HP StorageWorks

IP Distance Gateway user guide

hp ®

i n v e n t

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About this guide

This user guide provides information to help you:

- Create an implementation plan based on supported configurations
- Install the IP Distance Gateway (mpx110)
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- Manage the mpx110
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- Diagnose and troubleshoot error conditions
- Configure FCIP Routes

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Intended audience

This guide is intended for system administrators responsible for installing, managing, and servicing the mpx110 and the storage area network (SAN) to which it is attached.

Related documentation

The following documents provide related information:

- *HP StorageWorks Command View EVA user guide*
- *HP StorageWorks Continuous Access EVA administrator guide*
- *HP StorageWorks Continuous Access EVA planning guide*
- *HP StorageWorks EVA software compatibility reference*
- *HP StorageWorks Interactive Help for Command View EVA*
- *HP StorageWorks SAN design reference guide*
- *HP StorageWorks 4000/6000/8000 Enterprise Virtual Array user guide*
- *HP StorageWorks Enterprise Virtual Array 3000/5000 user guide*
- *HP StorageWorks Replication Solutions Manager installation guide*

Conventions

Conventions consist of the following:

- Format
- Notes and symbol usage

Document conventions and symbols

Table 1 Document conventions

Convention	Element
Blue text: Table 1	Cross-reference links and e-mail addresses
Blue, underlined text: http://www.hp.com	Web site addresses
Bold text	• Keys that are pressed • Text typed into a GUI element, such as a box • GUI elements that are clicked or selected, such as menu and list items, buttons, tabs, and check boxes
Italic text	Text emphasis
`Monospace` text	• File and directory names • System output • Code • Commands, their arguments, and argument values
`Monospace, italic` text	• Code variables • Command variables
`Monospace, bold` text	Emphasized monospace text

⚠ **WARNING!**

Indicates that failure to follow directions could result in bodily harm or death.

△ **CAUTION:**

Indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT:

Provides clarifying information or specific instructions.

NOTE:

Provides additional information.

HP technical support

Telephone numbers for worldwide technical support are listed on the HP support web site:
http://www.hp.com/support/.

Collect the following information before calling:

* Technical support registration number (if applicable)
* Product serial numbers
* Product model names and numbers
* Error messages
* Operating system type and revision level
* Detailed questions

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

Subscription service

HP strongly recommends that customers register online using the Subscriber's choice web site:
http://www.hp.com/go/e-updates.

Subscribing to this service provides you with e-mail updates on the latest product enhancements, newest driver versions, and firmware documentation updates as well as instant access to numerous other product resources.

After subscribing, locate your products by selecting **Business support** and then **Storage** under Product Category.

Other HP web sites

For additional information, see the following HP web sites:

- http://www.hp.com
- http://www.hp.com/go/storage
- http://www.hp.com/service_locator
- http://www.docs.hp.com
- http://www.hp.com/go/sandesignguide

1 Overview

This chapter includes the following:

mpx110 product description

The HP StorageWorks IP Distance Gateway (referred to hereafter as the mpx110) provides Fibre Channel (FC) SAN extension over an IP network. Used in conjunction with the EVA family of storage systems and Continuous Access EVA software, the mpx110 provides long-distance remote replication for disaster tolerance.

A base FCIP configuration consists of a minimum of two mpx110 gateways, one each for the local and remote site:

HP part number AG680A: HP StorageWorks IP Distance Gateway (single mpx110, one per site required), see Figure 1.

Optional equipment

Additional equipment for hardware redundancy:

HP part number AG681A: HP StorageWorks IP Distance Gateway Upgrade (single mpx110 for redundancy, one per site required) see Figure 1 and Figure 4.

> **NOTE:**
> See Configuration rules and guidelines, page 17 for additional required and optional equipment, based on your configuration.

Fibre Channel over IP (FCIP) overview

FCIP enables connectivity between geographically dispersed FC devices over an IP network. To deploy FCIP, two mpx110 gateways are required. Each gateway is configured for FCIP and connected to a fabric. The gateways are connected to each other through an IP network (LAN/WAN), see Figure 1.
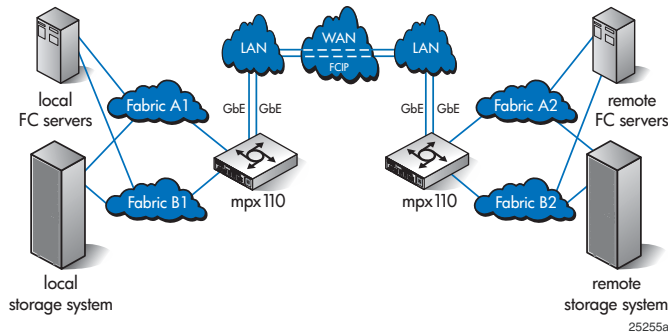
Figure 1 FCIP overview

Local FC devices need no additional hardware or software to access remote FC devices via the mpx110 deployed for FCIP.

Using FCIP to encapsulate FC packets

With FCIP, gateways transport FC frames over an IP network. From the perspective of the local and remote fabrics the FC devices accessed through the gateways appear to be part of one unified fabric. FC traffic is carried over the IP network in such a way that the FC fabric and all FC devices on the fabric are unaware of the presence of the IP Network.

Once configured, FCIP instances on each gateway become active and establish their connectivity through the IP network. The FC devices in the local fabric access the FC devices in the remote fabric using FC frames. The FC frames are encapsulated in IP packets by the local gateway, and transmitted to the remote gateway. The remote gateway strips the IP packet data and passes only the FC frames to the remote FC devices.

The gateways deployed for FCIP are configured to use the TCP protocol. TCP protocol uses standard TCP flow control and error recovery algorithms.

Redundant FCIP network structure example

Figure 2 shows a high availability FCIP configuration, in which pairs of mpx110 gateways and two IP networks provide full redundancy. In this configuration, loss of an mpx110 or loss of connectivity through one of the IP networks can be tolerated with no loss of connectivity between the fabrics.
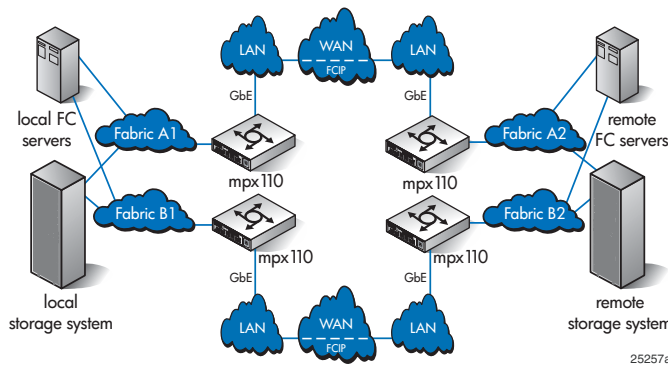
Figure 2 FCIP fully redundant high availability configuration

2 Configuration rules and guidelines

This chapter includes the following:

- Supported configurations, page 17
- IP performance tuning, page 21

Supported configurations

The mpx110 supports the following configurations as illustrated in Figure 3 through Figure 6:
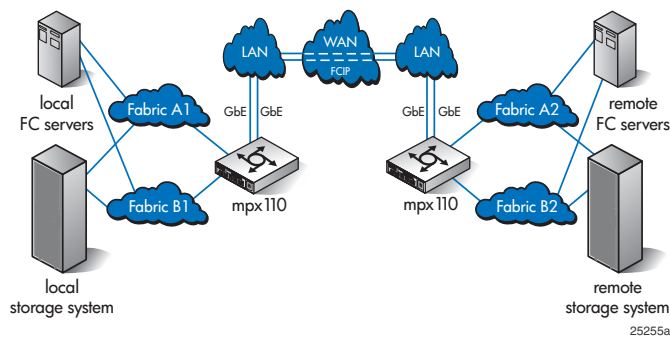
Figure 3 One pair of gateways, two long distance links
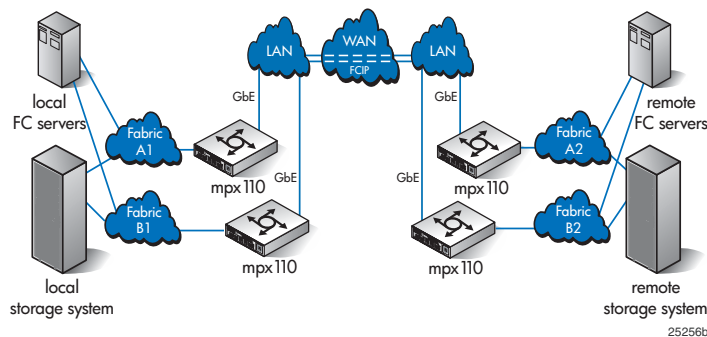
Figure 4 Redundant pairs of gateways, two long distance links
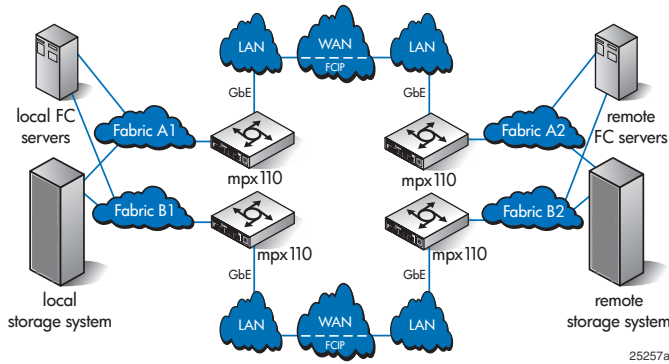
Figure 5 Redundant pairs of gateways, fully redundant long distance links
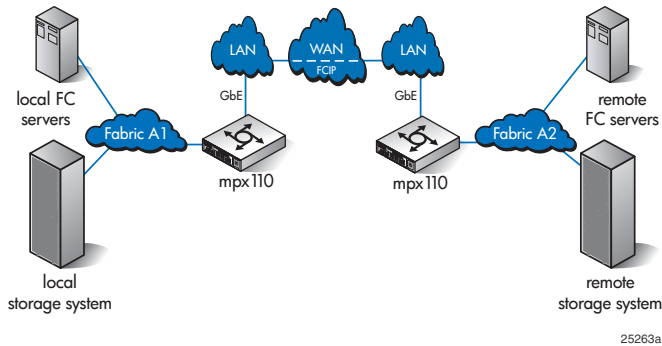
Figure 6 One pair of mpx110 gateways with single path connectivity

Configuration rules

The following sections define the configuration rules for using the mpx110 gateways for FCIP.

General

Review the following general configuration rules:

- All mpx110 configurations require a minimum of two mpx110 gateways, one local and one remote, connected through an IP network
- The mpx110 gateway must connect to another mpx110. HP does not support FCIP connectivity between different gateway models.
- The mpx110 gateway is supported for FCIP extension with Continuous Access EVA, see EVA storage system rules and guidelines, page 19.

Operating system and multi-path support

The mpx110 gateway is supported using FCIP with all operating systems and multi-path software supported by HP for Continuous Access EVA. For additional information, see the *HP StorageWorks SAN Design guide* at: http://www.hp.com/go/sandesignguide.

EVA storage system rules

The EVA storage system rules follow:

- The mpx110 gateway configured for FCIP is supported for use with Continuous Access EVA XL 4000/6000/8000 using XCS 6.0xx, 5.1xx, 5.03x, 4.0xx, 3.1xx, or 3.028 and EVA GL 3000/5000 using VCS 4.0xx, 3.1xx, or 3028.
- The mpx110 gateway is supported for use in all HP-supported Continuous Access EVA configurations, including the standard two-fabric, five-fabric, and six-fabric configurations. See the Continuous Access EVA documentation for more information.
- Continuous Access EVA supports Remote Copy Set (RCS) and non-RCS LUNs with FCIP extension.
- Supports the minimum IP bandwidth/maximum DR groups.

Table 2 defines the minimum IP bandwidth and maximum EVA DR groups for EVA XCS and VCS when using the IP distance Gateway for FCIP.

Table 2 EVA maximum DR groups and minimum IP bandwidth

Gateway pair	Minimum supported firmware version	Maximum DR groups[1] and minimum bandwidth			
		Dual fabric maximum latency		Single or shared fabric maximum latency	
		Up to 36 mSec	Between 36 and 100 mSec	Up to 36 mSec	Between 36 and 100 mSec
IP Distance Gateway (mpx110)	2.3.0.2	At least 2 Mb/s and only 1 DR group; at least 5 Mb/s and up to 5 DR groups	At least 2 Mb/s and only 1 DR group; at least 5 Mb/s and up to 5 DR groups	At least 4 Mb/s and only 1 DR group; at least 10 Mb/s and up to 5 DR groups	At least 4 Mb/s and only 1 DR group; at least 10 Mb/s and up to 5 DR groups

1 At 1 Gb/s IP bandwidth, up to 128 DR groups with VCS 3.x, 4.x, and XCS 5.03x. Up to 256 DR groups with XCS 5.1x and 6.x.

EVA storage system software

The mpx110 gateway is supported with current EVA storage software applications such as HP StorageWorks Continuous Access EVA, Command View EVA, Business Copy, SSSU, and Replication Solutions Manager.

Fibre Channel switch and firmware support

The mpx110 is supported with Fibre Channel switches as indicated in Table 3.

Table 3 Fibre Channel switch/fabric requirements

Switch series	Model/Firmware level	Switch firmware version (minimum)
B-Series	3.x	Contact your HP representative for supported switch versions.
	5.x	**NOTE:**
C-Series	3.1x	The mpx110 is not supported with B-Series switches using 5.2.0x firmware.

FC switch requirements

As indicated in Table 3, the mpx110 is compatible with B-Series and C-Series Fibre Channel switches. The following additional FC switch requirements must be observed:

- Local and remote mpx110 gateway pairs must be connected to the same Fibre Channel switch product line series.
- The maximum distance between an mpx110 and a Fibre Channel switch is 300 meters at 2 Gb/s and 500 meters at 1 Gb/s.
- For B-Series switches with HP Continuous Access EVA, disable the exchange-based routing feature and configure the FC ports connected to an mpx110 to R_RDY mode.
- For C-Series switches with HP Continuous Access EVA, change the Fibre Channel switch default load balance setting to Src-ID/D-ID.

IP network requirements

HP requires the following:

- Supported network protocol is TCP/IP IPv4 Ethernet 1000 Mb/s, see Table 2 for minimum IP bandwidth requirements.
- mpx110 IP data — local and remote pairs are supported for up to 100 ms of IP network delay one-way, or 200 ms round-trip. HP requires dedicated IP bandwidth, see Continuous Access EVA with XCS 6x.
- mpx110 IP management—LAN/WAN supported.

Table 4 Network requirements for the IP Distance Gateway (mpx110) with XCS and VCS

Specification	Description
Bandwidth[1]	Must be dedicated to the Continuous Access storage replication function. There is no support for dynamic pacing of the gateway.
Maximum number of DR groups	See Table 2 for minimum supported bandwidth based on the average packet-loss ratio and one-way intersite latencies.
Maximum transmission unit (MTU) of the IP network	1,500 bytes
Maximum latency[1]	100 mSec one-way or 200 mSec round-trip
Average packet-loss ratio[2]	Low-loss network: 0.0012% average over 24 hours High-loss network: 0.2% average over 24 hours; must not exceed 0.5% for more than 5 minutes in a 2-hour window
Latency jitter[3]	Must not exceed 10 mSec over 24 hours

[1]Pre-existing restriction.
[2]A high packet-loss ratio indicates the need to retransmit data across the intersite link. Each retransmission delays transmissions queued behind the current packet, thus increasing the time to complete pending transactions.
[3]Latency jitter is the difference between the minimum and maximum values, and indicates how stable or predictable the network delay. The greater the jitter, the greater the variance in the delay, which lowers the performance predictability.

IP performance tuning

The mpx110 supports Fibre Channel service at transmission rates of 1 Gb/s or 2 Gb/s with a maximum frame size of 2148 bytes. It supports Ethernet service at transmission rates of 1000-, 100- or 10-Mbps with a MTU size of 1500 or 9000 (jumbo frames). Related performance characteristics include the following:

- Distance
- Bandwidth
- Latency
- Jumbo frames
- Compression
- TCP Window size/scaling performance tuning

Distance

Consider the physical distance between the mpx110 gateways. This is usually measured in round-trip delay. Round trip delays range anywhere from less than 1 millisecond to as great as 200 milliseconds.

Bandwidth

Bandwidth is a measure of the volume of data that can be transmitted at a given transmission rate. WAN data rates range from 1.5 megabits per second (T1) to greater than 600 megabits per second (OC-12).

The Bandwidth setting for the FCIP Route must be set to the guaranteed bandwidth of the link regardless of the physical speed of the link. See FCIP route information tab options, page 53.

Latency

Latency is the amount of time a packet takes to traverse the network from source to destination.

Jumbo frames

Jumbo frames can enhance the IP performance of the mpx110. Before enabling Jumbo Frames ensure that the entire network supports Jumbo Frame.

Compression

The mpx110 integrates a software compression options. Software compression should only be enabled for FCIP routes with a distance of greater than 50 ms RTT or less than 45 Mb/s of guaranteed bandwidth.

TCP Window size/scaling performance tuning

The mpx110 performance is maximized when properly configured. Knowing the round trip delay (distance) between mpx110 gateways and WAN effective data rate (connection type) allows the gateways to be tuned for optimal performance. The following tables provide TCP Window Scaling Factor and Window Size settings for specific WAN environments.

The mpx110 window size can be set to a maximum of 32 KB, the scaling factor is used as a multiplier. Modify the window size and scaling factor in the mpx110 gateway pairs based on the WAN round trip delay. A table is provided for each connection type.

