop (hub)

- Public loop (hub that is also connected to a switch)

- Fabric environment (switch)

Note: Before connecting the router to other Fibre Channel devices, it is important to understand the configuration requirements of the environment to which it will be connected. Failure to correctly configure a Fibre Channel device may impair the operation of the storage network to which it is attached.
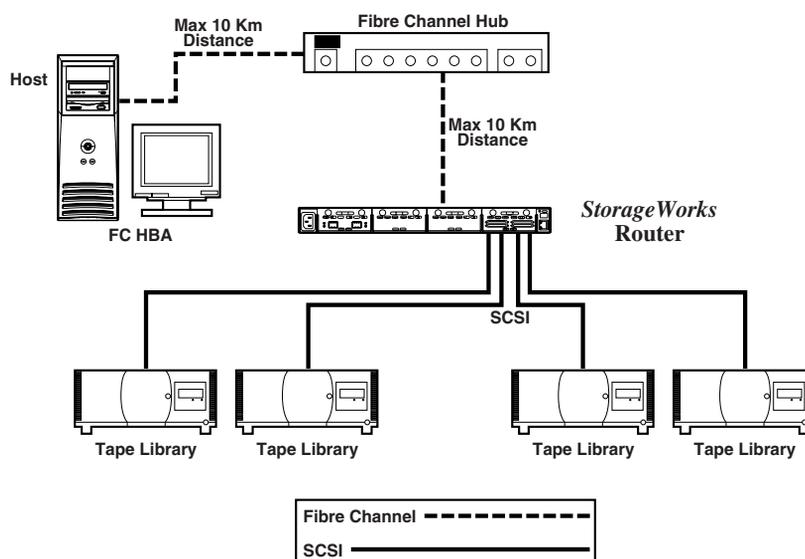
Figure 22: Configuration with tape library using Arbitrated (or Private) loop

Both Fibre Channel switches and hubs may allow individual ports to be configured for different media types. The router must be connected to the hub or switch port with the appropriate Fibre Channel cabling for the media type in use.

The router supports various Fibre Channel media types, using external Small Form Factor Pluggables (SFP).

Available media types use 2.125-Gb Dual SC connectors and include:

■   Multi-mode fiber support

■   Single-mode fiber support

To connect the router to a Fibre Channel storage area network (SAN):

1. Locate the Fibre Channel ports on the back-side of the router.
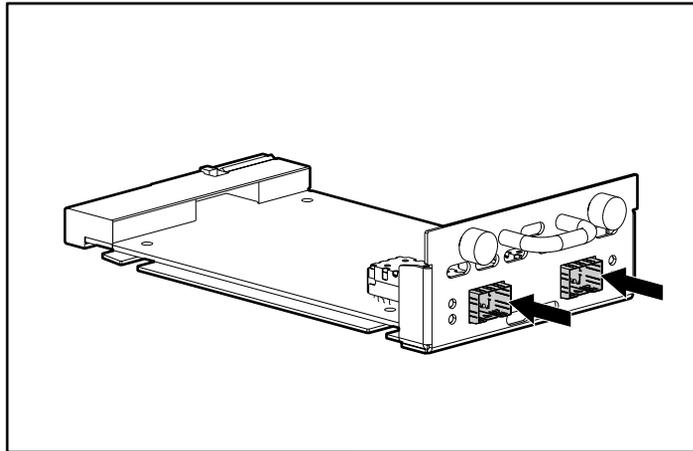
Figure 23: Fibre Channel ports

2. Remove the rubber protector inserts from the SFP.
3. With the router powered off, connect the router to the Fibre Channel environment, using the appropriate cabling. The Fibre Channel optical connectors on the router are keyed for proper orientation.

> ⚠ **Caution:** The router has been qualified with a specific set of SFPs. Using an SFP that has not been qualified by HP may cause the router to operate improperly. See the Laser Safety section of this manual for more information.

SCSI Connections

The router supports Fast/Ultra-2 Narrow/Wide SCSI. The router is factory configured to support LVD/Single-Ended or HVD (Diff), or a mixture of both types of SCSI buses. Up to twelve SCSI buses can be attached, using 3 SCSI modules.

Note: The router must always be installed at the end of SCSI buses.

The router supplies termination power (TERMPWR) to each SCSI bus.

Note: During certain faults, the termination power IC will shut down. It may be restarted once the fault is cleared.

Caution: During the attachment of high density SCSI cables, note the orientation of the high-density SCSI port connectors. Connector orientation failure may result in connector damage.

Caution: LVD/SE and HVD connections must be made on appropriate I/O modules. Failure to heed this caution may result in damage to equipment.

Caution: Failure to comply with the minimum high-density cable specifications can result in damage to the router or an operational failure of the product.

Note: SCSI cables used with the router must meet SCSI 2 standards. Optional SCSI cables are available from your supplier.

To connect the router to a SCSI device:

1. Power off the router and SCSI devices.
2. Locate the SCSI buses on the back-side of the router.
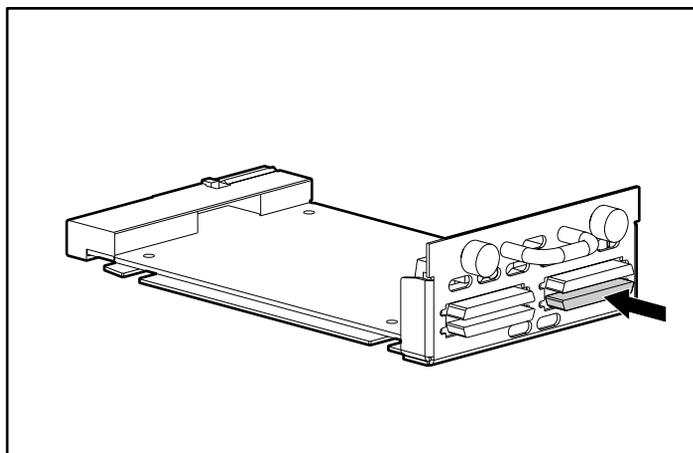
Figure 24: SCSI buses

3. Connect a SCSI cable to one of the SCSI buses on the router.

Note: The router should always be installed at the end of the SCSI bus.

Note: SE is not supported by SCSI-3 protocols. While it is possible to mix SE and LVD devices on the same bus, doing so will result in substantially decreased performance on the bus.

4. Connect the SCSI cable to the SCSI device.
5. Verify that the bus is terminated correctly. By default, the router is automatically terminated. However, the device at the other end of bus must also be terminated.
6. Power on all attached SCSI devices.
7. After all the SCSI devices have completed their individual POST (Power-On Self-Test) processes, power on the router.

Ethernet Connections

10/100BaseT Ethernet connectivity provides enhanced management and configuration capabilities. The RJ-45 connector on the router can be directly connected to a standard 10/100BaseT Ethernet network.

To allow configuration capabilities via this port, the IP network address must be set. The IP network address can be manually assigned or dynamically assigned using DHCP. Refer to Chapter 4, "Visual Manager User Interface" or Chapter 5, "Serial/Telnet User Interface"for details on setting the IP network address.

Note: The router has a unique Ethernet MAC address that is assigned during the manufacturing process.

Ethernet interfaces include Telnet, SNMP, FTP, and an HTTP interface known as StorageWorks Visual Manager (VM). For more information on router management, see Chapter 3, "Configuration Overview."
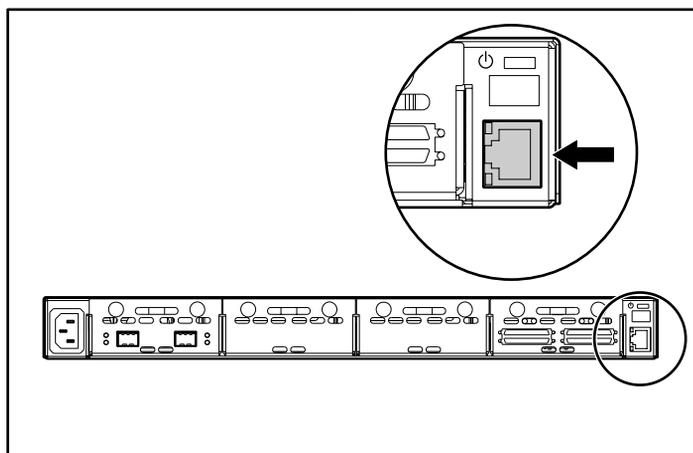
Figure 25: Ethernet port

Serial Port Connections

The DB-9 connector provides a serial port that is compliant with the EIA 562 standard and is RS-232 signaling-level compatible. The serial connection can be used to configure the unit, to monitor its diagnostic status, or to update the router firmware.

Figure 26 is an illustration of the serial port location on the front-side of the router.
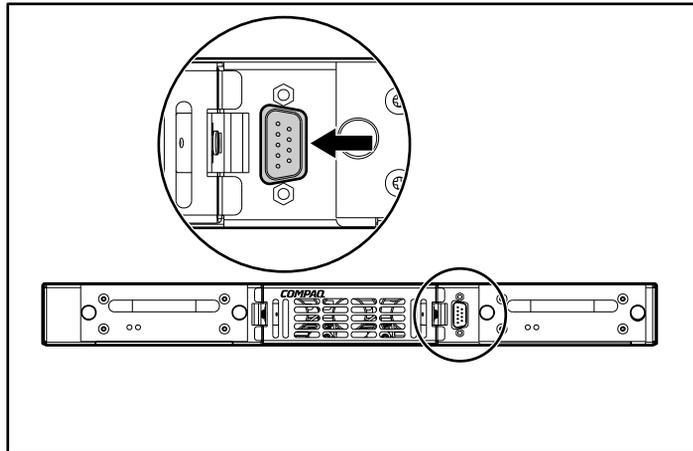
Figure 26: Serial port

Item	Settings
Baud Rate	Autobaud, 9600, 19200, 38400, 57600, or 115200 HP recommends setting the baud rate to 115200.
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None or XON/XOF

Setting up Serial Port Communications

To set up serial port communications:

1. Connect the serial cable between the host computer serial port (COM1 or COM2) and the router serial port.

2. Power on the router.

3. Power on the server.

4. Start the host terminal or terminal interface program (Microsoft Windows 9x, Windows NT 4.0, or Windows 2000 HyperTerminal).

5. Set the terminal or terminal interface program to use the appropriate COM port.

6. Configure the selected COM port as indicated in Figure 15.

7. Press **Enter** several times. The router will automatically detect the baud rate being used. The baud rate will be retained through future power cycles.

Note: This process can take up to 90 seconds. The Power On Self Test (POST) and initialization information may not be visible on screen.

Note: The baud rate in the terminal emulation program must be set at 9600, 19200, 38400, 57600, or 115200 to use the autobaud feature.

Configuration Overview

3

The StorageWorks Network Storage Router M2402 can be configured and managed using several user interfaces (UIs). Each UI is introduced in this chapter, along with information about common configuration settings.

■ Router default settings

■ UI overview

■ Common configuration settings

— Controller LUN commands

— SCSI bus configuration

— Fibre Channel port configuration

— Fibre Channel arbitrated loop configuration

— Fibre Channel switched fabric configuration

— Discovery mode

— Host device configuration

— Logical unit management

— Buffered tape writes

Note: Before attempting to configure the router, a basic understanding of Fibre Channel and SCSI devices is recommended. For information on SCSI standards, refer to publications from the X3T10 committee of ANSI (American National Standards Institute). For information on Fibre Channel standards, refer to publications from the X3T11 committee of ANSI. For those who are interested in purchasing approved American National Standards and Technical Reports, you can contact ANSI at (212) 642-4900.

Router Default Settings

Some of the basic factory default values are:

- IP address: `http://1.1.1.1/`
- Subnet mask: `255.255.255.0`
- Gateway address: `0.0.0.0`
- User name: `root`
- Password: `password`

HP recommends these values be changed from the defaults.

All settings within the router configuration are pre-set with default values. These values are set to allow the router to be installed into most HP environments with little or no configuration changes.

After changing the basic default values listed above, carefully consider any additional configuration changes.

After the initial configuration of the router is established, HP recommends backing up the configuration to an external file. If needed, during a recovery process, this file can then be restored back onto the router.

UI Overview

The router supports the following user interfaces:

- Visual Manager
- Serial/Telnet
- FTP
- SNMP

Each UI is introduced in the following paragraphs.

Visual Manager

Visual Manager allows any standard web browser to view and change router configuration. Information is dynamically generated in an HTML format so that any web browser can access it.

Unless the default values are used, the 10/100BaseT Ethernet port must be configured using the serial port with an appropriate IP address, subnet mask, and gateway prior to use.

For complete information on accessing and using Visual Manager, see Chapter 4, "Visual Manager User Interface."

Serial/Telnet

The serial port allows for configuration of device characteristics from a terminal or terminal emulator. Multiple serial connections cannot be run at the same time.

From most Windows 9x, Windows NT, and Windows 2000 systems, users can start a Telnet session from the DOS (Command) shell.

For complete information on accessing and using the Serial/Telnet UI, see Chapter 5, "Serial/Telnet User Interface."

FTP

The router supports the use of the FTP UI to perform several copy procedures using the "put" and the "get" commands.

For more information, see Chapter 6, "FTP User Interface."

SNMP Management Information Base

SNMP commands are transported via Ethernet. The router supports FA MIB 2.2 and the Enterprise MIB (Management Information Base.)

For more information, see Appendix D, "SNMP Management Information Bases."

Common Configuration Settings

To provide connectivity between hosts and devices, the router must establish an address on each connected Fibre Channel network and SCSI bus. The following paragraphs discuss configuration settings that are commonly modified and are available in the Visual Manager UI and the Serial/Telnet UI. For procedural information on accessing and changing these settings, see Chapter 4, "Visual Manager User Interface," and Chapter 5, " Serial/Telnet User Interface."

Controller LUN Commands

The router supports a set of SCSI-3 commands that can be received as FCP commands over the Fibre Channel bus. These commands provide support for value added features such as Extended Copy. When using these commands, they must be sent to the Controller LUN. For more information, see Appendix B, "Controller LUN Commands."

SCSI Bus Configuration

The router can appear on a SCSI bus as a pair of initiators. The primary Initiator ID can be set to any valid SCSI address (0-15) and is used for most traffic. The alternate Initiator ID can also be set to any valid SCSI address (0-15) and is for use with high priority traffic. The Initiator IDs (primary and alternate) should not be set to the same SCSI address and no other devices on the SCSI bus may use either of these SCSI addresses.

The router can also appear as one or more Target ID on a SCSI bus. By default, no Target IDs are set up.

The router provides the capability to reset SCSI buses during the router boot cycle. This allows devices on a SCSI bus to be in a known state. The reset option can be enabled/disabled during configuration of the router. The SCSI bus reset feature is enabled in the default configuration but should be disabled for configurations using multiple initiators, tape changers or other devices that have long reset cycles, or for environments that are adversely affected by bus resets.

The router negotiates the maximum values for transfer rates and bandwidth on a SCSI bus. If an attached SCSI device does not allow the full rates, the router will use the best rates it can negotiate for that device. Because negotiation is on a device-specific basis, the router can support a mix of SCSI device types on the same SCSI bus.

Fibre Channel Port Configuration

By default, the configuration of the Fibre Channel ports is set to N_Port, which minimizes conflicts when both the router and another Fibre Channel device, such as a switch, are using Auto Sensing for Fibre Channel ports. Alternatively, the configuration of the Fibre Channel ports can be set to Auto Sensing, which allows the router to detect whether it is connected to an Arbitrated Loop or a Switched Fabric.

Note: By default, the Fibre Channel port speed is set to 1 Gb/s. Changes to the Fibre Channel port speed must be manually set, such as for 2 Gb/s. If set incorrectly and the router is plugged into a Loop or Fabric, the unit may receive framing errors because of the incorrect Fibre Channel link speed.

Fibre Channel Arbitrated Loop Configuration

On a Fibre Channel Arbitrated Loop, each device appears as an Arbitrated Loop Physical Address (AL_PA). To obtain an AL_PA, two methods can be used:

■ Soft addressing

■ Hard addressing

Soft addressing is the default setting.

Soft Addressing

During soft addressing, the router automatically acquires the first available loop address, starting from 01 and moving up to EF. The router may participate on the Fibre Channel loop, as long as there is at least one address available on the loop connected to the router. Fibre Channel supports up to 126 devices on an Arbitrated Loop.

Hard Addressing

During hard addressing, the router attempts to acquire the AL_PA value specified in the configuration settings. If the desired address is not available at loop initialization time, the router negotiates the next available soft address. This allows both the loop and the router to continue to operate.

Hard addressing is recommended for Fibre Channel Arbitrated Loop environments where it is important that the Fibre Channel device addresses do not change. Device address changes can affect the mapping represented by the host operating system to the application, and have adverse effects. An example is tape library installation, where the application configuration requires fixed device identification for proper operation.

Fibre Channel Switched Fabric Configuration

When connected to a Fibre Channel switch, the router is identified to the switch as a unique device by the factory programmed World Wide Name (WWN).

Discovery Mode

This feature makes it easy to discover attached Fibre Channel and SCSI target devices and automatically map them on the host side for the bus/port in question.

There are two discovery methods available:

■   Manual discovery

■   Auto discovery

Auto Discovery can be set to occur after reboot events (when the router reboots) or link-up events (for instance, when cables are attached or a hub is rebooted). Auto Discovery can be disabled by setting the router to Manual Discovery.

Host Device Configuration

A host system using a Fibre Channel Host Bus Adapter (HBA) will typically map devices into the existing device-mapping scheme used by that operating system. Refer to the HBA manual for the mapping table.

Mapping involves pairing FC_AL_PA to SCSI target address. The HBA will claim enough SCSI bus entries to allow up to 125 Fibre Channel targets to be mapped to SCSI Bus:Target entries. This is usually done by a fixed mapping of AL_PA to Bus:Target. In such a configuration, the router corresponds to a Bus:Target identifier, with the attached SCSI devices appearing as logical units (LUNs). Operating systems can extend the available SCSI limit of 15 targets per bus. Although this is not an issue for the operating system or most applications, there are cases where older applications can have expectations about what constitutes a valid SCSI ID, and thus may not correctly handle certain mappings. In particular, some applications may exhibit difficulties addressing target IDs greater than 15 (16 and up, for example). This situation can be resolved by configuring the router to use hard addressing and setting the AL_PA to a value less then 16 that the HBA will be able to map.

For example, depending on the Fibre Channel HBA, if the hard AL_PA selection is 1, then the address is 1. If the selection is 125, the AL_PA address is 0xEF. Some Fibre Channel HBAs will map devices differently, so verify the AL_PA by reviewing the documentation for the HBA.

Logical Unit Management

Because SAN resources can be shared, it is possible for multiple hosts to have access to the same devices on the SAN. To prevent conflicts, the router provides LUN management as a means to restrict device access to certain hosts. LUN management goes beyond simple LUN masking, to prevent gaps in the list of LUNs presented to a host.

LUN management maps can be created for different views of the devices attached to the router. Each Fibre Channel host is assigned a specific map configuration. Not only can the administrator control which devices a host may access, but also which LUNs are used to access these devices.

For a Fibre Channel host, a map is a table of LUNs, where each entry is either empty or contains device address information needed for host/device communication.

For a SCSI host, a map contains a list of target IDs, each of which has its own table of LUNs with address information needed for host/device communication.

Note: The router can respond to multiple Target IDs on a SCSI bus.

Both Fibre Channel ports and SCSI buses have user-defined maps and pre-defined maps.

There are three predefined maps:

- Indexed (default)
- Auto Assigned
- SCC

When a host sends a command, the router will select which map to use, based on the port receiving the command and the ID of the host sending the command. For Fibre Channel ports, the host ID is the World Wide Name and for SCSI buses, the host ID is the Initiator ID (0 - 15). When a host is unknown or is not assigned a specific map, the router will use the default map.

Indexed Maps

An Indexed map is initially empty and can be modified by the user.

Auto Assigned Maps

An Auto Assigned map is built dynamically and contains all of the devices found during discovery. This map will change automatically any time the discovery process finds a change in the devices attached. This map cannot be modified by the user.

SCC Maps

An SCC map is only available on Fibre Channel ports and contains only a single entry for LUN 0. This LUN is a router controller LUN. Access to attached devices is managed using SCC logical unit addressing.

Buffered Tape Writes

This option is designed to enhance system performance by returning status on consecutive write commands prior to the tape device receiving data. In the event that data does not transfer correctly, the router will return a check condition on a subsequent command.

Commands other than Write are not issued until status is received for any pending write, and status is not returned until the device completes the command. This sequence is appropriate for tasks such as file backup or restore.

Some applications require confirmation of individual blocks being written to the medium, such as for audit trail tapes or log tapes. In these instances, the Buffered Tape Writes option must be disabled.

Visual Manager User Interface

4

The StorageWorks Visual Manager user interface (UI) provides a graphical and intuitive format that is used to remotely view and change router configurations. Use the Microsoft Internet Explorer or Netscape (version 6.2 or greater) Web browsers to access Visual Manager.

Information is presented in HTML format in accordance with the W3C specification for HTML 3.2. Current W3C recommendations and other technical documents can be found at http://www.w3.org/TR/.

This chapter describes the menus and tasks of the Visual Manager UI and is organized using the same structure of the Visual Manager UI:

- Visual Manager access
- Visual Manager best practices
- Main Menu
- System Menu
    - Serial configuration
    - Network configuration
    - SNMP configuration
    - Active Fabric configuration
    - User Configuration
    - Real-Time clock configuration
    - Power Supply configuration
    - Reset Menu

- Modules Menu
    - World Wide Node Name configuration
    - Fibre Channel Module configuration
    - SCSI Module configuration
- Discovery Menu
- Mapping Menu
    - Fibre Channel and SCSI common mapping tasks
    - Fibre Channel mapping tasks
    - SCSI mapping tasks
- Statistics Menu
- Utilities Menu
    - Beacon mode configuration
    - FTP utility access
    - Trace settings configuration
    - Current, previous, and last assert trace displays
    - Clear current traces and clear assert traces
    - Event log configuration
    - Event log display
- Report Menu
- Reboot Option

Visual Manager Access

Visual Manager (VM) can be accessed from any standard web browser:

1. Connect a 10/100BaseT Ethernet cable to the back of the router.
2. Apply power to the connected SCSI and/or Fibre Channel devices.
3. After all of the devices have completed their power up routines, apply power to the router.
4. Apply power to the host computer.
5. Enter the router IP address in the address field of the Web browser of the host computer.

Note: To access VM, the router must be assigned a valid IP address. The factory default setting for the IP address allows access on a local area network only. If the factory default for the IP address is already used by another device on the local network, the IP address must be changed.

The factory default for the IP address is `http://1.1.1.1/`

Note: If the IP address of the router is not known or needs to be changed, connect to the router using a serial connection. The current router IP address is displayed and can be changed in the serial Ethernet Configuration Menu.

---

6. In the Visual Manager home page, router status information is displayed. The home page is accessible to anyone who knows the router IP address.

   To access any other menus and screens, the user must enter the authorized user name and password.

   The default user name is `root` and the default password is `password`. This information is required only once per session.

Note: HP recommends changing the user name and password from the defaults.

Note: User name and password are case-sensitive.

---

7. After entering the user name and password, full access is gained to the VM menus.

Note: To end the current session of VM, it is necessary to close the browser window. Navigating the browser to another URL does not end the current session.

Visual Manager Best Practices

The following recommendations should be observed:

■   A standard keyboard and mouse must be used to navigate in the VM.

■   The router is shipped with a configuration of default settings that is acceptable for most system environments. Few changes to the configuration should be necessary.

■   After any configuration changes are made, depending on the menu option, select **Submit** or **Configure** to send changes from the Web browser to the router.

■   Changes will take effect during the next router reboot cycle.

■   If the configuration has been modified to meet company-specific needs, back up the company-specific configuration to an external file. If necessary, these settings can later be restored to the router.

■   Fields are not case-sensitive, except for the user name and password.

■   HP recommends that you not bookmark VM pages with the Web browser.

■   Because configuration information is transmitted via URLs, it is possible that the router could be configured with information present at the time a page was bookmarked.

■   HP recommends navigating only using the Web page links contained in VM itself.

■   Depending on the Web browser used, these links will often appear as highlighted text. By selecting these links, VM can be safely navigated.

Main Menu

The Main Menu home page is displayed whenever VM is accessed.

The home page contains status information, including a physical image of the back-side of the router.

Figure 27 is an example of the home page.

Figure 27: Visual Manager home page

Home page information includes:

■ The HP logo is located in the upper left corner of the page. Figure 28 is an example of this portion of the home page screen. If the Internet is accessible to the host, click the HP logo to open the router company website.

Figure 28: HP logo

■ A back-side view of the router is located near the top of the home page. Figure 29 is an example of this portion of the home page screen.

Figure 29: Back-side router image

■ The router image is interactive, allowing quick access to configuration menus:

— To display current settings and status for a module, click the corresponding module shown in the router image.

— To open a menu for making changes to the configuration for that particular port or bus, click the desired Fibre Channel port or SCSI bus.

— To open the Power Supply Configuration menu, click the power connector image.

— To open the Network Configuration menu, click the Ethernet port.

— To open the Beacon settings menu, click the System Status LED indicator.

■ Router status information is located in the body of the home page and includes:

— Platform information

— Temperature measurements

— The home page monitors the temperature of the router, checking once every 60 seconds. If the detected temperature is outside the operating range, a pop-up notification message indicates that the unit is about to shut down.

Note: The temperature warning message appears only on the home page.

— Voltage measurements

— Fan measurements

— Power supply functionality

■ The Main Menu option bar is located at the left-side of the home page. Use this option bar to access the configuration menus. Figure 30 is an example of this portion of the home page screen.

MAIN MENU
Home
System
Modules
Discovery
Mapping
Statistics
Utilities
Report
Reboot

Figure 30: Main Menu option bar

- ■ Main Menu options:
  - — **Home** displays router status information.
  - — **System** configures standard system components.
  - — **Modules** configures Fibre Channel and SCSI module ports/buses.
  - — **Discovery** shows devices and discovers new devices.
  - — **Mapping** shows and configures maps.
  - — **Statistics** shows router statistics.
  - — **Utilities** configures utility settings.
  - — **Report** shows and prints system information.
  - — **Reboot** restarts the router.

Each Main Menu option is discussed in the following sections of this chapter.

System Menu

The System Menu is accessed from the Main Menu and is used to view and configure serial, network, SNMP, Trap, Active Fabric, clock, and power supply components.

Figure 31 is an example of the System page.

Figure 31: System page

System Menu tasks:

- **Serial configuration** configures the baud rate.
- **Network configuration** configures Ethernet settings.
- **SNMP configuration** configures SNMP settings.
- **Active Fabric configuration** configures Active Fabric settings.
- **User configuration** configures user security settings.
- **Real-Time Clock configuration** configures system date and time.
- **Power Supply configuration** configures the number of power supplies.
- **Reset menu** restores factory default settings.

Each menu option is discussed in the following paragraphs.

Serial Configuration

The Serial screen is used to change the baud rate for the serial port. Figure 32 is an example of the Serial screen.

If the Autobaud feature is being used, it may not be necessary to set the baud rate.
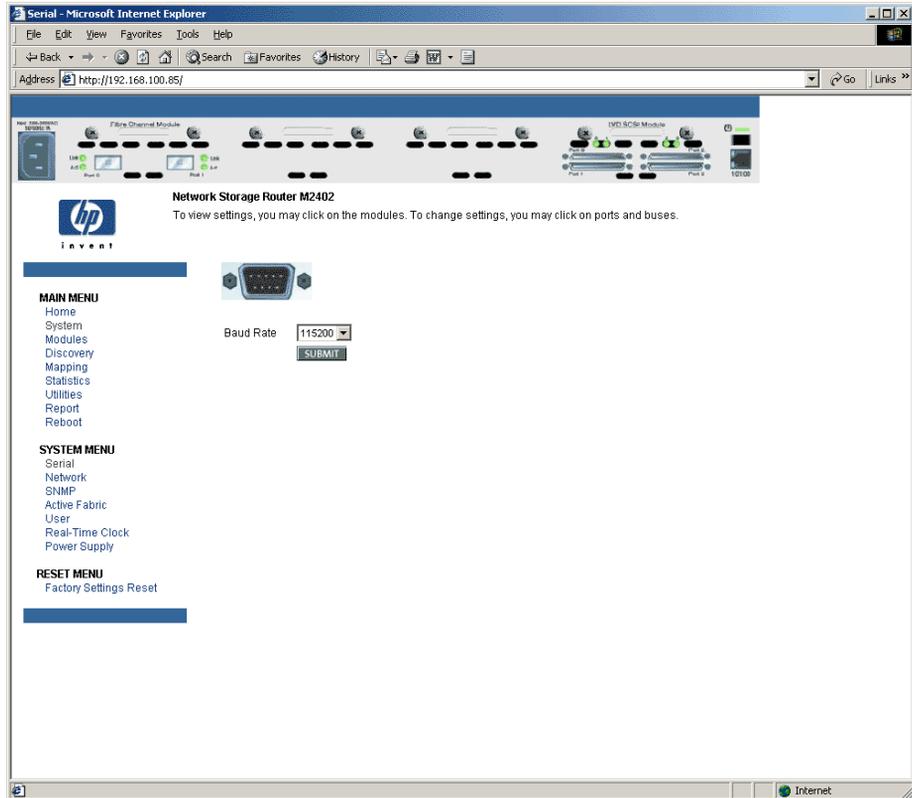
Figure 32: Serial screen

The current baud-rate setting is displayed. HP recommends setting this value to 115200.

Network Configuration

The Network screen is used to enter network settings, including Ethernet settings. Figure 33 is an example of the Network screen.
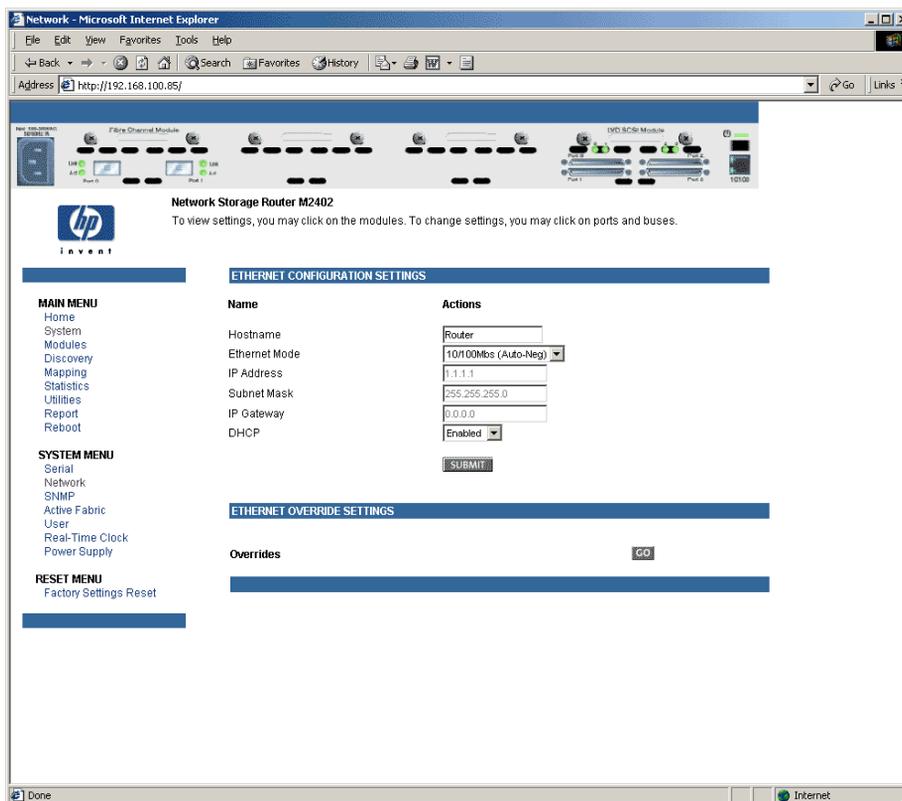
Figure 33: Network screen

The Network screen is divided into two sections:

■ **Ethernet Configuration Settings** sets the hostname and Ethernet configuration settings

■ **Ethernet Override Settings** changes Ethernet override settings.

Ethernet Configuration Settings

Ethernet configuration settings:

- **Hostname** is an alphanumeric entry of one word up to 8 characters in length.
- **Ethernet Mode** can be set to one of the following options:
  — 10Mps Only
  — 100Mps (half duplex) Only
  — 100Mps (full duplex) Only
  — 10/100Mps (Auto-Neg.)
- **IP address** (default: 1.1.1.1) is the IP address of the router.
- **Subnet Mask** (default: 255.255.255.0) is the IP subnet mask for the router.
- **IP Gateway** (default: 0.0.0.0) is the IP address of the gateway for the Ethernet network connected to the router.
- **DHCP** enables or disables support for Dynamic Host Configuration Protocol.

  When DHCP is enabled, the router will request a dynamic IP address from a DHCP server on the Ethernet network. The router must be rebooted before an IP address will be requested from the DHCP server. After the router is rebooted, the HTTP session will have to be restarted. The IP address will be different from the former non-DHCP IP address.

Note: To use the DHCP feature, a DHCP server must be operational on the Ethernet network. If the DHCP feature is used when there is not DHCP server, the standard for DHCP requires the router wait thee minutes for a response from a DHCP server before timing out.

Some DHCP servers allow a lease reservation to be set up for an IP address by providing the server with the Ethernet MAC address. The DHCP server will then always provide the same IP address to the router. This setup can be useful for remote management of the router via Telnet or VM. Because the method of setting up a lease reservation varies, depending on the DHCP server being used contact the Network Administrator for assistance.

Ethernet Override Settings

To change the Ethernet override settings, click the override icon.

The Ethernet Override dialog box is displayed. See Figure 34 for an example of the Ethernet Override dialog box.
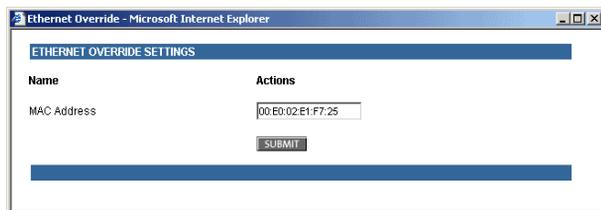
Figure 34: Ethernet Override dialog box

MAC Address is the Ethernet physical address of the router.

⚠️ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

The Ethernet physical address is always assigned by the manufacturer.