Table 5 T1 / DS-1: 1.554 Mbits/Sec

Round trip delay	Total window size (bytes)	Scaling factor
200	64 K	1
100	32 K	0
50	32 K	0
25	32 K	0
20	32 K	0
15	32 K	0
10	32 K	0
5	32 K	0
2.5	32 K	0
1 or less	32 K	0

Table 6 T3 / DS-3: 45 Mbits/Sec

Round trip delay	Total window size (bytes)	Scaling factor
200	1 MB	5
100	512 K	4
50	256 K	3
25	128 K	2
20	128 K	2
15	64–128 K	1 or 2
10	64 K	1
5	32 K	0
2.5	32 K	0
1 or less	32 K	0

Table 7 DS-5: 400 Mbits/Sec

Round trip delay	Total window size (bytes)	Scaling factor
200	1 MB	5
100	1 MB	5
50	1 MB	5
25	1 MB	5
20	1 MB	5
15	1 MB	5
10	512 K	4
5	256 K	3
2.5	128 K	2
1 or less	64 K	1

Table 8 OC-1: 50 Mbits/Sec

Round trip delay	Total window size (bytes)	Scaling factor
200	1 MB	5
100	512 K	4
50	256 K	3
25	128 K	2
20	128 K	2
15	64–128 K	1 or 2
10	64 K	1
5	32 K	0
2.5	32 K	0
1 or less	32 K	0

Table 9 OC-3: 150 Mbits/Sec

Round trip delay	Total window size (bytes)	Scaling factor
200	1 MB	5
100	1 MB	5
50	1 MB	5
25	512 K	4
20	512 K	4
15	256 K	3
10	256 K	3
5	128 K	2
2.5	64 K	1
1 or less	32 K	0

Table 10 OC-12 and Above: 621 Mbits/Sec

Round trip delay	Total window size (bytes)	Scaling factor
200	1 MB	5
100	1 MB	5
50	1 MB	5
25	1 MB	5
20	1 MB	5
15	1 MB	5
10	1 MB	5
5	512 K	4
2.5	256 K	3
1 or less	64 K	1

3 Installation and upgrades

This chapter includes the following:

Verify mpx110 requirements

Obtain the following (one of each, unless otherwise noted) for the local and remote site:

- HP StorageWorks IP Distance Gateway (mpx110), Part Number: AG680A
- Continuous Access EVA software
- EVA4000/6000/8000 or EVA3000/5000 storage system
- FC fabrics consisting of HP B-Series or C-Series switches
- Cat 5e network cable, two per site
- Optical SFPs and FC cables, two per site

Additional optional equipment (one of each, unless otherwise noted) for the local and remote site:

- HP StorageWorks IP Distance Gateway Upgrade (mpx110 for redundancy) Part Number: AG681A
- Optical SFPs and FC cables, two per site

📝 NOTE:

For the latest information about the minimum system requirements, see the *HP StorageWorks IP Distance Gateway release notes* at http://www.hp.com/go/san.

Pre-installation checklist

Before starting the configuration process, contact your System Administrator for the following mpx110 parameters:

- Symbolic Name of the mpx110
- IP address, subnet mask and gateway for the mpx110 management port (if not using DHCP)
- IP address, subnet mask & gateway for the GE1 port
- IP address of the remote mpx110 that connects to the GE1 port
- IP address, subnet mask & gateway for the GE2 port (if applicable)
- IP address of the remote mpx110 that connects to the GE2 port (if applicable)

Rack mount the mpx110

To rack mount the mpx110 (you will need one Phillips head screw driver):

△ CAUTION:

If the mpx110 is mounted in a closed or multi-unit rack assembly, make sure that the operating temperature inside the rack enclosure does not exceed the maximum rated ambient temperature (70° C).

📝 NOTE:

The rear of the C-Shelf is the end without the knurled thumbscrews.

---

1. Assemble two slide brackets (right and left) on the back ends of the C-Shelf, using the four hole nut plates.
   a. Mount the C-Shelf with the open side up.
   b. The slide bracket fits along the 1U side at the back of the C-Shelf with its screw hole tab pointing outboard and its lip supporting the C-Shelf. There are a right-hand and a left-hand slide bracket.
   c. The nut plate is used outside the slide bracket with the dimpled threaded holes pointing outboard.
   d. Place two screws (10-32 Pan 0.625 XRCS) through the two holes at the back of the C-Shelf, through the slide plate slots and loosely into the front two threaded holes of the nut plate.
   e. Repeat with the opposite hand slide bracket.
2. Install the C-Shelf assembly into the rack.
   a. Locate a clear 1U area space within the rack.

   📝 NOTE:

   The 1U space in a rack includes three rail mounting holes, however the rack holes are not evenly spaced. For best installation the C-Shelf can be centered in a 1U space. The center can be located by finding a hole that is 5/8 on center from the hole immediately above and below. This is the center of a 1U mounting position. The holes two above and two below this center are only 1/2 on center from their adjacent holes.

   ---

   b. At the front of the rack, in the center mounting holes, install two nuts (KEPs 10-32, 0.375AF' CSZ EXT).
   c. Carefully supporting the C-Shelf assembly, loosely thread the knurled thumbscrews through the rack into the two nuts just installed.

d. Go to the back of the rack and position a slide bracket next to the corresponding holes at the back of the rack. Slide the bracket to the rear until the threaded screw hole tabs are flush with the inside of the rack rail.

e. Insert two screws (10-32 Pan 0.325 XRCS) through the rack rail into the threaded screw hole tab and tighten loosely.

f. Repeat step e with the other side of the C-Shelf assembly.

g. Tighten all four screws (10-32 Pan 0.325 XRCS) at the rear of the C-Shelf assembly.

h. Tighten the front two knurled thumbscrews.

i. Tighten the two screws (10-32 Pan 0.625 XRCS) at each side of the back of the C-Shelf assembly.

3. Install the mpx110 into one of the two available positions in the C-Shelf:

a. The front of the mpx110 is the end with the connections and faces the rear of the equipment rack. The mpx110 slides in from the front of the equipment rack.

b. As the mpx110 slides in there are two tabs at the front and rear that catch and ensure that the mpx110 is firmly seated to the C-Shelf assembly. Take care to ensure that the mpx110 is engaged in all four tabs. To ensure that all four of the tabs engage, you may need to hold both the mpx110 and the C-Shelf assembly as you slide it in the last inch.

c. Once the rear of the mpx110 is flush with the front of the C-Shelf assembly and all four clips are engaged, the bezel can be snapped on the front.

Install SFPs

To install SFPs:

NOTE:

An SFP transceiver is required for each of the FC ports that connect to a FC switch.

---

1. Align the SFP transceiver so that the key is oriented correctly to the port. Transceivers are keyed so that they can only be inserted one way.

2. Insert the transceiver into the port.

3. Press gently until the transceiver snaps into place.

Management

The GUI application and CLI execute on a management workstation that provides for the configuration, control, and maintenance of the mpx110. Supported platforms include Microsoft Windows, Solaris, and Linux. The GUI application is installed and executed on the workstation.

The mpx110 supports the following management interfaces:

- **mpx Manager GUI** — GUI application, which executes on a management workstation
- **CLI** — executes on the mpx110 and is accessed via telnet or the serial port, see Command line interface, page 67.
- **SNMP** — Provides mpx110 status, traps, and alerts, see Simple Network Management Protocol, page 135.

Install the management application

You can manage the mpx110 using the HP StorageWorks mpx Manager as a standalone application. The mpx Manager software is available in the HP StorageWorks IP Distance Gateway software kit. The Linux kit is provided in .tar format and the Windows kit is provided as a .zip file. The kits are available at http://h18006.www1.hp.com/storage/networking/index.html.

Table 11 lists the requirements for the management servers running the HP StorageWorks mpx Manager.

Table 11 mpx Manager server requirements

Component	Requirement
Operating system	**Windows 2003** **Linux** – SUSE LINUX Enterprise Server 10 (x86) – SUSE LINUX Enterprise Server 9 (x86 – SUSE LINUX Enterprise Server 8 (x86) – Red Hat Enterprise Linux 3 Update 5 (x86) minimum – Red Hat Enterprise Linux 4 (x86) – Red Hat Enterprise Linux 5 (x86)
Memory	256 MB or more
Disk space	150 MB per installation
Processor	500 MHz or faster
Hardware	CD-ROM drive, RJ-45 Ethernet port, RS-232 serial port (optional)
Internet browser	Microsoft® Internet Explorer® 5.0 and later Netscape Navigator® 4.72 and later Mozilla™ 1.02 and later Safari® Java 2 Runtime Environment to support web applet

HP StorageWorks mpx Manager for Windows

You can install HP StorageWorks mpx Manager on a Windows server. To install the HP StorageWorks mpx Manager application from the HP StorageWorks IP Distance Gateway installation file:

1. Close all programs currently running, and unzip the executable file to the system.

2. Double-click the executable to start the installation.

HP StorageWorks mpx Manager for Linux

This section describes how to install HP StorageWorks mpx Manager on a Linux server.

> **NOTE:**
> In the following procedure, replace `n.n.nn` and `n.nnbnn` with a file name (for example, 2.3.0.2 and 2.302).

1. Download the `hpmpx_n.n.nn_linux_install.tar` file from
   http://h18006.www1.hp.com/storage/networking/index.html.
   The `.tar` file contains the `.bin` file and a GUI install README file.

2. Unpack the file to a temporary directory. For example:

   `tar -zxvf hpmpx_n.n.nn_linux_install.tar`

3. Enter the following to start the install:

   `./hpmpxn.n.nnbnn_linux_install.bin.`

   A `chmod` may be necessary prior to execution.

4. Follow the installation instructions on the screen and note the installation location. The default directory is `/opt/Hewlett-Packard/mpxManager.`

Set mpx110 management port parameters

To set initial mpx110 configuration parameters:

> **NOTE:**
>
> If using telnet to initially configure the mpx110, your workstation IP address must be 10.0.0.x where x is a number other than 1, and the subnet mask is 255.0.0.0.

1. Connect the mpx110 management port to a workstation to configure the initial mpx110 parameters. You may connect the mpx110 management port to an IP switch, hub or directly to the workstation with an Ethernet crossover cable to the Management port, or use a serial cable to connect to the RS232 port.

2. Attach one end of the AC power cord to the mpx110 and the other end to the Power Distribution Unit (PDU). Verify that the mpx110's Input power LED lights. The mpx110 runs a self-test and begins normal operation.

3. Verify that the heartbeat LED is blinking (once per second) and that the System fault LED does not light. Figure 7 shows the location of the ports and LEDs on the mpx110.
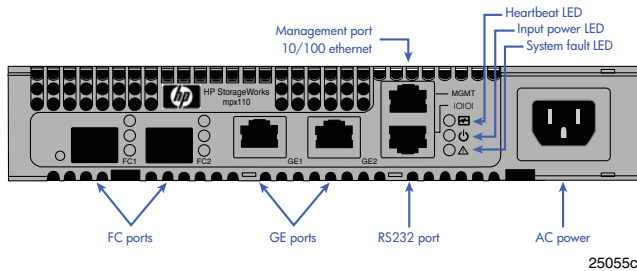
Figure 7 mpx110 ports and LEDs

> **NOTE:**
>
> See the Diagnostics and troubleshooting, page 39 for a description of the LED fault indications.

4. Telnet to the mpx110 using IP address 1.0.0.1 or use a terminal emulation program (serial cable) from your workstation as follows, see Figure 8:

   a. Type **guest** at the Login prompt.

   b. Type **password** at the Password prompt.

```
Command Prompt                                              _ □ ×
Linux/ppc 2.6.11


<none> login: guest
Password:


        ***********************************************************
        *                                                         *
        *                    HP StorageWorks mpx110               *
        *                                                         *
        ***********************************************************

mpx110 #> admin start

  Password     : ******

mpx110 <admin> #> set mgmt

   A list of attributes with formatting and current values will follow.
   Enter a new value or simply press the ENTER key to accept the current value.
   If you wish to terminate this process before reaching the end of the list
   press 'q' or 'Q' and the ENTER key to do so.

   WARNING:
   The following command might cause a loss of connections to the MGMT port.

   Mode (0=Static, 1=DHCP, 2=Bootp, 3=Rarp)  [Static          ]
   IP Address                                [10.0.0.1         ] 10.6.7.236
   Subnet Mask                               [255.0.0.0        ] 255.255.248.0
   Gateway                                   [0.0.0.0          ]


Connection to host lost.

C:\>
```

Figure 8 Setting IP addressing via telnet

5. Type `admin start` at the mpx110> prompt.

6. Type the default password: **config**.

7. Next, type the command `set mgmt` to set initial parameters.

8. Follow the onscreen prompts to define the following parameters (or press **Enter** to accept default parameters):

   • Mode (HP highly recommends using static address, Option 0)
   • IP address
   • Subnet mask
   • Gateway

   The management port is now configured with the appropriate IP address and network parameters.

IMPORTANT:

At this point the telnet session disconnects. To restart the telnet session, use the IP address you just assigned to the management port.

Cable the mpx110 Fibre Channel, GE and management ports

To cable the mpx110:

1. Connect the management port cable to your Ethernet network that is accessible from the management server running the mpx Manager GUI.

2. Connect cables to GE1, GE2, FC1, and FC2 as shown in the suggested configurations in Figure 3, Figure 4, or Figure 5.

Configure the mpx110 for connecting remote fabrics

Before starting, verify SAN configuration requirements:

• At least one FC port of each mpx110 should be connected to an FC fabric.
• Use FC World Wide Port names (WWPN) based zoning.

Configure FCIP routes
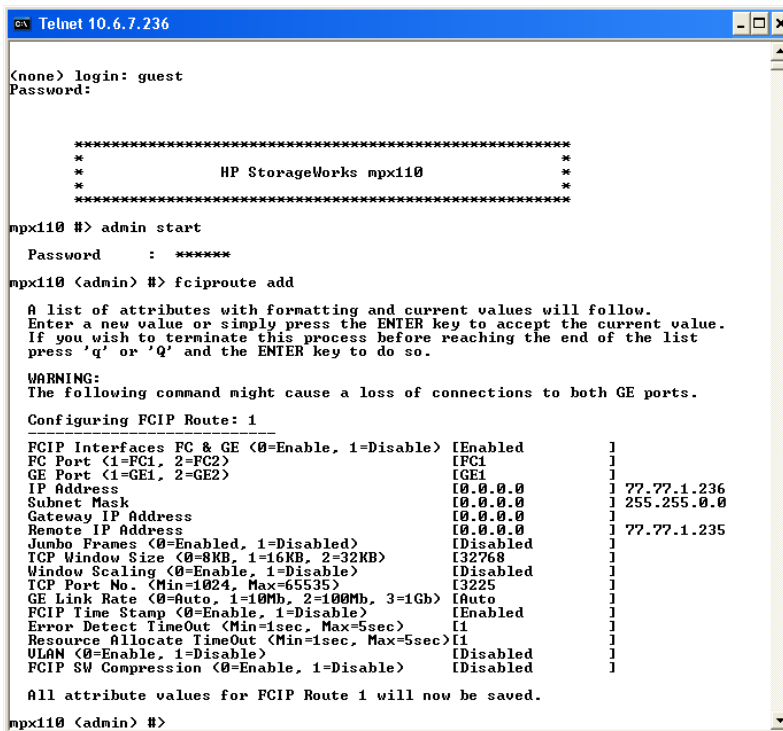
NOTE:

Many of the FCIP Route parameters have an affect on the performance of the link. Be sure to read and understand the IP performance tuning section see IP performance tuning, page 21, before setting or modifying the FCIP Route parameters.

Use these steps to configure FCIP routes via the CLI or the mpx Manager Graphical User Interface (GUI).

Using the CLI

For each mpx110, configure the FCIP Route information as shown in Figure 9:

Figure 9 Setting FCIP Route settings via the CLI

Using the mpx Manager GUI

1. Double click the mpx110 icon on your desktop to invoke the mpx Manager GUI.
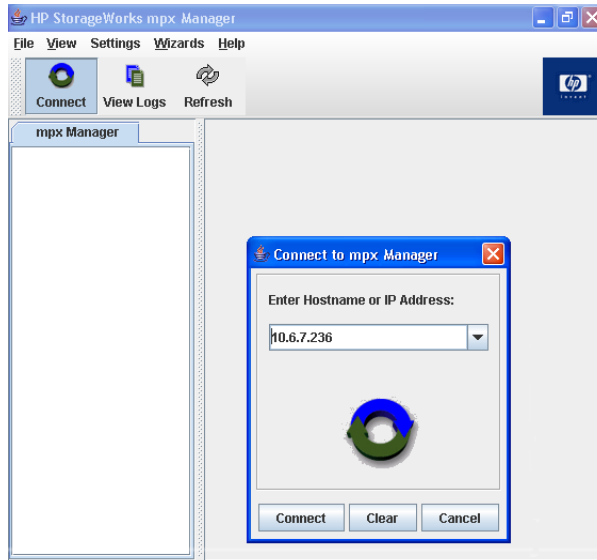
Figure 10 Setting FCIP Route settings via mpx Manager

2. Click the **Connect** icon on the top left corner of the screen, see Figure 10.

3. Enter the mpx110 IP address and click the **Connect** button.

4. Select the pull down Wizard menu to run the FCIP Route Add Wizard, see Figure 11.
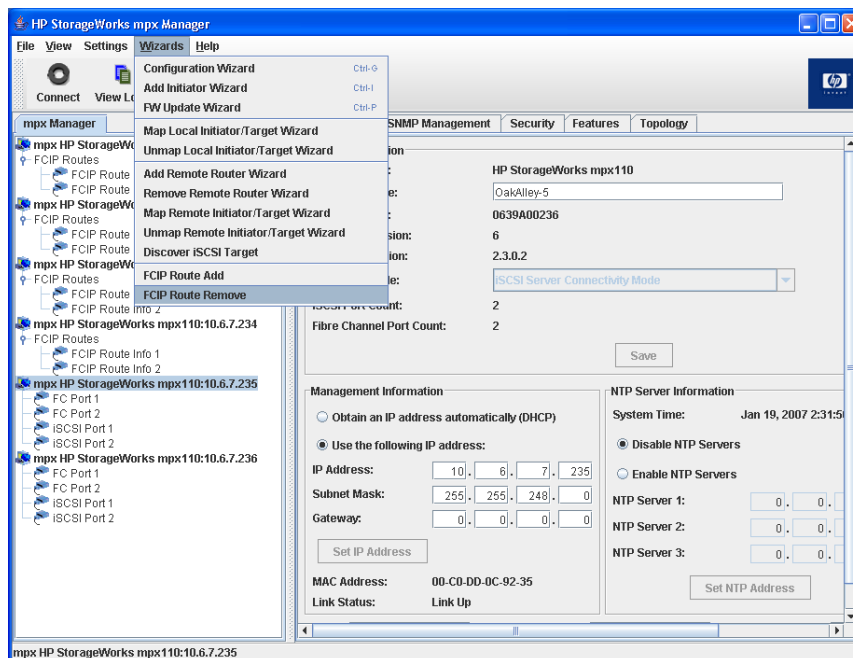
Figure 11 FCIP Route Add Wizard

   a. A warning message displays. Click **Yes** to continue.

   b. The FC & GigE Port Selection screen displays. Select the FC/GE ports to configure. Optionally, you may enter the GE port speed and flow control parameters. Click **Next** to continue.

   c. The Local & Remote IP Address screen displays. Enter the local GE port IP address, subnet mask, gateway and the IP address of the remote mpx110. Click **Next** to continue.

d. The TCP/IP Options screen displays. Select the appropriate options for your configuration and ensure that the same options are selected on the remote port as well. Click **Next** to continue.

e. The FCIP Option screen displays. Select the appropriate options for your configuration and ensure that the same options are selected on the remote port as well. Click **Finish** to continue.

f. The Security Check screen displays. Enter the admin password (default password is **config**). Click **OK** to continue.

A message displays, indicating that the adding FCIP routes process is now complete.

Configure the Fibre Channel switches for the mpx110

This section provides HP StorageWorks Fibre Channel switch parameters.

B-Series FC Switch parameters

iodset
portCfgISLMode [slot/port], 1 (Set for all mpx110 switch ports)
switchdisable
aptpolicy 1
switchenable

C-Series FC Switch parameters

MDS 1 #config
MDS 1 (config)# in-order-guarantee
MDS 1 (Config)# vsan databas
MDS 1 (config-vsan-db)# vsan x loadbalancing src-dst-id (where x = the VSAN(s) that will traverse the FCIP route)
MDS 1 (config-vsan-db)# exit
MDS 1 (Config)# exit
MDS 1 # copy run start

Firmware upgrades

Use the mpx Manager GUI or the CLI to install new firmware.

⚠ **CAUTION:**

Installing new firmware is disruptive because the mpx110 must be rebooted to activate the new firmware. The reboot may result in incorrect data being transferred between devices connected to the mpx110 . HP recommends suspending activity on the interfaces before activating the new firmware.

Using the mpx Manager GUI to upgrade firmware

To upgrade firmware:

1. Double-click the mpx110 in the topology display.

2. In the Firmware Upload window, click the **Select** button to browse and select the firmware file to be uploaded.

3. Click the **Start** button to begin the firmware load process. You will be shown a message warning you that the mpx110 will be reset to activate the firmware.

4. Click the **OK** to continue firmware installation or click the **Cancel** button to cancel the firmware installation.

Using the CLI to upgrade firmware

Using the CLI involves transferring the firmware image file from a workstation to the mpx110. Then issuing `image unpack` to install the new firmware image, as described in the following steps:

```
Password:  config

mpx110 (admin) #>

image unpack mpx110-2_0_3_2.bin
```

The following prompt appears:

```
Unpack Completed.  Please reboot the system for FW to take affect.
```

1. At the workstation prompt, use the `ftp` command to go to the location on the mpx110 where you want to transfer the firmware image. For example:

   ```
   C:\fwImage>ftp 172.17.137.190
   Connected to 172.17.137.190.
   220 (none) FTP server (GNU inetutils 1.4.2)
   ready.
   ```

2. Enter your username and password. For example:

   ```
   User (172.17.137.190:(none)):  ftp
   331 Guest login ok, type your name as password.
   Password:  ftp
   230 Guest login ok, access restrictions apply.
   ```

3. At the ftp prompt, type BIN to set binary mode. For example:

   ```
   ftp> bin
   200 Type set to I.
   ```

4. Issue the `put` command to transfer the firmware image file from the workstation to the mpx110. For example:

   ```
   ftp> put mpx110-2_0_3_2.bin
   200 PORT command successful.
   150 Opening BINARY mode data connection for
   mpx110-2_0_3_2.bin.
   226 Transfer complete.
   ftp:  4822816 bytes sent in 0.41Seconds 11878.86Kbytes/sec.
   ```

5. Type **quit**. The firmware image has been transferred to the mpx110.

6. Log into the mpx110 as an administrator:

   ```
   (none) login:  guest
   ```

   ```
   Password:  password
   ```

   The following appears:

   ```
   Command Line Interface (CLI)
   ```

   ```
   mpx110 #> admin start
   ```

7. Type the following command from the gateway *x* stands for the firmware image name:

8. Type `reboot`.

9. Type **y** to reboot the system.

Recovery

Consider the following when developing a recovery process for the mpx110:

- Save all firmware image files (updates) in a safe place, because you may:
  - revert to a previous firmware version
  - need the firmware image when replacing an mpx110
  - need the firmware image when adding an mpx110 to your site
- Save the mpx110's configuration (as a new file) after every configuration change, because you may:
  - revert to a previous configuration
  - configure a replacement mpx110
- Save the mpx110's mappings (as a new file) after every mapping change, because you may:
  - revert to a previous mapping
  - map a replacement mpx110
  - duplicate the mapping on a second mpx110 (for redundancy)

Removal and replacement

Read the following sections for procedures.

Removing an mpx110

To remove an existing mpx110:

1. All I/O operations to the gateway should be quiescent at the host systems.
2. Save the mpx110 configuration data using the FRU command (see Command line interface, page 67) or Saving and restoring the mpx110 configuration, page 145).
3. Power down the mpx110.
4. Label all the cables to ensure proper connections to the mpx110.
5. Remove all the FC and Ethernet cables.
6. Remove the mpx110 from the enclosure where it is mounted.

Replacing an mpx110

To install a replacement mpx110:

The newly installed mpx110 is connected and ready for use.

1. Mount the mpx110 in the enclosure.
2. Reconnect the FCl and Ethernet cables to the ports where they were previously connected.
3. Plug the mpx110 power cord in a power outlet.
4. Using a management station, configure the management port IP address. See Set mpx110 management port parameters.
5. Using a management workstation, restore the saved configuration or reconfigure mpx110 parameters. See FRU Command, page 77) or Saving and restoring the mpx110 configuration, page 145

Services

You can configure your mpx110 to suit the demands of your environment using a variety of mpx110 services. Familiarize yourself with the following mpx110 services and determine which ones you need:

- **Telnet** — manages the mpx110 over a telnet connection.
- **mpx Manager GUI**— provides out-of-band management.
- **Simple Network Management Protocol (SNMP)** — monitors the mpx110 through third-party SNMP applications.
- **Network time protocol (NTP)** — synchronizes the mpx110 and the workstation dates and times with an NTP server. NTP is disabled (not configured) by default.
- **File transfer protocol (FTP)** — transfers files rapidly between the workstation and mpx110 using FTP.

Security

Managing the mpx110 requires secure passwords. The GUI application uses a default password when connecting to an mpx110. Once connected, the GUI will prompt the operator for a password whenever a change is attempted.

The CLI requires a username and password to start. All set operations require an active `admin` session. To enter an `admin` session, the operator must enter a password.

The password can be changed by the operator.

Diagnostics and troubleshooting

Diagnostic information about the mpx110 is available through the chassis LEDs and the port LEDs, see Figure 12. Diagnostic information is also available through the mpx Manager GUI, CLI event logs and error displays. This section describes the following:

- Power-On Self-Test (POST) diagnostics
- Heartbeat LED
- Input Power LED
- System Fault LED
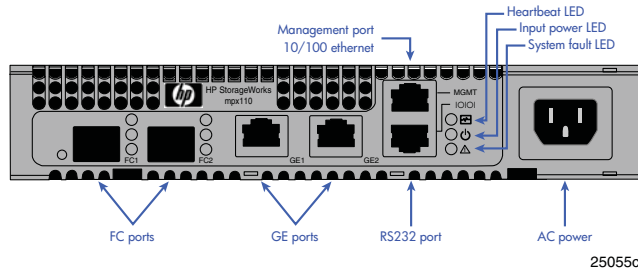
Figure 12 Locating LEDs

Power On Self-Test (POST) diagnostics

The mpx110 completes a series of tests as part of its power-on procedure:

- Memory
- FLASH validation
- PCI device discovery
- Management Ethernet port

Heartbeat LED (green)

The Heartbeat LED indicates the status of the internal mpx110 processor and any POST error results. Following a normal power-up, the Heartbeat LED blinks about once per second to indicate that the mpx110 passed the POST and that the internal mpx110 processor is running. See Table 12 for a description of all Heartbeat LED blink codes.

Table 12 Heartbeat LED blink patterns

Heartbeat LED description	Condition
One blink — One second ON followed by one second OFF.	Normal operation
Three blinks — Three blink pattern (once per second) followed by a two second pause.	System Error
Four blinks — Four blink pattern (once per second) followed by a two second pause.	Management port IP address conflict
Five blinks — Five blink pattern (once per second) followed by a two second pause.	Air temperature inside the mpx110 has exceeded the over temperature fault.

Input Power LED (green)

The Power LED indicates the input voltage status at the mpx110 logic circuit board. During normal operation, this LED lights indicating that the mpx110 logic circuit board is receiving the DC voltage from the power supply.

System Fault LED (amber)

The System Fault LED illuminates to indicate that a fault exists in the mpx110 firmware or hardware. Fault conditions include POST errors and over-temperature conditions. In addition, check the Heartbeat LED to confirm if the air temperature inside the mpx110 has exceeded the failure temperature, see

4 Using the HP StorageWorks mpx Manager Utility

This chapter includes the following:

- Overview, page 41
- Launching the mpx110 Manager GUI, page 56
- Using Wizards, page 58

Overview

The HP StorageWorks mpx Manager graphical user interface (GUI) allows you to manage the mpx110 gateway from a workstation. Information can be monitored, configured, and modified. The mpx Manager GUI consists of a menu bar, a tool bar, a system tree, and information, status, data windows and tabs, see Figure 13 and Table 13.
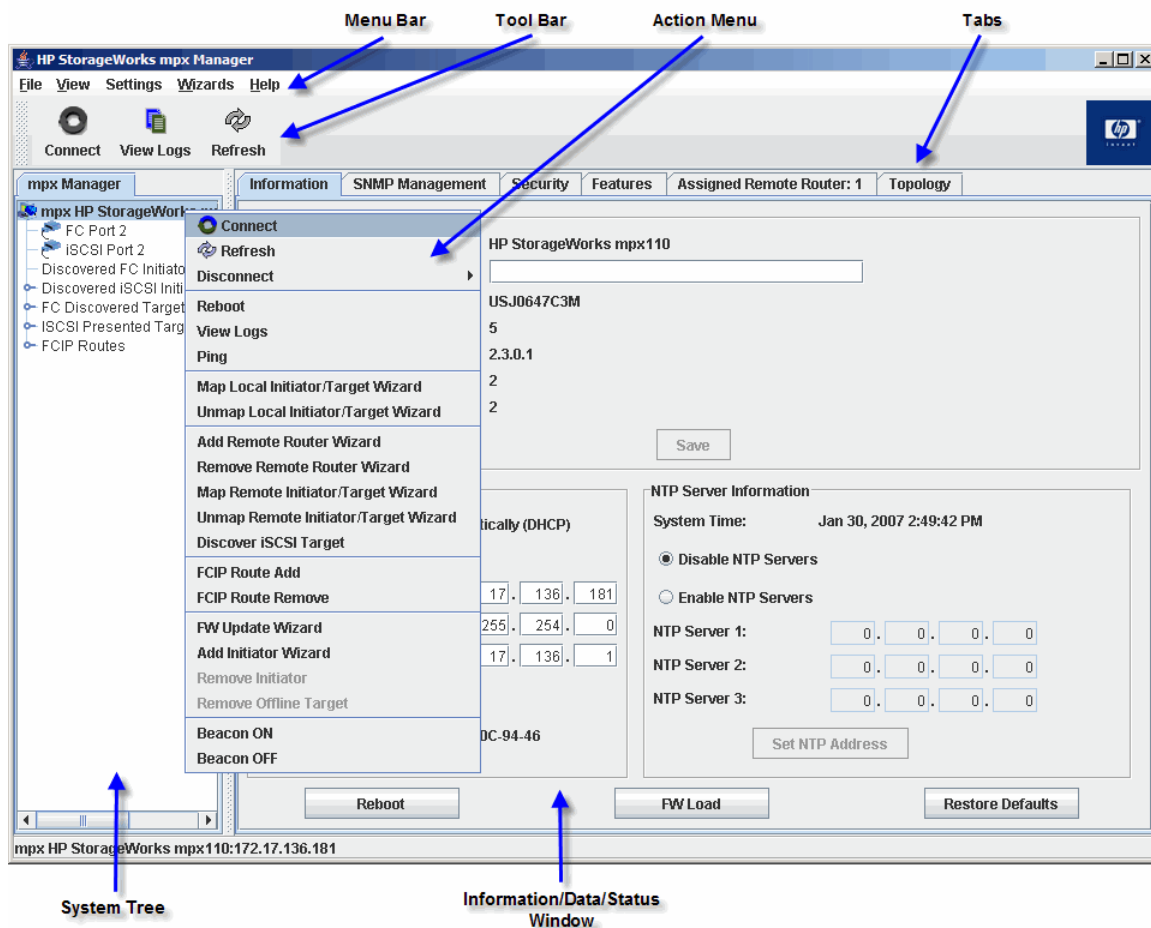
Figure 13 mpx Manager main window

Table 13 GUI main window sections

Item	Description
Menu bar	Provides access to system functions and Wizards.
Tool bar	Provide quick access to the common application functions—Connect, View Logs, and Refresh.
System tree	Located on the left side of the display, shows the connected systems and their components. Click an entry handle or double-click the entry to expand or collapse a system tree entry.
Action menu	To open, right-click the mouse. This menu provides a short cut to actions available elsewhere in the GUI.
Information, Configuration, and Status windows	Shows the corresponding information, configuration, or status for the selected window tab.
Window tabs	Determines what displays in the window.

Menu bar

Figure 14 identifies menu bar options described in the following sections.
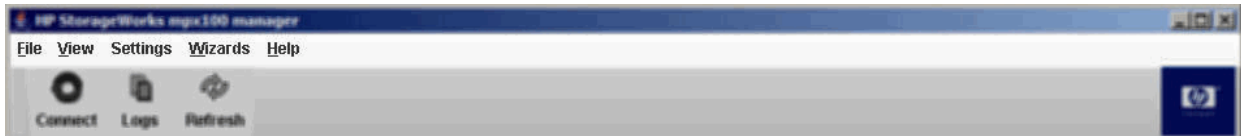
Figure 14 Menu bar

File menu

The **File** drop-down menu includes the following options, see Figure 15.

- **Save FRU** — Saves the gateway's configuration and persistent data to a file.
- **Restore FRU** — Restores the gateway's configuration and persistent data from a file.
- **Exit** — Exits the mpx Manager GUI.
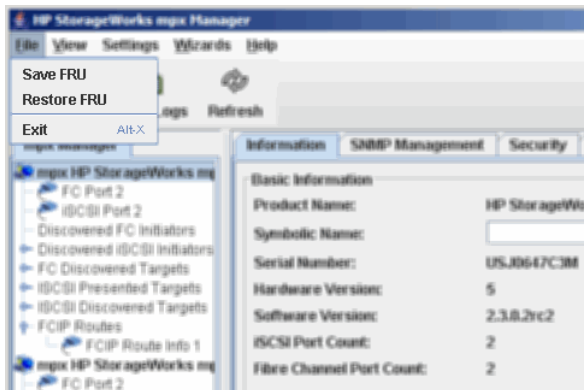
Figure 15 File menu

View menu

The **View** drop-down menu includes the **View Logs** option which opens the system logs, see Figure 16.
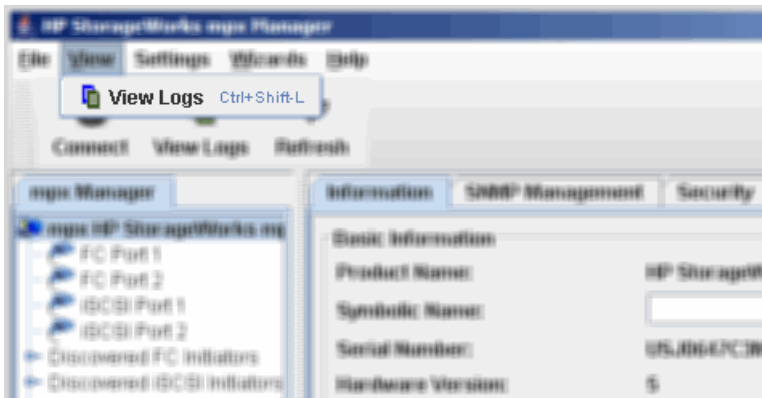
Figure 16 View menu

Settings menu

The **Settings** drop-down menu includes the **Broadcast** option which opens the **Broadcast Settings** option, see Figure 17.
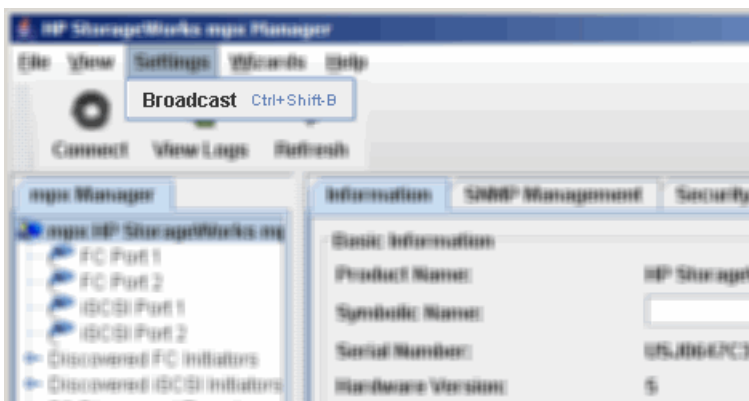
Figure 17 Settings menu

Wizards menu

The **Wizards** drop-down menu includes the following options, see Figure 18.

📝 NOTE:

Only Wizards applicable to the mpx110 are described next. Figure 18 shows Wizard menus unsupported by the gateway at the time of this document's release.

- **FW Update Wizard** — Launches the **Firmware Update Wizard**, which allows you to update the mpx110 gateway's firmware image. The firmware image is selected from a menu that allows browsing.
- **FCIP Route Add** — Launches the **FCIP Route Add** Wizard, which allows you to select the resources used for the route, the IP address of the remote FCIP peer, IP parameters, VLAN support, compression and bandwidth limit.
- **FCIP Route Remove** — Launches the **FCIP Route Remove** Wizard, which allows you to remove an existing FCIP Route freeing the resources (FC and GE ports) used by the route.
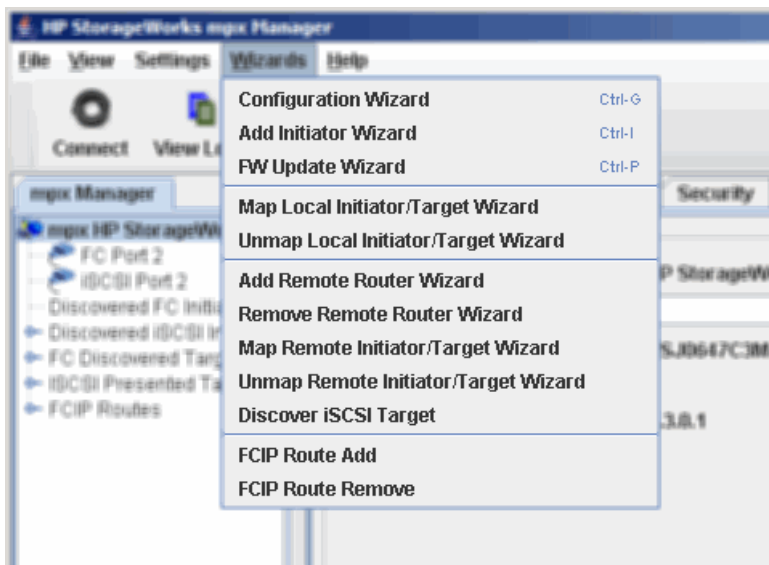
Figure 18 Wizards menu

Help menu

The **Help** drop-down menu includes the following options, see Figure 19.