SNMP Configuration

The SNMP screen is used to enter SNMP and Trap settings. Figure 35 is an example of the SNMP screen.
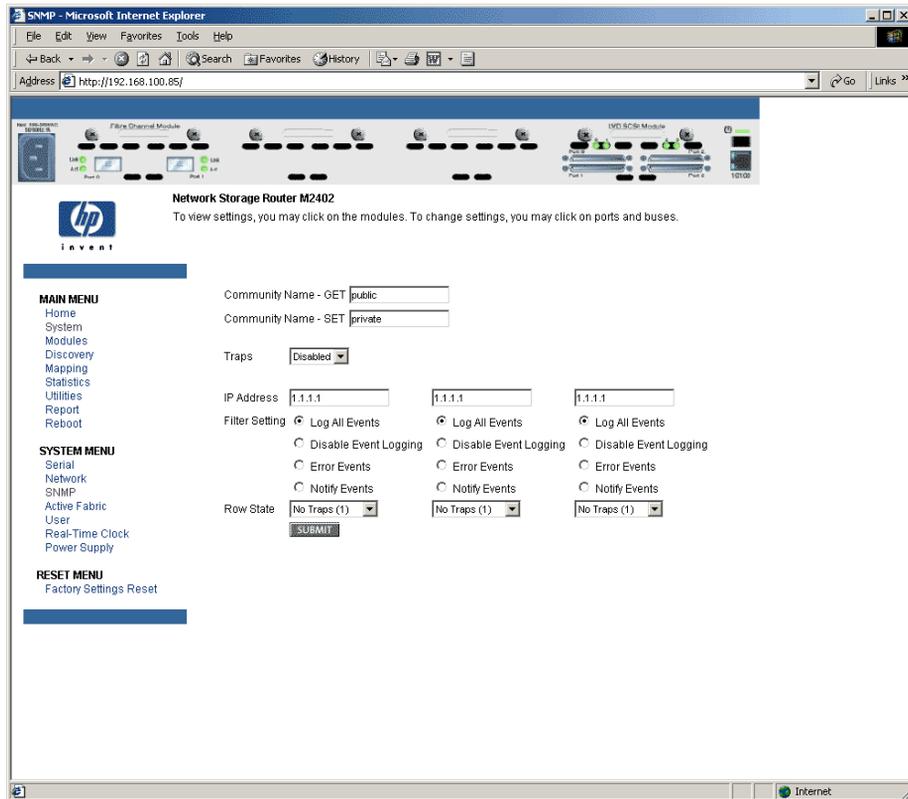
Figure 35: SNMP screen

SNMP settings:

■ **Community Name – GET** (default: public) is checked for each GET request received by the router.

The community name in the SNMP packet must match this community name for the SNMP GET request to be successfully completed. Configure the SNMP manager to have the same GET and SET community names as the router.

- **Community Name – SET** (default: private) is only applicable for the FA MIB 2.2. See Appendix D, "SNMP Management Information Bases," for more information.

- **Traps** enables or disables SNMP traps for manager IP addresses.

    If Traps are enabled, up to three Trap Manager IP addresses can be setup. Trapped events are logged in an event log. Event logging captures up to the last 215 events and then starts overwriting the log.

Note: To ensure accurate event logging, verify the clock and date are correctly set in the Real-Time Clock screen.

- **IP Address** is the address used for sending Trap notifications.

    Typically, this is the IP address of the machine using the network management application or MIB browser.

- **Filter Setting** sets filtering of event notifications (described in Appendix D, "SNMP Management Information Bases").

    Event notifications correspond to the trace setting levels configured in the Trace Settings Configuration menu. The filters that can be set include:

    — Log All Events (Priority 0)

    — Disable Event Logging (Priority 1)

    — Error Events (Priority 6)

    — Notify Events (Priority 4)

- **Row State** is set to an integer in the range of 0 through 3. Options include:

    — **Disabled (0)** clears to the default settings

    — **No Traps (1)** no traps exist

    — **Row Exist (2)** row exists but traps are not sent to target

    — **Send Traps (3)** row exists and traps are sent

Active Fabric Configuration

The Active Fabric screen allows setup of Active Fabric options. Figure 36 is an example of the Active Fabric screen.
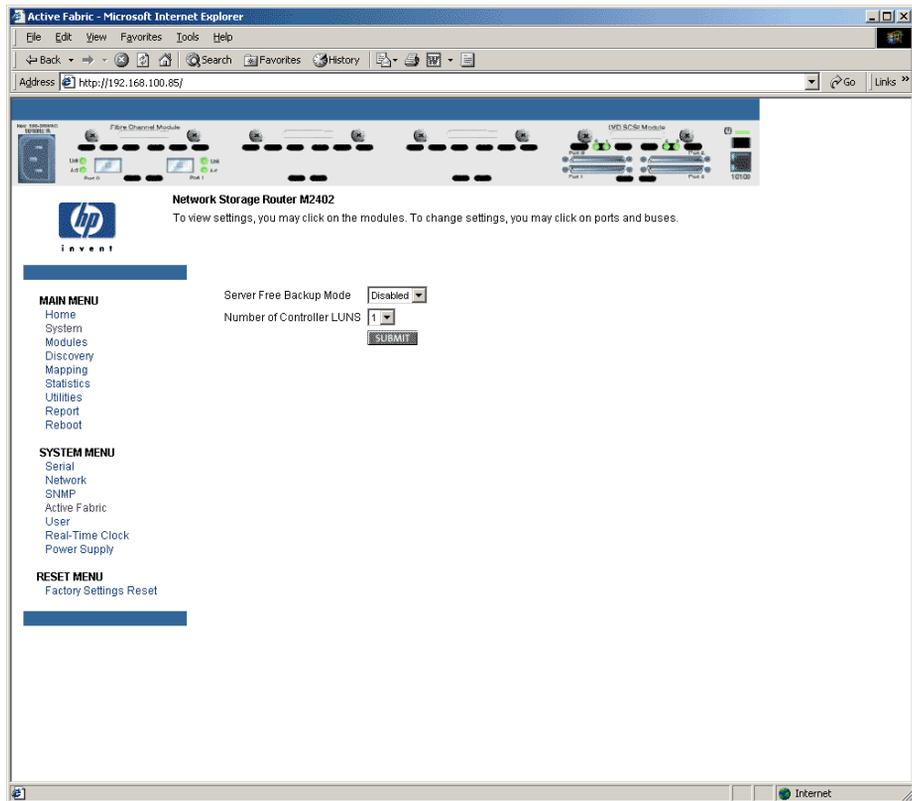
Figure 36: Active Fabric screen

Active Fabric settings:

■ **Server-Free Backup Mode** toggles between **Enabled** and **Disabled**.

When enabled, server-free backup capability is enabled to allow Extended Copy commands.

■ **Number of Controller LUNs** (default: 1) sets the number of controller LUNs reported by the router.

The number must be in the range of 0 through 4.

Note: For Server-Free Backup Mode functionality, if addressing a controller LUN is desired, at least one controller LUN must be enabled and included in a relevant map.

Note: If Server-Free Backup Mode is enabled, Fibre Channel Discovery must be enabled to allow router access to Fibre Channel Targets.

For information on controller LUN and Extended Copy commands, see Appendix B, "Controller LUN Commands."

For general information about server-free backups, see Chapter 1, "Introduction."

User Configuration

The User screen is used to set up router security. Figure 37 is an example of the User screen.
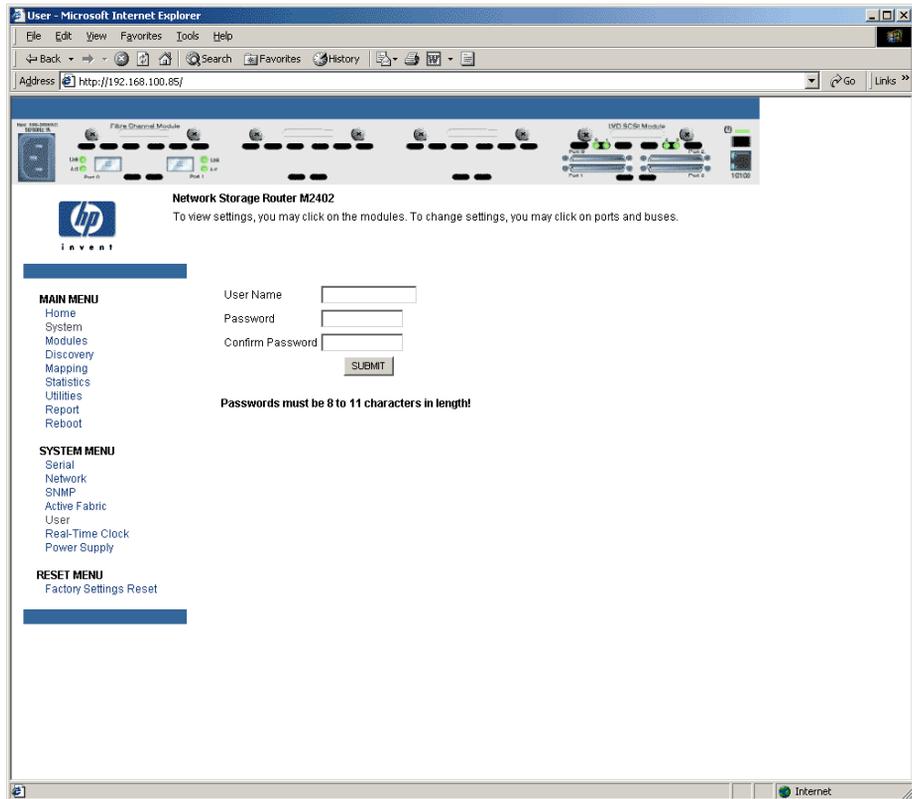
Figure 37: User screen

User settings:

- **User Name** (default: `root`) is any alphanumeric combination.
- **Password** (default: `password`) is any alphanumeric combination.

The user name and password should be unique and kept confidential. HP recommends using a combination of letters and numbers when creating the user name and password.

Note: These security settings affect all user interfaces of the router.

Real-Time Clock Configuration

The Real-Time Clock screen is used to set the system time and date. Figure 38 is an example of the Real-Time Clock screen.
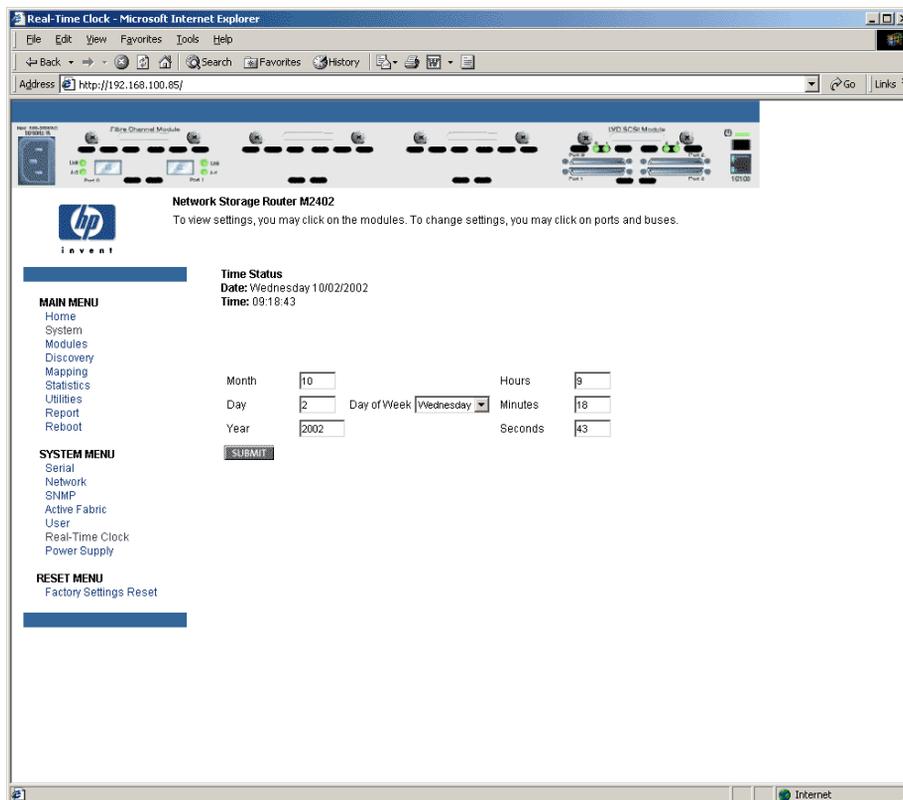
Figure 38: Real-Time Clock screen

Real-Time Clock settings:

- **Date Settings** sets the month, date, and year.

  Use a four-digit number to represent the year.

- **Day of Week** sets the day of week.

- **Time Settings** sets the hours, minutes, and seconds.

  This is a 24-hour clock.

Power Supply Configuration

The Power Supply screen is used to indicate the number of power supplies installed in the router.

The router is shipped with one installed power supply, but a redundant power supply can be purchased.

If two power supplies are installed in the router, use this screen to indicate the change.

Figure 39 is an example of the Power Supply screen.

When set to **1,** the router suppresses event notifications of the second power supply.

Note: If set to '1' in a two-power-supply configuration, the router cannot issue an event notification if one of the power supplies fails.

Note: If there are two power supplies, and one of the two fails, this option does not inhibit the router from using the second power supply.
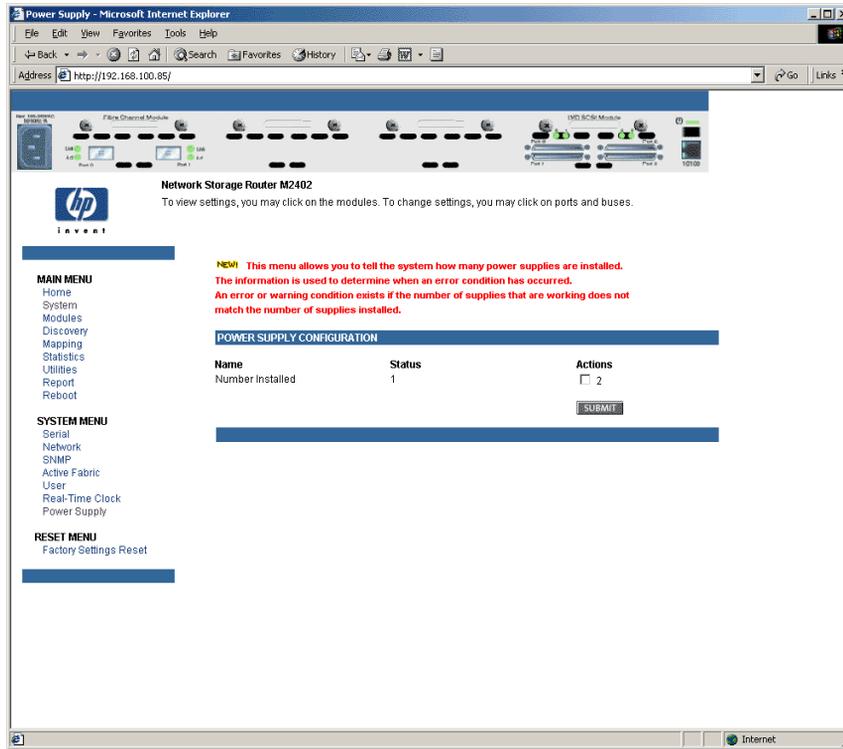
Figure 39: Power supply screen

Reset Menu

The Reset Menu is used to reset the router to factory default settings. Figure 40 is an example of the Reset Menu.
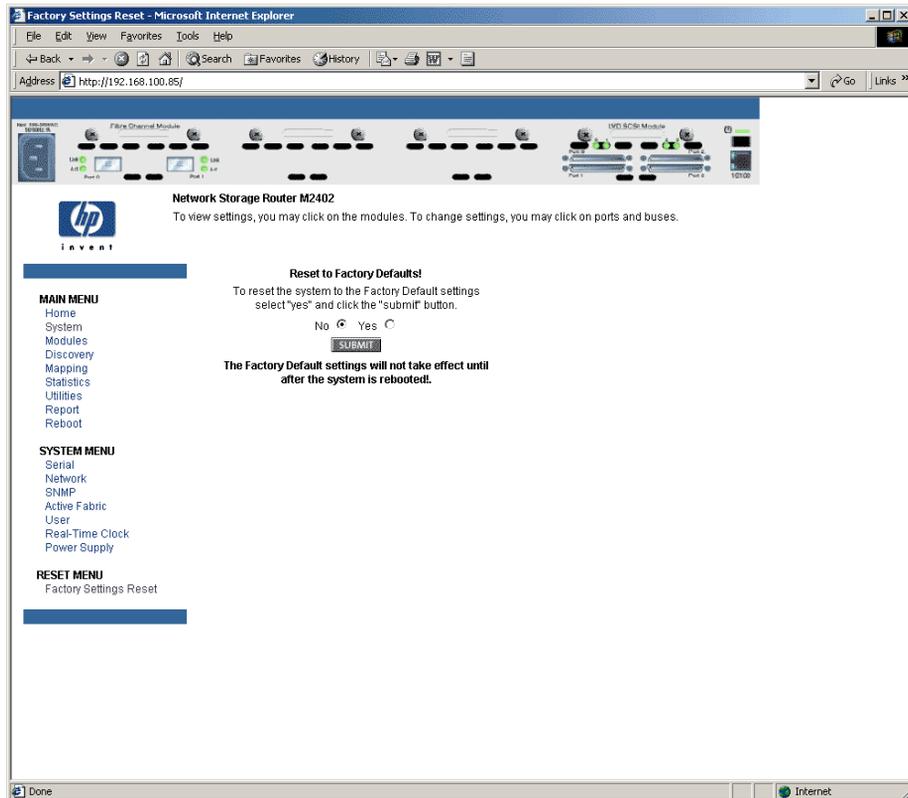
Figure 40: Reset to Factory Default screen

Current router activities will be disrupted while the unit resets the configuration to the factory defaults and saves those options to FLASH memory.

Note: Resetting to factory defaults through VM will not affect Ethernet connectivity. User-configured values for the IP address and gateway will be retained.

Modules Menu

Accessed from the Main Menu, the Modules Menu is used to view and modify configuration settings of Fibre Channel and SCSI modules.

The initial screen display of the Modules Menu includes summary information about each Fibre Channel and SCSI module in the router.

See Figure 41 for an example of the initial Modules Menu.
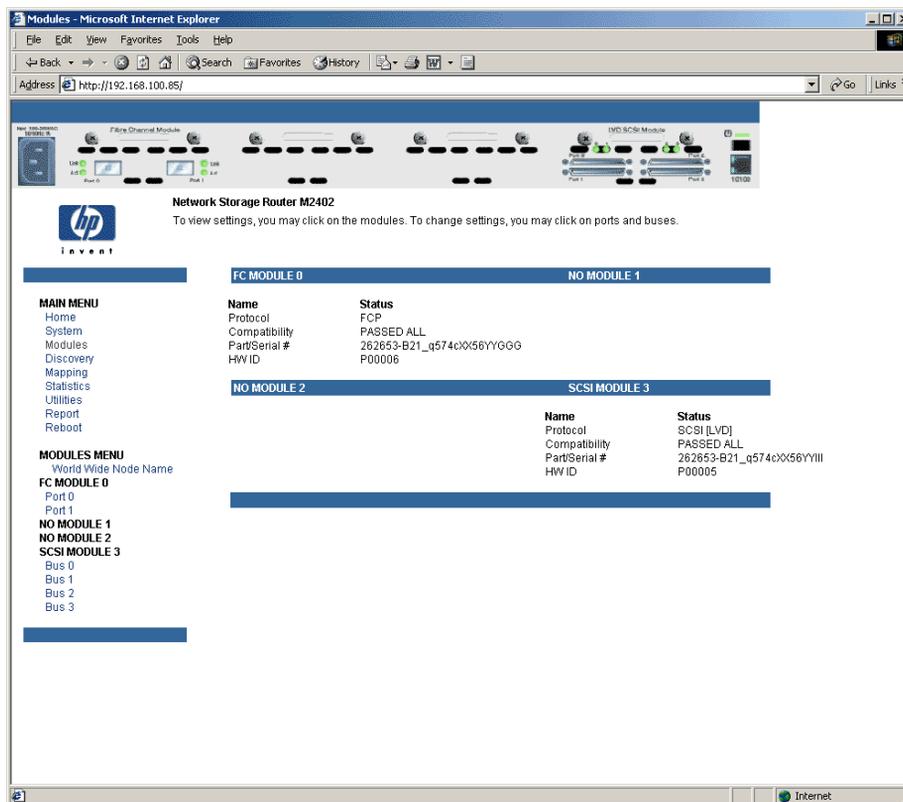
Figure 41: Modules menu

Note: To view or change configuration settings of a specific module, select one of the options from the menu bar on the left side of the screen or select a module or port from the router image at the top of the screen. To make changes, modify the setting and then click Submit.

Modules Menu tasks:

■   **World Wide Node Name configuration** changes World Wide Node Name.

■   **Fibre Channel Module configuration** changes Fibre Channel module settings.

■   **SCSI Module configuration** changes SCSI module settings.

Each Modules Menu option is discussed in the following sub-sections.

World Wide Node Name Configuration

The World Wide Node (WWN) Name screen is used to change the WWN Name settings for the router.

Figure 42 is an example of the World Wide Node Name screen.

These WWN settings are not normally changed.

⚠ **Caution:** Changing the WWN Name could result in duplicate names on a single Storage Area Network (SAN). HP recommends using the default values for World Wide Names.

Note: For Controller LUN commands to be operational, WWN naming schemes MUST be compliant with IEEE Fibre Channel Format 1, where the left-most hexadecimal character (the NAA field) of the WWN is '1'. Further, the sixth hexadecimal value from the right must be a value of '0' or '1'.

Note: If the configuration settings are reset to the factory default, these customized WWN settings will be overwritten.
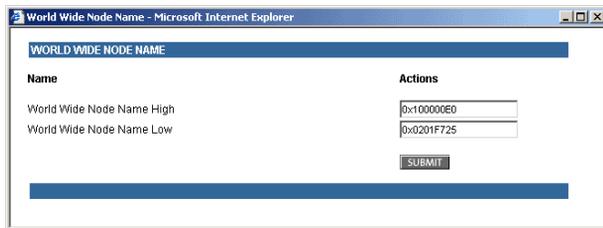
Figure 42: World Wide Node Name screen

Fibre Channel Module Configuration

When a Fibre Channel module is selected in Modules Menu, the Fibre Channel Module Port Configuration Settings screen for port 0 is displayed.

The Fibre Channel Module Port Configuration Settings screen is used to view and modify Fibre Channel module configuration settings. Because port 0 is automatically displayed, to change settings for a different Fibre Channel port, select the desired port on the Fibre Channel module on the menu bar or on the router image.

Figure 43 is an illustration of the Fibre Channel module on the router image.

Figure 43: Fibre Channel module image

The following screen is displayed to enter configuration changes. Figure 44 is an example of the FC Module Port Configuration Settings screen.
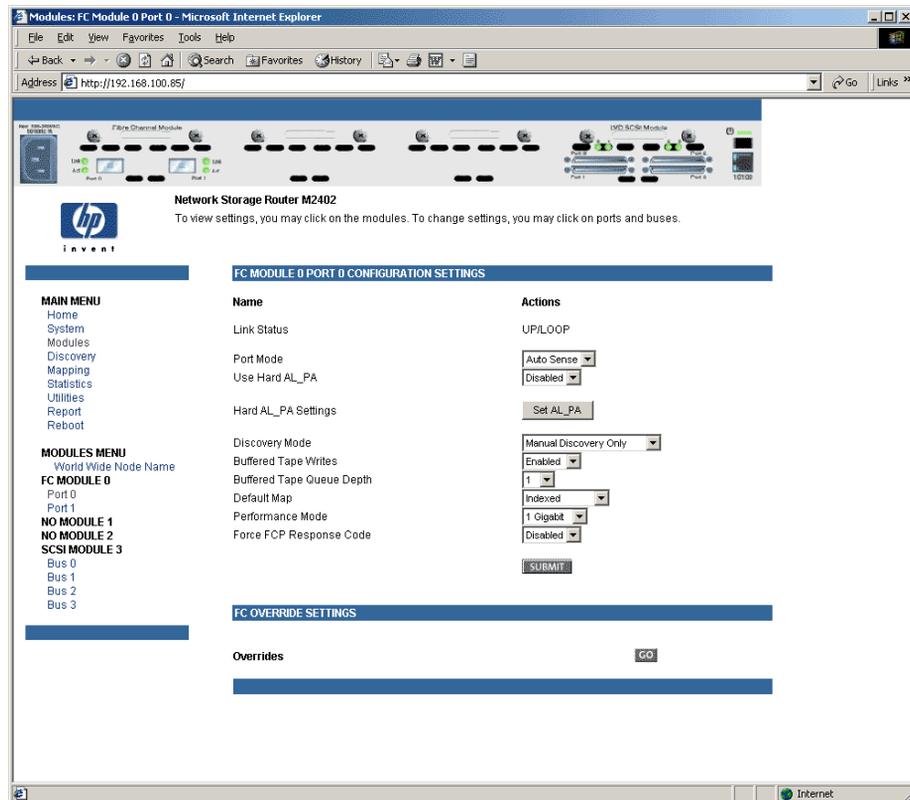
Figure 44: Fibre Channel module port configuration settings screen

Fibre Channel module port settings:

- **Link Status** indicates the port link status.

- **Port Mode** (default: N_Port) sets the port mode.

  Port Mode settings:

  — **Auto Sense** In this mode, the Fibre Channel port tries to negotiate as a loop. If it is not successful, then the Fibre Channel port negotiates as a fabric. If the port comes up as a loop, it then determines whether it is on a private or public loop.

  — **N_Port** (default) This mode allows the router to bypass the loop negotiation and come up as a fabric only. If the router is on a loop, and N_Port mode is selected, an error in communication may occur.

■ **Use Hard AL_PA** enables or disables Hard AL_PA usage.

■ **Hard AL_PA Settings** When Hard AL_PA usage is enabled, select **Set AL_PA Settings** to display the AL_PA Lookup Table.

Use the table to find the node number. This unique one-byte valid value (derived from an Arbitrated Loop Topology defined in ANSI specification FC_AL version 4.5) is used for the Fibre Channel configuration.

Figure 45 is an illustration of the AL_PA table.

Figure 45: AL_PA lookup table

■ **Discovery Mode** (default: auto discovery on reboot events) determines how the router will discover new Fibre Channel devices.

Discovery Mode settings:

— **Auto Discovery on Reboot Events** (default) allows the router to automatically discover all Fibre Channel devices when rebooted or when link-up events occur, such as connecting cables or rebooting network hubs.

— Both the ports and the devices behind the ports are discovered on all subsequent link-up events.

— **Auto Discovery on Link Up Events** allows the router to automatically discover all Fibre Channel devices when rebooted or when link-up events occur, such as connecting cables or rebooting network hubs.

— Both the ports and the devices behind the ports are discovered for the first link-up event. Subsequent link-up events will only discover the ports and not the devices behind the ports.

— **Manual Discovery Only** sets discovery of new devices to only occur after the user selects the **Discovery** option from the Main Menu or when a Registered State Change Notification (RSCN) is received from a fabric.

Note: SCSI devices attached to a Fibre Channel must be mapped as sequential Fibre Channel LUNs starting at LUN number 00. Skipping LUN numbers is not recommended when mapping Fibre Channel LUNs because Fibre Channel Discovery stops the discovery process whenever an empty LUN position is found.

■ **Buffered Tape Writes** (default: enabled) enables or disables the Buffered Tape Writes option.

⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

When enabled, to enhance performance, Buffered Tape Writes return status on consecutive write commands prior to the tape device receiving data.

■ **Buffered Tape Queue Depth** sets the Buffered Tape Queue Depth.

Select a setting of 0 through 10 from the drop-down list.

■ **Default Map** (default: indexed) sets the current mapping mode for the selected port.

The current map can be set to:

— Indexed (default)

— Auto-assigned contains all the SCSI devices that are attached to the router.

— SCC

For more information about mapping modes, see Appendix C, "Addressing Methods and Table Structures."

For information on changing map settings, see "Mapping Menu," later in this chapter.

■ **Performance Mode** (default: 1 Gb/s) toggles between 1 Gb/s and 2 Gb/s.

■ **Force FCP Response Code** toggles between **Off** and **On** for support of HP-specific HBA #223180-B21 and #120186-001.

Override Settings enhance interoperability with some storage devices that require special consideration during setup of the router configuration menus.

> **Caution:** If these configuration settings are incorrectly set, processing difficulties may occur. Before changing these settings, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

Figure 46 is an example of an Override Settings dialog box.
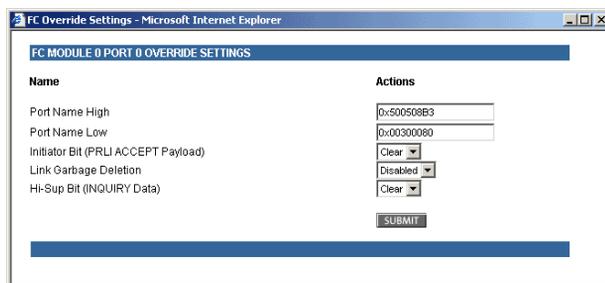
Figure 46: Override Settings dialog box

Override Settings dialog box settings:

■ **Port Name High** sets a new value for the World Wide Port Name High.

⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

■ **Port Name Low** sets a new value for the World Wide Port Name Low.

⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

Note: If set incorrectly and the router is plugged into a Loop or Fabric, the unit may receive Framing errors due to the incorrect Fibre Channel link speed.

■ **Initiator Bit** toggles between **Set** and **Clear**.

When using the router in a router-to-router configuration, this option should be configured to **Set**. A router-to-router configuration is a type of configuration where one router appears as a target to another initiator router.

■ **Link Garbage Deletion** toggles between **Enabled** and **Disabled**.

■ **Hi-Sup Bit** toggles between **Set** and **Clear**.

SCSI Module Configuration

When a SCSI module is selected in the Modules Menu, the SCSI Module Bus Configuration Settings screen is displayed. Figure 48 is an illustration of the SCSI Module Bus Configuration Settings screen.

The SCSI Module Bus Configuration Settings screen is used to view and modify SCSI module settings. The information for SCSI bus 0 is automatically displayed.

To change settings for a different SCSI bus, select the desired bus of the SCSI module on the menu bar or on the router image.

Figure 47 is an illustration of the SCSI module on the router image.
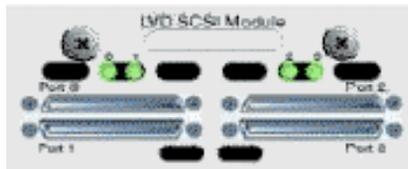
Figure 47: SCSI module image

After a bus on the SCSI module is selected, the SCSI Module Bus Configuration Settings screen is displayed for that bus. See Figure 48.
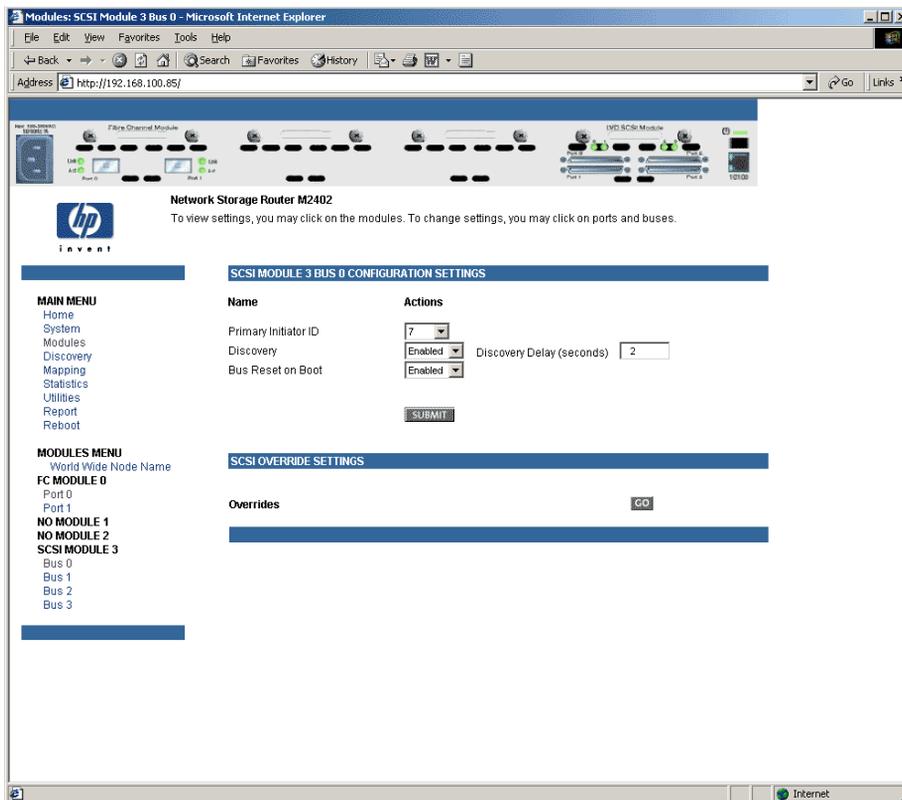
Figure 48: SCSI Module Bus Configuration Settings screen

SCSI module bus settings:

- **Primary Initiator ID** (default: 7) must be a unique ID.
- **Alternate Initiator ID** (default: none) will be used if the primary ID is taken. Must be a unique ID.

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

■ **Target ID(s)** adds or removes Target IDs.

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

Note: Target IDs must be set up prior to mapping devices on the SCSI bus.

Note: Do not enable Target IDs unless there is a SCSI initiator on the bus that wants to use Fibre Channel devices. This type of configuration is known as a Target Mode configuration.

■ **Discovery** toggles between **Enabled** and **Disabled**.

■ **Discovery Delay** is the wait time after a power-up or reboot before discovering SCSI devices.

Note: HP recommends setting the value to at least 2 seconds to ensure all SCSI devices complete their individual power-ups.

■ **Bus Reset on Boot** toggles between **Enabled** and **Disabled**.

When enabled, the router will automatically reset SCSI buses during a power up or reboot of the router.

■ **Internal Termination** toggles between **Enabled** and **Disabled**.

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

When enabled, allows internal termination of the selected SCSI bus. When disabled, the SCSI Bus, not the router handles SCSI termination.

■ **Buffered Tape Writes** (default: Enabled) toggles between **Enabled** and **Disabled**.

When enabled, Buffered Tape Writes enhance system performance. Buffered Tape Writes return status on consecutive write commands prior to the tape device receiving data.

■ **Default Map** (default: auto-assigned) sets the current mapping mode for the selected bus.

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

The current map can be set to:

— Indexed

— Auto-assigned (default) contains all the devices attached to the router.

— SCC

For more information about mapping modes, see Appendix C, "Addressing Methods and Table Structures."

For information on changing map entries, see "Mapping Menu" later in this chapter.

■ **Override Settings**: To override the settings of a SCSI target, select a Target ID icon with the appropriate Target ID number.

After a specific Target is selected, the SCSI Override sub-screen is displayed and is used to enter the Override settings. See Figure 49 for an illustration of the SCSI Override screen.

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.
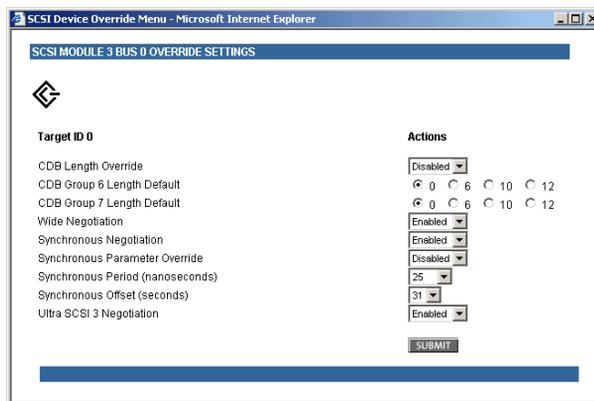
Figure 49: SCSI Device Override screen

- ■ SCSI bus override settings:

    — **CDB Length Override** enables or disables the override of default CDB lengths.