- **Set Browser location** — Specifies the browser that launches when you view the online help for the mpx Manager GUI.
- **Browse Contents** — Launches the online Help.
- **About...** — Displays the application version information.
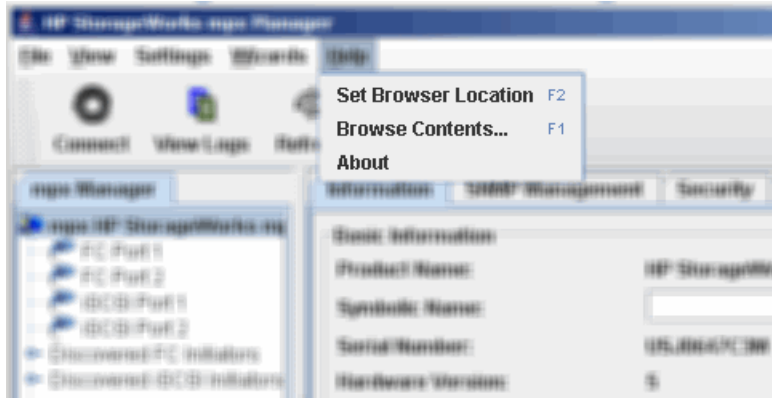
Figure 19 Help menu

Tool bar

The **Tool bar** consists of a row of graphical buttons that allow you to perform common functions: connect, view log files, and refresh the current display. The tool bar can be relocated in the display by clicking and dragging the handle at the left edge of the tool bar, see Figure 20.

- **Connect** button— Adds an mpx110 gateway to the system tree view.
- **View Logs** button— Opens a window to display the system log data.
- **Refresh** button — Updates the display with current information.
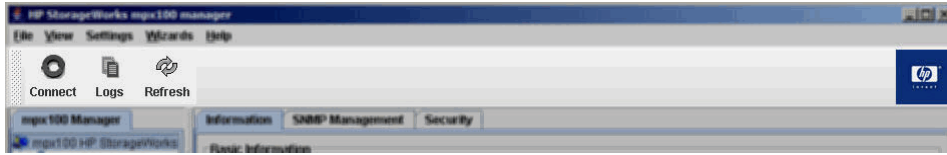
Figure 20 Tool bar

Action menu

The **Action** menu displays by right-clicking the mouse, and provides short cuts to actions available elsewhere in the GUI, see Figure 21.

> **NOTE:**
> Only Menu features applicable to the mpx110 are described next. Figure 21 shows features not supported at the time of this document's release.

Action menu options include:

- **Connect** — Adds an mpx110 gateway to the system tree view.
- **Refresh** — Updates the display with current information.
- **Disconnect** — Disconnects from a mpx110 gateway, removing it from the system tree.
- **Reboot** — Reboots the mpx110 gateway.
- **View Logs** — Opens the View Logs window.
- **Ping** —Initiates a ping from the specified port (management, GE1, or GE2) to a specified IP address.
- **FCIP Route Add** —Launches the **FCIP Route Add** Wizard, which allows you to select the resources used for the route, the IP address of the remote FCIP peer, IP parameters, VLAN support, compression and bandwidth limit.
- **FCIP Route Remove** —Launches the **FCIP Route Remove** Wizard, which allows you to remove an existing FCIP Route freeing the resources (FC and GE ports) used by the route.
- **FW Update Wizard** — Launches a Wizard for updating the gateway's firmware.
- **Beacon ON** —Turns on the mpx110 beacon to quickly locate the gateway.
- **Beacon OFF** —Turns off the mpx110 gateway beacon.
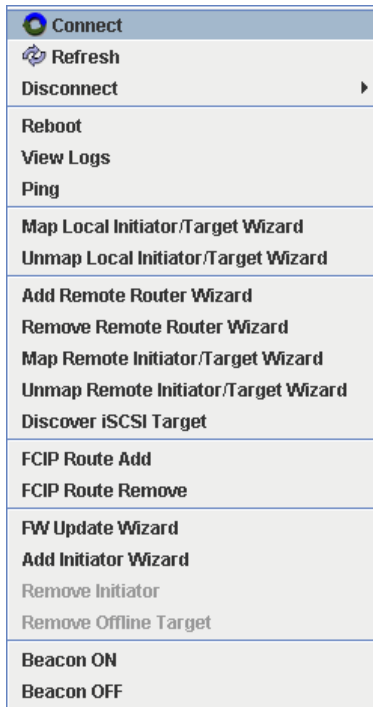
Figure 21 Action menu

System tree window

Figure 22 shows the **System tree** window. The **System tree** window is located in the left most window pane and contains the connected mpx110 gateways and the FCIP Routes for each gateway.
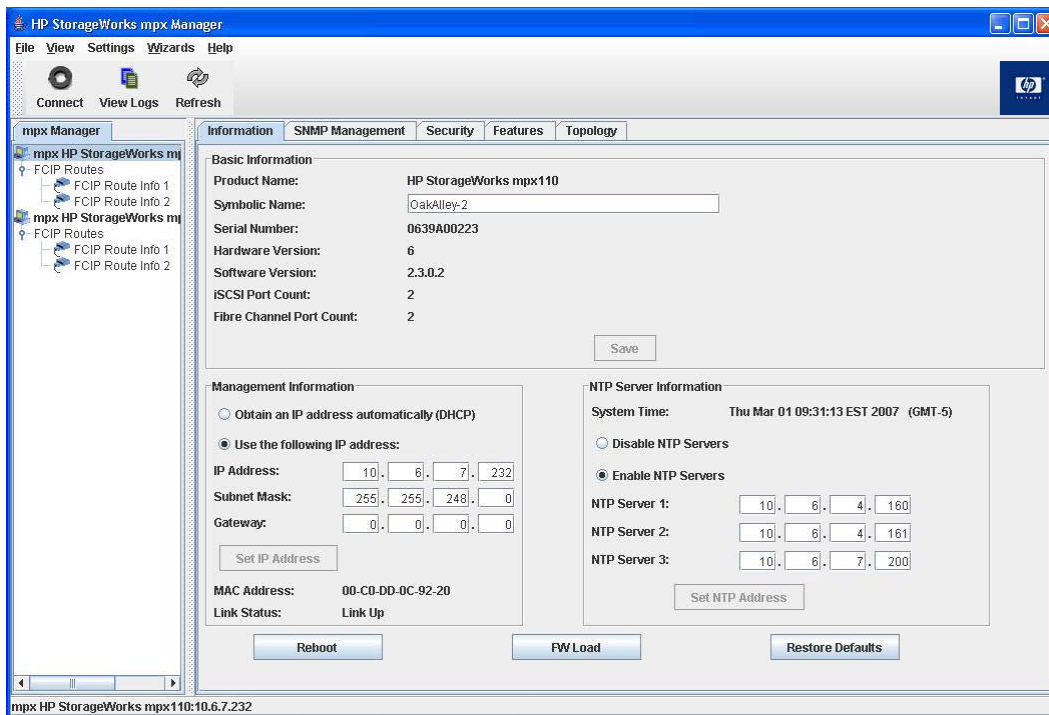
Figure 22 System tree window

For example, select **FCIP Routes** in the System tree to see component data in the tabbed pages to the right of the tree, see Figure 23.
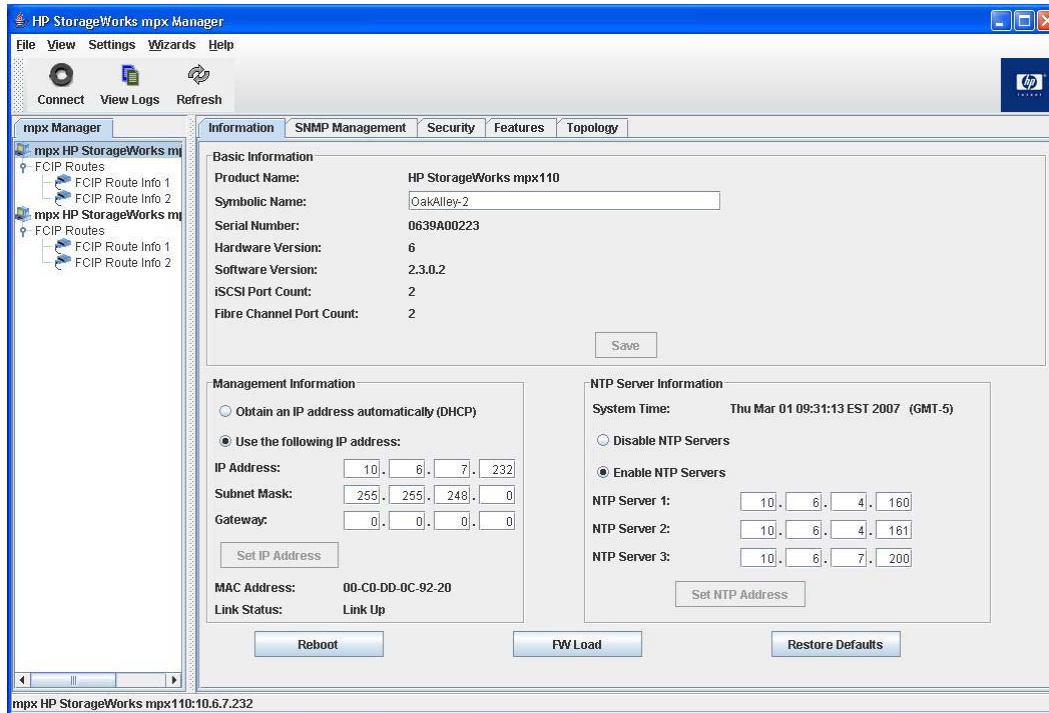
Figure 23 FCIP Routes information

mpx110 gateway

The top of the **System tree** window displays the gateway system configuration and status. It contains the following tabs:

- Information
- SNMP management
- Security
- Features
- Topology

Information tab

The Information tab consists of three sections: **Basic Information**, **Management Information**, and **Network Time Protocol (NTP) Server Information**, see Figure 24:

- **Basic Information**
  — **Product Name:** Model mpx110
  — **Symbolic Name:** A symbolic name for the gateway that you can create
  — **Serial Number:** Gateway's serial number
  — **IQN uses Symbolic Name:** Enable/disable the use of the symbolic name in the gateway's iSCSI name
  — **Hardware Version:** The gateway hardware version number
  — **iSCSI Port Count:** The number of iSCSI ports (2).
  — **Fibre Channel Port Count:** The number of FC ports (2).

- **Management Information**
  - **DHCP Radio Buttons:** Select whether you want to define the management port IP address or have it obtained automatically through DHCP.
  - **IP Address:** The management port's IP address. When the **Use the following IP address** button is selected, you can configure the IP address. When the **Obtain an IP address automatically (DHCP)** button is set, the IP address displayed is the address obtained automatically through DHCP.
  - **Subnet Mask:** The management port's subnet mask. When the **Use the following IP address** button is selected, you can configure the subnet mask. When the **Obtain an IP address automatically (DHCP)** button is selected, the subnet mask displayed is the mask obtained automatically through DHCP.
  - **Set IP Address:** This button saves any IP address changes.
  - **MAC Address:** The management port's MAC address.
  - **Link Status:** The management port link status (Link UP or Link Down).
- **Network Time Protocol (NTP) Server Information**
  - **System Time:** The current date and time set on the gateway.
  - **NTP Server Radio Buttons:** Disable or enable the use of NTP servers to set the gateway's date and time.
  - **NTP Server 1:** IP address of the first NTP server to be queried by the gateway when setting its time and date.
  - **NTP Server 2:** IP address of the second NTP server to be queried by the gateway when setting its time and date. This server is used only if the first NTP server did not respond.
  - **NTP Server 3:** IP address of the third NTP server to be queried.
  - **Set NTP Address:** Saves changes made to the NTP server IP addresses.
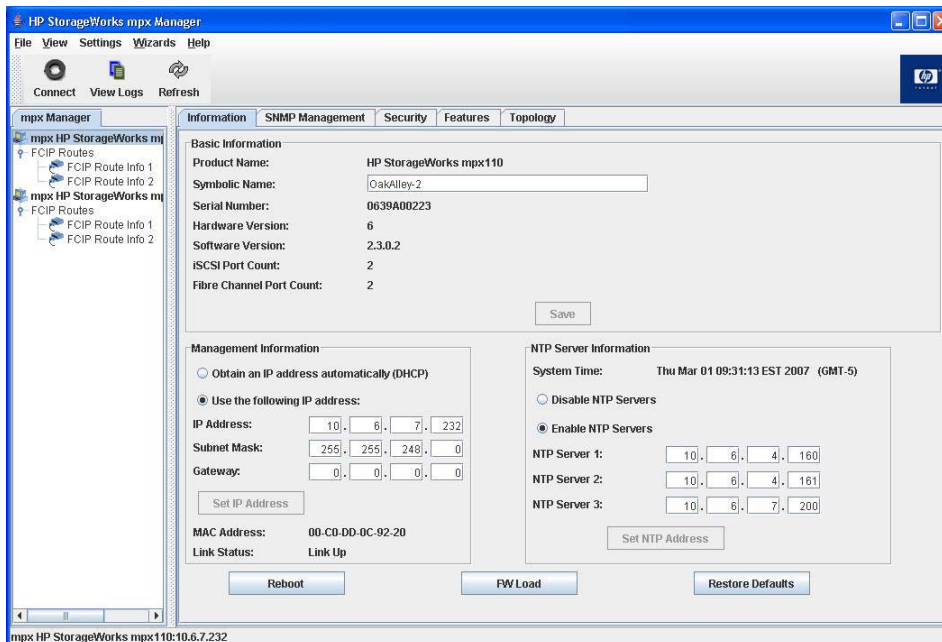
Figure 24 Information tabbed page

SNMP management tab

The **SNMP Management** tab consists of two sections: **SNMP Configuration** and **SNMP Trap Receivers**, see Figure 25. The **Save** button saves any SNMP management changes. For more information, see Simple Network Management Protocol, page 135.

SNMP Management tab options include:

- **SNMP Configuration**
  - **System OID:** The system object identifier.
  - **System Description:** Text that describes the location of the gateway.
  - **Read Community:** A password that authorizes an SNMP management server to read information from the router. This is a write-only field. The value on the gateway and the SNMP management server must be the same. The read community password can be up to 32 characters excluding #, semicolon (;), and comma (,). The default is public.
  - **Trap Community:** A password that authorizes an SNMP management server to receive traps. This is a write-only field. The value on the gateway and the SNMP management server must be the same. The trap community password can be up to 32 characters excluding the number sign (#), semicolon (;), and comma (,). The default is public.
  - **System Location:** Specifies the name of the gateway location. The name can be up to 64 characters excluding the number sign (#), semicolon (;), and comma (,).
  - **System Contact:** Specifies the name of the person to be contacted to respond to trap events. The name can be up to 64 characters excluding the number sign (#), semicolon (;), and comma (,).
  - **Authentication Traps:** Enables or disables the generation of authentication traps in response to authentication failures.
- **SNMP Trap receivers**
  - **Enabled:** A checkbox to enable the trap receiver specified by the IP address, trap port, and trap version.
  - **IP Address:** The IP address to which the SNMP traps are sent. A maximum of eight trap addresses are supported.
  - **Trap Port:** The port number on which the trap is sent. The default is 162..
  - **Trap Version:** Specifies the SNMP version (1 or 2) with which to format traps.
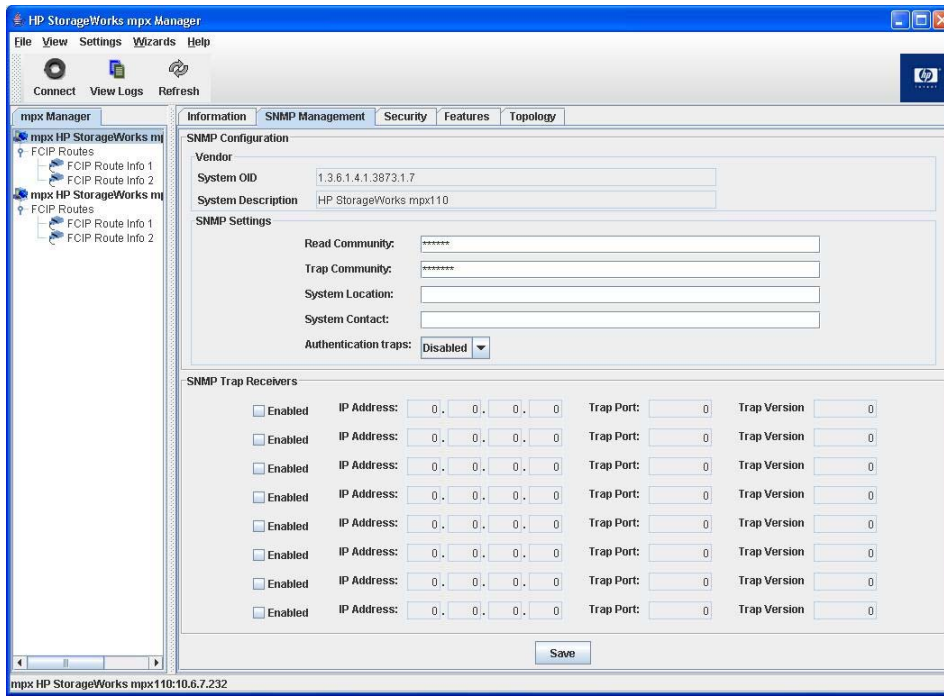
Figure 25 SNMP management tab page

Security tab

The Security tab enables you to set the gateway's password, see Figure 26. Security tab options include:

- **Current Password:** The current password must be supplied before it can be changed
- **New Password:** The new gateway password
- **Verify New Password:** Same content as the New Password field, to verify that it was typed correctly
- **Apply:** Saves the password changes
- **Clear Fields:** Clears the **Current Password**, **New Password**, and **Verify Password** fields
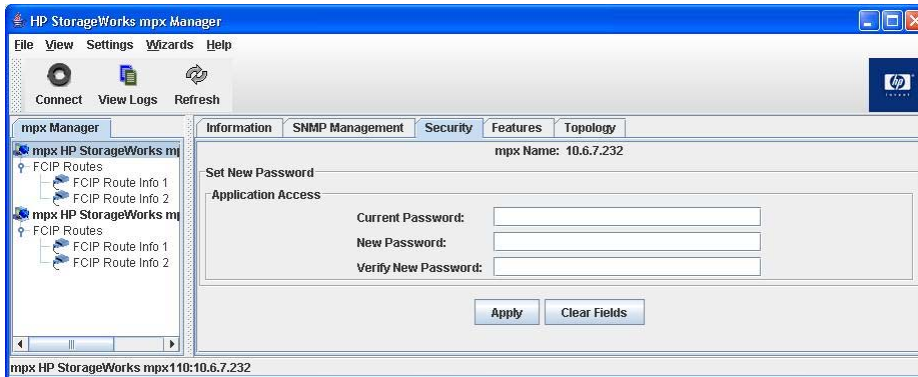
Figure 26 Security tab page

FCIP routes

Selecting the FCIP Routes branch on the **System tree** does not provide any information in the right window. Select a **FCIP Route Info #** in the **System tree** to display the **FCIP Route Information** and **Statistics** tabbed pages, see Figure 27.

A summary of FCIP routes tab options follows Figure 27.
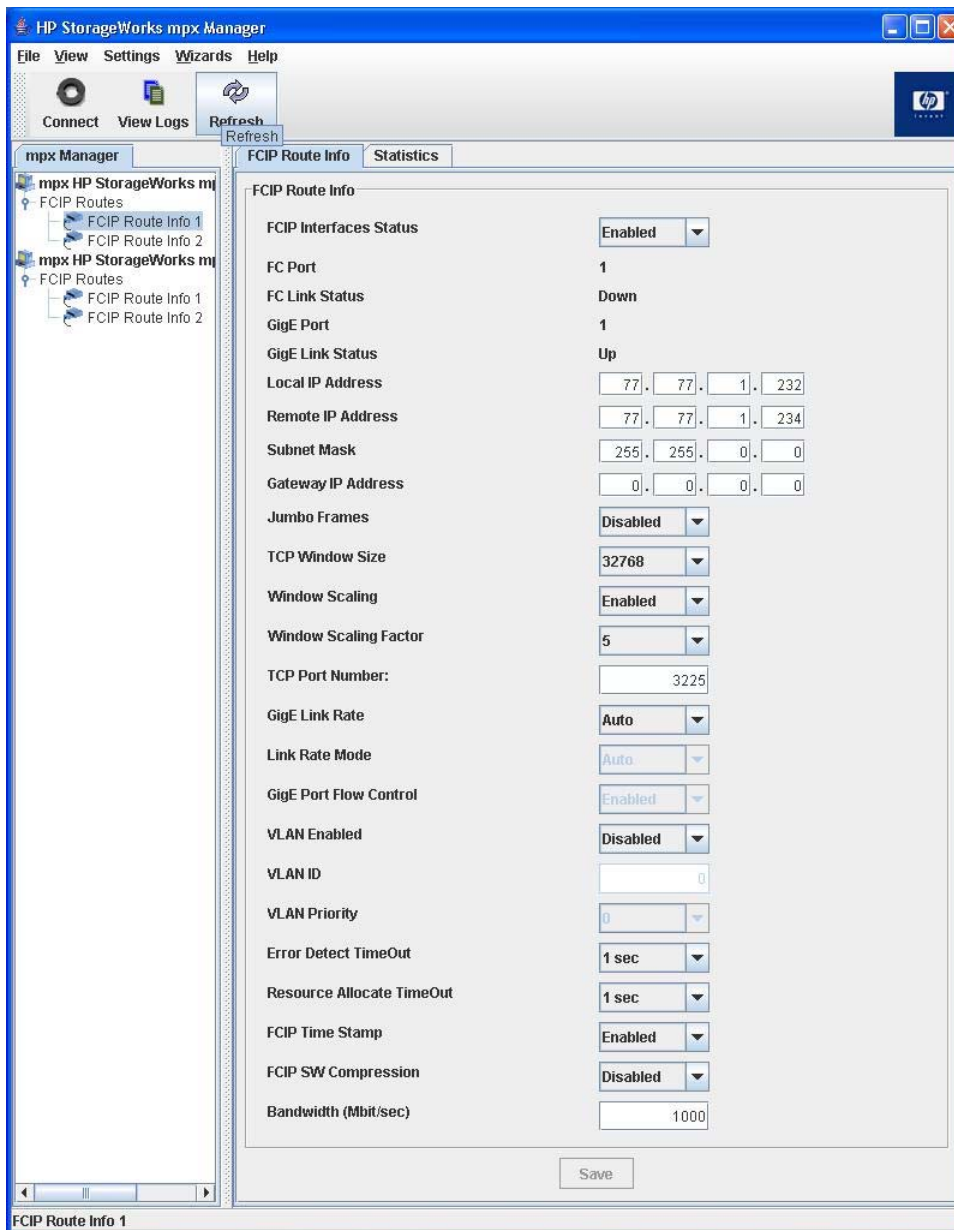
Figure 27 FCIP routes tab pages

FCIP route information tab options

The **FCIP Route Information** tab options include the following:

- **FCIP Interface Status**: Provides a pull down dialog box for enabling and disabling the FCIP route. When the route is disabled the FC and GE ports are placed in a down state. All route configuration parameters are retained. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **FC Port:** Identifies the FC port used for this FCIP route. The FC port can not be changed, it is selected when the route is created.

- **FC LInk Status:** Provides the state of the FC port used in this FCIP route.

- **GigE Port:** Identifies the GigE port used for this FCIP route. The GigE port can not be changed, it is selected when the route is created.

- **GigE Link Status:** Provides the state of the GigE port used in this FCIP route.

- **Local IP Address:** The IP address to be used by the GigE port. An uninitialized port has an IP address of all zeros. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Remote IP Address:** The IP address of the GigE port on the remote router. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Subnet Mask:** The subnet mask used by the GigE port. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Gateway IP Address:** The gateway IP address used by the GigE port. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Jumbo Frames:** Provides a pull down dialog box for enabling and disabling Jumbo IP frames. When disabled the MTU will be 1500 bytes, when enabled the maximum MTU will be 9000 bytes. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **TCP Window Size:** Contains a pull down dialog box that provides three options for TCP window size; 8192, 16384 and 32768 bytes. The default is 32768. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Window Scaling:** Contains a pull down dialog box that provides for enabling and disabling TCP window scaling. The default is disabled. When enabled the Window Scaling Factor is used. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Window Scaling Factor:** Contains a pull down dialog box that provides six options for TCP window scaling; 0,1,2,3,4 and 5. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **TCP Port Number:** Provides a dialog box that allows the user to define the destination TCP port number used by the FCIP route. This port number must be the same on both routers participating in the FCIP route (local and remote routers must be using same port number). The default port number used by FCIP is 3225. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **GigE Link Rate:** Provides a pull down dialog box that contains four options for the GigE link rate; auto, 10, 100 and 1000; The default link rate is auto. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Link Rate Mode:** Provides a pull down dialog box that contains three options for the link rate mode; auto, half duplex and full duplex. This dialog box is available only when the GigE link rate is set to something other than auto. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **GigE Port Flow Control:** Provides a pull down dialog box for enabling and disabling GigE port flow control. The default is enabled. This dialog box is available only when the GigE link rate is set to something other than auto. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **VLAN Enabled:** Provides a pull down dialog box for enabling and disabling VLAN support. The default is disabled. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect

- **VLAN ID:** Provides a dialog box that allows the user to define the VLAN ID. This dialog box is available only when VLAN is enabled. The VLAN ID must be the same on both gateways participating in the FCIP route (local and remote gateways must be using same VLAN ID) and the Ethernet switches. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **VLAN Priority:** Provides a pull down dialog box that contains eight options for the VLAN priority; 0 through 7. This dialog box is available only when VLAN is enabled. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Error Detect Timeout:** Provides a pull down dialog box that contains five options for the error detect timeout; 1 to 5 seconds. The default is one second. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **Resource Allocate Timeout:** Provides a pull down dialog box that contains five options for the resource allocate timeout; 1 to 5 seconds. The default is one second. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

- **FCIP Timestamp:** Provides a pull down dialog box for enabling and disabling FCIP timestamps. The default is enabled. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.
- **FCIP SW Compression:** Provides a pull down dialog box for enabling and disabling FCIP compression. The default is disabled. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.
- **Bandwidth (Mbit/sec):** Provides a dialog box that allows the user to define the maximum bandwidth (in megabits per second) used by the GigE port during transmits. The range of values supported is 1 to 1000 megabits per second. This setting allows the user to limit the bandwidth used by the FCIP route so as to not consume all the available link bandwidth. For example if the slowest link in the WAN being used is a DS-3 link then the maximum available bandwidth is 45 megabits per second. To limit the FCIP route to 33% of the overall link bandwidth set the bandwidth to 15 megabits per second. When you change this setting, you must click **Save** (at the bottom of the page) for the change to take effect.

Launching the mpx110 Manager GUI

To start the mpx110 Manager GUI:

1. Double click the mpx110 icon on your desktop to invoke the mpx Manager GUI.
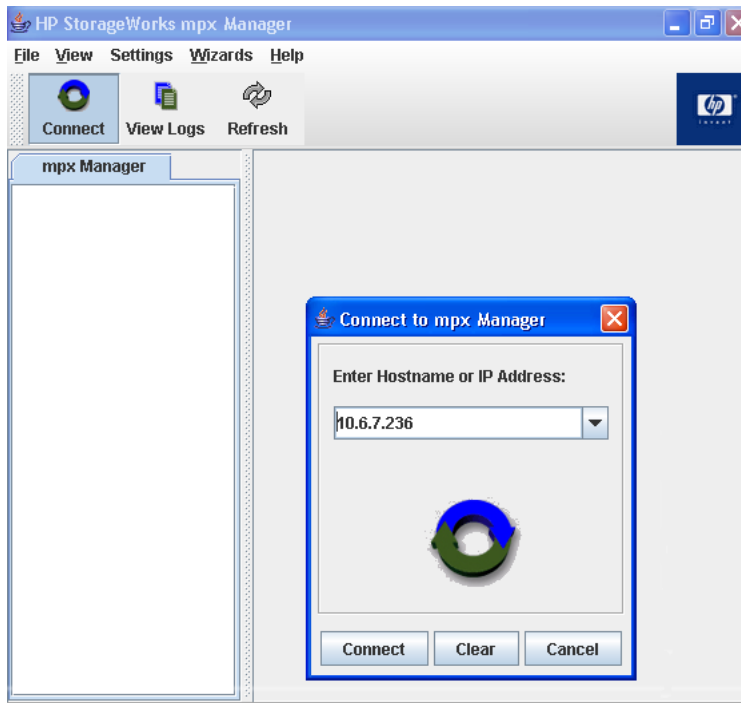
Figure 28 Connecting to an mpx110

2. Enter the mpx110 IP address and click the **Connect** button in the top left corner of the screen, see Figure 28.

   The mpx Manager main window displays, see Figure 29.
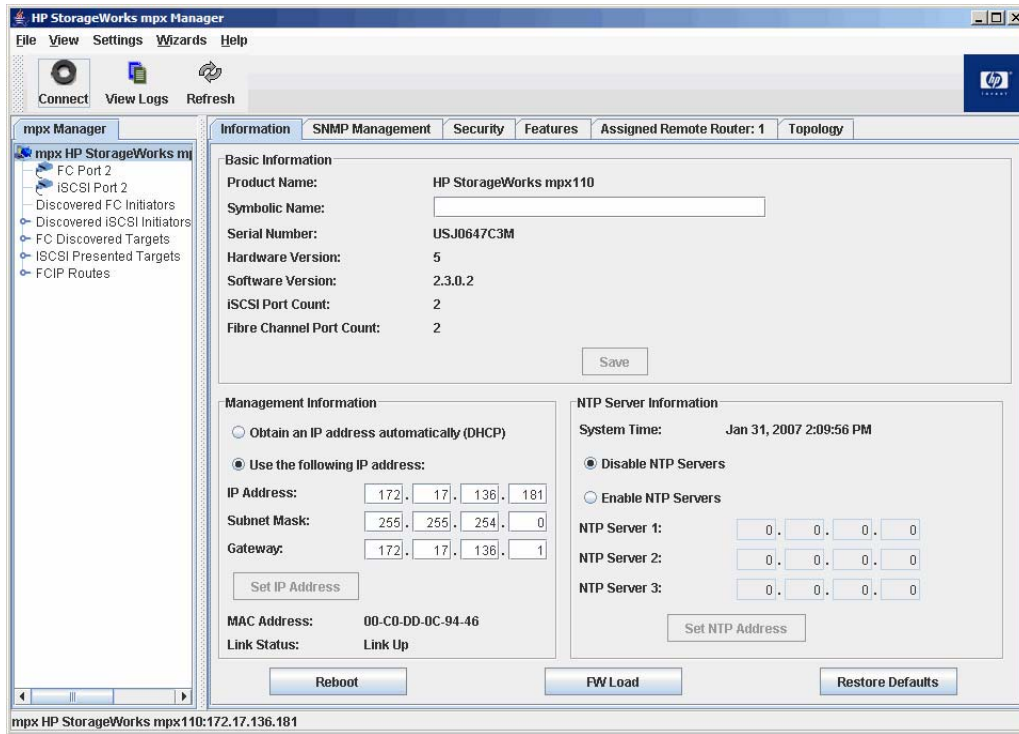
Figure 29 mpx Manager main window

3. Go to Using Wizards, page 58 for specific steps on setting additional mpx110 parameters.

Using Wizards

The **Wizards** menu contains step-by-step programs that help you configure and manage the mpx110 gateway, see Figure 30.

The following programs are available from the **Wizards** menu:

NOTE:

Only Wizards applicable to the mpx110 are described in this section.

- **FW Update Wizard:** Updates the mpx110 gateway firmware.
- **FCIP Route Add:** Launches the **FCIP Route Add** Wizard, which allows you to select the resources used for the route, the IP address of the remote FCIP peer, IP parameters, VLAN support, compression and bandwidth limit.
- **FCIP Route Remove:** Launches the **FCIP Route Remove** Wizard, which allows you to remove an existing FCIP Route freeing the resources (FC and GE ports) used by the route.
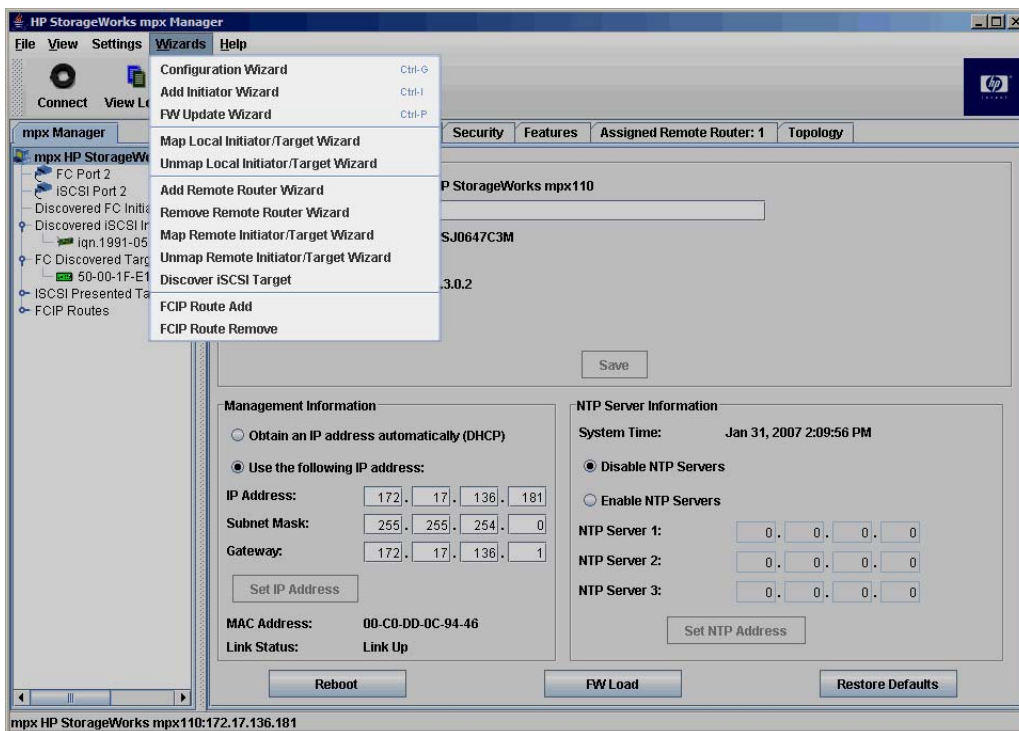
Figure 30 Wizards menu

FW update Wizard

The **Firmware Update** Wizard provides step-by-step instructions for updating the mpx110 gateway firmware. To update the firmware:

1. When the **FW Update** Wizard launches, the **mpx Selection** dialog box displays, see Figure 31. Select the check box next to the appropriate gateway, then click **Next**.
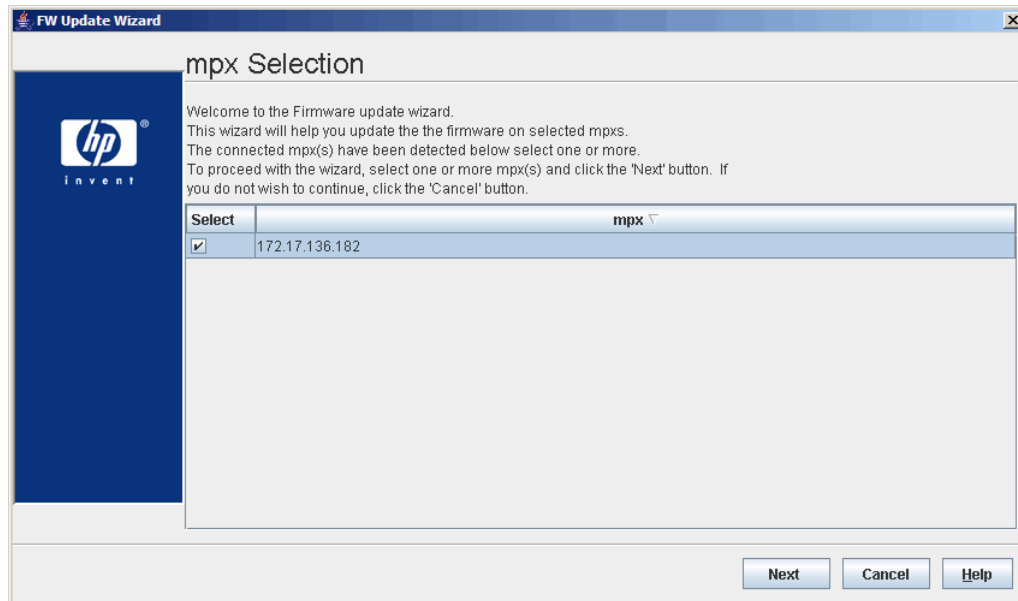
Figure 31 mpx Selection dialog box

2. The **Firmware File Selection** dialog box displays, see Figure 32.

   a. Type in the path to the firmware file, or click **Browse** to locate the firmware file.