    — **CDB Group 6 Length Default** (default: 0) can be set to 0, 6, 10, or 12.

    — **CDB Group 7 Length Default** (default: 0) can be set to 0, 6, 10, or 12.

    — **Wide Negotiation** enables or disables negotiation on a wide SCSI bus.

    — **Synchronous Negotiation** enables or disables synchronous negotiation on the SCSI bus.

    — **Synchronous Parameter Override** enables or disables parameters for synchronous negotiation.

    — **Synchronous Period** (default: 40) sets the maximum number of seconds allowed for negotiation.

    — **Synchronous Offset** (default: 16) sets the maximum variation in transfer rate that can be negotiated in megabytes per seconds (MB/s).

    — **Ultra SCSI-3 Negotiation** enables or disables Ultra SCSI-3 support for the selected Target ID.

    When enabled, Ultra SCSI-3 Negotiation helps solve certain compatibility issues in mixed vendor environments where there may be a device that cannot handle automatic negotiation of the bus speed or where there is a device that negotiates to use Ultra SCSI-3 but cannot handle the speed.

Discovery Menu

Accessed from the Main Menu, the Discovery Menu is used to view Target devices and discover new Target devices.

Figure 50 is an example of the Discovery page.

Figure 50: Discovery page

In the Discovery Menu, select a specific Fibre Channel Port or SCSI bus from the Menu Bar or the router image and then click **Go**.

Mapping Menu

Accessed from the Main Menu, the Mapping Menu is used to view and modify host and map information for a Fibre Channel port or SCSI bus. Maps and hosts may be added, edited, or deleted.

The initial screen display lists all available hosts and the assigned map for the selected Fibre Channel port or SCSI bus.

Figure 51 is an example of the initial Mapping screen.
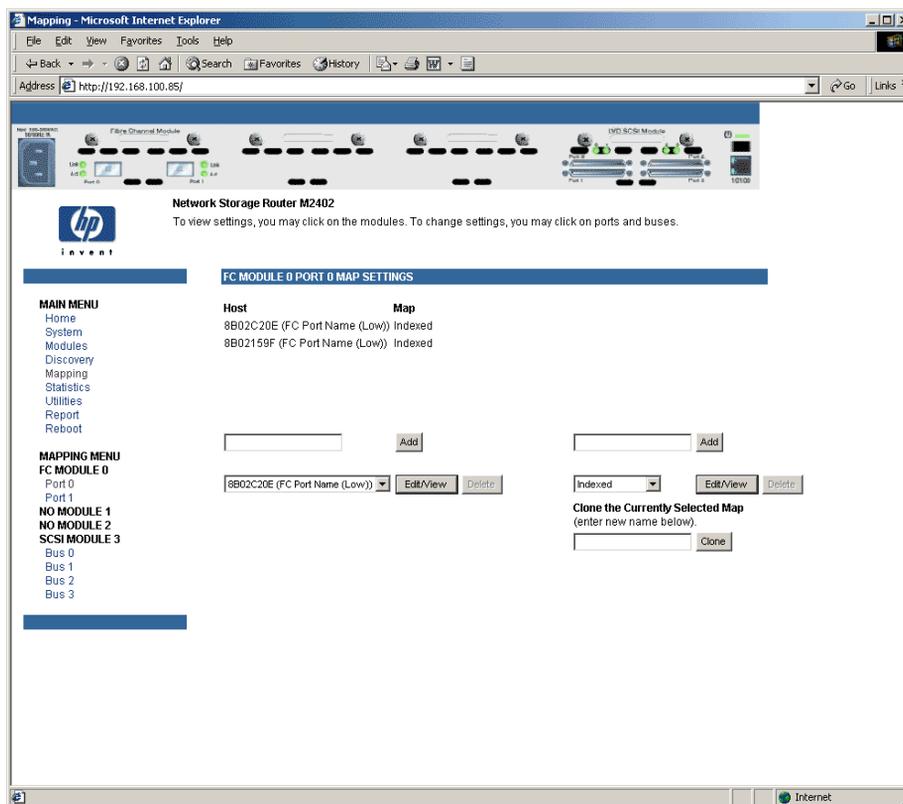
Figure 51: Mapping screen

To view or change map settings of a specific module:

1. Select one of the module and port/bus from the menu bar on the left side of the screen or from the router image at the top of the screen.

2. After a Fibre Channel port or SCSI bus has been selected, specific mapping information is displayed, including the name of the port, the selected host, and the assigned map.

3. To make changes to the configuration, enter the new value and then click **Submit**.

Because many mapping configuration settings are common to Fibre Channel and SCSI maps, this section is subdivided as follows:

- Fibre Channel and SCSI Common Mapping Tasks
- Fibre Channel Mapping Tasks
- SCSI Mapping Tasks

Fibre Channel and SCSI Common Mapping Tasks

The following action options are available for Fibre Channel and SCSI maps:

- **Add Host** adds a new host.

  To add an undefined host, type the hostname in the **Add Host** field and then click **Add**.

- **Add Map** adds a new map.

  To add an undefined map, type the name of the map in the **Add Map** field and then click **Add**.

- **Select Host** adds a known host.

  To select a previously set up host, expand the **Select Host** drop-down box and select the host from the list.

- **Select Map** adds a known map.

  To select a previously set up map, expand the **Select Map** drop-down box and select the map from this list.

- **Delete Host** deletes the current host.

Note: 'Built at runtime' hosts cannot be deleted.

■ **Delete Map** deletes the current map.

Note: 'Indexed', 'Auto Assigned', and 'SCC' maps cannot be deleted or renamed.

■ **Edit/View Host** view or change host information.

Viewing and changing Host information is discussed in the following paragraphs.

■ **Edit/View Map** view or change map information.

Viewing and changing Map information is discussed in the following paragraphs.

■ **Clone Map** makes a copy of the Current map.

Cloning makes it easier to setup new maps with similar information to previously created maps. The new map must have a unique map ID and name.

Note: SCC and Auto-Assigned maps cannot be cloned.

Fibre Channel Mapping Tasks

Configuration tasks for Fibre Channel mapping include:

■ Viewing and Changing Fibre Channel Host Information

■ Viewing and Changing Fibre Channel Map Information

Each task is discussed in the following paragraphs.

Viewing and Changing Fibre Channel Host Information

To view or change current host information:

1. In the Mapping Menu screen, select the desired Fibre Channel module and port.

2. Click **Edit/View** in the Host section of the screen.

   The Fibre Channel Host Name dialog box is displayed. Current host information is shown at the top of the dialog box.

3. Enter the new settings and then click **Modify**.

Figure 52 is an example of the Fibre Channel Host Name dialog box.

Figure 52: Fibre Channel Host Name dialog box

Fibre Channel Host Name settings:

- **Host Name**
- **Host ID** (hexadecimal)
- **Port WWN Hi** (hexadecimal)
- **Port WWN Lo** (hexadecimal)
- **Node WWN Hi** (hexadecimal)
- **Node WWN Lo** (hexadecimal)
- **Map Name**

Viewing and Changing Fibre Channel Map Information

To view or change current Fibre Channel map host information:

1. In the Mapping Menu screen, select the desired Fibre Channel module and port.

2. Click **Edit/View** in the Map section of the screen.

   The Fibre Channel Map dialog box is displayed. Current map information is shown at the top of the dialog box.

3. Enter the new settings and then click the appropriate action button.

Figure 53 is an example of the Fibre Channel Map dialog box.

Figure 53: Fibre Channel Map dialog box

Fibre Channel Map settings:

- **Clear Map** clears all entries from the current map.

- **Remove Gaps** removes any incremental gaps in the sequence of LUN listed in the table.

  When the system removes gaps from the table, the LUN are renumbered in sequential order, starting with LUN 0.

- **Fill Map** fills in the current map.

  To use the Fill Map option, expand the Fill Map Priority drop-down box, select the fill option, and then click **Fill Map**.

  When the map is filled, the display will show the current devices.

- **Delete** deletes map entries.

  To delete map entries, expand the Delete Map Item LUN drop-down box, select the LUN, and then click **Delete**.

  To delete a range of LUNs, select the beginning LUN to delete from the 'from' drop-down box and select the last LUN to delete from the 'to' drop-down box.

- **Discovered Device Entry** adds a discovered device to the map.

  To add a discovered device to the map, use the drop-down boxes to enter the settings, and then click **Create Entry** in the Discovered Device Entry section of the screen.

- **Manual Device Entry** create a map entry for a device that is not yet discovered or installed.

To add a new device to the map, use the drop-down boxes to enter the settings, and then click **Create Entry** in the Manual Device Entry section of the screen.

SCSI Mapping Tasks

Configuration tasks for SCSI mapping include:

■ Viewing and Changing SCSI Host Information

■ Viewing and Changing SCSI Map Information

Each task is discussed in the following paragraphs.

Viewing and Changing SCSI Host Information

To view or change current SCSI host information:

1. In the Mapping Menu screen, select the desired SCSI module and bus.

2. Click **Edit/View** in the Host section of the screen.

    The SCSI Host Name dialog box is displayed. Current host information is shown at the top of the dialog box.

3. Enter the new settings and then click **Modify**.

Figure 54 is an example of the SCSI Host Name configuration dialog box.
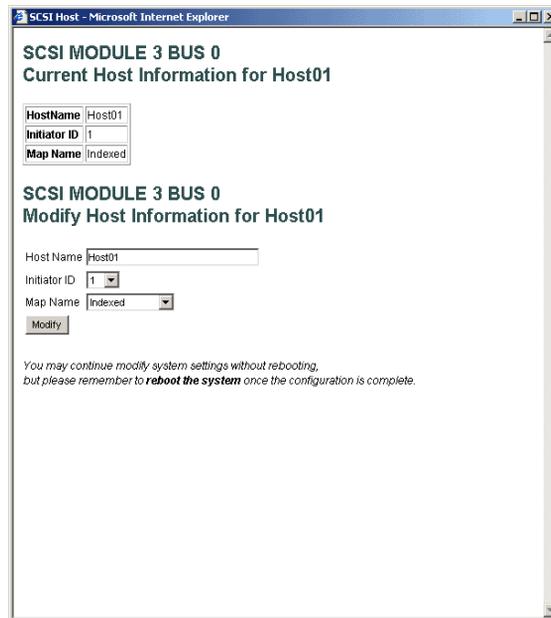
Figure 54: SCSI Host Name dialog box

SCSI Host Name settings:

- Host Name
- Initiator ID
- Map Name

Viewing and Changing SCSI Map Information

To view or change current SCSI map host information:

1. In the Mapping Menu screen, select the desired SCSI module and bus.

2. Click **Edit/View** in the Map section of the screen.

   The SCSI Map dialog box is displayed. Current map information is shown at the top of the dialog box.

3. Enter the new settings and then click the appropriate action button.

Figure 55 is an example of the SCSI Map dialog box.
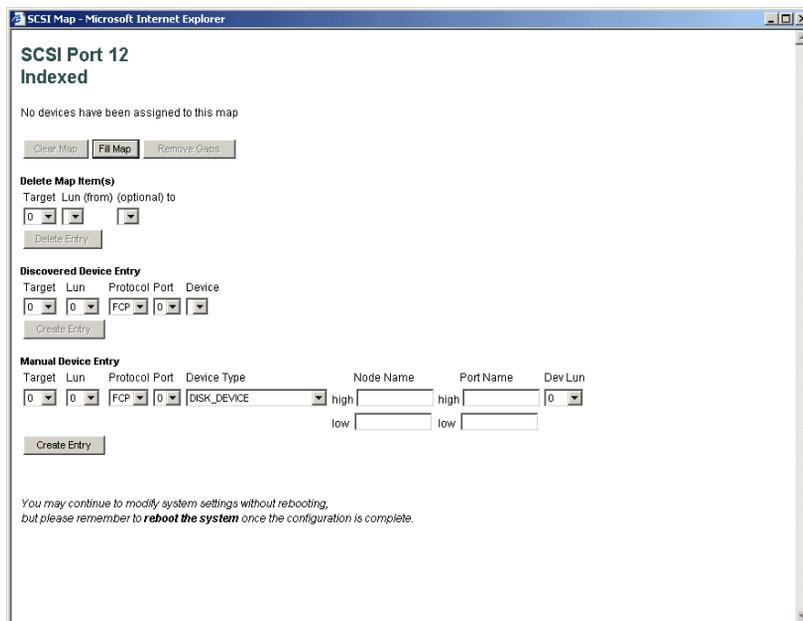
Figure 55: SCSI Map dialog box

Note: To map Fibre Channel devices to any SCSI initiator on the selected bus, a Target ID must be enabled from the SCSI Bus Configuration Menu. A Target ID should only be added if there is a SCSI initiator that needs to address Fibre Channel devices. Each Target ID can be used to store up to 32 Fibre Channel devices.

Note: Auto-Assigned and SCC maps cannot be modified, cleared, filled, or have entries deleted.

Note: Map settings are saved to memory when any button within the page is selected.

SCSI Map settings:

■ **Clear Map** clears all entries from the current map.

■ **Fill Map** fills in the current map.

When the map is filled, the display will show the current devices.

■ **Remove Gaps** removes any incremental gaps in the sequence of LUN listed in the table.

When the system removes gaps from the table, the LUN are renumbered in sequential order, starting with LUN 0.

Note: Some operating systems require gaps be removed in the mapping table to detect all devices.

■ **Delete** deletes map entries.

To delete a range of LUNs, select the beginning LUN to delete from the 'from' drop-down box and select the last LUN to delete from the 'to' drop-down box.

■ **Discovered Device Entry** adds a discovered device to the map.

To add a discovered device to the map, use the drop-down boxes to enter the settings, and then click **Create Entry** in the Discovered Device Entry section of the screen.

■ **Manual Device Entry** creates a map entry for a device that is not yet discovered or installed.

To add a new device to the map, use the drop-down boxes to enter the settings, and then click **Create Entry** in the Manual Device Entry section of the screen.

Note: SCSI maps can be filled or devices can be added to them only when at least one SCSI Target ID has been enabled in the SCSI bus configuration menu.

Statistics Menu

Accessed from the Main Menu, the Statistics Menu is used to display Fibre Channel port and SCSI bus information. Figure 56 is an example of the Statistics Menu.
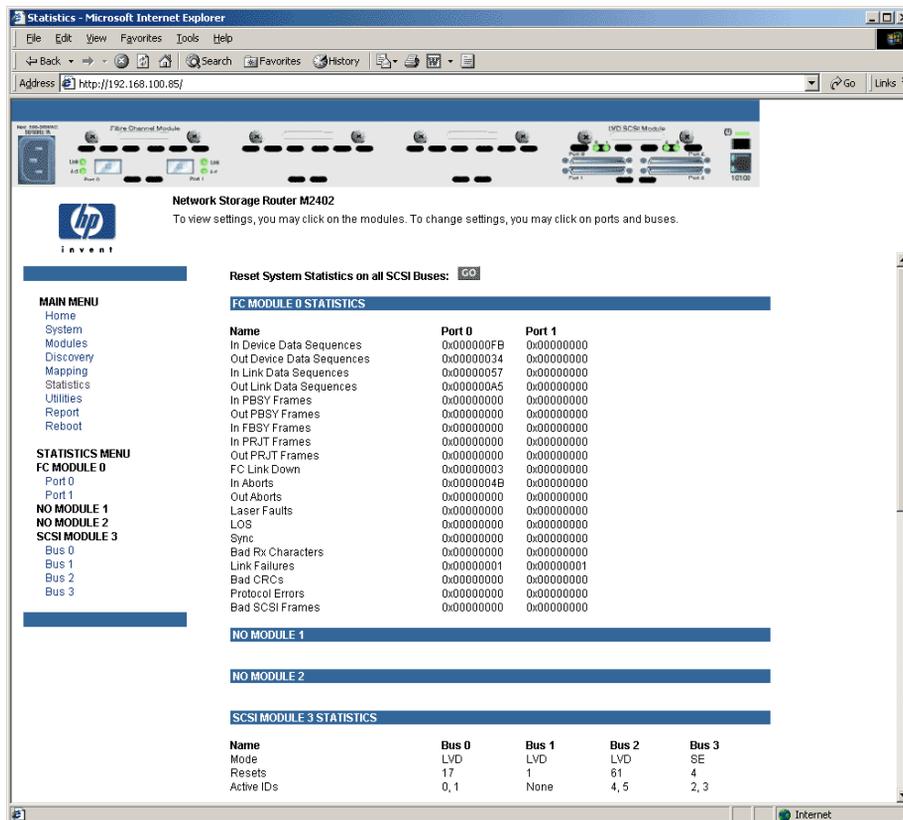
Figure 56: Statistics Menu

To view information for a specific module port/bus, click the component on menu bar or the router image.

To reset the statistics, click **Go.**

Utilities Menu

Accessed from the Main Menu, the Utilities Menu is used to view and configure utility options.

Figure 57 is an example of the Utilities Menu.

Figure 57: Utilities menu

Utility Menu tasks:

- **Beacon configuration** enables the Beacon mode.
- **FTP Utility access** opens an FTP session.
- **Trace Settings configuration** configures trace settings.
- **Current Traces display** shows current trace information.
- **Previous Traces display** shows previous trace information.
- **Last Assert Traces display** shows last assert trace information.
- **Clear Current Traces** clears current trace information.
- **Clear Assert Traces** clears assert trace information.
- **Event Log Settings** configures Event Log settings.
- **Event Log display** shows the Event Log.
- **Clear Event Log** clears the Event Log.

Each Utility Menu option is discussed in the following sections.

Beacon Mode Configuration

The Beacon Configuration screen is used to enable and disable the router Beacon mode. When enabled, the Power LED located on the back-side of the router will continuously blink, alternating between amber and green.

To enable the Beacon settings, select the **ON** checkbox and then click **Submit**.

Figure 58 is an example of the Beacon settings screen.
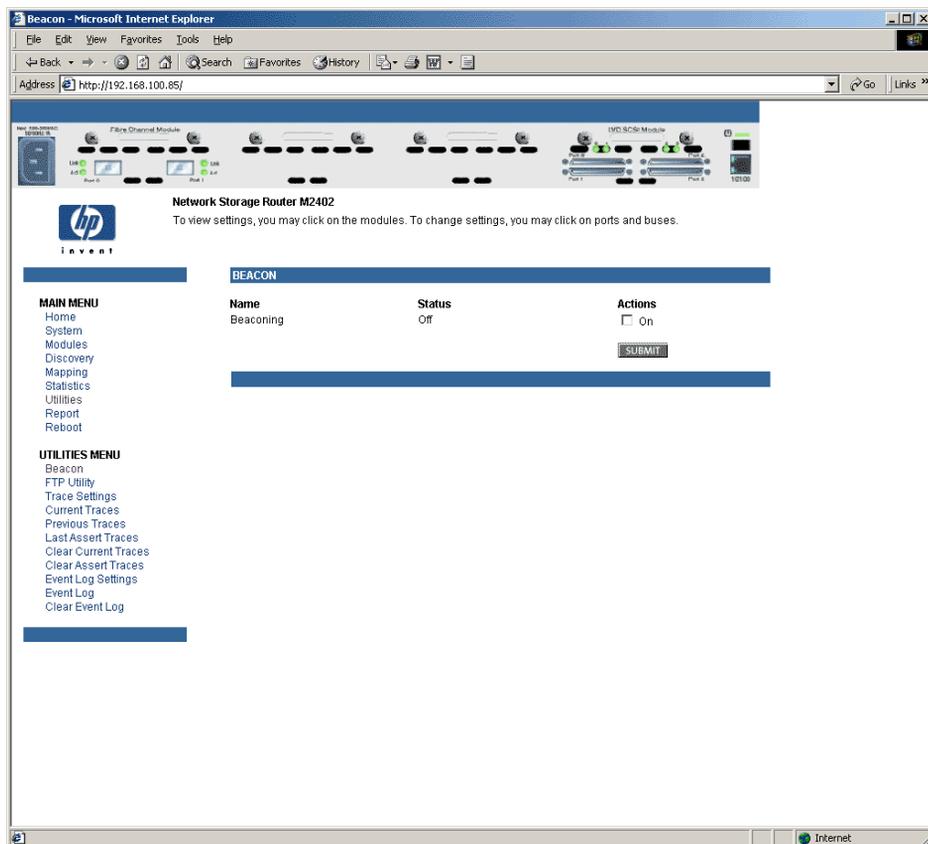
Figure 58: Beacon configuration screen

Note: When the router is rebooted, beaconing is automatically disabled.

FTP Utility Access

The FTP Utility screen is used to open an FTP session. Figure 59 is an example of the FTP Utility screen.
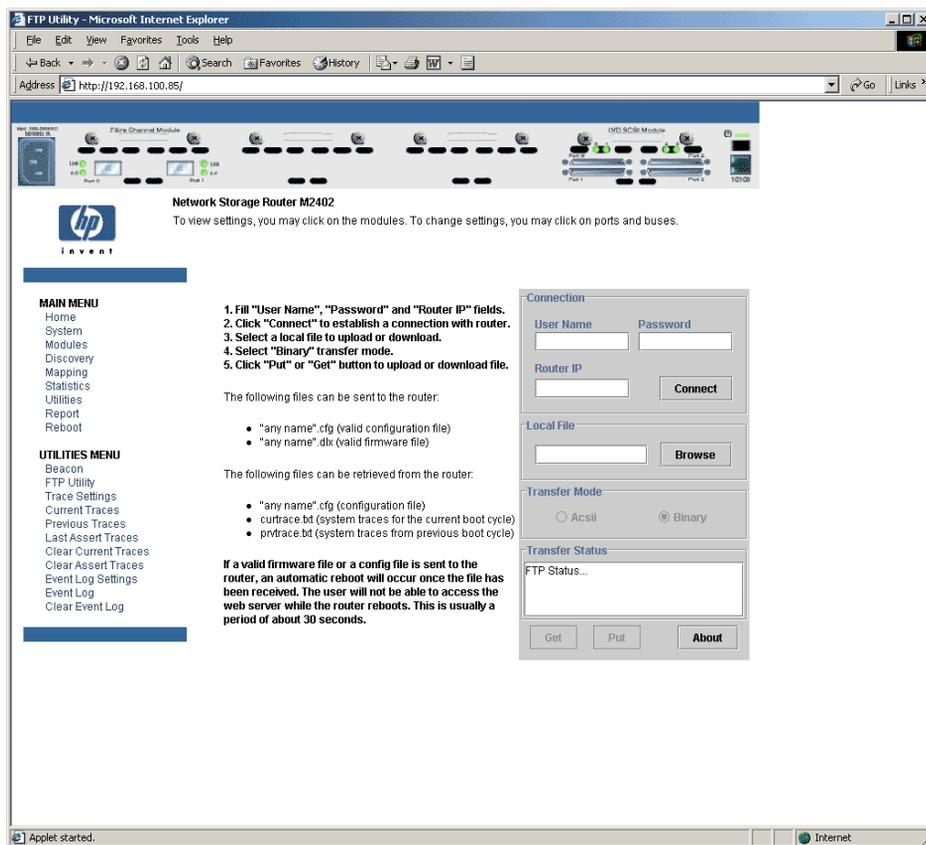
Figure 59: FTP Utility screen

The FTP Utility requires the use of a JAVA applet and prompts for permission to install the applet, if needed. If the prompt is displayed, follow the onscreen instructions to complete the installation. The FTP Utility then prompts for permission to run the applet.

> **Note:** Internet access is required to verify the signature for the HP FTP applet and to download the JAVA applet plug-in for your browser.

To open an FTP session:

1. Enter the User Name, Password, and the IP address of the router.

2. Click **Connect**.

3. Select the local file to upload or download. If necessary, click **Browse** to scroll through a file list.

   The following file types can be uploaded to the router:

   - Configuration (*.cfg*)
   - Firmware (*.dlx*)

   The following file types can be downloaded from the router:

   - Configuration (*.cfg*)
   - Traces for the current boot cycle (*curtrace.txt*)
   - Traces from the previous boot cycle (*prvtrace.txt*)

4. Click **Binary** Transfer mode.

5. To download a file, click **Get**.

6. To upload a file, click **Put**.

> **Note:** If a valid firmware or configuration file is uploaded to the router, an automatic reboot will occur once the file has been received. The router cannot be accessed from the Visual Manager UI during the time that the reboot is in process, which is approximately 30 seconds.

Trace Settings Configuration

The Trace Settings screen is used to configure the trace settings. Figure 60 is an example of the Trace Settings screen.
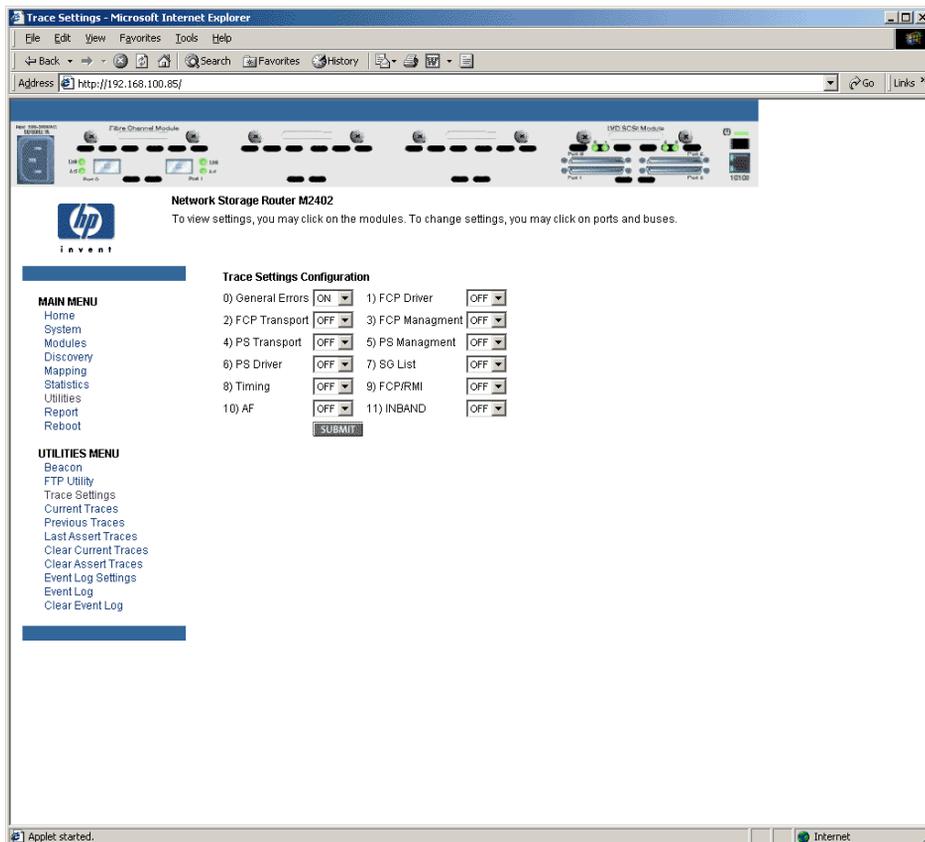
Figure 60: Trace Settings screen

Current Trace settings are displayed.

To change the settings, use the drop-down boxes and select the desired setting. After all changes are completed, click **Submit**.

Table 2 is a brief description list of the trace settings.

Table 2: Trace Settings

General Errors	Displays the most serious errors and exception conditions.
FCP Transport	Fibre Channel Protocol transport functionality will be monitored and recorded.
PS Transport	Parallel SCSI transport functionality will be monitored and recorded.
PS Driver	Parallel SCSI driver functionality will be monitored and recorded.
Timing	Timer functions will be monitored and recorded.
AF	Active Fabric firmware will be monitored and recorded.
FCP Driver	Fibre Channel Protocol driver functionality will be monitored and recorded.
FCP Management	Fibre Channel Protocol management functionality will be monitored and recorded.
PS Management	Parallel SCSI functionality will be monitored and recorded.
SG List	Scatter/gather list will be monitored and recorded.
FCP/RMI	Fibre Channel Protocol routing layer will be monitored and recorded.
INBAND	Controller management functionality will be monitored and recorded.

Current, Previous, and Last Assert Trace Displays

These three Utilities Menu screens show trace information. The Current Traces screen shows data since the router was last booted. The Previous Traces screen shows data from the last boot cycle. The Last Assert Traces screen shows data since the last assertion.

Figure 61 is an example of the Current Traces screen.
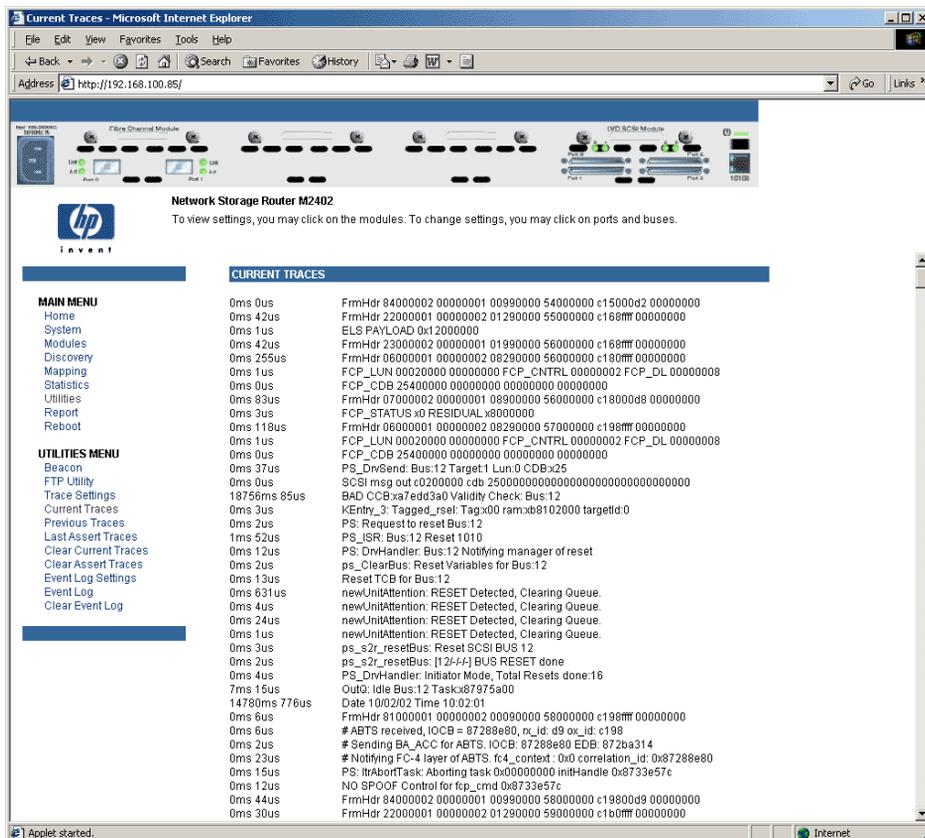
Figure 61: Current Traces screen

Clear Current Traces and Clear Assert Traces

These Utilities Menu screens are used to clear the current trace buffer or the assert trace buffer.

Current router activities will not be disrupted while the buffer is cleared.

Figure 62 is an example of the Clear Current Trace Buffer screen.
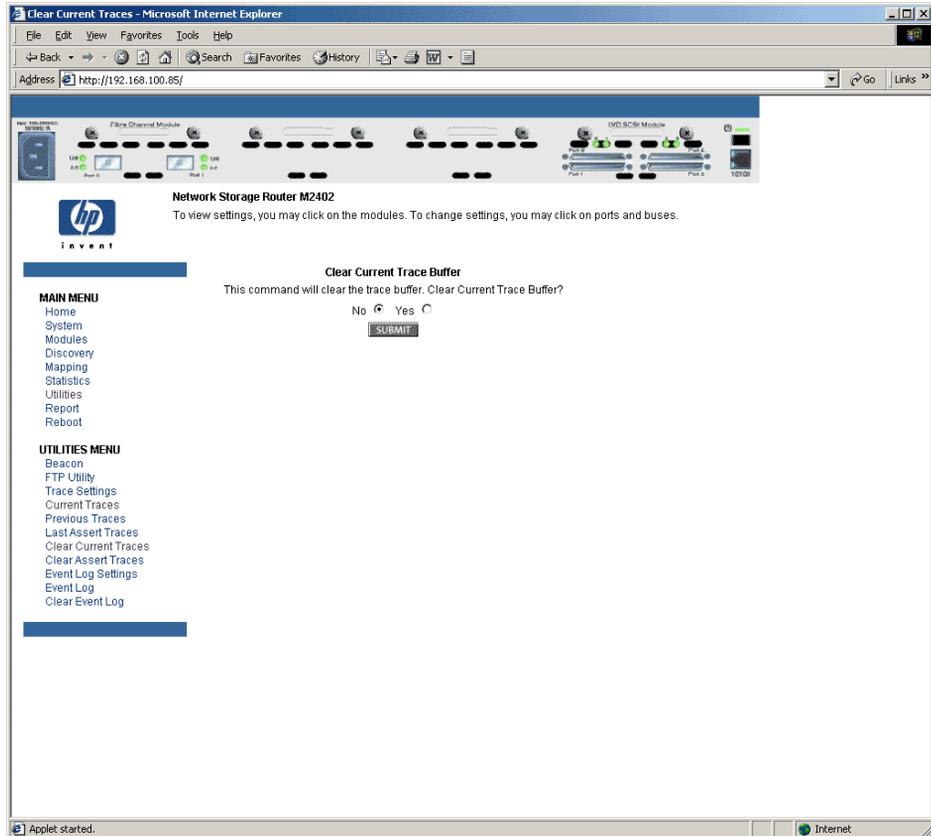
Figure 62: Clear Current Trace Buffer screen

Event Log Configuration

The Event Log Setting screen is used to configure Event Log filters. Figure 63 is an example of the Event Log Filter configuration screen.
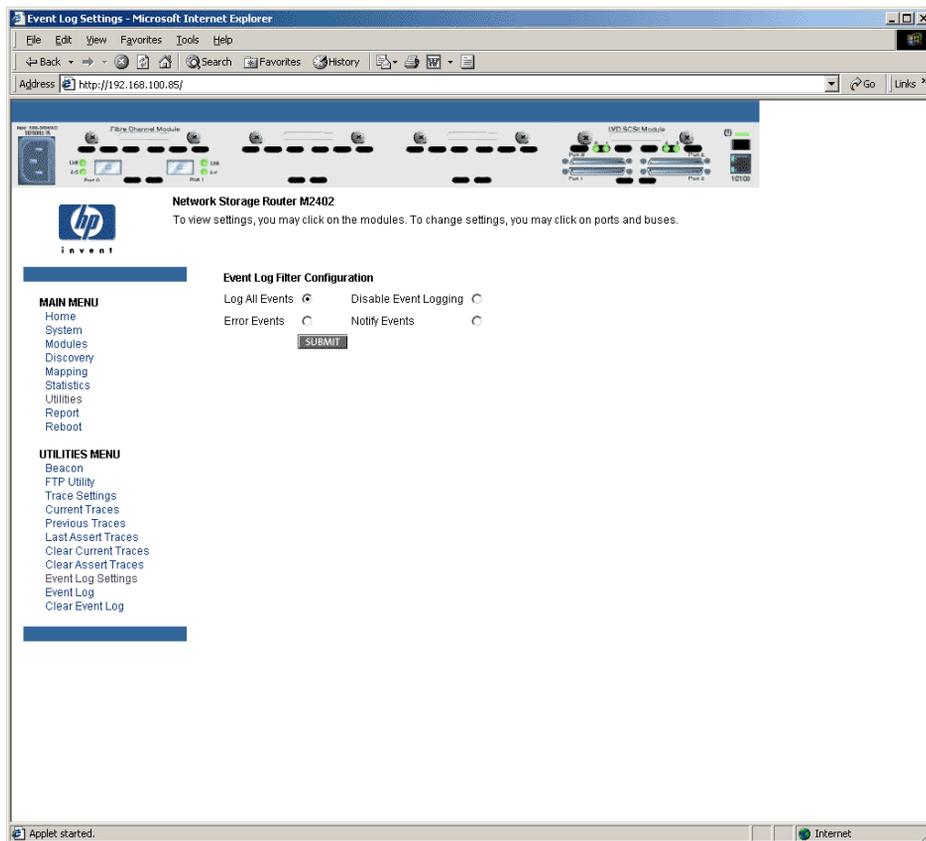
Figure 63: Event Log settings screen

Event Log settings:

- **Log All Events**
- **Disable/Enable Event Logging**
- **Log Error Events**
- **Log Notify Events**

Event logging captures the last 215 events and then starts overwriting the log.