   b. When the firmware file is displayed in the **Firmware Image File** box, click **Next**.
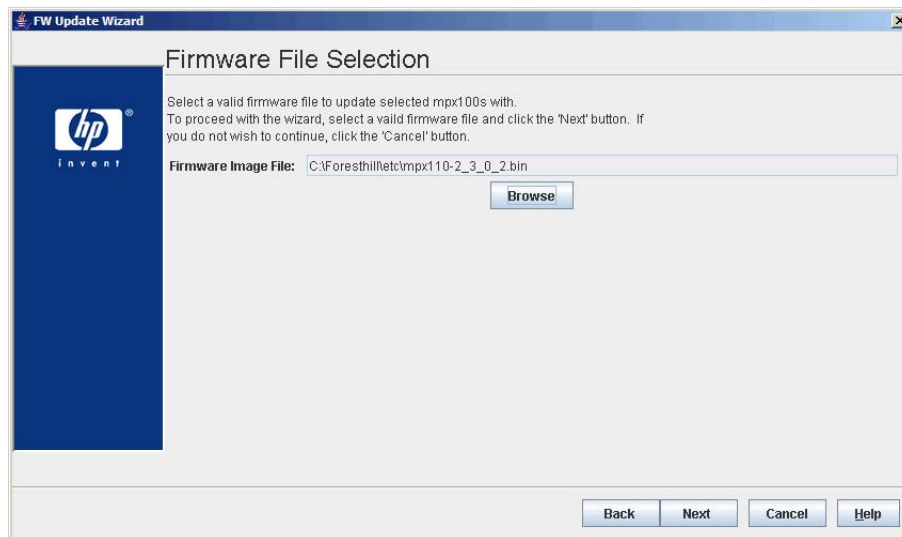
Figure 32 Firmware file selection dialog box

3. Click **Save Configuration to File**, see Figure 33.
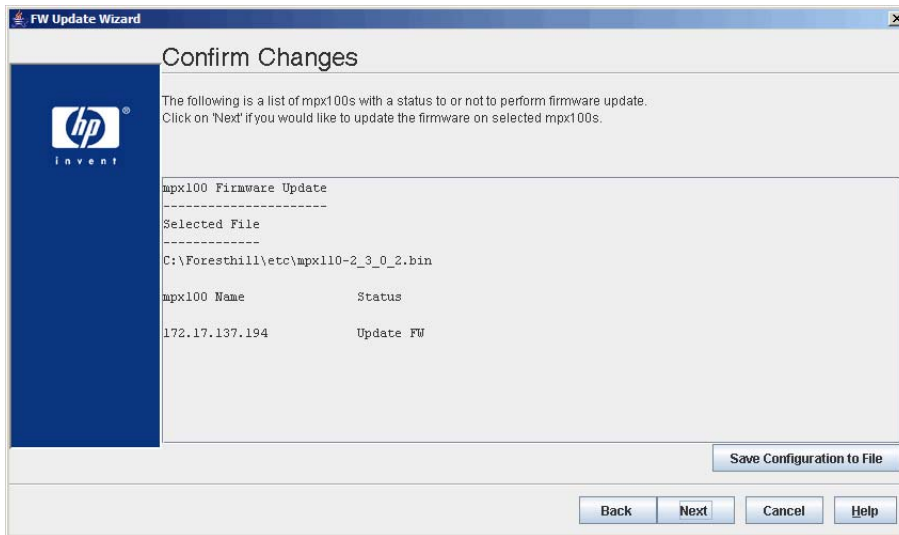
Figure 33 Confirm changes dialog box

Read the information, then do the following:

a. If you want to save a copy of this firmware configuration, press **Save Configuration to File**. Browse to the desired directory, enter a file name, then click **Save**.

b. Click **Next**.

4. The **Security Check** dialog box requests the `Admin` password. Enter the appropriate password, then click **OK** to start the firmware update.

5. The **Firmware Update Status** dialog box shows the progress of the update in the message section.

When the firmware loads successfully, the **Finish** dialog box and **Update success** dialog box display. Click **Yes** to reboot, see Figure 34.
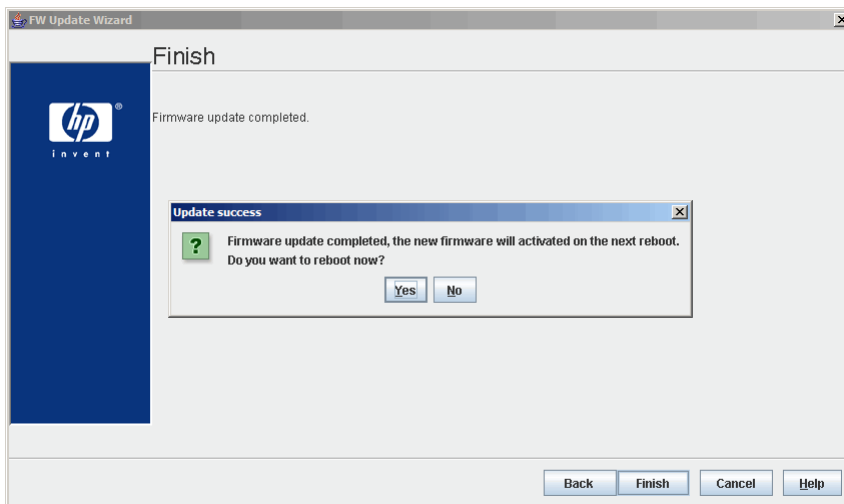
Figure 34 Finish dialog box (successful firmware update)

a. The new firmware will not take effect until the system is rebooted. If you want to reboot the system now, click **Yes**. Otherwise, click **No**.

b. Click **Finish**.

FCIP route add Wizard

The **FCIP route add** Wizard provides step-by-step instructions for adding a FCIP route. To add a FCIP route:

> **IMPORTANT:**
>
> When the **FCIP route add** Wizard launches, a warning displays indicating that the operation about to be performed will change the operation of the selected GE and FC ports. If the selected ports are being used in FC or iSCSI mappings, the connectivity will be lost. Also connectivity is disrupted on the GE port not selected for the FCIP route.

1. A warning displays when you launch the **FCIP route add** Wizard, see Figure 35. Click **Yes** to proceed, or click **No** to cancel the Wizard.
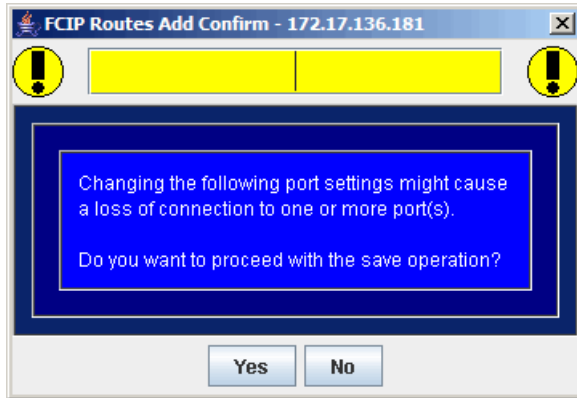
Figure 35 FCIP route add wizard—warning dialog box

2. The **FC and GigE Port Selection** dialog box requests the selection of a FC-GigE port pair, see Figure 36. The gateway port pair selected are the ports to be used for the FCIP route.

Figure 36 FCIP route add Wizard—port selection dialog box

Additionally the following port route/parameters may be configured:

- **FCIP Interfaces FC & GE** —Provides a pull down dialog box for enabling and disabling the FCIP route. When the route is disabled the FC and GE ports are placed in a down state. All route configuration parameters are retained.

- **GigE Port Programmed Link Rate** —Provides a pull down dialog box that contains four options for the GigE link rate; auto, 10, 100 and 1000. The default link rate is auto.
- **Link Rate Mode** —Provides a pull down dialog box that contains three options for the link rate mode; auto, half duplex and full duplex. This dialog box is available only when the GigE link rate is set to something other than auto.
- **GigE Port Flow Control** —Provides a pull down dialog box for enabling and disabling GigE port flow control. The default is enabled. This dialog box is available only when the GigE link rate is set to something other than auto.

After selecting a port pair and setting GE port parameters, click **Next** to continue. Or click **Cancel** to quit the wizard.

3. Enter IP addresses per the **Local and Remote IP Address** dialog box, see Figure 37.
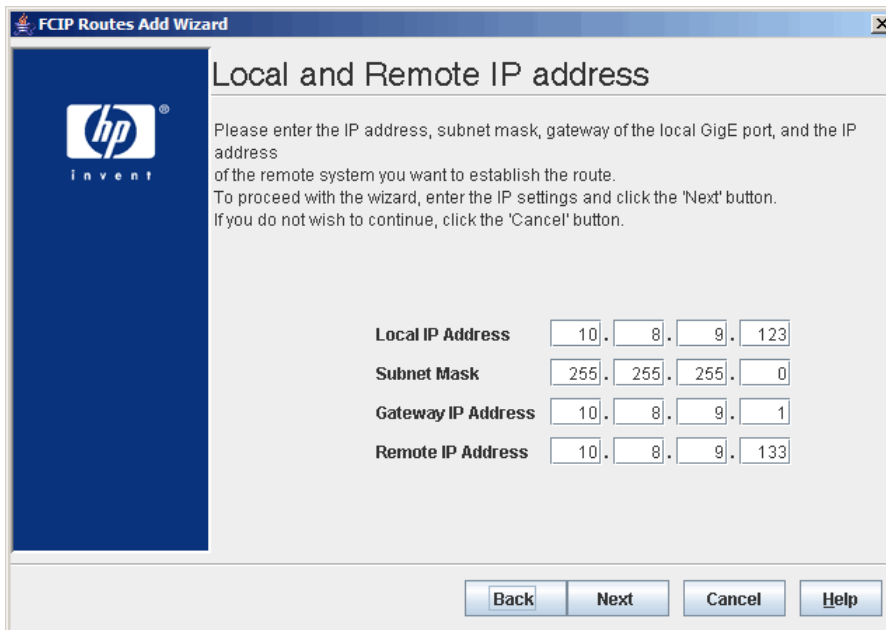
Figure 37 FCIP route add wizard—local and remote IP address dialog box

The following parameters are configured:

- **Local IP Address** —The IP address to be used by the GigE port. An uninitialized port has an IP address of all zeros.
- **Subnet Mask** —The subnet mask used by the GigE port.
- **Gateway IP Address** —The gateway IP address used by the GigE port.
- **Remote IP Address**—The IP address of the GigE port on the remote gateway.

After setting the IP address parameters, click **Next** to continue. Or click **Cancel** to quit the Wizard.

4. Enter TCP/IP parameters per the **TCP/IP Options** dialog box, see Figure 38.
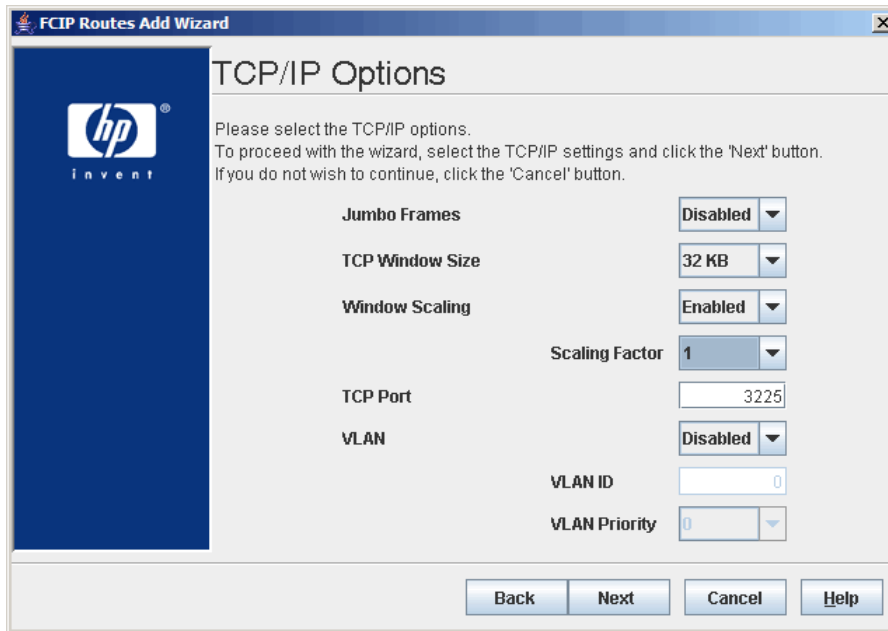
Figure 38 FCIP route add Wizard—TCP/IP options dialog box

Use the **TCP/IP Options** dialog box to configure the following parameters:

- **Jumbo Frames** —Provides a pull down dialog box for enabling and disabling Jumbo IP frames. When disabled the MTU will be 1500 bytes, when enabled the maximum MTU will be 9000 bytes.
- **TCP Window Size** —Contains a pull down dialog box that provides three options for TCP window size; 8192, 16384 and 32768 bytes. The default is 32768.
- **Window Scaling** —Contains a pull down dialog box that provides for enabling and disabling TCP window scaling. The default is disabled. When enabled the Window Scaling Factor is used.
- **Window Scaling Factor** —Contains a pull down dialog box that provides six options for TCP window scaling; 0,1,2,3,4 and 5.
- **VLAN Enabled** —Provides a pull down dialog box for enabling and disabling VLAN support. The default is disabled.
- **VLAN ID** —Provides a dialog box that allows the user to define the VLAN ID. This dialog box is available only when VLAN is enabled. The VLAN ID must be the same on both routers participating in the FCIP route (local and remote routers must be using same VLAN ID) and the Ethernet switches.
- **VLAN Priority** —Provides a pull down dialog box that contains eight options for the VLAN priority; 0 through 7. This dialog box is available only when VLAN is enabled.

After setting the TCP/IP parameters, click **Next** to continue. Or click **Cancel** to quit the Wizard.

5. Enter FCIP parameters per the **FCIP Options** dialog box, see Figure 39.
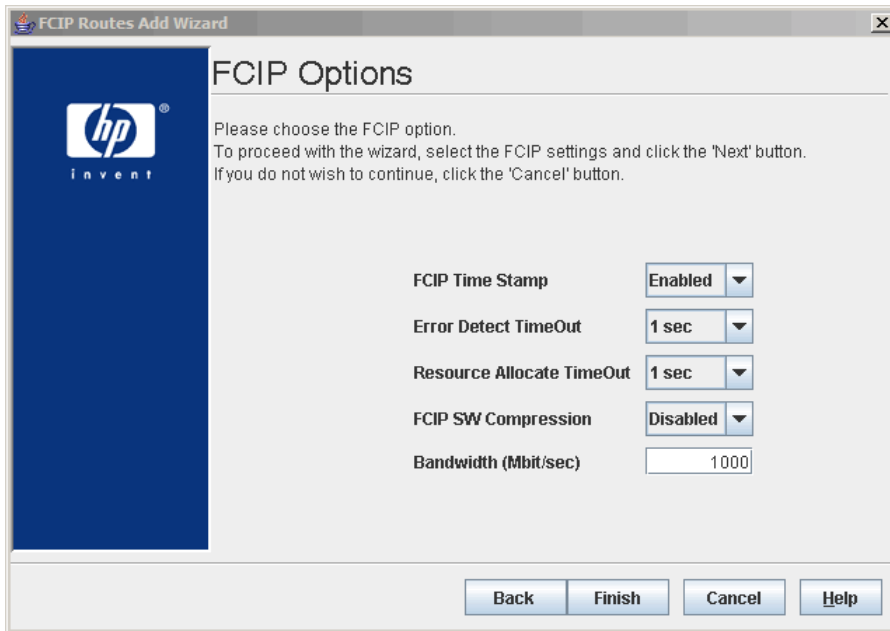
Figure 39 FCIP route add Wizard—FCIP options dialog box

The following parameters are configured:

- **Error Detect Timeout** —Provides a pull down dialog box that contains five options for the error detect timeout; 1 to 5 seconds. The default is one second.
- **Resource Allocate Timeout** —Provides a pull down dialog box that contains five options for the resource allocate timeout; 1 to 5 seconds. The default is one second.
- **FCIP Timestamp** —Provides a pull down dialog box for enabling and disabling FCIP timestamps. The default is enabled.
- **FCIP SW Compression** —Provides a pull down dialog box for enabling and disabling FCIP compression. The default is disabled.
- **Bandwidth (Mbit/sec)** —Provides a dialog box that allows the user to define the maximum bandwidth (in megabits per second) used by the GigE port during transmits. The range of values supported is 1 to 1000 megabits per second. This setting allows the user to limit the bandwidth used by the FCIP route so as to not consume all the available link bandwidth.

  For example if the slowest link in the WAN being used is a DS-3 link then the maximum available bandwidth is 45 megabits per second. To limit the FCIP route to 33% of the overall link bandwidth set the bandwidth to 15 megabits per second.

After setting the FCIP parameters, click **Next** to continue. Or click **Cancel** to quit the Wizard.

6. The **Security Check** dialog box requests the administrator password, see Figure 40. Enter the appropriate password, then click **OK** to confirm the add of the FCIP route.
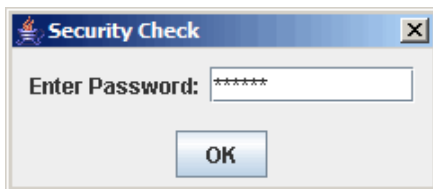
Figure 40 FCIP route add Wizard—security check dialog box

7. The **Add FCIP Route Complete** dialog box signifies the completion of the route add operation, see Figure 41. This dialog box may take a number of seconds before appearing. Click **OK** to exit the dialog box.
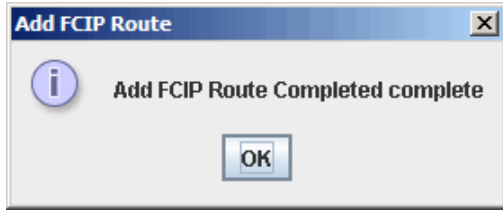
Figure 41 FCIP route add Wizard—completed dialog box

FCIP route remove

The **FCIP Route Remove** Wizard provides step-by-step instructions for removing a FCIP route. To remove a FCIP route:

1. When the FCIP route remove Wizard launches, a warning is displayed cautioning that the operation about to be performed will change the operation of the selected GE and FC ports. Also connectivity on the GE port not part of the FCIP route being removed will be momentarily disrupted.