Note: To ensure accurate event logging, be sure to correctly set the clock and date in the Real Time Clock Configuration menu.

Event Log Display

The Event Log screen is used to view the Event Log. Figure 64 is an example of the Event Log display screen.
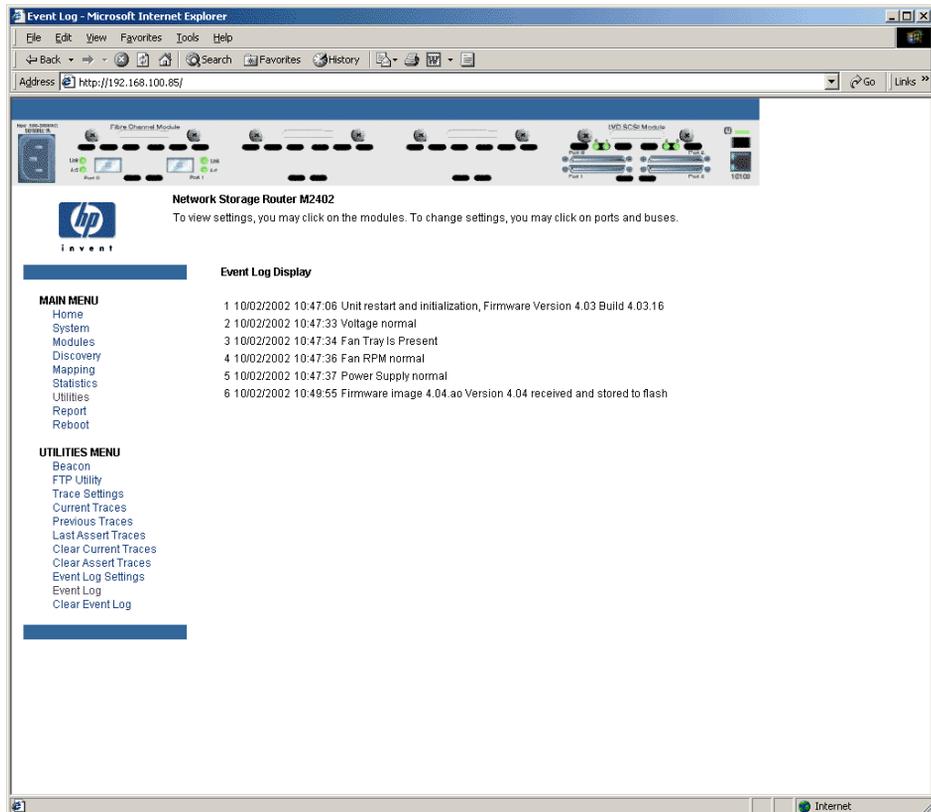
Figure 64: Event Log display screen

Clear Event Log

The Clear Event Log screen is used to clear the Event Log. Figure 65 is an example of the Clear Event Log screen.

Current router activities will not be disrupted.
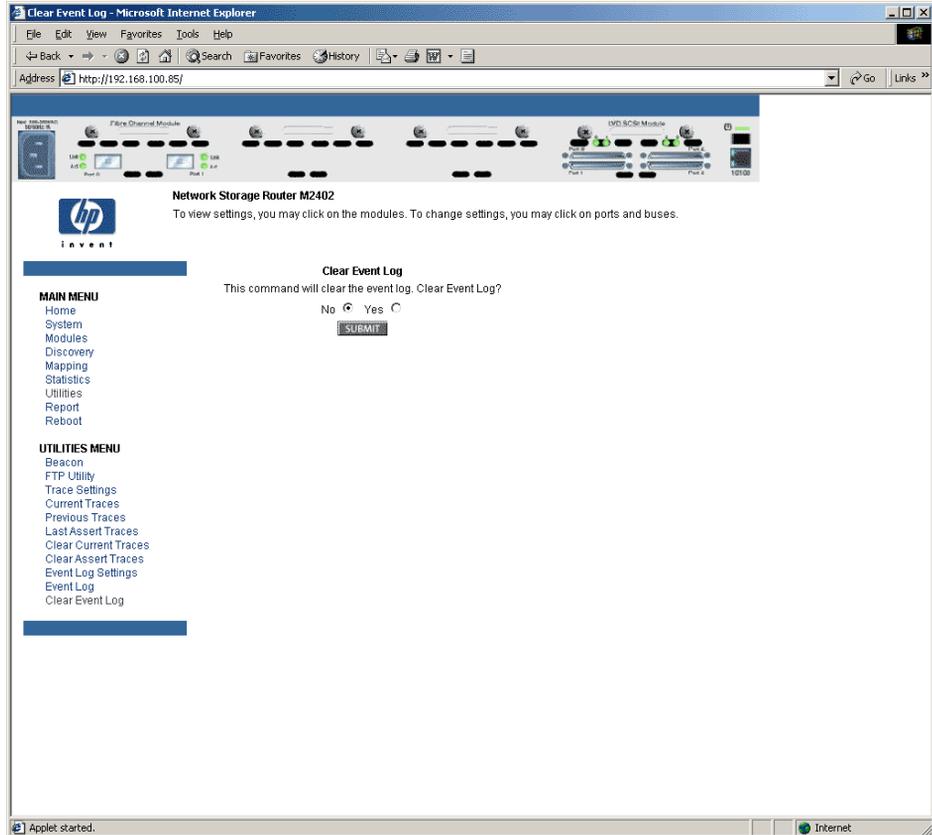
Figure 65: Clear Event Log screen

Report Menu

Accessed from the Main Menu, the Report page displays a consolidated view of all system information, including environmental conditions. Figure 66 is an example of the Report page.

To print the system information, click **Printable View**.

Figure 66: Report screen

Reboot Option

Router reboots are executed using this router Main Menu option. Figure 67 is an example of the Reboot screen.

When the router is rebooted, current router activities will be disrupted. All submitted configuration changes will be activated during the boot-up process.
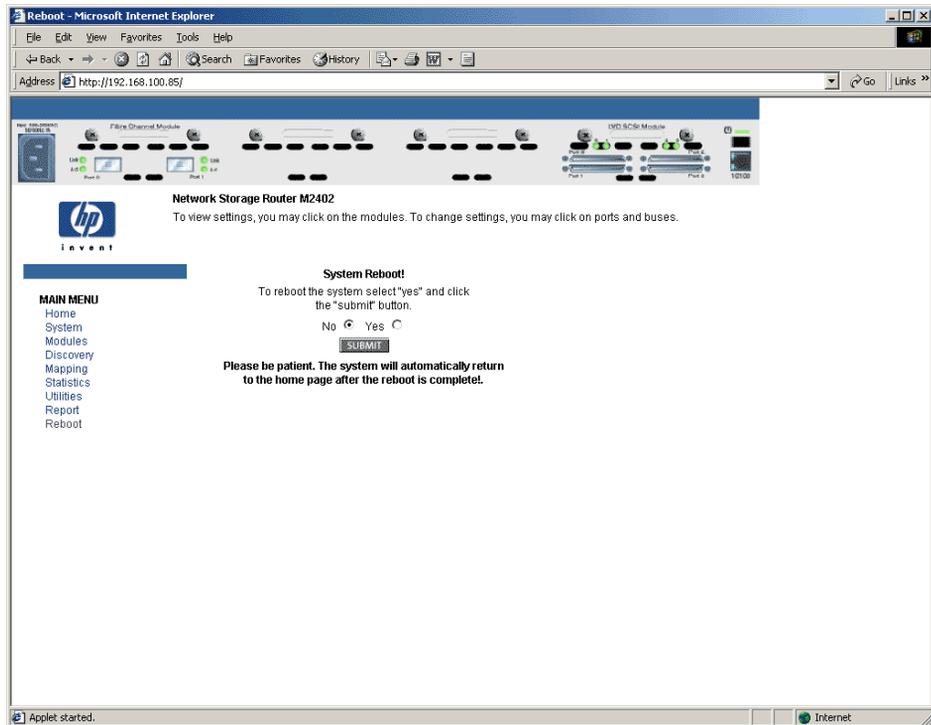
Figure 67: Reboot screen

Serial/Telnet User Interface

5

The Serial/Telnet User Interface (UI) is used to configure and manage the StorageWorks Network Storage Router M2402. This chapter describes the configuration menus and option tasks available in the Serial/Telnet UI.

Note: Unless otherwise indicated, configuration changes take effect when the router reboots.

During the start up process of the router, the Serial/Telnet UI displays initial power-up messages. After the power-up process is completed, the main menu of the UI is displayed. Within the router main menu, several configuration menus and tasks are listed. All configuration and management tasks are performed from these menus.

This chapter is organized using the same structure as the router main menu and its associated sub-menus. The sections are:

- Telnet UI access
- Serial UI access
- Power up messages
- Serial/Telnet main menu
- Configuration menu
- Baud Rate configuration
- Ethernet and SNMP configuration
- World Wide Node Name configuration
- Modules configuration
  - Configuring Fibre Channel modules
  - Configuring SCSI modules

- ■ Device mapping
  - — Selecting the current map
  - — Viewing the current map
  - — Creating a new map
  - — Removing the current map
  - — Editing the current map
  - — Cloning the current map
  - — Editing the host list for the current map
  - — Displaying the entire device list
- ■ Trace and event settings configuration
  - — Configuring trace settings
  - — Configuring event settings
- ■ Real-time clock configuration
- ■ Active Fabric configuration
- ■ Power supply settings
- ■ Save configuration
- ■ Restore last save configuration
- ■ Reset and save configuration to factory defaults
- ■ System utility menu
  - — System statistics
  - — Event log
  - — Beacon settings
- ■ Trace dump menu
  - — Saving copies of the trace buffers using FTP
- ■ Reboot option
- ■ Download new firmware option

Telnet UI Access

To open a Telnet session, the IP address of the router and a Telnet client utility are required.

Note: After each reboot, a new Telnet session must be started. If router is reset to factory settings, the Ethernet port will have to be re-configured using the serial interface.

From most Windows 9x, Windows NT, and Windows 2000 systems, a Telnet session can be started from the Command (DOS) shell using the following steps:

1. From the Windows **Start** menu, open the Command Prompt (DOS) window.

2. At the '>' prompt, enter:

   > `TELNET <IP ADDRESS>`

   where `<IP ADDRESS>` is the IP address of the router

3. Enter the user name and password.

   The default user name is `root` and the default password is `password`.

   HP recommends that the user name and password be changed from the default values.

4. The Configuration Menu is displayed.

Serial UI Access

To open a serial session, a terminal emulator utility is required.

From most Windows 9x, Windows NT, and Windows 2000 systems, a HyperTerminal session can be started using the following steps:

1. From the Windows **Start** menu, open the **HyperTerminal** window.

2. Name the new terminal session.

3. Indicate the appropriate COM port.

   Options include COM1 and COM2.

4. Configure the serial port settings, as listed in the "Installation" chapter.

Note: HP recommends setting the baud rate to 115200.

---

5. After completing the serial port configuration, select **OK** to start a serial session.

6. After the serial session has started, press **Enter** several times to initiate router communication and display the Configuration Menu.

Power up Messages

When power is applied to the router, a series of messages is displayed on the serial terminal or terminal emulation program. Figure 68 is an example of these power-up messages.

```
HP SMR X.X\XXXXX
CPU Program RAM: XXXXXXXX
 PCI Protocol RAM: XXXXXXXX
 SCSI Script RAM Module1\Port 0: XXXXXXXX
 SCSI Script RAM Module1\Port 1: XXXXXXXX
 SCSI Script RAM Module1\Port 2: XXXXXXXX
 SCSI Script RAM Module1\Port 3: XXXXXXXX
 SCSI Script RAM Module2\Port 0: XXXXXXXX
 SCSI Script RAM Module2\Port 1: XXXXXXXX
 SCSI Script RAM Module2\Port 0: XXXXXXXX
 SCSI Script RAM Module2\Port 1: XXXXXXXX
 SCSI Script RAM Module3\Port 0: XXXXXXXX
 SCSI Script RAM Module3\Port 1: XXXXXXXX
 SCSI Script RAM Module3\Port 0: XXXXXXXX
 SCSI Script RAM Module3\Port 1: XXXXXXXX
 Ethernet POST Test   : PASSED
 Fibre Channel POST(Module 0\Port 0): PASSED
 Fibre Channel POST(Module 0\Port 1): PASSED
 LSI 1010 SCSI Controller Detected (Module 1\Port 0)
 LSI 1010 SCSI Controller Detected (Module 1\Port 1)
 LSI 1010 SCSI Controller Detected (Module 1\Port 2)
 LSI 1010 SCSI Controller Detected (Module 1\Port 3)
 LSI 1010 SCSI Controller Detected (Module 2\Port 0)
 LSI 1010 SCSI Controller Detected (Module 2\Port 1)
 LSI 1010 SCSI Controller Detected (Module 2\Port 2)
 LSI 1010 SCSI Controller Detected (Module 2\Port 3)
 SCSI POST Test (Module 3\Port 0)   : PASSED
 SCSI POST Test (Module 3\Port 1)   : PASSED
 SCSI POST Test (Module 3\Port 2)   : PASSED
 SCSI POST Test (Module 3\Port 3)   : PASSED
```

Figure 68: Power up messages

Note: Throught this chapter, *XX* represents value fields.

Serial/Telnet UI Main Menu

The main menu is the starting point for all configuration sub-menus and tasks. Figure 69 is an illustration of the router main menu.

Note: If the power up messages and the main menu are not displayed, check the serial port settings.

```
            HP StorageWorks Modular Router
                  Version X.X    XXXXXXX

1) Perform Configuration
2) System Utilities
3) Display Trace and Assertion History
4) Reboot
5) Download a New Revision of the Firmware

Command >
```

Figure 69: Serial/Telnet main menu

Main menu options:

- **Perform Configuration (1)** lets you enter router configuration settings.

- **System Utilities (2)** shows system statistics and perform diagnostic tests.

- **Display Trace and Assertion History (3)** displays trace information and clear the trace buffer.

- **Reboot (4)** reboots the router.

- **Download a New Revision of the Firmware (5)** replaces the current revision of the router firmware with a different copy of firmware.

Each main menu option is discussed in a separate section of this chapter.

Note: Uppercase and lowercase characters can be used interchangeably in all of the menus.

Configuration Menu

The Configuration Menu is used to configure the router.

Figure 70 is an illustration of the Configuration Menu.

```
                  Configuration Menu
                Version X.X    XXXXXXX

1)Baud Rate Configuration
2)Ethernet and SNMP Configuration
3)World Wide Node Name Configuration
4)Modules Configuration
5)Trace and Event Settings Configuration
6)Real-Time Clock Configuration
7)Active Fabric Configuration
8)Power Supply Configuration

A) Save Configuration
B) Restore Last Saved Configuration
C) Reset and Save Configuration to Factory Defaults

X) Return to main menu
```

Figure 70: Configuration menu

Note: The router is shipped with a configuration of default settings that is acceptable for most system environments. Few changes to the configuration should be necessary.

After any configuration changes are made, select **A) Save Configuration** to record the changes.

If the configuration has been modified to meet company-specific needs, back up the company-specific configuration to an external file. If necessary, these settings can later be restored to the router.

Configuration Menu options:

- **Baud Rate Configuration (1)** changes the baud rate on the serial port.

- **Ethernet and SNMP Configuration (2)** lets you enter Ethernet network settings.

- **World Wide Node Name Configuration (3)** changes the values for the Fibre Channel World Wide/Node Name.

- **Modules Configuration (4)** configures the settings for each of the Fibre Channel and SCSI modules.

- **Trace and Event Settings Configuration (5)** modifies trace and event filter settings.

- **Real-Time Clock Configuration (6)** sets the system clock.

- **Active Fabric Configuration (7)** enables and disables server-free backup and change the number of controller LUNs.

- **Power Supply Configuration (8)** indicates the number of installed power supplies.

- **Save Configuration (A)** saves changes to memory.

- **Restore Last Saved Configuration (B)** reverts to the previous configuration.

- **Reset and Save Configuration to Factory Defaults (C)** resets all configuration options to the factory defaults.

- **Return to main menu (X)** goes back to the previous screen.

Because the Configuration Menu is the primary menu in the UI, each Configuration Menu option is discussed in a separate section.

Baud Rate Configuration

In the Configuration Menu, select **Baud Rate configuration (1)** to change the baud rate used on the serial port. Figure 71 is an illustration of the Baud Rate Configuration menu.

```
            Baud Rate Configuration Menu
                Version X.X    XXXXXXX

1)   9600   2)   19200
3)   38400  4)   57600
5) * 115200

X) Return to previous menu
```

Figure 71: Baud Rate Configuration menu

To change the baud rate enter the number (1 through 5) that represents the desired rate.

Note: The asterisk (*) symbol indicates the current setting for the baud rate.

Note: If the Autobaud feature is being used, it is not necessary to set a baud rate.

Ethernet and SNMP Configuration

In the Configuration Menu, select **Ethernet and SNMP Configuration (2)** to set up the Ethernet network. When this option is selected, the Ethernet Configuration Menu is displayed.

Current Ethernet settings are displayed, along with available Ethernet and SNMP configuration options. Figure 72 is an illustration of the Ethernet Configuration Menu.

```
              Ethernet Configuration Menu
                 Version X.X   XXXXXXX

IP Address                      : 1.1.1.1
Subnet Mask                     : 255.255.255.0
IP Gateway                      : 0.0.0.0
Ethernet Physical Address       : 08:06:07:05:03:09
Ethernet Mode                   : 10/100Mbps (Auto-Neg)
Hostname                        :
DHCP Configuration              : Disabled

1) Change IP Address
2) Change IP Subnet Mask
3) Change IP Gateway
4) Change Ethernet Physical Address
5) Toggle Ethernet Mode
6) Change Hostname
7) Toggle DHCP Configuration
8) Change SNMP Settings
9) Change Security Settings

X) Return to previous menu
```

Figure 72: Ethernet Configuration menu

Note: To view or change configuration settings, select the desired menu option. After completing configuration changes, select **X) Return to previous menu** and then select **A) Save Configuration** to record the changes.

Ethernet Configuration Menu options:

- **Change IP address (1)** (default: 1.1.1.1) changes the router IP address.

- **Change IP Subnet Mask (2)** (default: 255.255.255.0) changes the router Subnet mask.

- **Change IP Gateway (3)** (default: 0.0.0.0) changes the IP gateway for the Ethernet network.

- **Change Ethernet Physical Address (4)** changes the Ethernet physical address (MAC address).

> △ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

The manufacturer always assigns Ethernet physical addresses to the Ethernet adapters.

- **Toggle Ethernet Mode (5)** changes the Ethernet mode. Options include:
  - 10 Mb/s only
  - 100 Mb/s (half duplex) only
  - 100 Mb/s (full duplex) only
  - 10/100 MPS (Auto-Neg.)

- **Change Hostname (6)** changes the name of the host server.

  The name can be any combination of alphanumeric characters, up to eight characters.

- **Toggle DHCP Configuration (7)** enables or disables support for Dynamic Configuration Protocol.

  When DHCP is enabled, the router will request a dynamic IP address from the DHCP server on the Ethernet network.

■ Some DHCP servers allow a lease reservation to be set up for an IP address by providing the server with the Ethernet MAC address. The DHCP server will then always provide the same IP address to the router. This setup can be useful for remote management of the router such as Telnet or Visual Manager Because the method of setting up a lease reservation varies depending on the DHCP server being used, contact your Network Administrator for assistance.

Note: To use the DHCP feature, a DHCP server must be operational on the Ethernet network. If the DHCP feature is used when there is no DHCP server, DHCP standards require the router wait three minutes for a response from a DHCP server before timing out.

■ **Change SNMP Settings (8)** changes the community names for GET and SET as well as SNMP Trap settings.

■ A sub-screen is displayed listing the following options:

— **Change Community Name for GET (1)** changes the GET community name.

The SNMP GET community name is checked for each GET request received by the router. The community name in the SNMP packet must match this GET community name. If the community names do not match, the request will not be successfully completed. Configure the SNMP manager to have the same GET community name as the router.

— **Change Community Name for SET (2)** changes the SET Community Name.

The SNMP SET community name is checked for each SET request received by the router. The community name in the SNMP packet must match this SET community name. If the community names do not match, the request will not be successfully completed. Configure the SNMP manager to have the same SET community name as the router.

— **Toggle Trap (3)** enables or disables Traps.

If SNMP Traps are disabled, no Trap events are sent.

— **Modify Trap Manager IP Addresses and Filters (4)** sets up IP addresses for Trap Managers.

If Traps are enabled, this sub-menu is displayed and is used to change one of three Manager IP Addresses for Traps. The Trap Manager IP address is the address used for sending Trap notifications. Typically, this is the IP address of the machine using the network management application or a MIB browser.

Event logging captures the last 215 events and then starts overwriting the log.

The Trap IP Address Configuration Menu displays the current settings for the three Trap Managers.

To make changes to any of the Trap Managers, select the appropriate **Change Trap Manager Settings** option (**0**), (**1**), (**2**), or (**3**).

Note: Be sure to correctly set the clock and date in the Real Time Clock Configuration menu so that event logging is accurate.

■ **Change Security Settings (9)** changes security settings, including the user name and password.

The default user name is `root` and the default password is `password`.

⚠ **Caution:** To ensure security, change the user name and password from the default settings.

Note: The security settings entered here affect all user interfaces.

User names and passwords should be unique and kept confidential. HP recommends using a combination of letters and numbers when creating user names and passwords.

World Wide Node Name Configuration

In the Configuration Menu, select **World Wide Node Name Configuration (3)** to change the values for the Fibre Channel World Wide Node Name. Figure 73 is an illustration of the World Wide Node Name Settings menu.

```
              World Wide Node Name Setting
                 Version X.X    XXXXXXX

World Wide Node Name

World Wide Node Name Setting:    0x500508B3 00300021

1) Change Fibre ChannelWorld Wide/Node Name High
2) Change Fibre ChannelWorld Wide/Node Name Low
X) Return to previous Menu

Command >
```

Figure 73: Worldwide Node Name Setting menu

Note: For Controller LUN commands to be operational, WWN naming schemes MUST be compliant with IEEE Fibre Channel Format 1, where the left-most hexadecimal character (the NAA field) of the WWN is '1'. Additionally, the sixth hexadecimal value from the right must be a value of '0' or'1'.

⚠ **Caution:** Changing the WWN Name could result in duplicate names on a single Storage Area Network (SAN). It is recommended to use the default values for World Wide Names.

To change the World Wide Name, select the appropriate **Change Fibre Channel World Wide Node Name** option (**1**) or (**2**).

Note: If the Configuration Settings are reset to the factory defaults, these customized settings will be overwritten.

Modules Configuration

In the Configuration Menu, **Modules Configuration** (**4)** is used to configure the Fibre Channel and SCSI modules. Figure 74 is an illustration of the Module Configuration Menu.

```
            Module Configuration Menu
               Version X.X   XXXXXXX


Module Configuration : Module 0

     Protocol            :  FCP
     Compatibility       :  Passed
     Part Number         :  XXXXXX-XXX
     Module Number       :  PF0063
     Hardware Number     :  901
     Revision Number     :  01

1) Configure Module Settings
X) Return to previous Menu

Command, <enter> for next Module Settings >
```

Figure 74: Module Configuration menu

The preliminary screen display lists the current settings for Module 0, which is the left-most module on the back of the router.

To scroll through modules 0, 1, 2, and-3, press **Enter**.

To configure the selected module, select **Configure Module Settings (1)**.

Different sets of sub-screens are displayed for Fibre Channel and SCSI modules. This section is further subdivided into the following sections:

■   Configuring Fibre Channel Modules

■   Configuring SCSI Modules

Configuring Fibre Channel Modules

When a Fibre Channel module is selected, the Fibre Channel Configuration Menu
is displayed. The Fibre Channel Configuration Menu allows the user to configure
the Fibre Channel Address method, Hard Address value, discovery mode, WWN
overrides, tape backup settings, default map value, and Fibre Channel port mode.

```
           Fibre Channel Configuration Menu
                Version X.X    XXXXXXX


Fibre Channel Configuration : Module 0, Port 0

     Link Status: DOWN
     Port Name: 0x500508B3 0030007C
     Port Mode: Auto Sense
     Use Hard ALPA: No
     Discovery Mode: Manual Discovery Only
     Buffered Tape Writes: Enabled Queue Depth = 1
     Current Default Map: 'Auto Assigned'
     Performance: 2 GigaBit

1) Change Port Name High
2) Change Port Name Low
3) Change Port Settings
4) Toggle Discovery Mode
5) Change Tape Backup Settings
6) Change Map Settings
7) Change Override Settings
X) Return to previous menu

Command, <enter> for next Fibre ChannelPort >
```

Figure 75: Fibre Channel Configuration menu

Fibre Channel Configuration Menu options:

■ **Change Port Name High (1)** changes the World Wide Port Name High.

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

■ **Change Port Name Low (2)** changes the World Wide Port Name Low.

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

■ **Change Port Settings (3)** sets the negotiation settings for the module.

■ A sub-screen is displayed, listing the following options:

— **Toggle Performance Mode (1)** changes the performance mode to either 1 Gb/s or 2 Gb/s.

> **Note:** If set incorrectly and the router is plugged into a Loop or Fabric, the unit may receive framing errors due to the incorrect Fibre Channel link speed.

— **Toggle Port Mode (2)** (default: N_Port) changes the port mode to either Auto Sense or N_Port:

Auto Sense: In this mode, the Fibre Channel port tries to negotiate as a loop. If it is not successful, then the Fibre Channel port negotiates as a fabric. If the port comes up as a loop, it then determines whether it is on a private or public loop.

N_Port (default): This mode allows the router to bypass the loop negotiation and come up as a fabric only. Use this setting if a Compaq switch is being used. If the router is on a loop and N_Port mode is selected, an error in communication may occur.

— **Toggle Hard AL_PA Usage (3)** changes the Hard AL_PA usage to either **Yes** or **No**.

If set to **Yes**, a unique one-byte valid value (derived from an Arbitrated Loop Topology as defined in ANSI specification FC_AL version 4.5) is used for the Fibre Channel configuration.

When configuring the Fibre Channel AL_PA, the router presents a list of loop addresses along with the corresponding AL_PA. The user can select a loop address.

— **Change Hard AL_PA Value (4)** changes the AL_PA value.

The AL_PA lookup table is displayed. Enter a node number from the table.

■ **Toggle Discovery Mode (4)** (default: auto discovery on reboot events) determines how the router discovers new Fibre Channel devices.

Options include:

— **Auto Discovery on Reboot Events** (default) allows the router to automatically discover all Fibre Channel devices during reboots, including both the ports and the devices.

— **Auto Discovery on Link-up Events** allows the router to automatically discover all Fibre Channel devices during reboots, including both the ports and the devices for the first link-up event. Subsequent link-up events will only discover the ports and not attached devices.

Note: SCSI devices attached to a Fibre Channel port must be mapped as sequential Fibre Channel LUNs starting at LUN number 00. Skipping LUN numbers is not recommended when mapping Fibre Channel LUNs because Fibre Channel Discovery stops the discovery process whenever an empty LUN position is found.

— **Manual Discovery Only** sets discovery of new devices to only occur after the user selects the Refresh Device Display option. The Refresh Device Display option is accessed from the System Utilities Menu.

■ **Change Tape Backup Settings** (**5**) sets tape backup options.

A sub-screen is displayed, listing the following options:

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

— **Toggle Buffered Tape Writes (1) (**default: Enabled) changes the tape backup mode to either **Enabled** or **Disabled**.

— **Change Buffered Tape Queue Depth (2)** changes the tape backup queue depth. Select a value from 0 through 10.

■ **Change Map Settings (6)** changes and displays map settings for the module.

Mapping modes can be Auto-Assigned, Indexed (default), or SCC.

For more information about addressing methods, see Appendix C, "Addressing Methods and Table Structures."

Because the procedures for editing maps are the same for Fibre Channel and SCSI modules, they are documented only one time. See "Device Mapping" later in this chapter for procedural instructions on the following mapping tasks:

— Viewing the Current Map

— Creating a New Map

— Removing the Current Map

— Editing the Current Map

— Cloning a Map

— Editing the Host List for the Current Map

— Viewing the Entire Device List

■ **Change Override Settings (7)** lets you enter Fibre Channel override settings.

⚠️ **Caution:** If these configuration settings are incorrectly set, processing difficulties may occur. Before changing these settings, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

A sub-screen is displayed, listing the following options:

— **Toggle Hi-Sup Bit Settings (1)** changes the Hi-Sup Bit settings. Options include **Set** and **Clear.**

— **Toggle Forcing FCP Response Code (2)** For HBA #223180-B21 and #120186-001 changes the forcing of the FCP response code. Options include **Off** and **On.**

— **Toggle Initiator Bit Setting in PRLI_ACC (3)** changes the Initiator bit setting. Options include **Set** and **Clear**.

If the router is deployed in a router-to-router configuration where at least one router appears as target and another as initiator, set this option to **Set**.

— **Toggle Fibre Channel Link Garbage Deletion (4)** changes the Fibre Channel Link garbage deletion. Options include **Enabled** and **Disabled**.

■ **<Enter>** scrolls to the next port on this module.

Configuring SCSI Modules

When a SCSI module is selected in the Module Configuration Menu, the SCSI Configuration Menu is displayed:

```
              SCSI Configuration Menu
               Version X.X   XXXXXXX

SCSI Configuration : Module 1, Bus 0

Type                  : LVD
Initiator             : Enabled
Discovery             : Enabled
Bus Reset on Boot     : Enabled
Discovery delay time  : 2 seconds
Internal Termination  : Enabled
Buffered Tape Writes  : Enabled
Current Default Map   : `Auto Assigned'

1)Edit Initiator and Target Settings
2)Enable/Disable SCSI Discovery
3)Enable/Disable SCSI Reset on Boot
4)Set Discovery Delay Time
5)Set SCSI Termination Mode
6)Edit SCSI Target Override Settings
7)Enable/Disable Buffered Tape Writes
8)Change Map Settings
X) Return to previous menu

Command, <enter> for next SCSI bus >
```

Figure 76: SCSI Configuration menu

Current settings for the selected SCSI bus are displayed.

SCSI Configuration Menu options:

■ **Edit Initiator and Target Settings (1)** changes the SCSI Initiator and Target settings.

⚠ **Caution:** If these configuration settings are incorrectly set, processing difficulties may occur. Before changing these settings, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

The SCSI Initiator and Target Menu sub-screen is displayed, listing the following options:

— **Enable/Disable SCSI Initiator (1)** enables or disables the SCSI Initiator. Options are **Enabled** and **Disabled**.

— **Select primary and select/enable alternate SCSI ID (2)** sets the primary and alternate initiator SCSI IDs. These should be unique IDs on the bus.

Defaults: primary = 7; alternate = none

— **Add Target ID (3)** or **Remove Target ID (4)** adds or removes a Target ID.

This adds an ID for a Fibre Channel device that responds to operation requests from the SCSI initiator.

Note: Target IDs must be setup prior to mapping devices on the SCSI bus.

Note: Do not enable Target IDs unless a SCSI initiator on the bus wants to use Fibre Channel devices. This type of configuration is known as a Target Mode configuration.

■ **Enable/Disable SCSI Discovery** (**2**) enables or disables the Discovery Mode.

■ **Enable/Disable SCSI Reset on Boot (3)** enables or disables automatic bus resets after a reboot.

When enabled, the router automatically resets SCSI buses during initial power ups and reboots.

■ **Set Discovery Delay Time (4)** sets the length of time the router waits after a power-up or reboot before discovering SCSI devices.

Note: This value should be set to no less than 250ms, according to the SCSI standard for Reset-to-Selection Time. HP recommends setting the value to at least 2 seconds to ensure all SCSI devices complete their individual power on self tests (POST.)

■ **Set SCSI Termination Mode (5)** enables or disables the SCSI termination mode.

⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

■ **Set SCSI Target Override Settings (6)** changes the SCSI Target overrides.

⚠ **Caution:** If these configuration settings are incorrectly set, processing difficulties may occur. Before changing these settings, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

SCSI Parameter Override Configuration Menu options:

— **Toggle CDB Length Override (1)**—enabled or disabled.

   If enabled, the following configuration options are displayed:

   CDB Group 6 Length Default (default = 0) can be set to 0, 6, 10, or 12.

   CDB Group 7 Length Default (default = 0) can be set to 0, 6, 10, or 12.

— **Toggle Wide Negotiation (2)**—enabled or disabled.

— **Toggle Synchronous Negotiation (3)**—enabled or disabled.

   If enabled, the following configuration options are displayed:

   Synchronous Period (default = 40) the maximum number of seconds allowed for negotiation.

Synchronous Offset (default =16) the maximum variation in transfer rate that can be negotiated in MB/s.

— **Toggle Synchronous Parameter Override (4)**—enabled or disabled.

— **Toggle Ultra SCSI-3 Negotiation (5)**—enabled or disabled.

This feature is useful for solving certain compatibility issues in mixed vendor environments, where there may be a device that cannot handle automatic negotiation of the bus speed or where there is a device that does negotiate to use Ultra SCSI 3, but cannot handle the speed.

■ **Enable/Disable Buffered Tape Writes (7)** (default: Enabled) enables or disables Buffered Tape Writes.

Buffered Tape Writes return status on consecutive write commands prior to the tape device receiving data, to enhance performance.

■ **Change Map Settings (8)** changes map information for the module.