If you want to proceed, click **Yes** and continue with step 2. Otherwise, click **No** to cancel the Wizard.
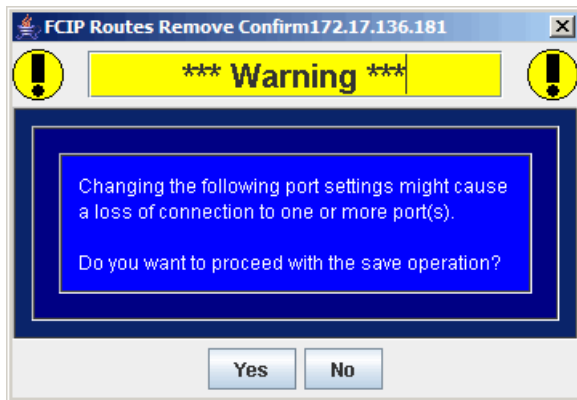
Figure 42 FCIP route remove Wizard—warning dialog box

2. Enter the FCIP route to be removed per the **Route Remove Selection** dialog box, see Figure 43.
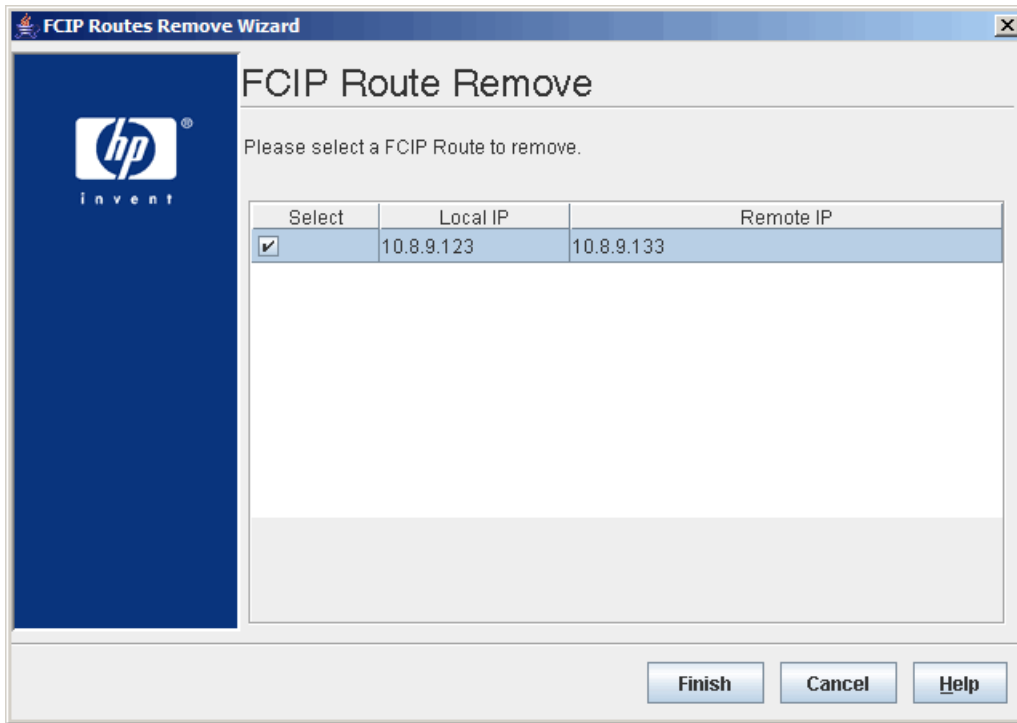
Figure 43 FCIP route remove Wizard—route selection dialog box

3. Enter the administrator password per the **Security Check** dialog box.

4. Click **OK** to confirm the removal of the FCIP route.

5. The **Remove FCIP Route Complete** dialog box indicates the completion of the route remove operation, see Figure 44.

   Click **OK** to exit the dialogue box.

Figure 44 Remove FCIP route complete message

A Command line interface

CLI summary

This appendix includes the following:

Logging on to the mpx110

To log on to an mpx110 using Telnet, open a command line window on the workstation, and then enter the Telnet command followed by the mpx110 IP address:

```
# telnet ip-address
```

A Telnet window opens prompting you for a login. Enter an account name and password.

To log on to a switch through the serial port, configure the server port with the following settings:

- 115200 baud
- 8-bit character
- 1 stop bit
- No parity

User accounts

The mpx110 ships with the following user account already defined:

```
Account name:  guest
```

```
Password:  password
```

See Password command on page 83 for more information about changing passwords.

Working with SAN mpx110 configurations

Successful management via the CLI depends on the effective use of mpx110 configurations. Modifying configurations, backing up configurations, and restoring configurations are key management tasks.

Modifying a configuration

The two major areas that require configuring include management port configuration and FCIP Route configuration:

Management port configuration uses the following commands:

- `Set Mgmt`
- `Show Mgmt`

FCIP Route configuration uses the following commands:

- `fciproute add`
- `fciproute mod`
- `show fciproutes`

Saving and restoring mpx110 configurations

See Saving and restoring the mpx110 configuration, page 145 for commands related to backing up and restoring a configuration.

Saving mpx110 configuration and persistence

Perform the following steps to save the configuration and persistent data. Persistent data consists of LUN mappings, discovered FC targets, and discovered iSCSI initiators.

1. Execute the `Fru save CLI` command (see FRU Command) to generate a file (HP_StorageWorks_mpx110_FRU.bin) containing the saved data. This file is stored locally on the mpx110 in an FTP directory.

2. Transfer the saved data from the mpx110 to a workstation by executing an FTP utility on a workstation. The following text is an example of an FTP transfer to get the saved mpx110 configuration data:

```
c:\>ftp 172.17.137.102

Connected to 172.17.137.102.

220 (none) FTP server (GNU inetutils 1.4.2) ready.

User (172.17.137.102:(none)):   ftp

331 Guest login ok, type your name as password.

Password:   ftp

230 Guest login ok, access restrictions apply.

ftp> bin

200 Type set to I.

ftp> get HP_StorageWorks_mpx110_FRU.bin

200 PORT command successful.

150 Opening BINARY mode data connection for 'HP_Storage-
Works_mpx110_FRU.bin' (6168 bytes).

226 Transfer complete.

ftp:   6168 bytes received in 0.00Seconds 6168000.00Kbytes/sec.

ftp> quit

221 Goodbye.
```

Restoring mpx110 configuration and persistence

Perform the following steps to restore the mpx110's configuration and persistent data.

1. Transfer the saved data from a workstation to the mpx110 by executing an FTP utility on the workstation. The following text is an example of an FTP transfer to put previously saved mpx110 configuration data on the mpx110:

```
c:\>ftp 172.17.137.102

Connected to 172.17.137.102.

220 (none) FTP server (GNU inetutils 1.4.2) ready.

User (172.17.137.102:(none)):  ftp

331 Guest login ok, type your name as password.

Password:  ftp

230 Guest login ok, access restrictions apply.

ftp> bin

200 Type set to I.

ftp> put HP_StorageWorks_mpx110_FRU.bin

200 PORT command successful.

150 Opening BINARY mode data connection for 'HP_Storage-
Works_mpx110_FRU.bin'.

226 Transfer complete.

ftp:  6168 bytes sent in 0.00Seconds 6168000.00Kbytes/sec.

ftp> quit

221 Goodbye.
```

2. Execute the `Fru restore` CLI command (see FRU Command) to update the mpx110 with the saved configuration data.

> **NOTE:**
> Always use the Full Configuration Restore with the mpx110. This allows you to restores the entire configuration.

Commands

The command syntax is as follows:

command

<u>key</u>word

keyword *[value]*

keyword [value1] [value2]

The command is followed by one or more parameters. Consider the following rules and conventions:

- Commands and parameters are case insensitive.
- Required keyword values appear in standard font: [value]. Optional values are shown in italics: *[value]*.
- Underlined portions of the keyword in the command format indicate the abbreviated form that can be used. For example, the Delete keyword can be abbreviated Del.

The command-line completion feature makes entering and repeating commands easier. Table 14 lists the command-line completion keystrokes.

Table 14 Command-line completion

Keystroke	Effect
Tab	Completes the command line. Enter at least one character and press the Tab key to complete the command line. If more than one possibility exists, press the Tab key again to display all possibilities.
Up arrow	Scrolls backward through the list of previously entered commands.
Down arrow	Scrolls forward through the list of previously entered commands.
Ctrl+A	Moves cursor to the beginning of the command line.
Ctrl+E	Moves cursor to the end of the command line.

The command set performs monitoring and configuration tasks. Commands related to monitoring tasks are available to all account names. Commands related to configuration tasks are available only within an Admin session. An account must have Admin authority to enter the `Admin Start` command, which opens an Admin session. See the Admin command on page 71.

Admin command

Opens and closes the Admin session. The Admin session provides commands that change mpx110 configurations. Only one Admin session can be open on the mpx110 at any time. An inactive Admin session will time out after a period of 15 minutes.

Authority	Admin
Syntax	**admin**
Parameters	**start (or begin)** Opens the Admin session. **end (or stop)** Closes the Admin session. The `logout`, `shutdown`, and `reset` commands will also end an Admin session. **cancel** Terminates an Admin session opened by another user. Use this parameter with care because it terminates the Admin session without warning the other user and without saving pending changes.
Notes	Closing a Telnet window during an admin session does not release the session. In this case, you must either wait for the Admin session to time out, or use the `admin cancel` command.
Examples	The following example shows how to start and end an Admin session: ``` mpx110 #> admin start Password: ****** mpx110 (admin) #> . . . mpx110 #> admin end mpx110 #> ```

Beacon command

Enables or disables flashing the Heartbeat and System Fault LEDs. The Heartbeat and System fault LEDs are flashed synchronously (they are turned on and off together). No other LEDs are affected.

Authority	None
Syntax	**beacon**
Parameters	**on** Turns on the mpx110 beacon. **off** Turns off the mpx110 beacon.
Example	`mpx110 #> beacon on`

Clear command

Allows you to remove all entries from the mpx110's log file and/or reset the Fibre Channel and iSCSI statistic counters.

Authority	Admin session
Syntax	**clear**
Parameters	**logs** Clears all entries from log file. **stats** Resets statistic counters.

Examples	The following is an example of the `Clear` command:
	`mpx110 #>clear logs`
	`mpx110 #>clear stats`

Date command

Displays or sets the date and time. To set the date and time, the information string must be provided in this format: `MMDDhhmmCCYY`. The new date and time takes effect immediately.

Authority	Admin session only to set date
Syntax	date
	[MMDDhhmmCCYY]
Parameters	[MMDDhhmmCCYY]
	Specifies the date—This requires an admin session. If you omit [MMDDhhmmCCYY], the current date is displayed, which does not require an admin session.
Notes	Network Time Protocol (NTP) must be disabled to set the time with the Date command.
	See Set command on page 89 for information about NTP.
Examples	The following is an example of the Date command:

```
mpx110 (admin) #> date 010314282006
Tue Jan 3 14:28:00 2006
mpx110 (admin) #> date
Tue Jan 3 14:28:14 2006
```

FcipRoute command

The `fciproute` command configures a new FCIP route and modifies or deletes an existing FCIP route. Each FCIP route requires a dedicated FC and Gigabit Ethernet port. Configuring an FCIP route, specifying an FC and GE port pair, take precedence over any previous configuration for the port pair (FC/GE).

Authority	Admin session only to set
Syntax	**fciproute**
Parameters	**add** The `fciproute add` command configures a new FCIP route. **mod** The `fciproute mod` command modifies an existing FCIP route. **rm** The `fciproute rm` command removes an existing FCIP route.

Example	The following is an example of the fciproute add command:
	
	`mpx110 (admin) #> fru add`
	`A list of attributes with formatting and current values`
	`will follow.  Enter a new value or simply press the`
	`ENTER key to accept the current value.  If you wish to`
	`terminate this process before reaching the end of the`
	`list press 'q' or 'Q' and the ENTER key to do so.`
	`WARNING:`
	`The following command might cause a`
	`loss of connections to both GE ports.`
	
	`Configuring FCIP Route:  2`
	`_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _`
	`FCIP Interfaces FC & GE (0=Enable, 1=Disable) [Enabled ]`
	`FC Port (1=FC1, 2=FC2) [FC2 ]`
	`GE Port (1=GE1, 2=GE2) [GE2 ]`
	`IP Address [0.0.0.0 ] 10.2.2.10`
	`Subnet Mask [0.0.0.0 ] 255.255.255.0`
	`Gateway IP Address [0.0.0.0 ]`
	`Remote IP Address [0.0.0.0 ] 10.2.2.20`
	`Jumbo Frames (0=Enabled, 1=Disabled) [Disabled ]`
	`TCP Window Size (0=8KB, 1=16KB, 2=32KB) [32768 ]`
	`Window Scaling (0=Enable, 1=Disable) [Disabled ]`
	`TCP Port No.  (Min=1024, Max=65535) [3225 ]`
	`GE Link Rate (0=Auto, 1=10Mb, 2=100Mb, 3=1Gb) [Auto ]`
	`FCIP Time Stamp (0=Enable, 1=Disable) [Enabled ]`
	`Error Detect TimeOut (Min=1sec, Max=5sec) [1 ]`
	`Resource Allocate TimeOut (Min=1sec, Max=5sec)[1 ]`
	`Bandwidth, Mbit/sec (Min=1, Max=1000) [1000 ]`
	`VLAN (0=Enable, 1=Disable) [Disabled ]`
	`FCIP SW Compression (0=Enable, 1=Disable) [Disabled ]`
	`All attribute values for FCIP Route 1 will now be saved.`

Example	The following is an example of the `FCIP route modify` command: `mpx110 (admin) #> fciproute mod` A list of attributes with formatting and current values will follow. Enter a new value or simply press the ENTER key to accept the current value.

```
If you wish to terminate this process before reaching
the end of the list
press 'q' or 'Q' and the ENTER key to do so.
WARNING: The following command might cause a loss of
connections to both GE ports.
Route FC Port ID GE Port ID
- - - - - - - - - - - - - -
Please select a FCIP route from the list above ('q' to
quit):  1
Configuring FCIP Route:  1
- - - - - - - - - - - - -
FCIP Interfaces FC & GE (0=Enable, 1=Disable) [Enabled ]
IP Address [10.6.6.20 ]
Subnet Mask [255.255.255.0 ]
Gateway IP Address [0.0.0.0 ] 10.6.6.1
Remote IP Address [10.6.6.10 ]
Jumbo Frames (0=Enabled, 1=Disabled) [Disabled ]
TCP Window Size (0=8KB, 1=16KB, 2=32KB) [32768 ]
Window Scaling (0=Enable, 1=Disable) [Disabled ]
TCP Port No.  (Min=1024, Max=65535) [3225 ]
GE Link Rate (0=Auto, 1=10Mb, 2=100Mb, 3=1Gb) [Auto ]
FCIP Time Stamp (0=Enable, 1=Disable) [Enabled ]
Error Detect TimeOut (Min=1sec, Max=5sec) [1 ]
Resource Allocate TimeOut (Min=1sec, Max=5sec)[1 ]
Bandwidth, Mbit/sec (Min=1, Max=1000) [1000 ]
VLAN (0=Enable, 1=Disable) [Disabled ]

FCIP SW Compression (0=Enable, 1=Disable) [Disabled ]

All attribute values for FCIP Route 1 will now be saved.
```

Example　　　The following is an example of the `FCIP route remove` command:

```
mpx110 (admin) #> fciproute rm
A list of attributes with formatting and current values
will follow.  Enter a new value or simply press the
ENTER key to accept the current value.  If you wish to
terminate this process before reaching the end of the
list press 'q' or 'Q' and the ENTER key to do so.
WARNING: The following command might cause a loss of
connections to both GE ports.
Route FC Port ID GE Port ID
- - - - - - - - - - - - - -
1 FC2 GE2

2 FC1 GE1
Please select an FCIP route from the list above ('q' to
quit):  1
FCIP Route 1 has been removed from the system.
```

FRU command

Saves and restores the mpx110 configuration.

Authority	Admin session only to set
Syntax	**fru**
Parameters	**restore**
	`FRU restore` requires that the user first ftp the tar file containing the desired configuration to the mpx110. When this command is issued it prompts the user for the restore level. The user has the option of fully restoring the mpx110's configuration (all configuration parameters and LUN mappings) or restoring only the LUN mappings. The restored configuration will not take effect until the mpx110 is rebooted.
	save
	`FRU save` will create a tar file containing the mpx110's persistent data, configuration and LUN mappings, storing the file in the mpx110's /var/ftp directory. The user must then ftp the bin file from the mpx110.
Examples	The following is an example of the `FRU restore` command:
	mpx110 (admin) #> fru restore
	A list of attributes with formatting and current values will follow. Enter a new value or simply press the ENTER key to accept the current value. If you wish to terminate this process before reaching the end of the list press 'q' or 'Q' and the ENTER key to do so. Type of restore (0=full, 1=mappings only) [full] FRU restore completed. Please reboot the system for configuration to take affect.
	The following is an example of the `FRU save` command:
	``mpx110 (admin) #> fru save
FRU save completed. Configuration
File is HP_StorageWorks_mpx110_fru.bin
Please use FTP to extract the file out from the System.```

Help command

Displays a list of the CLI commands and their syntax.

Authority

Syntax   **help**

Examples   The following is an example of the `Help` command:

```
mpx110 (admin) #> help
admin [ cancel | start | end ]
beacon [ on | off ]
date [ <MMDDhhmmCCYY> ]
discover [ <IP_ADDR> ]
clear [ logs | stats ]
fciproute [ add | mod | rm ]
discover
fru [ restore | save ]
history
image [ cleanup | unpack ]
image cleanup
image list
image unpack [ <filename> ]
logout
passwd
ping
quit
reboot
reset factory
reset factory
save [ capture | logs | traces ]
set [ chap | fc | features | iscsi | isns |
mgmt | ntp | properties | snmp | system ]
set chap
set fc [ <PORT_NUM> ]
set features
set mgmt
set ntp
set properties
set snmp [trap_destinations [ <DEST_NUM> ]]
set system
show [ chap | fc | fciproutes
features | initiators | iscsi
isns | localmaps | logs
memory | mgmt | ntp
perf | presented_initiators | presented_targets
properties | remotemaps | remotepeers
snmp | stats | system
targets ]
show chap
show fc [ <PORT_NUM> ]
show fciproutes [ <LINK_ID> ]
show features
show initiators [ fc | iscsi ]
show logs
show memory
show mgmt
show ntp
show perf [ byte | init_rbyte | init_wbyte |
tgt_rbyte | tgt_wbyte ] show statsshow system
show properties
show snmp
show stats
show system
show targets [ fc | iscsi ]
```

```
show vlan [ <PORT_NUM> ]
shutdown
target [ add | rm ]
```

History command

Displays a numbered list of the previously entered commands.

Authority	Admin session only to set
Syntax	**history**
Notes	Closing a Telnet window during an admin session does not release the session. In this case, you must either wait for the admin session to time out, or use `Admin Cancel` command.
Examples	The following is an example of the `history` command:

```
mpx110 (admin) #> history
mpx110 (admin) #> history
1:  admin start
2:  help
3:  history
mpx110 (admin) #>
```

Image command

Provides for updating the mpx110's firmware image and the cleanup (removal) of image files in the mpx110's `/var/ftp` directory.