Mapping modes can be either Auto-Assigned (default), Indexed, or SCC.

For more information about addressing methods, see Appendix C, "Addressing Methods and Table Structures."

Because the procedures for editing maps are the same for Fibre Channel and SCSI modules, they are documented only one time. See "Device Mapping" later in this chapter for procedural instructions on the following mapping tasks:

— Viewing the Current Map

— Creating a New Map

— Removing the Current Map

— Editing the Current Map

— Cloning a Map

— Editing the Host List for the Current Map

— Viewing the Entire Device List

■ **<Enter>** scrolls to the next SCSI bus on this module.

Device Mapping

Device mapping allows the user to manipulate maps and associate the selected hosts with a particular map. Each physical port/bus on the router can have the following maps:

Table 3: Device Map Types

Map Type	System/User Generated	Fibre Channel or SCSI
Auto Assigned	System	Fibre Channel and SCSI
Indexed	System	Fibre Channel and SCSI
SCC	System	SCSI
Custom	User	Fibre Channel and SCSI

Each map has a unique name and map ID; one of the maps must be identified as the "current" map for the router to use.

Maps are viewed, edited, deleted, and cloned in the Device Mapping Configuration menu.

To access the Device Mapping configuration menu:

1. In the router main menu, select **Module Configuration (4)**.

2. Select a module to configure.

    If a Fibre Channel module was selected, the Fibre Channel Configuration Menu is displayed. To view and change Fibre Channel mappings, select **Change Map Settings (6)**.

    If a SCSI module was selected, the SCSI Configuration Menu is displayed. To view and change SCSI mappings, select **Change Map Settings (8)**.

3. Regardless of the selected module type, the same Device mapping Configuration menu will be displayed. Figure 77 is an example of the Device Mapping Configuration Menu for a Fibre Channel module.

```
Device Mapping Configuration : Module 0, Port 0

Current Map for FCP Module - 'Auto Assigned'

1) Select Current Map
2) Display Current Map
3) Create New Map
4) Remove Current Map
5) Edit Current Map
6) Clone Current Map
7) Edit Host List for Current Map
8) Display Device List

X) Return to previous menu

Command, <enter> for next port >
```

Figure 77: Device Mapping Configuration menu

Device Mapping Configuration menu options:

■ **Select Current Map (1)** indicates which map is to be the Current map.

■ **Display Current Map (2)** lets you view the Current map.

■ **Create New Map (3)** creates a new map.

■ **Remove Current Map (4)** restores the default map as the Current map.

■ **Edit Current Map (5)** change Current map settings

■ **Clone Current Map (6)** copies the Current map.

■ **Edit Host List for Current Map** (**7)** changes the host information for the Current map.

■ **Display Device List (8)** lets you view the device list.

Because each option includes a menu or sample screen display, each menu option is discussed in the following separate sections.

Changing to the Next Port or Bus

To scroll to the next Fibre Channel port or SCSI bus, press **Enter**.

Selecting the Current Map

In the Device Mapping Configuration menu, **Select Current Map (1)** is used to select the Current map for each port or bus of a module.

When this option is selected, the Select Current Map screen is displayed. The current map assignment is displayed at the top of the screen.

Figure 78 is an illustration of the Select Current Map screen for a Fibre Channel module.

```
                 Select Current Map
              Version X.X    XXXXXXX


Current Map for FCP Module - 'Auto Assigned'

+-------+-----------+-------+---------------------+
| MAP # |  Protocol | Md/Pt |      Map Name       |
+-------+-----------+-------+---------------------+
|    1  | FCP       | 1/0   |       Indexed       |
|    2  | FCP       | 1/0   |    Auto Assigned    |
|    3  | FCP       | 1/0   |       SCC Map       |
+-------+-----------+-------+---------------------+
Page # 1 out of 1 pages.
Total Number of Maps = 3
Enter(N=Next, P=Prev, Number=Select, X=Exit) >
```

Figure 78: Select Current map

> ⚠ **Caution:** If this configuration setting is incorrectly set, processing difficulties may occur. Before changing this setting, evaluate the need for the change and verify the desired setting. HP recommends backing up the router configuration to an external file before making changes to this setting.

To indicate which map is to be the Current map for the module, type the number that corresponds to the desired map.

Viewing the Current Map

In the Device Mapping Configuration menu, **Display Current Map (2)** is used to view the entries for the Current Map.

The Current Map Display screen is displayed.

Depending on whether a Fibre Channel map or a SCSI map was selected, the screen display will differ. Figure 79 and Figure 80 are illustrations of the different screen displays for Fibre Channel maps and SCSI maps.

```
                        Current Map Display
                       Version X.X   XXXXXXX

Port Map Display

Map: FCP Module, Port 0: Name 'Default'
+-----++------+-------+------+------+------------------------------+
| LUN || Prtl | Md/Pt | TYPE | STAT | Protocol Specific Information|
+-----++------+-------+------+------+------------------------------+
|   0 || SCSI |  1/0  | TAPE |  UP  | Target= 3   Lun=  0          |
|   1 || SCSI |  1/1  | DISK |  UP  | Target= 4   Lun=  0          |
|   2 || SCSI |  1/2  | DISK |  UP  | Target= 5   Lun=  0          |
|   3 || SCSI |  1/3  | DISK |  UP  | Target= 6   Lun=  0          |
|   4 || SCSI |  2/0  | TAPE |  UP  | Target= 1   Lun=  0          |
+-----++------+-------+------+------+------------------------------+
Page # 1 out of 1 pages.
Number of entries in the Map = 5
Enter(N=Next, P=Prev, X=Exit) >
```

Figure 79: FCP Current Map display

Note: The entire list may not fit on one screen. Press N or P to go back and forth between screens.

```
                              Current Map Display
                              Version X.X    XXXXXXX


Port Map Display

Map: SCSI Port 7: Name 'Default'
+------+-----++------+------+------+------+-------------------------------+
| Trgt | LUN || Prtl | Md/Pt | TYPE | STAT |   Protocol Specific Information|
+------+-----++------+------+------+------+-------------------------------+
|    1 |   0 || FCP  |  0/0  | DISK |  UP  | WWN=0x22000020374F9BB7 Lun= 0 |
|    1 |   1 || FCP  |  0/1  | DISK |  UP  | WWN=0x500507650543E065 Lun= 0 |
|    1 |   2 || FCP  |  1/0  | TAPE |  UP  | WWN=ox65225211224EA025 Lun= 0 |
|    1 |   3 || FCP  |  1/0  | DISK |  UP  | WWN=ox9545626EF2077025 Lun= 0 |
|    1 |   4 || FCP  |  1/1  | TAPE |  UP  | WWN=ox25245641AA02EA29 Lun= 0 |
+------+-----++------+------+------+------+-------------------------------+
Page # 1 out of 1 pages.
Number of entries in the Map = 5
Enter(N=Next, P=Prev, X=Exit) >
```

Figure 80: SCSI Current Map display

Note: The entire list may not fit on one screen. Press N or P to go back and forth between screens.

Creating a New Map

In the Device Mapping Configuration menu, **Create New Map (3)** is used to create a new map for the module.

The **Create New Current Map** sub-screen is displayed.

At the prompt, enter a name for the new map. When a new map is created, it automatically becomes the Current Map.

Removing the Current Map

In the Device Mapping Configuration menu, **Remove Current Map (4)** is used to remove the Current map and restore the default map as Current.

A verification prompt is displayed.

Editing the Current Map

In the Device Mapping Configuration menu, **Edit Current Map (5)** is used to edit the current map

The Map Edit Menu sub-screen is displayed.

Figure 81 is an illustration of the Map Edit Menu.

Note: Auto Assigned and SCC Maps cannot be edited.

```
                  Map Edit Menu
               Version X.X    XXXXXXX

Current Map: FCP Module 0, Port 0 - Name 'Indexed'

1) Edit Name
2) Edit Map Entries
3) Clear Map
4) Fill Map

X) Return to previous menu

Command >
```

Figure 81: Map Edit menu

Map Edit Menu options:

■   **Edit Name (1)** changes the name of the current map.

■   **Edit Map Entries (2)** changes the content of the current map.

■   **Clear Map (3)** erases all entries from the current map.

■   **Fill Map (4)** automatically completes the entries for the current map.

Each editing option is discussed in the following sections.

Changing the Name of the Current Map

To change the name of the current map, in the Map Edit Menu, select **Edit Name (1)**. Then, enter the new name at the prompt.

Note: Only user-defined map names can be changed.

Editing the Map Entries of the Current Map

To edit the details of the Current map, in the Map Edit Menu, select **Edit Map Entries (2)**. This editing screen allows the user to navigate up and down the map entries and create or remove entries. Device lists are also available to make it easier to identify the device to be mapped.

Note: Mapping a device to its native port/bus is not allowed. The information needed to create entries is protocol/port dependent.

Although the options are the same for editing maps of Fibre Channel and SCSI modules, the screen display differs.

Figure 82 is an example screen display for Fibre Channel maps and Figure 83 is an example screen display for a SCSI map.

```
                          Edit Map Entries
                       Version X.X    XXXXXXX


Port Map Edit Display

Map: FCP Module 0, Port 0: Name 'Default'
+-----++------+-------+------+------+------------------------------+
| LUN || Prtl | Md/Pt | TYPE | STAT | Protocol Specific Information|
+-----++------+-------+------+------+------------------------------+
|   0 || SCSI |  1/0  | TAPE |  UP  | Target= 3   Lun=  0          |
|   1 || SCSI |  1/0  | DISK |  UP  | Target= 4   Lun=  0          |
|   2 || SCSI |  1/0  | DISK |  UP  | Target= 5   Lun=  0          |
|   3 || SCSI |  1/1  | DISK |  UP  | Target= 6   Lun=  0          |
|   4 || SCSI |  1/1  | TAPE |  UP  | Target= 1   Lun=  0          |
+-----++------+-------+------+------+------------------------------+
Page # 1 out of 1 pages.
Number of entries in the Map = 5
Enter(N=Next,P=Prev,A=Add,C=Create,R=RemoveGaps,D=Delete,X=Exit) >
```

Figure 82: Edit Map Entries for a Fibre Channel map

```
                          Edit Map Entries
                       Version X.X    XXXXXXX


Port Map Edit Display

Map: SCSI Module 2, Port 4: Name 'Default'
+------+-----++------+-------+------+------+--------------------------------+
| Trgt | LUN || Prtl | Md/Pt | TYPE | STAT |    Protocol Specific Information    |
+------+-----++------+-------+------+------+--------------------------------+
|    1 |   0 || FCP  |  1/0  | DISK |  UP  | WWN=0x22000020374F9BB7 Lun= 0 |
|    1 |   1 || FCP  |  1/1  | DISK |  UP  | WWN=0x500507650543E065 Lun= 0 |
|    1 |   2 || FCP  |  1/2  | TAPE |  UP  | WWN=ox65225211224EA025 Lun= 0 |
|    1 |   3 || FCP  |  1/3  | DISK |  UP  | WWN=ox9545626EF2077025 Lun= 0 |
|    1 |   4 || FCP  |  2/0  | TAPE |  UP  | WWN=ox25245641AA02EA29 Lun= 0 |
+------+-----++------+-------+------+------+--------------------------------+
Page # 1 out of 1 pages.
Number of entries in the Map = 5
Enter(N=Next,P=Prev,A=Add,C=Create,R=RemoveGaps,D=Delete,X=Exit) >
```

Figure 83: Edit Map Entries for a SCSI map

Edit Map Entries options:

■ **Next (N)** scrolls down the list of map entries.

■ **Previous (P)** scrolls up the list of map entries.

■ **Add (A)** adds new map entries.

■ **Create (C)** creates a new map entry for a newly added device.

- **Remove Gaps** (**R**) removes gaps in the listed sequence of LUN.
- **Delete** (**D)** deletes a map entry.
- **Exit** (**X**) returns to the previous menu.

Scrolling between Display Pages of the Edit Map Entries Screen

To scroll up and down the map entries, select **P** or **N**.

Adding a Map Entry to a Fibre Channel Map

To add a new entry to a Fibre Channel map:

1. In the Map Edit Entries screen, select **Add (A)**.

    The following screen is displayed:

```
Enter desired LUN address > 0

Select Protocol (0 - SCSI, 1 - AF, X=Cancel) > 0

Select SCSI Module Number or X to Cancel:
1) Module 0
2) Module 2

Select Module Number:> 2
Select Port Number (0-3) or X to Cancel:> 0
>

                 Edit Map Entries
              Version X.X    XXXXXXX

Port Map Edit Display

Map: SCSI Module 1, Port 3: Name 'Default'
+------+-----------++-----+------+-------+
| Num  | Target ID || LUN | Type | State |
+------+-----------++-----+------+-------+
|   1  |     1     ||  0  |   1  | DISK  |
|   2  |     2     ||  1  |   0  | TAPE  |
+------+-----------++-----+------+-------+
Page # 1 out of 1 pages.
Number of entries in the list = 2
Enter(Number=Select,N=Next,P=Prev,X=Exit) >
```

Figure 84: Adding an Entry to a Fibre Channel map

2. Enter the desired LUN ID.

    If the selected LUN is already present in the map, a prompt is displayed that asks to either confirm the override or enter different address information.

    A device selection list is automatically generated.

Note: Devices cannot be mapped to their native port.

---

3. To select the map entry to edit, enter the number from the left-hand column of the Port Map Edit Display screen.

    A Device List is displayed.

```
                            Device List
                      Version X.X    XXXXXXX

FCP Module 0, Port 1 Device List:
+-----+-----+------+---------+--------------------+--------------------+
| Num | LUN | TYPE | State   |      Port WWN      |      Node WWN      |
+-----+-----+------+---------+--------------------+--------------------+
|   1 |  -  |   -  |    -    | 0x22000020374F9BB7 | 0x20000020374F9BB7 |
|   2 |  0  | DISK |  ACTIVE | 0x22000020374F9BB7 | 0x20000020374F9BB7 |
|   3 |  -  |   -  |    -    | 0x500507650543E065 | 0x500507650503E065 |
|   4 |  0  | DISK |  ACTIVE | 0x500507650543E065 | 0x500507650503E065 |
+-----+-----+------+---------+--------------------+--------------------+
Page # 1 out of 1 pages.
Number of entries in the device table = 4
Enter(Number=Select, N=Next, P=Prev, X=Exit) >
```

Figure 85: Device List generated for a Fibre Channel port

4. In the Device List, to add a listed device to the map, enter the number from the "Num" column.

    If the selected device is already mapped, an error message will appear, warning about adding a duplicate device.

Adding a Map Entry to a SCSI Map

To add a new entry to a SCSI map:

1. In the Edit Map Entries screen, select **Add (A)**.

    The following screen is displayed.

```
Choose desired Target SCSI ID from( 1 2 3 ) > 1

Enter desired lun address > 0

Select Protocol (0 - FCP, X=Cancel) > 0

Select FCP Module Number or X to Cancel:

1)    Module 0

Select Module Number: > 1
Select Port Number (0 - 1) or X to cancel: > 0
```

Figure 86: Adding an Entry to a SCSI map

2. Enter a Target/LUN ID combination.

    If the selected Target/LUN is already present in the map, a prompt is
    displayed that asks to either confirm the override or enter different address
    information.

    A device selection list is automatically generated.

Note: Devices cannot be mapped to their native port.

```
                    Device List


    Version X.X    XXXXXXX

    SCSI Module 0, Port 1 Device List:
    +-----+-----------+-----+------+---------+
    | Num | Target ID | LUN | Type |  State  |
    +-----+-----------+-----+------+---------+
    |   1 |         3 |  -  |  -   |    -    |
    |   2 |         3 |  0  | TAPE | ACTIVE  |
    |   3 |         4 |  -  |  -   |    -    |
    |   4 |         4 |  0  | DISK | ACTIVE  |
    |   5 |         5 |  -  |  -   |    -    |
    +-----+-----------+-----+------+---------+
    Page # 1 out of 2 pages.
    Number of entries in the device table = 8
    Enter(Number=Select, N=Next, P=Prev, X=Exit) >
```

Figure 87: Device List generated for a SCSI port

Note: A target ID must be defined in the SCSI Configuration to add devices.

3. In the Device List, to add a device to the map, enter the number from the "Num" column.

    If the selected device is already mapped, an error message will appear, warning about adding a duplicate device.

Note: If a device with LUN = "-' is selected, all LUNs for this Target will be added to the map.

Creating a Map Entry for a Fibre Channel Map

To pre-enter a map entry for devices that are not yet online, select **Create (C).**

Note: All essential information about the device must be known.

A series of questions is displayed. The questions will vary based on the 'Current' map protocol. Required information includes the LUN address, protocol, port, device name, and device type must be entered.

Figure 88 is an example of the screen display when creating an entry for a Fibre Channel map.

```
Enter desired LUN address > 1

Select Protocol (0 - SCSI, X=Cancel) > 0
Select SCSI Port:  Port# = ? (0-7,X=Cancel) > 2
Enter desired Device Name (could be empty) >

DISK_DEVICE         - 0,  TAPE_DEVICE          - 1
PRINTER_DEVICE      - 2,  PROCESSOR_DEVICE     - 3
WORM_DEVICE         - 4,  CDROM_DEVICE         - 5
SCANNER_DEVICE      - 6,  OPTICAL_DEVICE       - 7
MEDIUM_CHGR_DEVICE - 8,  COMM_DEVICE          - 9
ARRAY_CTLR_DEVICE  - 12, ENCLOSURE_SRV_DEVICE - 13

Enter desired Device Type > 1

Enter device target id > 5

Enter device LUN id > 0
```

Figure 88: Creating a Map Entry for a Fibre Channel map

Note: If the device being added is a SCSI device, the Target ID and LUN ID must be entered. The Target ID must already be defined in the SCSI configuration.

Creating an Entry for a SCSI Map

To pre-enter a map entry for devices that are not yet online, select **Create (C)**.

Note: All essential information about the device must be known.

A series of questions is displayed. The questions will vary based on the 'Current' map protocol. Required information includes the Target ID and LUN address, protocol, port, device name, and device type must be entered.

Figure 89 is an example of the screen display when creating an entry for a SCSI map.

```
Choose desired Target SCSI ID from( 1 2 3 ) > 1

Enter desired LUN address > 0

Select Protocol (0 - FCP, X=Cancel) > 0
Select FCP Port:  Port# = ? (0-1,X=Cancel) > 0
Enter desired Device Name (could be empty) >

DISK_DEVICE        - 0,  TAPE_DEVICE          - 1
PRINTER_DEVICE     - 2,  PROCESSOR_DEVICE     - 3
WORM_DEVICE        - 4,  CDROM_DEVICE         - 5
SCANNER_DEVICE     - 6,  OPTICAL_DEVICE       - 7
MEDIUM_CHGR_DEVICE - 8,  COMM_DEVICE          - 9
ARRAY_CTLR_DEVICE  - 12, ENCLOSURE_SRV_DEVICE - 13

Enter desired Device Type > 0

Enter Port WWN High > 12321232

Enter Port WWN Low > 02563265

Enter Node WWN High > 26589500

Enter Node WWN Low > 21548754

Enter device LUN id > 0
```

Figure 89: Creating an Entry for a SCSI map

Note: If the device being added is a Fibre Channel device, the Node WWN, Port WWN, and LUN ID must be entered.

Note: If this device is a duplicate of a device currently present in the device list, an error message will be displayed.

Removing Gaps in the Map

To remove any incremental gaps in the sequence of LUN listed in the table, in the Edit Map Entries screen, select **Remove (R)**.

As the system removes any gaps from the table, the LUN are renumbered in sequential order, starting with LUN 0.

Note: Some operating systems require gaps be removed in the mapping table in order to detect all devices.

Deleting a Map Entry

To delete an entry from a map, in the Edit Map Entries screen, select **Delete (D)**.

For Fibre Channel maps, at the prompt, either enter the LUN ID of the LUN to delete or enter "D" to delete multiple LUN.

For SCSI maps, at the prompt, enter the Target ID and LUN ID of the LUN to delete or enter "D" to delete multiple LUN.

Clearing the Entries from the Current Map

To remove all entries from the Current map, in the Edit Map Entries screen, select **Clear Map (3)**. A confirmation prompt is displayed.

Filling in the Current Map

To instruct the system to automatically fill in the Current map, in the Edit Map Entries screen, select **Fill Map (4)**.

All new devices are added to the end of the Current map.

After this operation is completed, the Edit Map Entries menu is redisplayed.

Note: Devices marked 'DOWN' are not mapped.

Cloning the Current Map

In the Device Mapping Configuration menu, **Clone Current Map (6)** is used to make an exact copy of the Current map.

Note: Auto Assigned maps and SCC maps cannot be cloned.

The new map must have a unique name.

After the cloning process is complete, this copy becomes the Current map.

Editing the Host List for the Current Map

In the Device Mapping Configuration menu, **Edit Host List for Current Map (7)** is used to edit the host list for the Current map.

The Current map can be associated with hosts available in the host list on the same port where the map is defined. Initially all hosts are associated with an Auto Assigned map. These are 'built at runtime' hosts and cannot be edited or deleted.

Although the options are the same for FCP maps and SCSI maps, the screen display differs. Figure 90 and Figure 91 are examples of the Host List Display screens for FCP and SCSI maps.

```
                       Host List Edit Display
                       Version X.X    XXXXXXX

Current Map: FCP Module 0, Port 1 - Name 'Indexed'

FCP Port# 0 Host List:
+----+----------------+---------------+--------------------++-----------------+
| N# |   Port WWN     |   Node WWN    |     Host Name      ||  Active Map Name|
+----+----------------+---------------+--------------------++-----------------+
|  1 | Hi 0x2routerE0 | Hi 0x200000E0 | (built at runtime) ||   Auto Assigned |
|    | Lo 0x8B02C20E  | Lo 0x8B02C20E | PortID = 0x0000EF  ||                 |
+----+----------------+---------------+--------------------++-----------------+
Page # 1 out of 1 pages.
Total Number of Hosts = 1
Select Host Number(1 - 1) to associate host with the Current Map
Enter (N=Next, P=Prev, A=Add, D=Delete, E=Edit, X=Exit) >
```

Figure 90: Host List Display for Fibre Channel maps

```
                          Host List Edit Display
                          Version X.X    XXXXXXX

Current Map: SCSI Module 1, Port 0 - Name 'Indexed'

SCSI Port# 0 Host List:
+-----+-------------+---------------------++---------------------+
| Num | Initiator ID |      Host Name     ||      Active Map Name |
+-----+-------------+---------------------++---------------------+
|  1  |      7      |      SCSI Host      ||         Default     |
+-----+-------------+---------------------++---------------------+
Page # 1 out of 1 pages.
Total Number of Hosts = 1
Select Host Number(1 - 1) to associate host with the Current Map
Enter (N=Next, P=Prev, A=Add, D=Delete, E=Edit, X=Exit) >
```

Figure 91: Host List Display for SCSI maps

Host List Edit Display options:

- **Next (N)** scrolls down the Host List.
- **Previous** (**P**) scrolls up the Host List.
- **Add (A)** adds a new host to the Host List.
- **Delete (D)** deletes a host from the Host List.
- **Edit (E)** edits host information.
- **Exit (X)** returns to the previous menu.

Each of the options is discussed in the following paragraphs.

Scrolling between the Display Pages of the Host List Edit Screen

To scroll up and down the host entries, select **P** or **N**.

Selecting a Host

To select a host from the list, enter the number displayed in the "N#" or the "Num" column at the left of the screen.

Adding a Host to the Host List

To add a host to the Host List, select **Add (A)**.

If the host is an FCP host, the Host Name, Host ID, port WWN, and Node WWN for FCP host must be entered. (WWN values are hexidecimal.)

Figure 92 is an example of the screen display when adding a host to the Host List of a FCP host.

```
Enter desired Host Name > Fcp Host
Do you know Port ID of the Host?(y/n) > y

Enter Host ID of the host > 0000ef

Enter the new host's Port WWN High > 2routerE0

Enter the new host's Port WWN Low > 8B02C20E

Enter the new host's Node WWN High > 200000E0

Enter the new host's Node WWN Low > 8B02C20E
Host was successfully added to the host list!!!
```

Figure 92: Adding a Host to the Host List - FCP host

If the host is a SCSI host, the host name and the initiator ID must be entered.

Figure 93 is an example of the screen display when a host is added to the Host List of a of a SCSI host.

```
Enter desired Host Name > SCSI Host

Enter desired Initiator ID > 7
Host was successfully added to the host list!!!
```

Figure 93: Adding a Host to the Host List - SCSI host

Deleting a Host from the Host List

To remove a host from the Host List, select **Delete (D)**. After entering the number of the host to delete, a confirmation prompt is displayed.

Editing Host information

To change host information, select **Edit (E)**.

Current host information is displayed on the screen. The system will display a series of prompts, allowing changes to be entered.

Note: To retain the current information for a prompt, press **Enter** at the prompt.

Figure 94 is an example of editing host information for a Fibre Channel module.

```
Host List Edit Display
Version X.X   XXXXXXX

Current Map: FCP Module 0, Port 0 - Name 'Indexed'

FCP Module 0, Port 0 Host List:
+----+---------------+--------------+------------------++----------------+
| N# |    Port WWN   |   Node WWN   |    Host Name     || Active Map Name |
+----+---------------+--------------+------------------++----------------+
| 1  | Hi 0x2routerE0 | Hi 0x200000E0 |                  ||    Default     |
|    | Lo 0x8B02C20E  | Lo 0x8B02C20E | PortID = 0x0000EF ||                |
+----+---------------+--------------+------------------++----------------+
Page # 1 out of 1 pages.
Total Number of Hosts = 1
Select Host Number(1 - 1) to associate host with the Current Map
Enter (N=Next, P=Prev, A=Add, D=Delete, E=Edit, X=Exit) > e
Select Host to edit (X=Cancel) > 1
Old Host Name:
Enter desired new name (<enter> = use old name) > New FCP Host
Old host's Port WWN High: 0x2routerE0
Enter desired Port WWN High(<enter> = use old Port WWN High) >
Old host's Port WWN Low: 0x8B02C20E
Enter desired Port WWN Low(<enter> = use old Port WWN Low) >
Old host's Node WWN High: 0x200000E0
Enter desired Node WWN High(<enter> = use old Node WWN High) >

Old host's Node WWN Low: 0x8B02C20E
Enter desired Node WWN Low(<enter> = use old Node WWN Low) >
```

Figure 94: Editing Host information on a Fibre Channel module

Figure 95 is an example of editing host information for a SCSI module.

```
Host List Edit Display
Version X.X    XXXXXXX


Current Map: SCSI Module 1, Port 0 - Name 'Indexed'


SCSI Module 1, Port 0 Host List:
+-----+-------------+-----------------+++-------------------+
| Num | Initiator ID |    Host Name    ||   Active Map Name  |
+-----+-------------+-----------------+++-------------------+
|  1  |      7       |    SCSI Host    ||       Default      |
+-----+-------------+-----------------+++-------------------+
Page # 1 out of 1 pages.
Total Number of Hosts = 1
Select Host Number(1 - 1) to associate host with the Current Map
Enter (N=Next, P=Prev, A=Add, D=Delete, E=Edit, X=Exit) > e
Select Host to edit (X=Cancel) > 1
Old Host Name: Scsi Host
Enter desired new name (<enter> = use old name) > New Name

Old Initiator ID: 7
Enter desired Initiator ID(<enter> = use old Initiator ID) >
```

Figure 95: Editing Host Information for a SCSI module

Displaying the Entire Device List

In the Device Mapping Configuration menu, **Display Device List (8)** is used to view the entire device list for all modules and ports.

The Entire Device List screen is displayed.

```
Entire Device List
Version X.X   XXXXXXX


+----++------+-------+------+------+----------------------------------+---------+
| N# || Prtl | Md/Pt | TYPE | STAT | Protocol Specific Information    | Map Cnt |
+----++------+-------+------+------+----------------------------------+---------+
|  1 || SCSI |  1/0  | TAPE |  UP  | Target=  3  Lun=   0             |       2 |
|  2 || SCSI |  1/0  | DISK |  UP  | Target=  4  Lun=   0             |       2 |
|  3 || SCSI |  1/1  | DISK |  UP  | Target=  5  Lun=   0             |       2 |
|  4 || SCSI |  1/1  | DISK |  UP  | Target=  6  Lun=   0             |       2 |
|  5 || SCSI |  1/1  | TAPE | DOWN | Target=  5  Lun=   0             |       1 |
|  6 || SCSI |  1/2  | TAPE |  UP  | Target=  1  Lun=   0             |       2 |
|  7 || SCSI |  1/2  | DISK |  UP  | Target=  2  Lun=   0             |       2 |
|  8 || FCP  |  0/0  | DISK | DOWN | WWN= 0x1545210015326500 Lun=  0 |       1 |
|  9 || FCP  |  0/1  | DISK |  UP  | WWN= 0x22000020374F9BB7 Lun=  0 |       1 |
| 10 || FCP  |  0/1  | DISK |  UP  | WWN= 0x500507650543E065 Lun=  0 |       1 |
+----++------+-------+------+------+----------------------------------+---------+
Page # 1 out of 1 pages.
Number of entries in the device table = 10

Enter(N=Next, P=Prev, X=Exit) >
```

Figure 96: Entire Device list

Note: The entire list of maps may not fit on one screen. Select 'N' or 'P' to go back and forth between screens displaying more maps. Select 'X' to return to the previous menu.

Trace and Event Settings Configuration

In the Configuration Menu, select **Trace and Event Settings Configuration (5)** to view and change Trace and Event settings. When this option is selected, the following menu is displayed.

```
              Utility Settings
           Version X.X    XXXXXXX

1) Trace Settings Configuration
2) Event Settings Configuration

X) Return to previous menu
```

Figure 97: Utility Settings (Trace Settings) menu

Trace Settings Menu options:

■ **Trace Settings Configuration** (**1**) configures the trace settings.

■ **Event Settings Configuration** (**2**) configures the event settings.

Each of these options is discussed in the following sections.

Configuring Trace Settings

In the Utility Trace Settings Menu, **Trace Settings Configuration** (**1**) is used to modify trace levels. Two pages of trace level settings are displayed. Figure 98 and Figure 99 are illustrations of the two Trace Settings screens.

Note: Trace settings should not be modified in normal operation; performance degradation may result.

---

1. To change any of the settings in these screens, enter the number that corresponds to the option that needs to be changed.

   The current setting is toggled to either **On** or **Off**.

2. Repeat Step 1 for each setting that needs to be changed in the page.

3. Before leaving the page, activate the new setting by entering **Update Current Operating Trace levels (U)**.

This option forces the currently displayed trace settings to become effective immediately, without requiring a reboot or power cycle.

Note: Be sure to set the clock and date in the Real Time Clock Configuration menu so that event logging is accurate.

```
                  Trace Settings
             Version X.X    XXXXXXX

      0) General Errors     : ON
      1) FCP Driver         : OFF
      2) FCP Transport      : OFF
      3) FCP Management      : OFF
      4) PS Transport       : OFF
      5) PS Management       : OFF
      6) PS Driver          : OFF


U) Update Current Operating Trace Levels
X) Return to previous menu

Enter the trace level index, <enter> for next page >
```

Figure 98: Trace Settings screen

```
                     Trace Settings
                Version X.X    XXXXXXX


           0) SG List           : OFF
           1) Timing            : OFF
           2) FCP/RMI           : OFF
           3) AF                : OFF
           4) INBAND            : OFF



     U) Update Current Operating Trace Levels
     X) Return to previous menu

     Enter the trace level index, <enter> for next page >
```

Figure 99: Trace Settings screen, continued

Configuring Event Settings

In the Utility Trace Settings Menu, **Event Settings Configuration (2)** is used to modify event filters.

The following Event Filter Settings screen is displayed:

```
                    Event Filter Settings
                 Version X.X XXXX  Link Up
                     01/01/02 14:49:02


     1) *Log All Events          2) Disable Event Logging
     3) Error Events             4) Notify Events

     U) Update Current Operating Trace Levels
     X) Return to Previous Menu
     Enter Event Threshold <1-4> >
```

Figure 100: Event filter settings

Note: The asterisk in the screen display denotes the current setting.

---

1. To change any of the settings in this screen, enter the number of the desired setting (**1**, **2**, **3**, or **4**) that corresponds to the option that needs to be changed.

   Settings include:

   - **1) Log All Events**
   - **2) Disable Event Logging**
   - **3) Error Events**
   - **4) Notify Events**

2. Before leaving the page, activate the new setting by entering **Update Current Operating Trace levels (U)**.

   This option forces the currently displayed trace settings to become effective immediately, without requiring a reboot or power cycle.

Note: Set the clock and date in the Real-Time Clock Configuration menu so that event logging is accurate.

Real-Time Clock Configuration

In the Configuration Menu, select **Real-time Clock Configuration (6)** to change the system time and date. Figure 101 is an illustration of the System Clock Setup menu.

```
                    System Clock Setup Menu
                     Version X.X    XXXXXXX



TUESDAY, Date: 06/11/2002, Time: 12:43:13

1) Set clock
X) Return to previous menu
```

Figure 101: Clock Setup menu

1. To change the date or time, select **Set clock (1)**.

2. A series of prompts are displayed, allowing setup of:

   ■ 24-hour time

   ■ Current date

   ■ Current day of the week

Active Fabric Configuration

In the Configuration Menu, select **Active Fabric Configuration (7)** to enter Active Fabric options. Figure 102 is an illustration of the Active Fabric Configuration menu.

```
            Active Fabric Configuration Menu
                 Version X.X   XXXXXXX



Current Active Fabric Configuration:

Server Free Backup Mode              : ON
Number of Controller LUNS (0-4)      : 1

1) Toggle Server Free Backup Mode
2) Change number of Controller LUNs

NOTE : Fibre ChannelDISCOVERY mode must be enabled
       when Server Free Backup Mode is ON
       and to access Fibre Channel targets.

X) Return to previous menu
```

Figure 102: Active Fabric Configuration menu

Active Fabric Configuration Menu options:

■   **Toggle Server-Free Backup Mode (1)** changes the Server-free Backup setting. Options include **On** and **Off**.

    When set to **On**, server-free backup capability is enabled to accept Extended Copy commands.

■   **Change the number of controller LUN (2)** (default: 1) changes the number of controller LUN. This setting is a number in the range of 0 through 4.

Note: For Server-Free Backup Mode functionality, if addressing a Controller LUN is desired, at least one controller LUN must be enabled and included in a relevant map.

Note: When Server-Free Backup Mode is set to ON, be sure Fibre Channel Discovery is also enabled.

For more information on controller LUN and Extended Copy commands, see Appendix B, "Controller LUN Commands."

For information about server-free backup, see Chapter 1, "Introduction."

Power Supply Configuration

In the Configuration Menu, select **Power Supply Configuration (8)** to change the indicated number of installed power supplies. Figure 103 is an illustration of the Power Supply Configuration Menu.

The router uses this information to determine when an error condition occurs. An error or warning condition exists if the specified number of power supplies does not match the number of system operational power supplies.

When a power supply fails with a redundant (second) power supply, the router will issue an event notification once every three minutes, with each notification being logged in the event log.

Note: For systems with two working power supplies, HP recommends setting this option to Dual Mode to allow the router to issue an event notification should one of the power supplies fail. However, if set to Single Mode and one of the power supplies does fail, the router will still use the second power supply but just will not issue an event notification.

```
            Power Supply Configuration Menu
                 Version X.X    XXXXXXX


Number of Power Supplies:   2

1) Toggle Number of Power Supplies (2 to 1)

X) Return to previous menu
```

Figure 103: Power supply configuration menu

To change the setting, select **Toggle Number of Power Supplies (1)**. The value can be toggled between 1 and 2.

Save Configuration

In the Configuration Menu, **Save Configuration (A)** is used to save any configuration changes.

The current configuration state is saved in FLASH, which updates the previous configuration. This configuration is retained across future device resets or power cycles.

Restore Last Saved Configuration

In the Configuration Menu, **Restore Last Saved Configuration (B)** is used to revert to the previous configuration. This can be useful when configuration changes have been made, and the user wishes to return to the previously configuration.

Reset and Save Configuration to Factory Defaults

In the Configuration Menu, **Reset and Save Configuration to Factory Defaults (C)** is used to reset the router configuration to its initial settings.

System Utility Menu

Accessed from the router main menu, the **System Utility Menu** is primarily used to view system information.

To access the System Utilities Menu, in the router Main Menu, select **System Utilities (2)**.

Figure 104 is an illustration of the System Utility Menu.

```
              System Utility Menu
           Version X.X    XXXXXXX



1)System Statistics Menu
2)Event Log
3)Enter System Diagnostics Mode
4)Special Fibre Channel Link States
5)Beacon Settings

X) Return to previous menu
```

Figure 104: System utilities

System Utility Menu options:

- **System Statistics Menu (1)** displays a variety of system status information.

- **Event Log (2)** displays the system Event Log.

- **Enter System Diagnostics Mode (3)** performs Ethernet, SCSI, and Fibre Channel connection tests.

- **Special Fibre Channel Link States** (**4**) (This option is a special diagnostic utility used only by authorized service technicians.)

- **Beacon Settings (5)** enables or disables the Beacon LED signal.

Each System Utility Menu option is discussed in a separate section.

System Statistics

In the System Utility Menu, select **System Statistics Menu (1)** to view system status information.

Figure 105 is an illustration of the System Status/Statistics Menu.

```
            System Status/Statistics Menu
                 Version X.X    XXXXXXX



1) Display System Status
2) Display Enclosure Monitoring Status
3) Display Fibre Channel Protocol Status
4) Display Parallel SCSI Protocol Status

X) Return to main menu
```

Figure 105: System Statistics menu

System Statistics Menu options:

- **Display System Status (1)** displays router status information.

- **Display Enclosure Monitoring Status (2)** displays environmental status information.

- **Display Fibre Channel Protocol Status (3)** displays Fibre Channel status information.

- **Display Parallel SCSI Protocol Status (4)** displays SCSI status information.

Because each option offers a variety of display screens, each of these menu options is discussed in the following separate sub-sections.

Viewing System Status Information

In the System Statistics Menu, select **Display System Status (1)** to view a variety of status information, including memory statistics, current active tasks, and stack usage.

The System Status Menu is displayed.

Figure 106 is an illustration of the System Status Menu.

```
                 System Status Menu
               Version X.X    XXXXXXX



     1) Display memory statistics
     2) Display active tasks
     3) Display stack usage
     4) Display SCSI Protocol Resources

     X) Return to previous menu
```

Figure 106: System Status menu

System Status Menu options:

- **1) Display memory statistics** shows memory usage information.

- **2) Display active tasks** shows a list of current tasks.

- **3) Display stack usage** shows current stack information.

- **4) Display SCSI Protocol Resources** shows SCSI protocol information.

Viewing Environmental Status Information

To display environmental measurements, in the System Statistics Menu, select **Display Enclosure Monitoring Status (2)**.

The Environmental Statistics page is displayed.

The Environmental Statistics page has no options. It is used to view environmental conditions measurements. Figure 107 is an illustration of the Environmental Statistics page.

```
                  Environmental Statistics
                   Version X.X    XXXXXXX



Temperature Information
-----------------------
Current temperature is 104.00 Fahrenheit (40 Celsius)

Voltage Information
-------------------
Expected voltage is 1.8, actual voltage is  1.79070
Expected voltage is 2.5, actual voltage is  2.48682
Expected voltage is 3.3, actual voltage is  3.26420
Expected voltage is 5.0, actual voltage is  4.97364
Expected voltage is 12.0, actual voltage is 12.06250
Expected voltage is 1.8, actual voltage is  1.77660

Fan Information
---------------
Fan 1 RPM is 8881
Fan 2 RPM is 8490
Fan 3 RPM is 8766

Supply Information
---------------
Supply 1 is working
Supply 2 is working

(Press any key to continue)...
```

Figure 107: Environmental statistics

Viewing Fibre Channel Status Information

To display Fibre Channel status information, in the System Statistics Menu, select **Display Fibre Channel Protocol Status (3)**.

The Fibre Channel Status Menu is displayed.

```
                Fibre Channel Status Menu
                  Version X.X    XXXXXXX



 1) Display Fibre Channel Link Status
 2) Display Attached Fibre Channel Devices
 3) Display Fibre Channel Resource Status
 4) Display Fibre Channel Driver Resource Status

 X) Return to main menu

 Command, <enter> for next Fibre Channel Port >
```

Figure 108: Fibre Channel Status menu

The Fibre Channel Status Menu lists the following options:

■ **Display Fibre Channel Link Status (1)** displays Fibre Channel link information.

■ **Display Attached Fibre Channel Devices (2)** displays a list of devices attached to this Fibre Channel port.

■ **Display Fibre Channel Resource Status (3)** displays Fibre Channel resource transport information.

■ **Display Fibre Channel Driver Resource Status (4)** displays Fibre Channel driver information.

Each menu option and example screen displays are discussed in the following sub-sections.

Viewing Fibre Channel Link Information

To see link statistics for the Fibre Channel module:

1. In the Fibre Channel Status Menu, select **Display Fibre Channel Link Status (1)**.

    The following page is displayed.

    See Table 4 for a list of term definitions.

```
                    Fibre Channel Status & Statistics
                         Version X.X   XXXXXXX



Current Fibre Channel Status - Port 0

LinkState      UP/LOOP     ALPA          x00000001    InDevDataSeqs x00000000
OutDevDataSeq x00000000    InLnkDataSeqs x00000005    OutLnkDataSeq x00000084
InP_BSYFrames x00000000    OutP_BSYFrms  x00000000    InF_BSYFrames x00000000
InP_RJTFrames x00000000    OutP_RJTFrame x00000000    LinkDowns     x00000002
InABTSs       x00000000    OutABTSs      x00000000    LaserFaults   x00000000
SignalLosses  x00000000    SyncLosses    x00000000    BadRxChars    x00000000
LinkFailures  x00000001    BadCRCFrames  x00000000    ProtocolErrs  x00000000
BadSCSIFrames x00000000

A) Autorepeat
X) Return to previous menu

Command, <enter> for next Fibre Channel Port >
```

Figure 109: Fibre Channel Link Status screen

2. To view link information for the next Fibre Channel port on this module, press **Enter**.

3. To refresh the screen display, select **Autorepeat A)**.

Table 4: Link Status Definitions

Link Status Field	Definition
LinkState	Current Fibre Channel link status.
AL_PA	Arbitrated loop physical address.
InDevDataSeqs	Number of Device Data sequences received by this port.
OutDevDataSeq	Number of Device Data sequences transmitted by this port.
InLnkDataSeqs	Number of Link Data frames received by this port.
InP_BSYFrames	Number of P_BSY frames received by this port.
OutP_BSYFrms	Number of P_BSY frames transmitted by this port.
InF_BSYFrames	Number of F_BSY frames received by this port.
InP_RJTFrames	Number of P_RJT frames received by this port.
OutP_RJTFrame	Number of P_RJT frames transmitted by this port.
LinkDowns	Number of Link Down conditions detected.
InABTSs	Number of ABTS frames received.
OutABTSs	Number of ABTS frames transmitted.
LaserFaults	Number of laser faults detected.
SignalLosses	Number of times Loss of Signal was detected.
SyncLosses	Number of times Loss of Sync was detected.
BadRxChars	Number of bad characters received.
LinkFailures	Number of Link Failure conditions.
BadCRCFrames	Number of frames received with a bad CRC.
ProtocolErrs	Number of protocol errors detected.
BadSCSIFrames	Number of BAD SCSI frames detected.

Viewing Attached Fibre Channel Devices

To view a list of the devices attached to this module:

1. In the Fibre Channel Status Menu, select **Display Attached Fibre Channel Devices (2).**

    The Fibre Channel Device Display page is displayed.

    Figure 110 is an illustration of the Fibre Channel Device Display page when it is first displayed.

```
                 Fibre Channel Device Display
                    Version X.X    XXXXXXX



Fibre Channel Module 0 Port 0   LINK UP

R) Refresh Device Display
D) Display Device Details
X) Return to previous menu

Command, <enter> for next Fibre Channel Port > r
```

Figure 110: Initial Fibre Channel Device Display page

2. To scroll to the next port, press **Enter**.
3. To activate the display, select **Refresh Device Display (R)**.

    See Figure 111 for an illustration of the updated Fibre Channel Device Display screen.

Note: In Router-to-Router (R2R) configurations, only the first device of all the attached devices will be shown. To see all of the devices in R2R configurations, use Visual Manage.

---

4. To view device details, select **Display Device Details (D)**.

```
                            Fibre Channel Device Display
                                  Version X.X XXXX


Fibre Channel Module 0 Port 0   LINK UP

Port 0: TARGET DEVICE (UP)    Port id: 0x000010
SEAGATE ST39103Fibre Channel  Revision: 0003  ANSI SCSI Revision: 02  Type: Direct Access

R) Refresh Device Display
D) Display Device Details
X) Return to previous menu
```

Figure 111: Updated Fibre Channel Device Display screen

Viewing Fibre Channel Resource Transport Information

To view FCP transport information, in the Fibre Channel Status Menu, select **Display Fibre Channel Resource Status (3)**.

The FCP Transport Queues page is displayed.

The FCP Transport Queue page has no options. It is used only for viewing resource status.

Figure 112 is an illustration of the FCP Transport Queue page.

```
FCP Transport Queues:
   fcpRcvEventQ  fcpCmpltEventQ  fcpSendReqQ  fcpCmdInProgressQ
        0                0             0               0
   fcpRcvRmiQ fcpRmiXmitPendQ  free_fcp_req_q  free_fcp_cmd_q
        0             0            2048            1024
   fcpFreeFcpIuBufsQ  fcpFreeQelmtsQ  fcpFreeSpoofControlQ
     4096                 0                 500

(Press any key to continue)
```

Figure 112: FCP Transport queues

Viewing Fibre Channel Driver Status Information

To display Fibre Channel Driver Queue information, in the Fibre Channel Status Menu, select **Display Fibre Channel Driver Resource Status (4)**.

The Fibre Channel Driver Queues page is displayed.

The Fibre Channel Driver Queues page has no options. It is used only for viewing Fibre Channel driver resources.

```
Port 0 Fibre Channel Driver Queues:
   SFSBufsQ  TachHdrQ  ESGLQ  QElemsFreeList
    1024       1064    2048       537
   ERQWaitQ SCSIWaitQ
      0         0

Port 1 Fibre Channel Driver Queues:
   SFSBufsQ  TachHdrQ  ESGLQ  QElemsFreeList
    1024       1064    2048       537
   ERQWaitQ SCSIWaitQ
      0         0
```

Figure 113: Fibre Channel Driver resource status

Viewing SCSI Status Information

To display SCSI status information, in the System Statistics Menu, select **Display Parallel SCSI Protocol Status (4)**.

The Parallel SCSI Protocol Status Menu is displayed. Figure 114 is an illustration of the SCSI Status Menu.

```
        Parallel SCSI Protocol Status Menu
            Version X.X    XXXXXXX


1) Display SCSI Statistics
2) Display Attached SCSI Devices
3) Display SCSI Resource Status

X) Return to previous menu
```

Figure 114: SCSI Status menu

SCSI Status Menu options:

- **Display SCSI Statistics (1)** shows SCSI statistics.
- **Display Attached SCSI Devices (2)** shows attached SCSI devices.
- **Display SCSI Resource Status (3)** shows SCSI resource status.

Each option is discussed in the following paragraphs.

Viewing SCSI Statistics

To view the SCSI status page, In the SCSI Status Menu, select **Display SCSI Statistics (1)**. There are no options in this display screen.

Viewing Attached SCSI Devices

To see a list of the devices attached to this SCSI module in the SCSI Status Menu, select **Display Attached SCSI Devices (2)**.

The SCSI Device Display Menu is displayed. Figure 115 is an illustration of the SCSI Device Display Menu.

```
            SCSI Device Display Menu
             Version X.X   XXXXXXX


   1) Issue discovery for all buses
   2) Issue discovery for selected bus
   3) Issue boot discovery (includes resets and delays)
   4) Display all local devices
   5) Display local devices on specified bus

   X) Return to previous menu
```

Figure 115: SCSI Device Display menu

SCSI Device Display Menu options:

- **Issue discovery for all buses (1)** issues a discovery command for *all* SCSI buses.
- **Issue discovery for selected bus (2)** issues a discovery command for the *selected* bus.
- **Issue boot discovery (3)** issues a boot discovery command.
- **Display all local devices (4)** displays a list of local devices for *all* buses.

■ **Display local devices on specified bus (5)** displays a list of local devices for the *selected* bus.

Viewing SCSI Resource Information

To display SCSI resource information, in the SCSI Status Menu, select **Display SCSI Resource Status (3)**.

The SCSI Resource Display page is displayed. There are no options in the SCSI Resource Display. It is used only for viewing SCSI resource status.

Figure 116 is an illustration of the SCSI Resource Display page.

```
SCSI Resource Display
                  Version X.X   XXXXXXX

  psNotifyFreeQ  psPendingFreeQ  psTaskFreeQ  psCmdFreeQ
      16              2048            2040         0
  psActiveInitiatorFreeQ  psLocalHostFreeQ  psLocalDeviceFreeQ
        1024                      16                  250
  pEventQ  pEventQfree  psDoubleQelmtFreeQ
     0        1024              4096

(Please hit any key to continue)
```

Figure 116: SCSI Resource display

Event Log

In the System Utilities Menu, **Event Log (2)** is used to view and clear the system Event Log.

Figure 117 is an illustration of the Event Log Menu.

```
              Event Log Menu
          Version X.X   XXXXXXX



1) Display event log
2) Clear event log

X) Return to previous menu

```

Figure 117: Event Log menu

Event Log Menu options:

■ **Display event log (1)** displays the Event Log.

■ **Clear event log (2)** deletes all entries from the Event Log.

Beacon Settings

In the System Utility menu, **Beacon Settings (5)** can be used to locate the router in the rack.

When toggled on, the Power LED located on the back-side of the router will continuously blink, alternating between amber and green. Figure 118 is an illustration of the Beacon Settings Menu.

```
         Beacon Settings Menu
         Version X.X    XXXXXXX



Beacon Settings: OFF

1)Toggle Beacon Settings
X) Return to previous menu
```

Figure 118: Beacon Settings menu

Note: Whenever the router is rebooted, the Beacon Mode is automatically turned off.

To change the setting, enter **Toggle Beacon Settings (1)**.

Options are **On** and **Off**.

Trace Dump Menu

In the router Main Menu, **Display Trace and Assertion History (3)** is used to manage trace history information.

Figure 119 is an illustration of the Trace Dump Menu.

```
             Trace Dump Menu
         Version X.X    XXXXXXX


1) Display trace for current boot cycle
2) Display trace from previous boot cycle
3) Display trace from last assertion failure
4) Clear current trace buffer
5) Clear (flash) assert trace buffer

X) Return to previous menu
```

Figure 119: Trace Dump menu

Trace Dump Menu options:

- **Display trace for current boot cycle (1)** displays current boot cycle trace history information.
- **Display trace from previous boot cycle (2)** displays previous boot cycle trace history information.
- **Display trace from the last assertion failure (3)** displays trace history information from the last assertion failure.
- **Clear current trace buffer (4)** clears the current trace buffer.
- **Clear (flash) assert trace buffer (5)** clears the assertion failure trace buffer.

Saving Copies of the Trace Buffers using FTP

Using an FTP session, the trace buffers from the router can be copied and saved.

1. Verify the router is connected to the Ethernet network.
2. Start an FTP session.
3. At the FTP prompt, enter the router IP address:

   ```
   ftp <IP address>
   ```

> **Note:** Initially, the factory default router IP address is 1.1.1.1. To view the current IP address, navigate to the Ethernet Configuration Menu and view the screen display. See the "Configuration Menu" section for information on viewing and changing the router IP address.

4. Specify the directory location on the computer or network where the FTP program will store the trace file.

5. Enter the user name and password.

   The factory default user name is *root* and the default password is *password*.

6. Specify Bin mode:

   ```
   bin
   ```

7. To copy the current trace buffer:

   ```
   get curtrace.txt
   ```

   The file will transfer from the router.

8. To copy the previous trace buffer:

   ```
   get prvtrace.txt
   ```

   The file will transfer from the router.

Reboot Option

To reboot the router, in the Main Menu, select **Reboot (4)**.

After this option is selected, a confirmation prompt is displayed. If a positive response is given to the confirmation message, the router is restarted.

Note: Current router activities will be disrupted during a reboot.

Download New Firmware Option

To download a new version of the firmware:

1. From the router Main Menu, select **Download a New Revision of the Firmware (5)**.

    A confirmation prompt is displayed.

2. Respond to the confirmation prompt.

3. In the terminal emulator utility, select **Transfer, Send File**.

4. Select the location of the firmware.

    If necessary, use **Browse** to search for the file.

5. Select XMODEM as the transfer protocol.

6. Press the **Send** button.

7. The firmware will begin to download to the router.

When the download process is complete, the system verifies that the firmware image was successfully written to the FLASH memory and reboots. When the router is rebooted, it detects that there is a newly downloaded firmware image, copies that image to the boot sector of the FLASH, and boots using the new image.

Figure 120 is an illustration of the Download Firmware Menu after a new version of the firmware has been loaded.

```
                    Download Firmware Menu
              Version X.X    XXXXXXX    Link Down



     This will replace the current revision of the firmware.
     A reboot will also be performed as part of this process.


     Are you sure (y/n)? y


     Please begin xmodem file transfer...
     §§§§§§§§


     D O W N L O A D    C O M P L E T E



      **********************************


     ...* Start System Cold Reboot!!
```

Figure 120: Download Firmware menu

FTP User Interface

6

The following tasks can be managed through an FTP interface:

■ Accessing the FTP UI

■ Backing Up and Restoring Configuration Settings

■ Copying Trace Buffers

■ Upgrading Firmware

Each of these procedures is discussed in this chapter.

Accessing the FTP UI

To access the router using an FTP UI:

1. Connect the router to the Ethernet network used by the host computer.

2. Start an FTP session using the router IP address:

   `ftp <IP address>`

   where *IP address* is the IP address of the router.

   The default router IP address is 1.1.1.1.

Note: You may also need to specify the external directory location where your FTP utility will store the backup configuration file.

---

3. Enter the user name and password.

   The default user name is `root` and the default password is `password`.

Backing Up and Restoring Configuration Settings

The router supports the backup and restore of configuration settings over FTP. This allows multiple configuration files to be maintained in a location external to the router. When backing up a configuration, the settings are saved from the flash memory on the router to a binary file in an external location determined by the user.

Backing up the Router Configuration

To backup the router configuration settings:

1. Connect the router to the Ethernet network used by the host computer.

2. Start an FTP session using the router IP address:

   ```
   ftp <IP address>
   ```

   where *IP address* is the IP address of the router.

   The default router IP address is 1.1.1.1.

Note: You will need to specify the external directory location where your FTP utility is to store the backup configuration file.

---

3. Enter the user name and password.

   The default user name is root and the default password is password.

   HP recommends that the user name and password be changed from the default values.

4. Specify binary mode:

   ```
   bin
   ```

5. Specify the filename (with the extension *.cfg*) using the get command:

   ```
   get filename.cfg
   ```

   The file will transfer to the user specified location.

Note: When backing up a configuration file, the World Wide Name (WWN) values and Ethernet physical address (MAC address) values are not saved in the configuration file. All other configuration settings are saved.

Restoring the Router Configuration

To restore a configuration to the router:

1. Connect the router to the Ethernet network used by the host computer.

2. Start an FTP session using the router IP address:

   ```
   ftp <IP address>
   ```

   where *IP address* is the address of the router.

   The default IP address of the router is 1.1.1.1.

3. Enter the user name and password.

   The default user name is `root` and the default password is `password`.

   HP recommends that the user name and password be changed from the default values.

4. Specify binary mode:

   ```
   bin
   ```

5. Specify the configuration's path and filename (with the filename extension *.cfg*) using the put command:

   ```
   put <path:filename.cfg>
   ```

The file is transferred to the router. After the file transfer is complete, router will automatically reboot. When the router completes the POST process, it will use the restored configuration.

Note: When restoring a configuration, World Wide Name (WWN) values and Ethernet physical address (MAC address) values revert to the factory default settings. User defined values for these settings are not retained and must be re-entered after the restoration of the configuration is complete.

Note: Confirm the restored configuration by verifying that the settings are correct.

Copying Trace Buffers

Use the following procedure to save copies of the trace buffers:

1. Connect the router to the Ethernet network used by the host computer.

2. Start an FTP session using the router IP address:

   ```
   ftp <IP address>
   ```

   where *IP address* is the address of the router.

   The default router IP address is 1.1.1.1.

Note: You will need to specify the directory location where your FTP utility will store the trace file.

---

3. Enter the user name and password.

   The default user name is root and the default password is password.

   HP recommends that the user name and password be changed from the default values.

4. Specify binary mode:

   ```
   bin
   ```

5. Specify the filename (with the extension *.txt)* using the get command.

   For the current trace buffer, use the following command:

   ```
   get curtrace.txt.
   ```

   For the previous trace buffer, use the following command:

   ```
   get prvtrace.txt.
   ```

Upgrading Firmware

Use the following procedure for Windows-based systems to upgrade the router firmware.

Note: A JAVA applet-based FTP utility is accessible from the UI.

---

1. Connect the router to the Ethernet network used by the host computer.
2. Start an FTP session using the router IP address:

   ```
   ftp <IP address>
   ```

   where *IP address* is the IP address of the router.

   The default router IP address is 1.1.1.1.
3. Enter the user name and password.

   The default user name is `root` and the default password is `password`.

   HP recommends that the user name and password be changed from the default values.
4. Specify binary mode:

   ```
   bin
   ```
5. Specify the path and filename (extension *.dlx*) of the firmware file to be transferred by using the put command as shown:

   ```
   put <path:filename.dlx>
   ```

The firmware file will be transferred and the router automatically reboots. The firmware upgrade will be effective after POST process completes.

Note: Confirm the firmware level by checking the reboot messages through the serial interface.

Hardware Module Replacement

7

This chapter fred the procedures for installing and removing hardware modules of the StorageWorks Network Storage Router M2402.

Included topics:

- Removing and Installing a Power Module or Power Bay Cover
- Removing and Installing the Fan Module
- Removing and Installing an I/O Module or Blank I/O Module

> ⚠ **Caution:** To prevent static shock, which can damage electrical equipment, use industry accepted handling practices when servicing the router and its components. See Appendix F, "Electrostatic Discharge.," for more information.

Removing and Installing a Power Module or Power Bay Cover

When two power modules are installed, as long as at least one power module remains working, the power modules are hot-swappable.

> ⚠ **Caution:** Power bays must either have a power module or power bay cover installed to ensure proper cooling. If proper cooling is not maintained, the router could overheat and automatically power off.
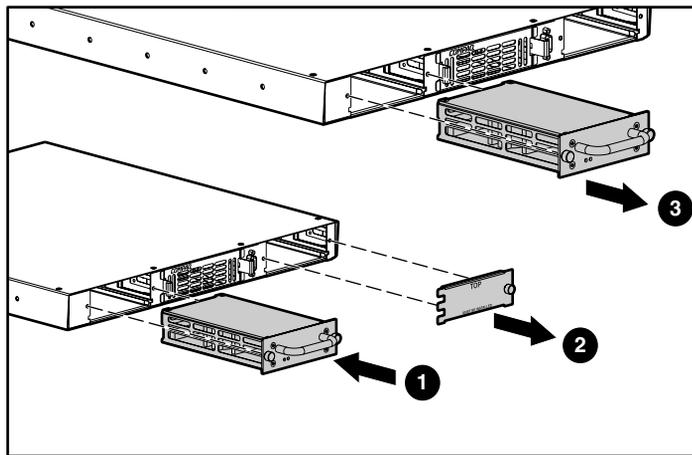
Figure 121: Removing and installing power modules

Item	Description
❶	Installing a power module
❷	Removing a power bay cover
❸	Removing a power module

> ⚠ **Caution:** If it is necessary to remove the power module in a single power supply system, HP recommends first powering-down the router. Be sure all data movement operations are suspended during this time.

⚠ **Caution:** The router detects error and warning conditions by comparing the number of power modules detected to the number of power modules in the configuration information. If a power module is added or removed, the power supply configuration must be updated to ensure the proper warning and error conditions will be detected.

⚠ **Caution:** To prevent static shock, which can damage electrical equipment, use industry accepted handling practices when servicing the router and its components. See Appendix F, "Electrostatic Discharge," for more information.

Removing a Power Module or Power Bay Cover

To remove a power module or power bay cover:

1. Loosen the thumbscrews ❶ in a counter-clockwise rotation on the power module or the power bay cover as shown in Figure 122 and Figure 123.

   The thumbscrews cannot be physically detached from the modules, but can be loosened so that the power module or power bay cover can be removed, as described in Step 2.
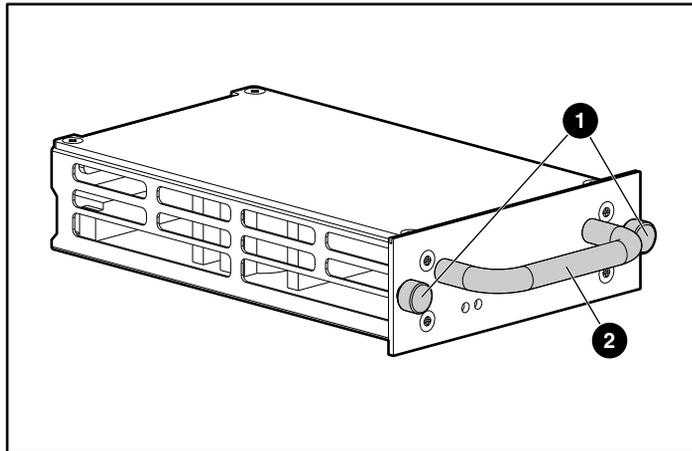
Figure 122: Thumbscrews and handle of a power module
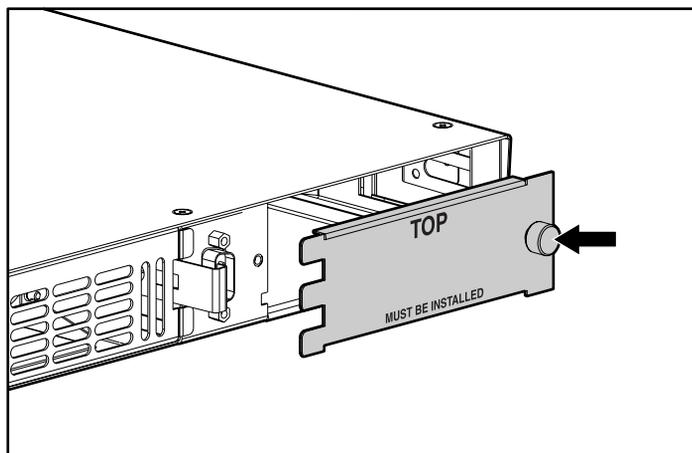
Figure 123: Thumbscrew of a power bay cover

2. To remove a power module, hold the handle ❷ shown in Figure 122 and pull
    out the module until it has completely cleared the power bay.

    To remove a power bay cover, pull out slightly on the side of the cover with
    the thumbscrew, slide the cover slightly to the right, and then carefully
    remove the cover. See Figure 123 for an illustration.

> ⚠ **Caution:** Power bays must either have a power module or power bay cover
> installed to ensure proper cooling. If proper cooling is not maintained, the
> router could overheat and automatically power off.

Installing a Power Module or Power Bay Cover

To install a power module or power bay cover:

1. If a power module or power bay cover has not been removed, refer to the preceding procedure, "Removing a Power Module or Power Bay Cover.." When completed, proceed to Step 2.

2. Remove the new power module from its shipping container and remove all packing material from around the module. See Figure 122 for an illustration of a power module.

> ⚠ **Caution:** Place the module onto a smooth surface and avoid exposure to direct sunlight, liquids or vapors, excessive heat, risk of accidental dropping, or other damage.

3. To install a power module, hold the handle ❷ shown in Figure 122, align the bottom plate of the module beneath the guides of the bay opening, and slide the module into the power bay until the outer plate of the module is flush against the front-side of the router.

> ⚠ **Caution:** When installing a module, ensure the edges of the bottom plate of the module are beneath the guides of the bay opening. Failure to properly install a module may result in damage to the module or router and may void your service warranty.

To install a power bay cover, carefully slide the cover so that it clips onto the left side of the power bay. Verify the orientation of the warning message as seen in Figure 123.

4. Tighten the thumbscrews on the power module or power bay cover.

Removing and Installing the Fan Module

The fan module is hot-swappable.

⚠ **Caution:** If the fan module is not replaced quickly, the router could overheat and automatically power off.

⚠ **Caution:** The fan module replacement should be performed in less than 3 minutes to avoid overheating. Failure to do so may void the product warranty.

⚠ **Caution:** To prevent static shock, which can damage electrical equipment, use industry accepted handling practices when servicing the router and its components. See Appendix F, "Electrostatic Discharge" for more information.

Removing the Fan Module

To remove a fan module, press the fan module latches inward ❶ and while holding the latches in, pull the fan module outward.

See Figure 124 for an illustration of removing a fan module.
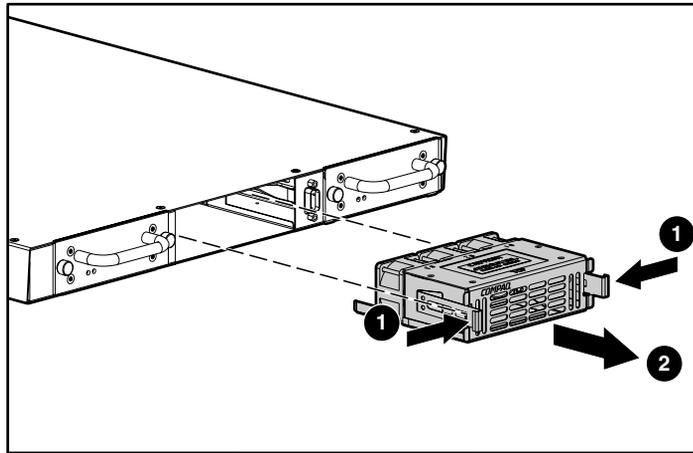
Figure 124: Removing the fan module

Installing the Fan Module

To install the fan module:

1. If a fan module has not been removed, see the preceding procedure, "Removing the Fan Module." When completed, go to Step 2.

2. Remove the new fan module from its shipping container and remove all packing material from around the module.

> ⚠ **Caution:** Place the module onto a smooth surface and avoid exposure to direct sunlight, liquids or vapors, excessive heat, or risk of accidental dropping or other damage.

3. Insert the new fan module into the fan bay, using the orientation shown in Figure 125, Installing a Fan Module. Push the module into position until the fan latches lock into place.
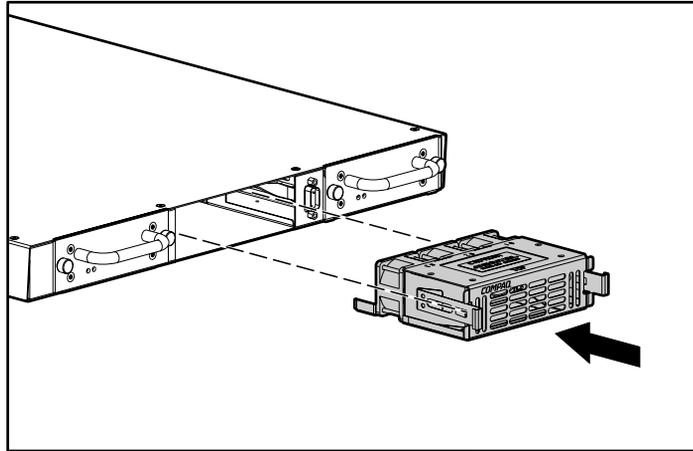
Figure 125: Installing a fan module

4. Verify the newly installed fan module is functioning properly by viewing the Environmental Statistics screen of the Serial/Telnet user interface or the Report Screen of the Visual Manager user interface. These display screens confirm that each fan in the module is rotating.

Removing and Installing an I/O Module or Blank I/O Module

The I/O modules are *not* hot-swappable and must be replaced while the router is powered down.

⚠ **Caution:** To prevent static shock, which can damage electrical equipment, use industry accepted handling practices when servicing the router and its components. See Appendix F, "Electrostatic Discharge," for more information.
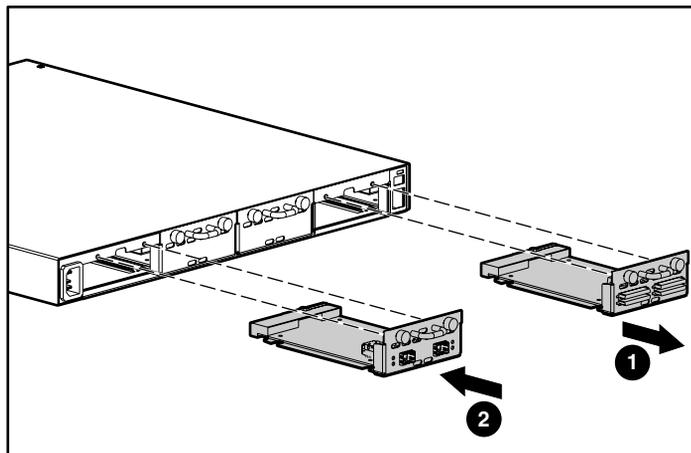
Figure 126: Removing and installing I/O modules

Item	Description
❶	Removing an I/O module blank
❷	Installing a SCSI module

⚠ **Caution:** I/O modules must be installed or removed when the router is powered off. Installing I/O modules while power is applied may result in damage to the module or system. Failure to do so may void the product warranty.

⚠ **Caution:** I/O modules or blank modules must be installed in each I/O bay to ensure proper cooling. If proper cooling is not maintained, the router could overheat and automatically power off.

Removing an I/O Module or Blank Module

To remove an I/O module:

1. Remove power to the router.

2. Loosen the thumbscrews ❶ on the I/O module or blank module shown in Figure 127 in a counter-clockwise rotation.

   The thumbscrews cannot be physically detached from the modules, but can be loosened so that the I/O module or blank module can be removed.
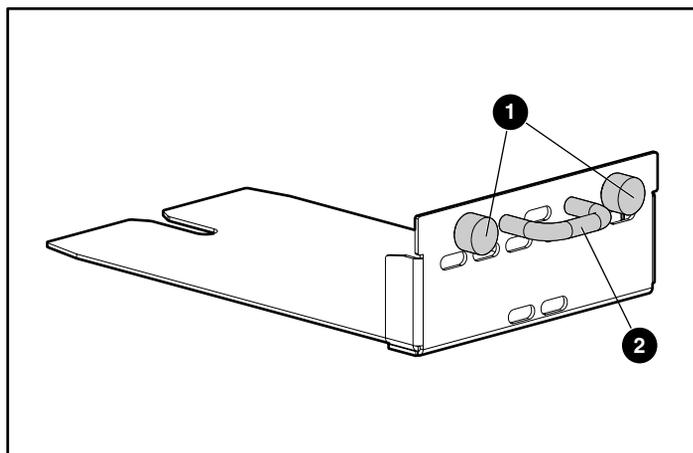
Figure 127: Thumbscrews and handle on an I/O module or blank module

3. Holding the handle ❷ shown in Figure 127, pull out the I/O module or blank module until it has completely cleared the I/O bay.

⚠ **Caution:** I/O bays must either have an I/O module or I/O module blank installed to ensure proper cooling. If proper cooling is not maintained, the router could overheat and automatically power off.

Installing an I/O Module or Blank Module

To install an I/O module:

1. If an I/O module or blank module has not been removed, see the preceding procedure, "Removing an I/O Module or Blank Module." When completed, proceed to Step 2.

2. Remove power to the router.

3. Remove the new I/O module from its shipping container and remove all packing material from around the module.

> ⚠ **Caution:** Place the module onto a smooth surface and avoid exposure to direct sunlight, liquids or vapors, excessive heat, or risk of accidental dropping or other damage.

Figure 128 illustrates a SCSI module and Figure 129 illustrates a Fibre Channel module.
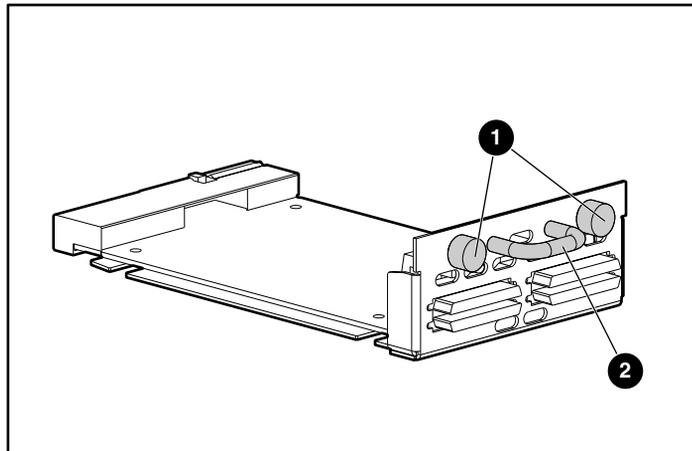
Figure 128: Thumbscrews and handle on a SCSI module
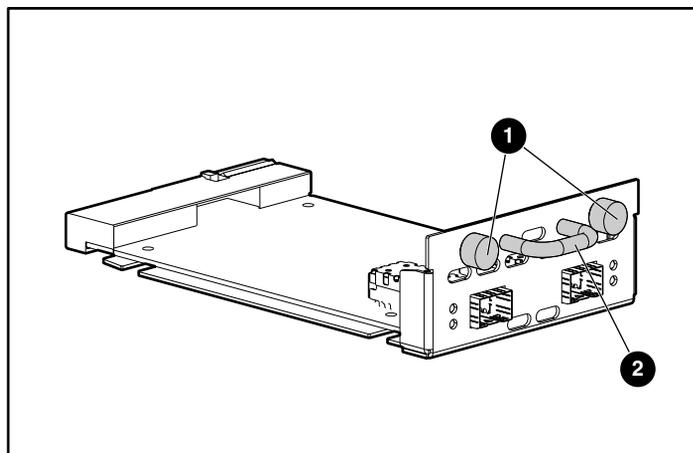
Figure 129: Thumbscrews and handle on a Fibre Channel module

4. To install the new module, hold the handle ❷ shown in Figure 128 or Figure 129, align the bottom plate of the module beneath the guides of the bay opening, and slide the new module into the bay opening until the outer plate of the module is flush against the back-side of the router.

> ⚠ **Caution:** When installing a module, ensure the edges of the bottom plate of the module are beneath the guides of the bay opening. Failure to properly install a module may result in damage to the module or router and may void your service warranty.

5. Tighten the thumbscrews on the new I/O module or blank module until secure.

Basic Troubleshooting

8

This chapter discusses some basic methods of identifying faults in the setup and configuration of the StorageWorks Network Storage Router M2402.

Most problems are made during the initial installation of the router. Before proceeding with advanced troubleshooting techniques, verify all connections and review the configuration.

The following topics are discussed in this chapter:

- LED indicators
- Basic troubleshooting
  - Verifying SCSI bus configuration
  - Verifying Fibre Channel connection
  - Verifying SCSI devices in Windows NT
  - Verifying the router configuration
  - Verifying mapping
  - Verifying devices
  - Verifying host configuration
  - Verifying HBA device driver information
  - Verifying serial port configuration
  - Verifying PRLI data

LED Indicators

The LED indicators on the router are useful for diagnosing various problems:

■   The *Power* LED indicates when power is applied to the router.

   If the power LED is not lit, verify the power supply source or check for an internal problem with the power module.

■   The *Fault* LED indicates that the router detects a fault condition on the power module.

   If the fault indicator stays lit, contact Systems Support.

■   The *Fibre Channel* LEDs indicate Fibre Channel activity and link status.

   If one of these indicators does not light or stays continually lit without any corresponding SCSI bus activity, it may indicate a problem with the Fibre Channel link. Verify the Fibre Channel configuration.

■   The *SCSI Bus* LEDs indicate SCSI activity.

   These indicators are lit during power up, configuration, and when the unit is transferring data. If the SCSI indicator stays continually lit without any corresponding Fibre Channel LED activity, it may indicate a problem with the SCSI bus configuration. Verify the SCSI bus configuration.

■   The *Ethernet* LEDs indicate activity and link status.

   If one of these indicators does not light or stays continuously lit, it may indicate a problem with the network connection. Verify the network connection. The port must be connected to a 10/100BaseT Ethernet network to function properly.

■   The *System Status* LED indicates system power is on.

   An amber light indicates a system fault condition. System faults can occur as a result of a Power On Self Test (POST) failure or operational failures. It is normal for this indicator to flash when the unit is powered up or reset. When the LED continuously alternates between green and amber, this indicates the router is in Beaconing Mode.

Additional information and illustrations of the specific LEDs is available in Chapter 1, "Introduction."

Basic Troubleshooting

If possible, simplify the installation by reducing it to the most basic configuration. Then, add elements one at a time, verifying the operation after each step.

Basic troubleshooting includes verifying the setup and the connections, including:

■ Verifying SCSI Bus Configuration

■ Verifying Fibre Channel Connection

■ Verifying SCSI Devices in Windows NT

■ Verifying the Router Configuration

■ Verifying Mapping

■ Verifying Devices

■ Verifying Host Configuration

■ Verifying HBS Device Driver Information

■ Verifying Serial Port Configuration

■ Verifying PRLI Data

Each of these topics is discussed in the following sections.

Verifying SCSI Bus Configuration

Items to check include:

■ Termination—Problems with termination can cause intermittent or hard failures. A SCSI bus must be terminated on both ends. Termination problems are common when both narrow and wide devices are on the same bus.

■ Bus Type—On an LVD SCSI module, SE and LVD devices can be connected to the same bus. However, if one SE device is detected during power up, communication to all devices will convert to SE mode.

> ⚠️ **Caution:** Do not mix LVD/SE and HVD devices on the same module. Failure to heed this caution may result in severe damage to equipment.

- **Device ID**—Each device on a SCSI bus must have a unique ID. Verify configured IDs are not in use by other devices on the same SCSI bus.

- **Cabling**—Check SCSI cables to verify they are functional. SCSI rules for total length, distance between devices, and stub length must be followed. Connections should also be checked and reseated if necessary.

- **SCSI Devices**—Verify that the SCSI devices on a particular SCSI bus can be seen in the Configuration Menu of the router. If the router cannot see the devices, verify SCSI configuration, cabling, and termination.

Verifying Fibre Channel Connection

If SCSI devices are recognized on the SCSI buses, but do not appear to the Fibre Channel host, it may be that the Fibre Channel link is not properly established. Most hubs and switches have link indicators showing link status. When the router is connected and powered on, this link indicator should show a good link. If it does not, check the cabling or connections.

One method of verifying link integrity when connected to a functional host, involves disconnecting and then reconnecting the Fibre Channel cable. This procedure should cause momentary activity of this indicator as the link reinitializes.

Additionally, verify that the media type of the router and the attached hub, HBA, or switch is of corresponding types. When using optical media, verify that the attached device is using non-OFC type optical devices.

Note: By default, the Fibre Channel port speed is set to 1 Gb/s. Changes to the Fibre Channel port speed must be manually set, such as for 2 Gb/s. If set incorrectly and plugged into a Loop or Fabric, the unit may receive Framing errors due to the incorrect Fibre Channel link speed.

Verifying SCSI Devices in Windows NT

If running Fibre Channel-to-SCSI mapping mode, verify the Fibre Channel and the SCSI devices are recognized by the router.

Sometimes Windows NT may need to be rebooted with all SCSI devices and the router powered up before recognizing the devices.

Verify the Fibre Channel and the SCSI devices:

■   To verify the Fibre Channel devices, navigate to the Windows NT Control Panel, select SCSI Adapters, and double click the Fibre Channel HBA.

The SCSI devices should be listed.

If no devices are listed, verify the router configuration, Fibre Channel HBA configuration, and cabling.

If devices are listed, verify the Fibre Channel HBA mapping mode or the AL_PA addresses.

■   To verify the SCSI devices, navigate to the Windows NT Control Panel, select SCSI adapters, and double click the SCSI controller.

If no devices are listed, verify the router configuration, SCSI Controller configuration, and cabling.

Verifying the Router Configuration

If you are in doubt about the configuration or about the location of the error, restore the router to the factory default configuration and proceed to configure the unit one step at a time, verifying the functionality of the configuration after each change is made.

> **Caution:** Restoring factory defaults overwrites user configurations. In the serial/ Telnet interface, use the save configuration option before resetting factory defaults, to allow recovery of user configuration.

Verifying Mapping

If the router is working in Fibre Channel-to-SCSI Initiator mode and is using Indexed or SCC mapping, try changing to Auto-assigned mapping.

Verifying Devices

It may be useful to connect the SCSI target devices directly to a SCSI interface (for example, a host SCSI bus) to verify that the devices are functional.

Verifying the Host Configuration

In some cases, it may be that the Fibre Channel HBA or host device driver may not be working properly. Check the configuration of these elements.

It may be useful to check the release notes for the device driver to see if there are any specific issues or required configuration. It may also be useful to ensure that the current version of the HBA driver is being used.

There are cases where older applications can have expectations about what constitutes a valid SCSI ID, and thus may not correctly handle certain mappings. This is not an issue for the operating system or most applications. However, some applications may exhibit difficulties addressing target IDs greater than 15 (for example, 16 and higher.) To resolve this situation, configure the router to use hard addressing and set the AL_PA to a value that the HBA will be able to map with an ID less than 16.

Verifying HBA Device Driver Information

Review the HBA device driver *Readme.txt* file for configuration specifics. An HBA may require a different configuration. HBAs typically come with utility programs to view or change their configurations.

Verifying Serial Port Configuration

Verify the configuration of the terminal or terminal emulation program.

Table 5: Terminal EmulationConfiguration Settings

Item	Setting
BAUD Rate	Autobaud, 9600, 19200, 38400, 57600, 115200
Data Bits	8
Stop Bit	1
Parity	None
Flow Control	XON/XOFF

If problems persist, verify the cabling.

If a valid Ethernet IP address is configured, serial configuration settings can also be set via SNMP and Telnet.

Verifying PRLI Data

The router returns the PRLI (preliminary login) response data as specified in . In the default configuration, the router returns PRLI Data (PRLI Accept Payload) with the Target bit SET and the Initiator bit CLEAR. However, some configurations require the Initiator bit be SET, such as in router-to-router configurations. See the Fibre Channel configuration sections of Chapter 4, "Visual Manager User Interface," or Chapter 5, "Serial/Telnet User Interface," for information.

Table 6: PRLI Data

Item	Value
PRLI Command Code	0x20
Page Length	0x10
Payload Length	0x10
Type Code	0x8
Type Code Extension	0x0
OPA	0x0
RPA	0x0
IPE	0x1
Response Code	0x1
Originator Process Associator	0x0
Responder Process Associator	0x0
Initiator Function	0x1
Target Function	0x1
Command/Data Mixed Allowed	0x0
Data/Response Mixed Allowed	0x0
Read XFER_RDY Disabled	0x1
Write XFER_RDY Disabled	0x0

Serial and Ethernet Pin Assignments

A

This appendix provides details for:

■   DB-9 serial pin assignments

■   RJ-45 Ethernet pin assignments

DB-9 Serial Pin Assignments

The layout of the pin assignments for the DB-9 serial receptacle on the front-side of the router is illustrated in Figure 130.
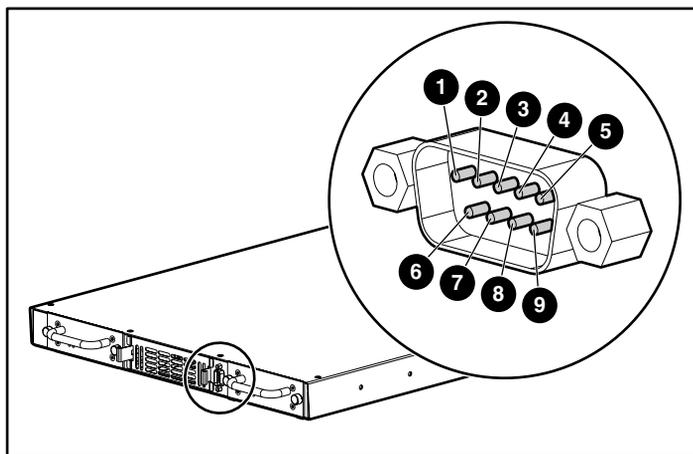
Figure 130: DB-9 Serial pin assignments

The pin definitions in the following table correspond to the pin assignments in Figure 130.

Pin Number	Function
❶	No Connection
❷	Receive Data
❸	Transmit Data
❹	No Connection
❺	Ground
❻	No Connection
❼	RTS (Request to Send) Unused
❽	CTS (Clear to Send) Unused
❾	No Connection

Note: To connect the router to a host system, use a RS-232 null modem cable.

RJ-45 Ethernet Cable Pin Assignments

The layout of the pin assignments for RJ-45 Ethernet receptacle is illustrated in Figure 131.

The router Ethernet connection supports the IEEE specifications for 10BASE-T and 100BASE-TX Ethernet standards.
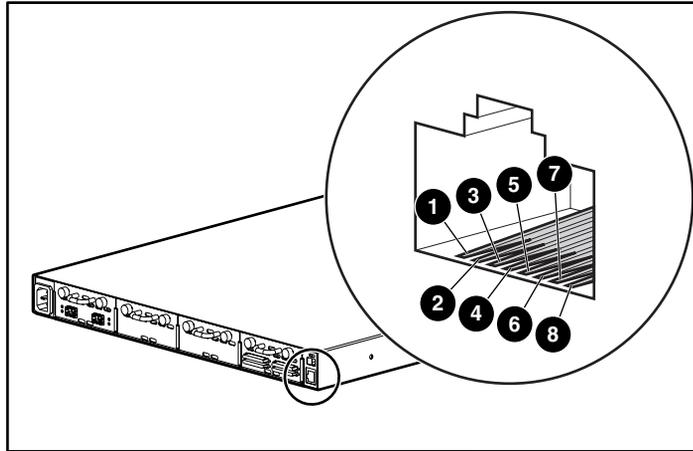
Figure 131: RJ-45 Ethernet pin assignments

Pin Number	Function
❶	Transmit Out +
❷	Transmit Out -
❸	Receive in +
❹	No Connection
❺	No Connection
❻	Receive in -
❼	No Connection
❽	No Connection

Controller LUN Commands

<div style="text-align: right">**B**</div>

The StorageWorks Network Storage Router M2402 supports and executes the set of SCSI-3 commands listed in this Appendix. These commands can be received as FCP commands over the Fibre Channel bus and are supported by the Controller LUNs. This document refers to these commands as Controller LUN commands. Complete definitions of SCSI-3 commands can be found in the SCSI-3 standard available from the American National Standards Institute (ANSI).

This document divides Controller LUN commands into two categories:

■   General commands

■   Copy Manager commands

To first determine which router LUNs are controller LUNs and which are device LUNs, the host software must use the Inquiry general command.

Controller LUNs are addressable in all addressing modes. In SCC mode, there is one controller LUN. In Auto-Assigned and Indexed modes, there can be up to four configurable controller LUNs.

To access Copy Manager or other general management features, the commands must be sent to the router controller LUNs.

To initiate Extended Copy operations (a subset of Copy Manager), the commands can be sent to any tape device LUN attached to the router. The four controller LUNs allow the host software to run multiple concurrent Extended Copy commands.

Note: Controller LUNs are numbered in sequence following the last device LUN, without any gaps. A controller LUN may be placed anywhere in custom tables.

General Commands

- ■ `Report LUNs`
- ■ `Inquiry`

Each of these commands is discussed in the following paragraphs.

Report LUNs Command

The `Report LUNs` command returns a list of LUNs that can receive commands. The format of the `Report LUNs` command is shown in Table 7.

Table 7: Format of Report LUNs Command

Bit/Byte	7	6	5	4	3	2	1	0
0	Operation Code (Example: 0xA0)							
1	Reserved							
2	Reserved							
3	Reserved							
4	Reserved							
5	Reserved							
6	Most Significant Byte (MSB)							
7	Allocation Length							
8								
9	Least Significant Byte (LSB)							
10	Reserved							
11	Control Byte							

The router returns the LUN Parameters as defined in Table 8.

Table 8: Report LUNs Data

Bit/Byte	7	6	5	4	3	2	1	0
0	Most Significant Byte (MSB)							
1	LUNS Length List							
2								
3	Least Significant Byte (LSB)							
4	Reserved							
5	Reserved							
6	Reserved							
7	Reserved							

All LUNs are reported and will appear in the host map.

Note: In addition to the device LUNs, controller LUNs are also included in the report. Controller LUN values are displayed at the end of the list. Controller LUN Inquiries report peripheral device types as 0x0c.

Inquiry Command

The format of the Inquiry Command is shown in Table 9.

Table 9: Format of LUN Inquiry Command

Bit/Byte	7	6	5	4	3	2	1	0
0	Operation Code (Example: 0x12)							
1	Reserved							EVPD
2	Page Code or Operation Code							
3	Reserved							
4	Allocation Length							
5	Control							

EVPD Page 0x80

If the EVPD bit (bit 0 of byte 1) is set and the Page Code is 0x80, the *unit serial number page* is returned. The format of this page is shown in Table 10.

Table 10: Format of EVPD Page 0X80

Bit/Byte	7	6	5	4	3	2	1	0
0	Device Type (Example: 0x0c)							
1	Page Code (80h)							
3	Reserved							
4	Page Length							
5	Serial Number							

The router returns the LUN Inquiry Data as defined in Table 11.

Table 11: LUN Inquiry Data

Item	Value
Peripheral Qualifier	0x00
Peripheral Device Type	0x0C – Indicates Router/Router function
RMB	0x00
Device Type Qualifier	0x00
ISO Version	0x00
AENC	0x00
TrmIOP	0x00
Response Data Format	0x02 – SCSI-2 Inquiry Data Format
Additional Length	0x20
RelAdr	0x00
Wbus32	0x00
Sync	0x00
Linked	0x00
CmdQue	0x00
SftRe	0x00

Table 11: LUN Inquiry Data

Item	Value
Vendor ID	"HP"
Product ID	"router"
Revision Level	"XXXXXX"

The router will only reply to a SCSI Inquiry using 8-byte LUN field of 0x00.

Note: The Revision Level comes from the last four characters of the build string, which appears in the headings for most menu screens.

Copy Manager Commands

To access Copy Manager or other general management features, the commands must be sent to the router controller LUNs.

The following controller LUN commands can be used for Copy Manager on the router:

- `Extended Copy`
- `Receive Copy Results`
- `Mode Sense (6)` and `Mode Sense (10)`

Each of these commands is discussed in the following paragraphs.

Extended Copy Command

The router supports Extended Copy commands in the following two formats:

- Version 99-143r1
- Version SPC-2

To initiate Extended Copy operations, the commands can be sent to any tape device LUN attached to the router. Multiple concurrent `Extended Copy` commands can be active.

Version 99-143r1

The `Extended Copy` command supports the following Target descriptor codes listed in T10 document 99-143r1 (Page 3, Table 10):

Table 12: Extended Copy Target descriptor codes, version 99-143r1

Item	Value
Fibre Channel World Wide Name Target Descriptor	0xE0
Fibre Channel N_Port Target descriptor	0xE1

The `Extended Copy` command supports the following Initiator descriptor codes listed in T10 document 99-143r1 (Page 3, Table 10):

Table 13: Extended Copy Initiator descriptor codes, version 99-143r1

Item	Value
Block to Stream	0x00
Stream to Block	0x01
Block to Block	0x02
Inline to Stream	0x04
Stream to Discard	0x06
Verify Target	0x07
Space Operation	0x11
Locate Operation	0x12

Version SPC-2

The `Extended Copy` command supports the following Target descriptor codes listed in T10 document 1236-D (Page 48, Table 16):

Table 14: Extended Copy Target descriptor codes, version SPC2

Item	Value
Fibre Channel World Wide Name Target Descriptor	0xE0
Fibre Channel N_Port Target Descriptor	0xE1

`Extended Copy` command also supports the following Initiator descriptor codes listed in T10 document 1236-D (Page 48, Table 16):

Table 15: Extended Copy Initiator codes, version SPC2

Item	Value
Block to Stream	0x00
Stream to Block	0x01
Block to Stream	0x02
Stream to Stream	0x03
Inline Data to Stream	0x04
Stream to Discard	0x06
Verify Target	0x07
Block with Offset to Stream	0x08
Stream to Discard + Hold	0x0f
Space Operation	0x11
Locate Operation	0x12

Receive Copy Results Command

The router supports the `Receive Copy Results` command, used to return the results of a previous or current `Extended Copy` command.

The `Receive Copy Results` command supports the following mode listed in T10 document 99-143r1 (Page 30, Table 38):

Table 16: Receive Copy Results command, mode

Item	Value
Copy Status	0x00

The `Receive Copy Results` command also supports the following service actions listed in T10 document 1236-D (Page 119, Table 86):

Table 17: Receive Copy Results command, service actions

Item	Value
Copy Status	0x00
Receive Data	0x01
Operating Parameters	0x03
Failed Segment DetailsS	0x04

Mode Sense (6) and Mode Sense (10) Commands

The router supports the `Mode Sense (6)` and `Mode Sense (10)` commands, used in conjunction with the 99-143r1 version of `Extended Copy` command.

Addressing Methods and Table Structures

C

Fibre Channel and SCSI systems use different methods of addressing devices. The router has a method of translating device IDs so each SCSI device is mapped to the appropriate Fibre Channel LUN. The SCSI buses establish the bus connections between devices. Targets on a SCSI bus may internally address LUNs. The addressing of a specific SCSI device is represented by the BUS:TARGET:LUN triplet.

When a Fibre Channel Initiator initializes on a loop, the host must first determine what devices exist on the loop. Device discovery is performed and an FCP target device list is built. Each device is queried for FCP LUNs (the LUNs are the actual devices that the operating system will address.) The addressing used is the SCC Logical Unit Addressing and Peripheral Device Addressing method, shown in Table 18 through Table 23. First level addressing is supported, so only the first two bits of the 8 bit FCP LUN are used.

Table 18: Addressing Sequence

Bit/Byte	7	6	5	4	3	2	1	0
N	Address Method				Address Method Specific			
N+1	Address Mothod Specific							

Table 19: Address Method Definitions

Code	Description
00	Peripheral Device Addressing Method
01	Volume Set Addressing Method
10	Logical Unit Addressing Method
11	Reserved

Table 20: SCSI Logical Unit Addressing

Bit/Byte	7	6	5	4	3	2	1	0
N	1	0	Target					

Table 21: Peripheral Device Addressing

Bit/Byte	7	6	5	4	3	2	1	0
N	0	0	Bus					
N+1	Target/LUN							

Depending on the configuration, the router supports the Peripheral Device Addressing method and the Logical Unit Addressing method.

The data shown in Table 22 comes from the Fibre Channel Configuration Menu. The administrator enters the node number (number to the left of the colon in Table 22) and the router translates the node number into the corresponding AL_PA value (number to the right of the colon in Table 22).

Table 22: Arbitrated Loop Node-Number to AL-PA Lookup Table

0:0x01	21:0x2E	42:0x52	63:0x74	84:0xA6	105:0xC9
1:0x02	22:0x31	43:0x53	64:0x75	85:0xA7	106:0xCA
2:0x04	23:0x32	44:0x54	65:0x76	86:0xA9	107:0xCB
3:0x08	24:0x33	45:0x55	66:0x79	87:0xAA	108:0xCC
4:0x0F	25:0x34	46:0x56	67:0x7A	88:0xAB	109:0xCD
5:0x10	26:0x35	47:0x59	68:0x7C	89:0xAC	110:0xCE
6:0x17	27:0x36	48:0x5A	69:0x80	90:0xAD	111:0xD1
7:0x18	28:0x39	49:0x5C	70:0x81	91:0xAE	112:0xD2
8:0x1B	29:0x3A	50:0x63	71:0x82	92:0xB1	113:0xD3
9:0x1D	30:0x3C	51:0x65	72:0x84	93:0xB2	114:0xD4
10:0x1E	31:0x43	52:0x66	73:0x88	94:0xB3	115:0xD5
11:0x1F	32:0x45	53:0x67	74:0x8F	95:0xB4	116:0xD6
12:0x23	33:0x46	54:0x69	75:0x90	96:0xB5	117:0xD9
13:0x25	34:0x47	55:0x6A	76:0x97	97:0xB6	118:0xDA
14:0x26	35:0x49	56:0x6B	77:0x98	98:0xB9	119:0xDC
15:0x27	36:0x4A	57:0x6C	78:0x9B	99:0xBA	120:0xE0
16:0x29	37:0x4B	58:0x6D	79:0x9D	100:0xBC	121:0xE1
17:0x2A	38:0x4C	59:0x6E	80:0x9E	101:0xC3	122:0xE2
18:0x2B	39:0x4D	60:0x71	81:0x9F	102:0xC5	123:0xE4
19:0x2C	40:0x4E	61:0x72	82:0xA3	103:0xC6	124:0xE8
20:0x2D	41:0x51	62:0x73	83:0xA5	104:0xC7	125:0xEF

SCC (SCSI Controller Command) Addressing Method

When a router is configured to use SCSI Controller Command addressing (SCC) and a command is received, the router either will respond as a controller device to the FCP Initiator or will route the FCP request to a specified BUS:TARGET:LUN. If a request using the Peripheral Device Addressing method is received (an FCP command with the LUN field bits 7 and 6 of byte 0 set to 0), the router routes the request to the internal processor, which acts on the command directly. If a request using the Logical Unit Addressing method is received (bits 7 and 6 set to 00x10), the request is routed to the BUS:TARGET:LUN as specified in the defined field.

Host systems using SCC addressing will typically do initial device discovery using the Peripheral Device Addressing method. On issuing an Inquiry command to the router, the host will receive the router Inquiry data, indicating the device type as a controller device (Inquiry data indicates device type is 0xC). The host will then know that subsequent commands to router-attached devices will use the Logical Unit Addressing method.

The host can perform discovery by either progressing through the BUS:TARGET:LUN values, as would a standard SCSI driver, or by issuing a Report LUNs command. This command is sent to the router (using the Peripheral Device Addressing method). The router returns a table indicating the attached devices. The host can then perform actions on these devices directly without performing further discovery processing.

Auto Assigned Addressing Method

The Auto Assigned addressing method is created through SCSI device discovery on power up or reset. As the router performs device discovery on the SCSI bus, the index table FCP LUN values are filled with adjacent FCP LUN referencing each subsequent SCSI device. The index table generated by the Auto Assigned option cannot be manually edited.

When the Auto Assigned option is used, the host system will detect every attached SCSI device without voids, allowing full device access to the host. This method allows easy configuration in environments where SCSI device ordering is not important and where hot plugging of SCSI devices will not occur. For example, tape libraries are excellent candidates for using Auto Assigned Addressing. Configuration options provide for the SCSI discovery to be performed in order of bus, target, or LUN as desired for the specific environment.

Indexed Addressing Method

Indexed addressing allows for host bus adapter (HBA) drivers that use only Peripheral Device Addressing to access SCSI devices attached to the router. This addressing is done by use of a table, which is indexed by sequential LUN values, indicating the selected BUS:TARGET:LUN devices. In this mode, it is not possible to address the router as a controller unit directly.

The maximum size of the table is equal to the number of buses multiplied by the number of targets per bus less one Initiator ID per bus, multiplied by the number of LUNs per target. The index table can be manually edited. A method is also provided to perform SCSI device discovery and fill the index table.

See Table 23 for the Indexed addressing table.

Table 23: Indexed Addressing Table

FCP LUN Value	SCSI BUS:TARGET:LUN
0	0:0:0
1	0:1:0
2	0:2:0
3	0:3:0
4	0:4:0
5	0:5:0
6	0:6:0
	(0:7:0 occupied by Initiator ID)
7	0:8:0
(…)	(…)
13	0:14:0
14	0:15:0
15	1:0:0
16	1:1:0
17	1:2:0
(…)	(…)

SNMP Management Information Bases

<div style="text-align: right">**D**</div>

The StorageWorks Network Storage Router M2402 (router) supports two Simple Network Management Protocol (SNMP) Management Information Bases (MIB):

■ Fibre Alliance (MIB)

■ Enterprise (MIB)

An MIB contains complete descriptions of the different types of information that can be exchanged between the router and a management application using SNMP. The Fibre Alliance MIB provides support for link status, event logging, traps, and other information. The Enterprise MIB allows access to all configuration information stored in the router.

In addition to discussing the Fibre Alliance MIB and the Enterprise MIB, this appendix also includes one table for each MIB that includes a listing of the MIB elements. These tables are at the end of this appendix.

The MIBs can be used to view serial number, port information, topology, and statistics even while the router is operating in a SAN environment.

Revision information, such as board, bios, and firmware version numbers can also be viewed. In addition, information about server-free backup agents and their compliance information, such as supported T11 standards can be viewed.

Link and topology information (in the connUnitLink Table leaf) can be used to draw visual maps of the SAN fabric with various applications including Computer Associates SANiti^{TM} and Vixel SANinsite^{TM}.

Fibre Alliance MIB

The router supports the Fibre Alliance MIB, version 2.2. The Fibre Alliance is an industry consortium dedicated to implementing standard methods of management for SAN environments. The Fibre Alliance MIB has been submitted to the IETF for review as of September 14, 1999, but is has not yet been adopted as an IETF standard. For further information, contact a systems services representative, go to the Fibre Alliance website, or go to the IETF website.

Note: Fibre Alliance is located at http://www.fibrealliance.org and IETF is located at http://www.ietf.org.

The router provides the following support for the Fibre Alliance MIB, version 2.2:

■ Setting router statistics

■ Viewing the router Event Log

Setting Router Statistics

Some of the router settings include the router name, port names, port connections, and SNMP traps. Up to three network-management trap stations can be set.

The next sections of this appendix discuss:

■ Setting Basic Router Information

■ Setting Port Name Information

■ Setting SNMP Trap IP Addresses

Setting Basic Router Information

Router basic information settings include the router name and information, contact information, and location information.

To set basic router information:

1. Access the Fibre Alliance MIB.
2. Go to the connUnitTable in the Fibre Alliance MIB.
3. Go to the connUnitName leaf.

4. Do a SET operation on the connUnitName leaf, making sure to use the community SET string shown in the Serial/Telnet SNMP Configuration Menu.

5. Repeat these steps for each connUnitInfo, connUnitContact, and connUnitLocation.

Setting Port Name Information

HP recommends naming ports based on the type of device that is connected to that port. For example, a port connected to a terabyte RAID storage array could be named something to reflect this identity.

To name a port:

1. Access the Fibre Alliance MIB.

2. Go to the connUnitPortTable leaf.

3. Scroll to the connUnitPortName leaf.

4. Do a SET operation on the connUnitPortName leaf, making sure to use the community SET string shown in the Serial/Telnet SNMP Configuration Menu.

Setting SNMP Trap IP Addresses

The router allows configuration of up to three network managers, with different filtering levels on each manager. Each network management station receives event traps about unit, port, and sensor changes. These traps can be monitored by various applications, including Computer Associates SANiti[TM] and Vixel SANinsite[TM].

To set up an IP address for a network manager:

1. Access the Fibre Alliance MIB.

2. Go to the trapReg leaf.

3. Do a WALK of the leaf to see how many open slots are available in the trapClientAccount leaf. There should be less than three.

4. Go to the trapRegRowState leaf in the trapRegTable.

5. Set the Object Identifier (OID) to the IP address and port number.

   This sets an IP address with a default filter value of 6 (which corresponds to warning events) and includes events for all values of 5 and below.

   The value entered for the port number must be an integer in the range of 1 to 65,535.

6. To modify trap filters for this IP address, do a SET on the trapRegFilter leaf, after creating that row in the trapRegTable.

   To change the filter value, use options 5 and 6 in the SNMP Configuration menu.

7. Repeat these steps to a maximum limit provided by trapMaxClients.

Viewing the Router Event Log

From the network management application or SNMP MIB browser, it is possible to view the event log of the router from the connUnitEventTable leaf.

The format of event log entry: `Event Severity, Type, OID Value`

- **Event Severity** is an integer in the range of 0 to 9 and corresponds to the filter values selected from the Fibre Alliance MIB 2.2 Event Filter Settings menu of the SNMP Configuration Menu.

- **Type** can be status (for example, a reboot event), configuration (for example, a change to settings), topology (for example, a discovery event), other (for example, internal information), or unknown (for example, an unclassified event).

- **OID Value** is the Object Identifier associated with this event.

Each entry in the event log also includes a 4-digit time stamp, indicating the elapsed time since the last boot. The first two digits represent seconds and the second two represent hundredths of a second.

Enterprise MIB

The Enterprise MIB can be accessed over an Ethernet connection. The current implementation of the MIB supports read-only functionality. Information is broken down into 'config', 'topology', and 'utilities' nodes.

- **Config node** provides information about the static configuration settings of the router.

- **Topology node** provides information about all of the devices attached to the router, current map settings, and maps used by initiators.

- **Utilities node** provides information about the current status of the router, port and bus statistics, and various system logs that can be used for diagnostics.

For more information on accessing the Enterprise MIB, contact a systems services representative.

Fibre Alliance MIB 2.2 Table

Table 24 is a listing of the Fibre Alliance MIB 2.2 elements.

Table 24: Fibre Alliance MIB Table

ID	Name	Type
1.3.6.1.3	experimental	NODE
1.3.6.1.3.94	fcmgmt	NODE
1.3.6.1.3.94.1	connSet	NODE
1.3.6.1.3.94.1.1	uNumber	LEAF INTEGER
1.3.6.1.3.94.1.2	systemURL	LEAF DisplayString
1.3.6.1.3.94.1.3	statusChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.4	configurationChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.5	connUnitTableChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.6	connUnitTable	NODE
1.3.6.1.3.94.1.6.1	connUnitEntry	NODE
1.3.6.1.3.94.1.6.1.1	connUnitId	LEAF DisplayString
1.3.6.1.3.94.1.6.1.2	connUnitGlobalId	LEAF FcGlobalId
1.3.6.1.3.94.1.6.1.3	connUnitType	LEAF FcUnitType
1.3.6.1.3.94.1.6.1.4	connUnitNumports	LEAF INTEGER
1.3.6.1.3.94.1.6.1.5	connUnitState	LEAF INTEGER
1.3.6.1.3.94.1.6.1.6	connUnitStatus	LEAF INTEGER
1.3.6.1.3.94.1.6.1.7	connUnitProduct	LEAF DisplayString
1.3.6.1.3.94.1.6.1.8	connUnitSn	LEAF DisplayString
1.3.6.1.3.94.1.6.1.9	connUnitUpTime	LEAF TimeTicks
1.3.6.1.3.94.1.6.1.10	connUnitUrl	LEAF DisplayString
1.3.6.1.3.94.1.6.1.11	connUnitDomainId	LEAF DisplayString
1.3.6.1.3.94.1.6.1.12	connUnitProxyMaster	LEAF INTEGER
1.3.6.1.3.94.1.6.1.13	connUnitPrincipal	LEAF INTEGER
1.3.6.1.3.94.1.6.1.14	connUnitNumSensors	LEAF INTEGER
1.3.6.1.3.94.1.6.1.15	connUnitStatusChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.6.1.16	connUnitConfigurationChangeTime	LEAF TimeTicks
1.3.6.1.3.94.1.6.1.17	connUnitNumRevs	LEAF INTEGER
1.3.6.1.3.94.1.6.1.18	connUnitNumZones	LEAF INTEGER

Table 24: Fibre Alliance MIB Table

ID	Name	Type
1.3.6.1.3.94.1.6.1.19	connUnitModuleId	LEAF DisplayString
1.3.6.1.3.94.1.6.1.20	connUnitName	LEAF DisplayString
1.3.6.1.3.94.1.6.1.21	connUnitInfo	LEAF DisplayString
1.3.6.1.3.94.1.6.1.22	connUnitControl	LEAF INTEGER
1.3.6.1.3.94.1.6.1.23	connUnitContact	LEAF DisplayString
1.3.6.1.3.94.1.6.1.24	connUnitLocation	LEAF DisplayString
1.3.6.1.3.94.1.6.1.25	connUnitEventFilter	LEAF FcEventSeverity
1.3.6.1.3.94.1.6.1.26	connUnitNumEvents	LEAF INTEGER
1.3.6.1.3.94.1.6.1.27	connUnitMaxEvents	LEAF INTEGER
1.3.6.1.3.94.1.6.1.28	connUnitEventCurrID	LEAF INTEGER
1.3.6.1.3.94.1.7	connUnitRevsTable	NODE
1.3.6.1.3.94.1.7.1	connUnitRevsEntry	NODE
1.3.6.1.3.94.1.7.1.1	connUnitRevsUnitId	LEAF DisplayString
1.3.6.1.3.94.1.7.1.2	connUnitRevsIndex	LEAF INTEGER
1.3.6.1.3.94.1.7.1.3	connUnitRevsRevId	LEAF DisplayString
1.3.6.1.3.94.1.7.1.4	connUnitRevsDescription	LEAF DisplayString
1.3.6.1.3.94.1.8	connUnitSensorTable	NODE
1.3.6.1.3.94.1.8.1	connUnitSensorEntry	NODE
1.3.6.1.3.94.1.8.1.1	connUnitSensorUnitId	LEAF DisplayString
1.3.6.1.3.94.1.8.1.2	connUnitSensorIndex	LEAF INTEGER
1.3.6.1.3.94.1.8.1.3	connUnitSensorName	LEAF DisplayString
1.3.6.1.3.94.1.8.1.4	connUnitSensorStatus	LEAF INTEGER
1.3.6.1.3.94.1.8.1.5	connUnitSensorInfo	LEAF DisplayString
1.3.6.1.3.94.1.8.1.6	connUnitSensorMessage	LEAF DisplayString
1.3.6.1.3.94.1.8.1.7	connUnitSensorType	LEAF INTEGER
1.3.6.1.3.94.1.8.1.8	connUnitSensorCharacteristic	LEAF INTEGER
1.3.6.1.3.94.1.10	connUnitPortTable	NODE
1.3.6.1.3.94.1.10.1	connUnitPortEntry	NODE
1.3.6.1.3.94.1.10.1.1	connUnitPortUnitId	LEAF DisplayString
1.3.6.1.3.94.1.10.1.2	connUnitPortIndex	LEAF INTEGER
1.3.6.1.3.94.1.10.1.3	connUnitPortType	LEAF INTEGER

Table 24: Fibre Alliance MIB Table

ID	Name	Type
1.3.6.1.3.94.1.10.1.4	connUnitPortFCClassCap	LEAF DisplayString
1.3.6.1.3.94.1.10.1.5	connUnitPortFCClassOp	LEAF DisplayString
1.3.6.1.3.94.1.10.1.6	connUnitPortState	LEAF INTEGER
1.3.6.1.3.94.1.10.1.7	connUnitPortStatus	LEAF INTEGER
1.3.6.1.3.94.1.10.1.8	connUnitPortTransmitterType	LEAF INTEGER
1.3.6.1.3.94.1.10.1.9	connUnitPortModuleType	LEAF INTEGER
1.3.6.1.3.94.1.10.1.10	connUnitPortWwn	LEAF FcNameId
1.3.6.1.3.94.1.10.1.11	connUnitPortFCId	LEAF DisplayString
1.3.6.1.3.94.1.10.1.12	connUnitPortSn	LEAF DisplayString
1.3.6.1.3.94.1.10.1.13	connUnitPortRevision	LEAF DisplayString
1.3.6.1.3.94.1.10.1.14	connUnitPortVendor	LEAF DisplayString
1.3.6.1.3.94.1.10.1.15	connUnitPortSpeed	LEAF INTEGER
1.3.6.1.3.94.1.10.1.16	connUnitPortControl	LEAF INTEGER
1.3.6.1.3.94.1.10.1.17	connUnitPortName	LEAF DisplayString
1.3.6.1.3.94.1.10.1.18	connUnitPortPhysicalNumber	LEAF INTEGER
1.3.6.1.3.94.1.10.1.19	connUnitPortStatObject	LEAF OBJECT IDENTIFIER
1.3.6.1.3.94.1.11	connUnitEventTable	NODE
1.3.6.1.3.94.1.11.1	connUnitEventEntry	NODE
1.3.6.1.3.94.1.11.1.1	connUnitEventUnitId	LEAF DisplayString
1.3.6.1.3.94.1.11.1.2	connUnitEventIndex	LEAF INTEGER
1.3.6.1.3.94.1.11.1.3	connUnitEventId	LEAF INTEGER
1.3.6.1.3.94.1.11.1.4	connUnitREventTime	LEAF DisplayString
1.3.6.1.3.94.1.11.1.5	connUnitSEventTime	LEAF TimeTicks
1.3.6.1.3.94.1.11.1.6	connUnitEventSeverity	LEAF FcEventSeverity
1.3.6.1.3.94.1.11.1.7	connUnitEventType	LEAF INTEGER
1.3.6.1.3.94.1.11.1.8	connUnitEventObject	LEAF OBJECT IDENTIFIER
1.3.6.1.3.94.1.11.1.9	connUnitEventDescr	LEAF DisplayString
1.3.6.1.3.94.1.12	connUnitLinkTable	NODE
1.3.6.1.3.94.1.12.1	connUnitLinkEntry	NODE
1.3.6.1.3.94.1.12.1.1	connUnitLinkUnitId	LEAF DisplayString
1.3.6.1.3.94.1.12.1.2	connUnitLinkIndex	LEAF INTEGER

Table 24: Fibre Alliance MIB Table

ID	Name	Type
1.3.6.1.3.94.1.12.1.3	connUnitLinkNodeIdX	LEAF DisplayString
1.3.6.1.3.94.1.12.1.4	connUnitLinkPortNumberX	LEAF INTEGER
1.3.6.1.3.94.1.12.1.5	connUnitLinkPortWwnX	LEAF DisplayString
1.3.6.1.3.94.1.12.1.6	connUnitLinkNodeIdY	LEAF DisplayString
1.3.6.1.3.94.1.12.1.7	connUnitLinkPortNumberY	LEAF INTEGER
1.3.6.1.3.94.1.12.1.8	connUnitLinkPortWwnY	LEAF DisplayString
1.3.6.1.3.94.1.12.1.9	connUnitLinkAgentAddressY	LEAF DisplayString
1.3.6.1.3.94.1.12.1.10	connUnitLinkAgentAddressTypeY	LEAF INTEGER
1.3.6.1.3.94.1.12.1.11	connUnitLinkAgentPortY	LEAF INTEGER
1.3.6.1.3.94.1.12.1.12	connUnitLinkUnitTypeY	LEAF FcUnitType
1.3.6.1.3.94.1.12.1.13	connUnitLinkConnIdY	LEAF DisplayString
1.3.6.1.3.94.2	trapReg	NODE
1.3.6.1.3.94.2.1	trapMaxClients	LEAF INTEGER
1.3.6.1.3.94.2.2	trapClientCount	LEAF INTEGER
1.3.6.1.3.94.2.3	trapRegTable	NODE
1.3.6.1.3.94.2.3.1	trapRegEntry	NODE
1.3.6.1.3.94.2.3.1.1	trapRegIpAddress	LEAF IpAddress
1.3.6.1.3.94.2.3.1.2	trapRegPort	LEAF INTEGER
1.3.6.1.3.94.2.3.1.3	trapRegFilter	LEAF FcEventSeverity
1.3.6.1.3.94.2.3.1.4	trapRegRowState	LEAF INTEGER
1.3.6.1.3.94.3	revisionNumber	LEAF DisplayString
1.3.6.1.3.94.4	statSet	NODE
1.3.6.1.3.94.4.1	connUnitPortStatHubTable	NODE
1.3.6.1.3.94.4.1.1	connUnitPortStatHubEntry	NODE
1.3.6.1.3.94.4.1.1.1	connUnitPortStatHubUnitId	LEAF DisplayString
1.3.6.1.3.94.4.1.1.2	connUnitPortStatHubIndex	LEAF INTEGER
1.3.6.1.3.94.4.1.1.3	connUnitPortStatHubCountError	LEAF DisplayString
1.3.6.1.3.94.4.1.1.4	connUnitPortStatHubCountTxFrame	LEAF DisplayString
1.3.6.1.3.94.4.1.1.5	connUnitPortStatHubCountRxFrame	LEAF DisplayString
1.3.6.1.3.94.4.1.1.6	connUnitPortStatHubCountTxOctets	LEAF DisplayString
1.3.6.1.3.94.4.1.1.7	connUnitPortStatHubCountRxOctets	LEAF DisplayString

Table 24: Fibre Alliance MIB Table

ID	Name	Type
1.3.6.1.3.94.4.2	connUnitPortStatFabricTable	NODE
1.3.6.1.3.94.4.2.1	connUnitPortStatFabricEntry	NODE
1.3.6.1.3.94.4.2.1.1	connUnitPortStatFabricUnitId	LEAF DisplayString
1.3.6.1.3.94.4.2.1.2	connUnitPortStatFabricIndex	LEAF INTEGER
1.3.6.1.3.94.4.2.1.3	connUnitPortStatFabricCountError	LEAF DisplayString
1.3.6.1.3.94.4.2.1.4	connUnitPortStatFabricCountTxFrame	LEAF DisplayString
1.3.6.1.3.94.4.2.1.5	connUnitPortStatFabricCountRxFrame	LEAF DisplayString
1.3.6.1.3.94.4.2.1.6	connUnitPortStatFabricCountTxOctets	LEAF DisplayString
1.3.6.1.3.94.4.2.1.7	connUnitPortStatFabricCountRxOctets	LEAF DisplayString
1.3.6.1.3.94.4.3	connUnitPortStatSCSITable	NODE
1.3.6.1.3.94.4.3.1	connUnitPortStatSCSIEntry	NODE
1.3.6.1.3.94.4.3.1.1	connUnitPortStatSCSIUnitId	LEAF DisplayString
1.3.6.1.3.94.4.3.1.2	connUnitPortStatSCSIIndex	LEAF INTEGER
1.3.6.1.3.94.4.3.1.3	connUnitPortStatSCSICountError	LEAF DisplayString
1.3.6.1.3.94.4.3.1.4	connUnitPortStatSCSICountTxIO	LEAF DisplayString
1.3.6.1.3.94.4.3.1.5	connUnitPortStatSCSICountRxIO	LEAF DisplayString
1.3.6.1.3.94.4.3.1.6	connUnitPortStatSCSICountTxBytes	LEAF DisplayString
1.3.6.1.3.94.4.3.1.7	connUnitPortStatSCSICountRxBytes	LEAF DisplayString
1.3.6.1.3.94.4.4	connUnitPortStatLANTable	NODE
1.3.6.1.3.94.4.4.1	connUnitPortStatLANEntry	NODE
1.3.6.1.3.94.4.4.1.1	connUnitPortStatLANUnitId	LEAF DisplayString
1.3.6.1.3.94.4.4.1.2	connUnitPortStatLANIndex	LEAF INTEGER
1.3.6.1.3.94.4.4.1.3	connUnitPortStatLANCountError	LEAF DisplayString
1.3.6.1.3.94.4.4.1.4	connUnitPortStatLANCountTxPacket	LEAF DisplayString
1.3.6.1.3.94.4.4.1.5	connUnitPortStatLANCountRxPacket	LEAF DisplayString
1.3.6.1.3.94.4.4.1.6	connUnitPortStatLANCountTxBytes	LEAF DisplayString
1.3.6.1.3.94.4.4.1.7	connUnitPortStatLANCountRxBytes	LEAF DisplayString
1.3.6.1.4	private	NODE
1.3.6.1.4.1	enterprises	NODE
1.3.6.1.5	security	NODE
1.3.6.1.6	snmpV2	NODE

Table 24: Fibre Alliance MIB Table

ID	Name	Type
1.3.6.1.6.1	snmpDomains	NODE
1.3.6.1.6.1.1	snmpUDPDomain	NODE
1.3.6.1.6.1.2	snmpCLNSDomain	NODE
1.3.6.1.6.1.3	snmpCONSDomain	NODE
1.3.6.1.6.1.4	snmpDDPDomain	NODE
1.3.6.1.6.1.5	snmpIPXDomain	NODE
1.3.6.1.6.2	snmpProxys	NODE
1.3.6.1.6.2.1	rfc1157Proxy	NODE
1.3.6.1.6.2.1.1	rfc1157Domain	NODE
1.3.6.1.6.3	snmpModules	NODE

Enterprise MIB Table

Table 25 is a listing of the Enterprise MIB elements.

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512	HP	NODE
1.3.6.1.4.1.2512.1	router	NODE
1.3.6.1.4.1.2512.1.1	config	NODE
1.3.6.1.4.1.2512.1.1.1	physical	NODE
1.3.6.1.4.1.2512.1.1.1.1	module	NODE
1.3.6.1.4.1.2512.1.1.1.1.1	moduleTable	NODE
1.3.6.1.4.1.2512.1.1.1.1.1.1	moduleEntry	NODE
1.3.6.1.4.1.2512.1.1.1.1.1.1.1	moduleNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.1.1.1.2	moduleStatus	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.1.1.1.3	moduleProtocol	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.1.1.1.4	moduleNumPorts	LEAF Integer32
1.3.6.1.4.1.2512.1.1.1.1.1.1.5	moduleVendor	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.1.1.1.6	moduleSerNum	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.3	fc	NODE
1.3.6.1.4.1.2512.1.1.1.3.1	fcNodeName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.3.2	fcPortTable	NODE
1.3.6.1.4.1.2512.1.1.1.3.2.1	fcPortEntry	NODE
1.3.6.1.4.1.2512.1.1.1.3.2.1.2	fcPortNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.3.2.1.3	fcPortName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.3.2.1.4	fcLinkStatus	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.3.2.1.5	fcPortId	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.3.2.1.6	fcUseHardALPA	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.3.2.1.7	fcDiscoveryMode	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.3.2.1.8	fcBufferedTapeWrites	LEAF INTEGER

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512.1.1.1.3.2.1.9	fcDefaultMap	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4	scsi	NODE
1.3.6.1.4.1.2512.1.1.1.4.1	scsiPortTable	NODE
1.3.6.1.4.1.2512.1.1.1.4.1.1	scsiPortEntry	NODE
1.3.6.1.4.1.2512.1.1.1.4.1.1.2	scsiBusNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.4.1.1.3	scsiInitiator	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.1.1.4	scsiInitiatorId	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.1.1.5	scsiDiscovery	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.1.1.6	scsiDiscoveryDelay	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.4.1.1.7	scsiBusResetOnBoot	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.1.1.8	scsiInternalTermination	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.1.1.9	scsiBufferedTapeWrites	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.1.1.10	scsiDefaultMap	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.2	scsiTargetTable	NODE
1.3.6.1.4.1.2512.1.1.1.4.2.1	scsiTargetEntry	NODE
1.3.6.1.4.1.2512.1.1.1.4.2.1.1	scsiTargetTargetId	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.3	scsiTargetOverrideTable	NODE
1.3.6.1.4.1.2512.1.1.1.4.3.1	scsiTargetOverrideEntry	NODE
1.3.6.1.4.1.2512.1.1.1.4.3.1.1	scsiTargetOverrideTargetId	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.3.1.2	scsiTargetOverrideCDBLengthOverride	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.3.1.3	scsiTargetOverrideCDBGroup6LengthDefault	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.3.1.4	scsiTargetOverrideCDBGroup7LengthDefault	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.3.1.5	scsiTargetOverrideWideNegotiation	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.3.1.6	scsiTargetOverrideSynchronousNegotiation	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.3.1.7	scsiTargetOverrideSynchronousParameterOverride	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.4.3.1.8	scsiTargetOverrideSynchronousPeriod	LEAF INTEGER

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512.1.1.1.4.3.1.9	scsiTargetOverrideSynchronous Offset	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5	ethernet	NODE
1.3.6.1.4.1.2512.1.1.1.5.1	ipMacAddress	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.1.5.2	ipAddress	LEAF IpAddress
1.3.6.1.4.1.2512.1.1.1.5.3	ipSubnetMask	LEAF IpAddress
1.3.6.1.4.1.2512.1.1.1.5.4	ipGateway	LEAF IpAddress
1.3.6.1.4.1.2512.1.1.1.5.5	ipDHCP	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.5.6	ipEthernetMode	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.6	clock	NODE
1.3.6.1.4.1.2512.1.1.1.6.1	dayofweek	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.6.2	day	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.6.3	month	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.1.6.4	year	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.6.5	hour	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.6.6	minute	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.1.6.7	second	LEAF Unsigned32
1.3.6.1.4.1.2512.1.1.2	logical	NODE
1.3.6.1.4.1.2512.1.1.2.2	snmp	NODE
1.3.6.1.4.1.2512.1.1.2.2.1	snmpTraps	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.2.2	snmpCommunityNameGet	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.2.2.3	snmpCommunityNameSet	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.1.2.2.4	snmpTrapManagerTable	NODE
1.3.6.1.4.1.2512.1.1.2.2.4.1	snmpTrapManagerEntry	NODE
1.3.6.1.4.1.2512.1.1.2.2.4.1.1	snmpTrapManagerIndex	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.2.4.1.2	snmpTrapManagerIpAddress	LEAF IpAddress
1.3.6.1.4.1.2512.1.1.2.2.4.1.3	snmpTrapManagerFilter	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.2.4.1.4	snmpTrapManagerRowState	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.3	af	NODE

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512.1.1.2.3.1	afServerFreeBackup	LEAF INTEGER
1.3.6.1.4.1.2512.1.1.2.3.2	afControllerLUNs	LEAF INTEGER
1.3.6.1.4.1.2512.1.2	topology	NODE
1.3.6.1.4.1.2512.1.2.1	fcInitiatorTable	NODE
1.3.6.1.4.1.2512.1.2.1.1	fcInitiatorEntry	NODE
1.3.6.1.4.1.2512.1.2.1.1.1	fcInitiatorIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.2	fcInitiatorName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.1.1.3	fcInitiatorModule	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.4	fcInitiatorPort	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.5	fcInitiatorId	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.6	fcInitiatorNodeName	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.7	fcInitiatorPortName	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.8	fcInitiatorLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.1.1.9	fcInitiatorCurMap	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.2	scsiInitiatorTable	NODE
1.3.6.1.4.1.2512.1.2.2.1	scsiInitiatorEntry	NODE
1.3.6.1.4.1.2512.1.2.2.1.1	scsiInitiatorIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.1.2	scsiInitiatorName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.2.1.3	scsiInitiatorModule	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.1.4	scsiInitiatorBus	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.2.1.5	scsiHostInitiatorId	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.2.1.6	scsiInitiatorCurMap	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.3	fcDeviceTable	NODE
1.3.6.1.4.1.2512.1.2.3.1	fcDeviceEntry	NODE
1.3.6.1.4.1.2512.1.2.3.1.1	fcDeviceIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.3.1.2	fcDeviceModule	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.3.1.3	fcDevicePort	LEAF Unsigned32

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512.1.2.3.1.5	fcDeviceNodeName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.3.1.6	fcDevicePortName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.3.1.7	fcDeviceLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.3.1.8	fcDeviceType	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.3.1.9	fcDeviceState	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.3.1.10	fcDeviceMapCount	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.4	scsiDeviceTable	NODE
1.3.6.1.4.1.2512.1.2.4.1	scsiDeviceEntry	NODE
1.3.6.1.4.1.2512.1.2.4.1.1	scsiDeviceIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.4.1.2	scsiDeviceModule	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.4.1.3	scsiDeviceBus	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.4.1.4	scsiDeviceTarget	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.4.1.5	scsiDeviceLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.4.1.6	scsiDeviceType	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.4.1.7	scsiDeviceState	LEAF INTEGER
1.3.6.1.4.1.2512.1.2.4.1.8	scsiDeviceMapCount	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.5	mapping	NODE
1.3.6.1.4.1.2512.1.2.5.1	fcScsiMappingTable	NODE
1.3.6.1.4.1.2512.1.2.5.1.1	fcScsiMappingEntry	NODE
1.3.6.1.4.1.2512.1.2.5.1.1.1	fcLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.5.1.1.2	scsiMapDeviceIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.5.1.1.3	fcScsiMapName	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.2.5.2	scsiFcMappingTable	NODE
1.3.6.1.4.1.2512.1.2.5.2.1	scsiFcMappingEntry	NODE
1.3.6.1.4.1.2512.1.2.5.2.1.1	scsiTargetId	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.5.2.1.2	scsiTargetLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.5.2.1.3	fcMapDeviceIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.2.5.2.1.4	scsiFcMapName	LEAF OCTET STRING

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512.1.3	utilities	NODE
1.3.6.1.4.1.2512.1.3.1	status	NODE
1.3.6.1.4.1.2512.1.3.1.1	enclosure	NODE
1.3.6.1.4.1.2512.1.3.1.1.1	fanTable	NODE
1.3.6.1.4.1.2512.1.3.1.1.1.1	fanEntry	NODE
1.3.6.1.4.1.2512.1.3.1.1.1.1.1.2	fanActualRPM	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.1.1.1.1.4	fanNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.1.2	voltageTable	NODE
1.3.6.1.4.1.2512.1.3.1.1.2.1	voltageEntry	NODE
1.3.6.1.4.1.2512.1.3.1.1.2.1.2	voltageActual	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.1.2.1.3	voltageNominal	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.1.2.1.4	voltageIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.1.3	powerTable	NODE
1.3.6.1.4.1.2512.1.3.1.1.3.1	powerEntry	NODE
1.3.6.1.4.1.2512.1.3.1.1.3.1.2	powerSupplyStatus	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.1.1.3.1.3	powerSupplyNumber	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.1.4	temperature	NODE
1.3.6.1.4.1.2512.1.3.1.1.4.1	celcius	LEAF Integer32
1.3.6.1.4.1.2512.1.3.1.1.4.2	fahrenheit	LEAF Integer32
1.3.6.1.4.1.2512.1.3.1.2	statistics	NODE
1.3.6.1.4.1.2512.1.3.1.2.1	fcStats	NODE
1.3.6.1.4.1.2512.1.3.1.2.1.1	fcStatsTable	NODE
1.3.6.1.4.1.2512.1.3.1.2.1.1.1	fcStatsEntry	NODE
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.1	fcStatsInDeviceDataSequences	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.2	fcStatsOutDeviceDataSequences	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.3	fcStatsInLinkDataSequences	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.4	fcStatsOutLinkDataSequences	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.5	fcStatsInPBSYFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.6	fcStatsOutPBSYFrames	LEAF Unsigned32

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.7	fcStatsInFBSYFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.8	fcStatsInPRJTFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.9	fcStatsOutPRJTFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.10	fcStatsLinkDown	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.11	fcStatsInAborts	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.12	fcStatsOutAborts	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.13	fcStatsLaserFaults	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.14	fcStatsLOS	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.15	fcStatsSync	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.16	fcStatsBadRxCharacters	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.17	fcStatsLinkFailures	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.18	fcStatsBadCRCs	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.19	fcStatsProtocolErrors	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.20	fcStatsBadSCSIFrames	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.1.1.1.21	fcStatsActiveLUN	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.2	scsiStats	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.1	scsiBusStatsTable	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.1.1	scsiBusStatsEntry	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.1.1.1	scsiBusStatsMode	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.1.2.2.1.1.2	scsiBusStatsResets	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.1.2.2.2	scsiTgtStatsTable	NODE
1.3.6.1.4.1.2512.1.3.1.2.2.2.1	scsiTgtStatsEntry	NODE

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512.1.3.1.2.2.2.1.1	scsiTgtStatsParityErrs	LEAF Counter64
1.3.6.1.4.1.2512.1.3.1.2.2.2.1.2	scsiTgtStatsCheckConds	LEAF Counter64
1.3.6.1.4.1.2512.1.3.1.2.2.2.1.3	scsiTgtStatsTransIOs	LEAF Counter64
1.3.6.1.4.1.2512.1.3.1.2.2.2.1.4	scsiTgtStatsRecIOs	LEAF Counter64
1.3.6.1.4.1.2512.1.3.1.3	platform	NODE
1.3.6.1.4.1.2512.1.3.1.3.1	platformVendor	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.2	platformProduct	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.3	platformVersion	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.4	platformFirmwareLevel	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.5	platformBIOSVersion	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.6	platformBooterVersion	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.1.3.7	platformSerialNumber	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.2	traces	NODE
1.3.6.1.4.1.2512.1.3.2.1	traceGeneralErrors	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.2	traceFCPDriver	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.3	traceFCPTransport	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.4	traceFCPManagement	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.5	tracePSTransport	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.6	tracePSManagement	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.7	tracePSDriver	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.8	traceSGList	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.9	traceAF	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.10	traceInband	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.13	traceTiming	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.14	traceFCPRMI	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.2.15	traceCurrentTable	NODE

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.4.1.2512.1.3.2.15.1	traceCurrentEntry	NODE
1.3.6.1.4.1.2512.1.3.2.15.1.1	traceCurIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.2.15.1.2	traceCurTime	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.2.15.1.3	traceCurMsg	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.2.16	traceAssertTable	NODE
1.3.6.1.4.1.2512.1.3.2.16.1	traceAssertEntry	NODE
1.3.6.1.4.1.2512.1.3.2.16.1.1	traceAssertIndex	LEAF Unsigned32
1.3.6.1.4.1.2512.1.3.2.16.1.2	traceAssertTime	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.2.16.1.3	traceAssertMsg	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.3	events	NODE
1.3.6.1.4.1.2512.1.3.3.1	logFilter	LEAF INTEGER
1.3.6.1.4.1.2512.1.3.3.2	eventLogTable	NODE
1.3.6.1.4.1.2512.1.3.3.2.1	eventLogEntry	NODE
1.3.6.1.4.1.2512.1.3.3.2.1.1	eventLogIndex	LEAF Integer32
1.3.6.1.4.1.2512.1.3.3.2.1.2	eventLogDate	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.3.2.1.4	eventLogSysTime	LEAF OCTET STRING
1.3.6.1.4.1.2512.1.3.3.2.1.5	eventLogSev	LEAF Integer32
1.3.6.1.4.1.2512.1.3.3.2.1.6	eventLogDesc	LEAF OCTET STRING
1.3.6.1.5	security	NODE
1.3.6.1.6	snmpV2	NODE
1.3.6.1.6.1	snmpDomains	NODE
1.3.6.1.6.1.1	snmpUDPDomain	NODE
1.3.6.1.6.1.2	snmpCLNSDomain	NODE
1.3.6.1.6.1.3	snmpCONSDomain	NODE
1.3.6.1.6.1.4	snmpDDPDomain	NODE
1.3.6.1.6.1.5	snmpIPXDomain	NODE

Table 25: Enterprise MIB Table

OID	Name	Type
1.3.6.1.6.2	snmpProxys	NODE
1.3.6.1.6.2.1	rfc1157Proxy	NODE
1.3.6.1.6.2.1.1	rfc1157Domain	NODE
1.3.6.1.6.3	snmpModules	NODE

Regulatory Compliance Notices

E

Regulatory Compliance Identification Numbers

For the purpose of regulatory compliance certifications and identification, your product has been assigned a unique HP Series Number. The series number can be found on the product label, along with the required approval markings and information. When requesting compliance information for this product, always refer to this series number. The series number should not be confused with the marketing name or model number of the product.

Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

The rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or FCC ID on the label. After the Class of the device is determined, refer to the corresponding statement in the following sections.

Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

■   Reorient or relocate the receiving antenna

■   Increase the separation between the equipment and receiver

■   Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected

■   Consult the dealer or an experienced radio or television technician for help

Declaration of Conformity for Products Marked with the FCC Logo

This device complies with Part 15 of the FCC Rules, in the United States. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding your product, contact us by mail or telephone:

■   Hewlett-Packard Computer Corporation
    P. O. Box 692000, Mail Stop 530113
    Houston, Texas 77269-2000

■   1-800-652-6672 (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

■   Hewlett-Packard Computer Corporation
    P. O. Box 692000, Mail Stop 510101
    Houston, Texas 77269-2000

■   1-281-514-3333

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Computer Corporation may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Power Cords

The power cord set included in your server meets the requirements for use in the country where you purchased your server. If you need to use this server in another country, you should purchase a power cord that is approved for use in that country.

The power cord must be rated for the product and for the voltage and current marked on the product's electrical ratings label. The voltage and current rating of the cord should be greater than the voltage and current rating marked on the product. In addition, the cross sectional area of the wire must be a minimum of 1.00 mm² or 18AWG, and the length of the cord must be between 6 feet (1.8 m) and 12 feet (3.6 m). If you have questions about the type of power cord to use, contact your HP authorized service provider.

A power cord should be routed so that it is not likely to be walked on or pinched by items placed upon it or against it. Particular attention should be paid to the plug, electrical outlet, and the point where the cord exits from the product.

Mouse Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian Notice (Avis Canadien)

Class A Equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B Equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union Notice

Products with the CE Marking comply with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms (the equivalent international standards are in parenthesis):

■   EN55022 (CISPR 22) – Electromagnetic Interference

■   EN55024 (IEC61000-4-2, 3, 4, 5, 6, 8, 11) – Electromagnetic Immunity

■   EN61000-3-2 (IEC61000-3-2) – Power Line Harmonics

■   EN61000-3-3 (IEC61000-3-3) – Power Line Flicker

■   EN60950 (IEC950) – Product Safety

Japanese Notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文を
お読み下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準
に基づくクラスB情報技術装置です。この装置は、家庭環境で使用すること
を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に
基づくクラスA情報技術装置です　この装置を家庭環境で使用すると電波
妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ず
るよう要求されることがあります。

Taiwanese Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能
會造成射頻干擾，在這種情況下，使用者會被要求採
取某些適當的對策。

Laser Device

All HP systems equipped with a laser device comply with safety standards,
including International Electrotechnical Commission (IEC) 825. With specific
regard to the laser, the equipment complies with laser product performance
standards set by government agencies as a Class 1 laser product. The product does
not emit hazardous light; the beam is totally enclosed during all modes of
customer operation and maintenance.

Laser Safety Warnings

⚠ **WARNING:** To reduce the risk of exposure to hazardous radiation:

■ Do not try to open the laser device enclosure. There are no user-serviceable
components inside.

■ Do not operate controls, make adjustments, or perform procedures to the
laser device other than those specified herein.

■ Allow only HP authorized service technicians to repair the laser device.

Compliance with CDRH Regulations

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and
Drug Administration implemented regulations for laser products on August 2,
1976. These regulations apply to laser products manufactured from August 1,
1976. Compliance is mandatory for products marketed in the United States.

Compliance with International Regulations

All HP systems equipped with laser devices comply with appropriate safety standards including IEC 825.

Laser Product Label

The following label or equivalent is located on the surface of the HP supplied laser device.

CLASS 1 LASER PRODUCT

This label indicates that the product is classified as a CLASS 1 LASER PRODUCT. This label appears on a laser device installed in your product.

Laser Information

Table 26: Laser Information

Feature	Description
Laser type	Semiconductor GaAIAs
Wave length	780 nm +/- 35 nm
Divergence angle	53.5 degrees +/- 0.5 degrees
Output power	Less than 0.2 mW or 10,869 W m-2 sr-1
Polarization	Circular 0.25
Numerical aperture	0.45 inches +/- 0.04 inches

Electrostatic Discharge

F

To avoid damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

■   Avoid hand contact by transporting and storing products in static-safe containers.

■   Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.

■   Place parts on a grounded surface before removing them from their containers.

■   Avoid touching pins, leads, or circuitry.

■   Always be properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.

- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

- Use conductive field service tools.

- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have a HP authorized reseller install the part.

Note: For more information on static electricity, or assistance with product installation, contact your HP authorized reseller.

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