Authority	Admin session only to set
Syntax	**image**
Parameters	**cleanup**
	Removes any firmware image file(s) in the mpx110's /var/ftp directory. These are files transferred by the user when updating the firmware image.
	list
	Displays a list of the firmware image files in the mpx110's /var/ftp directory.
	unpack [<filename>]
	Unpacks the firmware image file specified in the <filename> parameter and installs the firmware image on the mpx110. The mpx110 must be rebooted for the new firmware image to be activated. The firmware image file must first have been transferred to the mpx110's `/var/ftp` directory using FTP.
Example	The following is an example of the `image cleanup` command:
	`mpx110 (admin) #> image cleanup`
Example	The following is an example of the `image list` command:
	`mpx110 (admin) #> image list` `mpx110-2_0_3_2.bin`
Example	The following is an example of the `image unpack` command:
	mpx110 (admin) #> image unpack mpx110-2_0_3_2.bin
	Unpack Completed. A reboot is required for the FW to take affect. Do you wish to reboot the System at the current time (y/n): n

Logout command

Exits the CLI and returns the operator to the login prompt.

Authority   Admin session only to set

Syntax   **logout**

Examples   mpx110 (admin) #> logout
                       (none) login:

Password command

Changes the guest and administrator passwords.

Authority	Admin session only to set
Syntax	**password**
Examples	The following is an example of the `Password` command:

```
mpx110 (admin)
#> passwd
Press 'q' and the ENTER key to abort this command.
Select password to change (0=guest, 1=admin):  1
account OLD password :  ******
account NEW password (6-128 chars) :  ******
please confirm account NEW password :  ******
Password has been changed.
```

Ping command

Verifies the connectivity of each Ethernet port, management, GE1 (iSCSI 1), and GE2 (iSCSI 2).

Authority	Admin session
Syntax	**ping**
Examples	The following is an example of the `ping` command:

```
mpx110 (admin) #> ping
A list of attributes with formatting and
current values will follow.  Enter a new value or simply
press the ENTER key to accept the current value.  If you
wish to terminate this process before reaching the end
of the list press 'q' or 'Q' and the ENTER key to do so
IP Address [0.0.0.0] 10.3.5.105
Iteration Count (Min=1, Max=10) [10 ]
Outbound Port (0=Mgmt, 1=GE1, 2=GE2) [Mgmt ] 1
Pinging 10.3.5.105 with 32 bytes of data:
Pinging 10.3.5.105 with 32 bytes of data:
Reply from 10.3.5.105:  bytes=32 time=0.1ms Reply from
10.3.5.105:  bytes=32 time=<0.1ms Reply from 10.3.5.105:
bytes=32 time=<0.1ms Reply from 10.3.5.105:  bytes=32
time=<0.1ms Reply from 10.3.5.105:  bytes=32 time=<0.1ms
Reply from 10.3.5.105:  bytes=32 time=<0.1ms Reply from
10.3.5.105:  bytes=32 time=<0.1ms Reply from 10.3.5.105:
bytes=32 time=<0.1ms Reply from 10.3.5.105:  bytes=32
time=<0.1ms Reply from 10.3.5.105:  bytes=32 time=<0.1ms
Ping Statistics for 10.3.5.105:
Packets:  Sent = 10, Recieved = 10, Lost = 0
Approximate round trip times in milli-seconds:
Minimum = 0.0ms, Maximum = 0.1ms, Average = 0.0ms
```

Quit command

Exits the CLI and returns the operator to the login prompt.

Authority	Admin session only to set
Syntax	**quit**
Examples	The following is an example of the Quit command:

```
mpx110 (admin) #> quit
(none) login:
```

Reboot command

Restarts the mpx110 firmware.

Authority   Admin session only

Syntax   **reboot**

Examples   The following is an example of the `reboot` command:

```
mpx110 (admin) #> reboot
QAre you sure you want to reboot the System (y/n):  y
System will now be rebooted...
```

Reset factory command

Restores the mpx110 factory default values. All LUN mappings are deleted as is all persistent data regarding targets, LUNs and initiators. The factory default IP addresses will be restored.

Authority	Admin session.
Syntax	**reset**
Parameters	**factory**
	Restores mpx110 to factory default configuration.
Examples	The following is an example of the `reset factory` command:

```
mpx110 (admin) #> reset factory
Are you sure you want to restore to factory
default settings (y/n):  y Please reboot the System for
the settings to take affect.
```

Save command

Saves logs and traces.

Authority	Admin session only
Syntax	**save**
Parameters	**capture**
	`save capture` creates a debug file that captures all debug dump data. After the command completes, you must ftp the debug capture file from the mpx110.
	logs
	The `save logs` command will create a tar file containing the mpx110's log data, storing the file in the mpx110s /var/ftp directory. The operator must then ftp the logs tar file from the mpx110.
	traces
	The `save traces` command will create a tar file containing the mpx110's dump data storing the tar file in the mpx110's /var/ftp directory. The operator must then ftp the traces tar file from the mpx110. If the mpx110 does not have any dump data, the operator will be notified when executing this command. An event log entry is generated whenever a dump data is generated.
Example	The following is an example of the `Save capture` command:
| | ```
mpx110 (admin) #> save capture
Debug capture completed.  Package is Sys-
tem_Capture.tar.gz Please use FTP to extract the file
out from the System.
``` |
| **Example** | The following is an example of the `save logs` command: |
| | ```
mpx110 (admin) #> save logs
Save Event Logs completed.  Package is
System_Evl.tar.gz Please use FTP to extract the file
out from the System.
``` |
| **Example** | The following is an example of the `save traces` command: |
| | ```
mpx110 (admin) #> save traces
 Save ASIC Traces completed.
Package is System_Asic_Trace.tar.gz
Please use FTP to extract the file out from the System.
mpx110 (admin) #> save traces
No ASIC trace files exist to save.  Command
aborted.
``` |

Set command

Configures general parameters as well as the parameters for the FC, iSCSI, and management ports.

Authority	Admin session only
Syntax	**set**
Parameters	**chap** Set CHAP secrets **mgmt** Set management port parameters. **ntp** Set network time protocol (NTP) parameters. **properties** Set CLI properties. **snmp** Sets the simple network management protocol (SNMP) parameters. **system** Set system parameters.
Examples	The following is an example of the `set` command: `mpx110 #>set mgmt`

Set FC command

Configures an FC port.

Authority	Admin session
Syntax	**set fc [port_num]**
Parameter	**port_num** The number of the FC port to be configured.
Examples	The following is an example of the `set fc` command:

```
mpx110 (admin) #> set fc 1
A list of attributes with formatting and current
values will follow.  Enter a new value or simply
press the ENTER key to accept the current value.
If you wish to terminate this process
before reaching the end of the list press
'q' or 'Q' and the ENTER key to do so.
WARNING:
The following command might cause a loss of
connections to both ports.  Configuring FC Port:  1
------------------------
Link Rate (0=Auto, 1=1Gb, 2=2Gb, 4=4Gb) [Auto ]
Frame Size (0=512B, 1=1024B, 2=2048B) [2048 ]
Execution Throttle (Min=16, Max=256) [64 ]
All attribute values for Port 1 that
have been changed will now be saved.
Configuring FC Port:  2
------------------------
Programmed Link Rate (0=Auto, 1=1Gb, 2=2Gb, 4=4Gb)
[Auto ] Frame Size (0=512B, 1=1024B, 2=2048B) [2048
] Execution Throttle (Min=16, Max=256) [64 ] All
attribute values for Port 2 that have been changed
will now be saved.
```

Set MGMT command

Configures the mpx110 management port (10/100).

Authority	Admin session
Syntax	**set mgmt**
Examples	The following is an example of the `set mgmt` command:

```
mpx110 (admin) #> set mgmt
A list of attributes with formatting and current
values will follow.  Enter a new value or simply
press the ENTER key to accept the current value.
If you wish to terminate this process
before reaching the end of the list press
'q' or 'Q' and the ENTER key to do so.
Mode (0=Static, 1=DHCP, 2=Bootp, 3=Rarp) [Dhcp ] 1
IP Address [10.0.0.1 ]
Subnet Mask [255.0.0.0 ]
Gateway [0.0.0.0 ]
All attribute values that have been changed
will now be saved.
```

Set NTP command

Configures NTP parameters.

Authority	Admin session
Syntax	**set ntp**
Examples	The following is an example of the `set ntp` command:

```
mpx110 (admin) #> set ntp
A list of attributes with formatting and
current values will follow.  Enter a new value or simply
press the ENTER key to accept the current value.  If you
wish to terminate this process before reaching the end
of the list press 'q' or 'Q' and the ENTER key to do so.
NTP (0=Enable, 1=Disable) [Enabled ]
TimeZone Offset from GMT (Min=-12hrs,Max=12hrs) [-8 ]
IP Address [0] [0.0.0.0 ] 207.126.97.57
IP Address [1] [0.0.0.0 ]
IP Address [2] [0.0.0.0 ]
All attribute values that have been
changed will now be saved.
```

Set properties command

Configures CLI properties.

Authority	Admin session
Syntax	**set properties**
Examples	The following is an example of the set properties command:

```
mpx110 (admin) #> set properties
A list of attributes with formatting and current
values will follow.  Enter a new value or
simply press the ENTER key to accept the current
value.  If you wish to terminate this process
before reaching the end of the list press
'q' or 'Q' and the ENTER key to do so.
CLI Inactivity Timer (0=Dis-
able, 1=15min, 2=60min) [Disabled
CLI Prompt (Max=32 Characters) [mpx110 ] RTR1
All attribute values that have been changed will now
be saved.
```

Set SNMP command

Configures general SNMP properties. It also provides for configuration of up to eight trap destinations.

Authority   Admin session

Syntax   **set snmp**

Parameters   **trap_destinations**
                       The number of the trap destinations to be configured for SNMP.

Examples   The following is an example of the set snmp command:

```
mpx110 (admin) #> set snmp
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.
Configuring SNMP:
---------
Read Community                          [            ] Public
Trap Community                          [            ] Private
System Location                         [          ]
System Contact                          [          ]
Authentication Traps (0=Enable, 1=Disable) [Disabled      ]
All attribute values that have been changed will now be saved.
```

Examples   The following is an example of configuring an SNMP trap destination:

```
mpx110 (admin) #> set snmp trap_destinations
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current value.
If you wish to terminate this process before reaching the end of the list
press 'q' or 'Q' and the ENTER key to do so.

Configuring SNMP Trap Destination 1 :
-------------------
Destination enabled   (0=Enable, 1=Disable) [Disabled ] 0
IP Address     [0.0.0.0 ] 10.0.0.5
Destination Port    [0 ] 1024

Trap Version [0 ] 2
Configuring SNMP Trap Destination 2 :-
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 3 :
-------------------
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 4 :
-------------------
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 5 :
-------------------
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 6 :
-------------------
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 7 :
-------------------
Destination enabled (0=Enable, 1=Disable) [Disabled ]
Configuring SNMP Trap Destination 8 :
-------------------
Destination enabled (0=Enable, 1=Disable) [Disabled ]
All attribute values that have been changed will now be saved.
```

Set System command

Configures general mpx110 parameters.

Authority	Admin session
Syntax	**set system**
Parameter	**port_num** The number of the iSCSI port to be configured for iSNS.
Examples	The following is an example of the set system command:

```
mpx110 (admin) #> set system
A list of attributes with formatting and current values will follow.
Enter a new value or simply press the ENTER key to accept the current
value.
If you wish to terminate this process before reaching the end of the
list
press 'q' or 'Q' and the ENTER key to do so.
System Symbolic Name (Max = 64 characters) [ ] testing
Mode (0=Normal, 1=Transparent, 2=Encap_FC) [0 ]
System Log Level (Min = 0, Max = 3) [0 ]
All attribute values that have been changed will now be saved.
```

Show command

Displays operational information.

Authority   Admin session only to set

Syntax   show [keyword]

Parameters   **fciroutes [link_id]** — Shows FCIP routes in effect and their configuration parameters.

                    logs — Shows contents of the mpx110 logs.

                    memory — Shows memory managed by mpx110. Includes total and available.

                    mgmt — Shows the mpx110 management port configuration.

                    ntp — Shows the network time protocol (NTP) configuration.

                    perf [byte | init_rbyte | init_wbyte | tgt_rbyte | tgt_wbyte] — Shows performance data.

                    properties — Shows the mpx110 CLI properties.

                    snmp — Shows the mpx110 SNMP properties and trap configurations.

                    stats — Shows the mpx110 statistics, both FC and iSCSI.

                    system — Shows product information including serial number, software version, hardware version, configuration, and temperature.

Examples   The following is an example of the `Show` command:

```
mpx110 #> show mpx110

QRouter Information
-------------------
Product Name              QRouter
Symbolic Name             Rack3
QRouter Mode              iSCSI Server Connectivity Mode
Serial Number             0539A01070
HW Version                2
SW Version                1.0.5.0
No. of FC Ports           2
No. of iSCSI Ports        2
Log Level                 0
Log Length (KB)           32768
Temperature (C)           32
```

Show FcipRoutes command

Shows FCIP route(s) configuration parameters.

Authority	None
Syntax	**show fciproutes**
Parameters	**[link_id]** The number of the FCIP route to be displayed (1 or 2).
Examples	The following is an example of the show fciproutes command:

```
mpx110 #> show fciproutes

FCIP Route Information
------------------------
FCIP Route       1
FCIP Interfaces Status Enabled
FCIP Link Status    Up
FC Port        FC1
GE Port        GE1
GE Link Status     Up
Local IP Address   10.6.6.10
Remote IP Address    10.6.6.20
Subnet Mask    255.255.255.0
Gateway IP Address  0.0.0.0
Jumbo Frames    Disabled
TCP Window Size    32768
Window Scaling     Disabled
TCP Port No     3225
GE Link Rate    Auto
FCIP Time Stamp    Enabled
Error Detect TimeOut  1
Resource Allocate TimeOut 1
Bandwidth, Mbit/sec  1000
VLAN       Disabled
FCIP SW Compression  Disabled

FCIP Route       2
FCIP Interfaces Status Enabled
FCIP Link Status    Up
FC Port        FC2
GE Port        GE2
GE Link Status     Up
Local IP Address    10.2.2.10
Remote IP Address    10.2.2.20
Subnet Mask    255.255.255.0
Gateway IP Address   0.0.0.0
Jumbo Frames     Disabled
TCP Window Size    32768
Window Scaling     Disabled
TCP Port No     3225
GE Link Rate     Auto
FCIP Time Stamp     Enabled
Error Detect TimeOut   1
Resource Allocate TimeOut 1
Bandwidth, Mbit/sec 1000
VLAN Disabled
FCIP SW Compression Disabled
```

Show Logs command

Shows the mpx110 event log.

Authority	None
Syntax	**show logs**
Examples	The following is an example of the `show logs` command:

```
mpx110 #> show logs

01/01/1970 00:00:13 System   3 Thursday 01 January 12:13 AM
01/01/1970 00:00:21 QL4022   3 #0: QLIsrDecodeMailbox: Link up
01/01/1970 00:00:13 System   3 Thursday 01 January 12:13 AM
01/01/1970 00:00:22 QL4022   3 #0: QLIsrDecodeMailbox: Link up
```

Show Memory command

Shows the mpx110 memory usage. The FCIP memory usage will be zero if there are no FCIP routes configured.

Authority	None
Syntax	**show memory**
Examples	The following is an example of the `show memory` command:

```
mpx110 #> show memory

Memory Units      Free/Total
-------------- ----------
Physical        15MB/505MB
Buffer Pool      11520/12544
Process Blocks     8192/8192
Request Blocks     8192/8192
Event Blocks       1024/1024
Control Blocks      256/256
FCIP Buffer Pool     0/0
FCIP Request Blocks    16384/16384
```

The following is an example of the show memory command with one FCIP route configured:

```
mpx110 #> show memory

Memory Units      Free/Total
-------------- ----------
Physical        28MB/251MB
Buffer Pool       2176/4224
Process Blocks     4096/4096
Request Blocks     4096/4096
Event Blocks        512/512
Control Blocks      128/128
FCIP Buffer Pool     13320/16384
FCIP Request Blocks    15368/16384
```

Show MGMT command

Shows management port (10/100) configuration.

Authority	None
Syntax	**show mgmt**
Examples	The following is an example of the Show Mgmt command:

```
mpx110 #> show mgmt
Management Port Information
-----------------------------
Mode                    Dhcp
Link Status             Up
IP Address              172.17.137.210
Subnet mask             255.255.254.0
Gateway                 172.17.136.1
MAC Address             00-c0-dd-0c-60-10
```

Show NTP command

Shows Network Time Protocol (NTP) configuration.

Authority	None
Syntax	**show ntp**
Examples	The following is an example of the show ntp command:

```
mpx110 #> show ntp

NTP Information
-----------------
Mode                    Disabled
Status                  Offline
TimeZone Offset (Hours)  0
```

Show Performance command

Displays performance data.

Authority	None
Syntax	**show perf**
Parameters	**byte** Shows data transfer rate of each port (FC and GE). **init_rbyte** Shows initiator read transfer rate per port. **init_wbyte** Shows initiator write transfer rate per port. **tgt_rbyte** Shows target read transfer rate per port. **tgt_wbyte** Shows target write transfer rate per port.
Examples	The following is an example of the `show performance` (all) command.

The following is an example of the Show Performance byte command.

Displaying bytes/sec (total)... (Press any key to stop display)

```
GE1    GE2    FC1   FC2

47M    93M    94M   48M
47M    94M    96M   47M
46M    96M    96M   47M
45M    94M    97M   48M
47M    92M    93M   48M
45M    93M    94M   46M
```

Show Properties command

Shows CLI properties.

Authority	None
Syntax	**show properties**
Examples	The following is an example of the `show properties` command:

```
mpx110 #> show properties

CLI Properties
----------------
Inactivity Timer    Disabled
Prompt String       QRouter
```

Show SNMP command

Displays the mpx110's SNMP properties and any traps that have been configured.

Authority	None
Syntax	**show snmp**
Examples	The following is an example of the show snmp command:

```
QRouter #> show snmp

SNMP configuration
------------------------------
Read Community        Public
Trap Community        Private
System Location
System Contact
Authentication traps
System OID            1.3.6.1.4.1.3873.1.4
System Description    HP StorageWorks mpx110

Trap Destination      1
IP Address            10.0.0.5
Trap Port             1024
Trap Version          2
```

Show Stats command

Displays mpx110 for statistics, FC and iSCSI.

Authority	None
Syntax	**show stats**
Examples	The following is an example of the show stats command:

```
mpx110 #> show stats

FC Port Statistics
--------------------
FC Port
Interrupt Count
Target Command Count
Initiator Command Count

FC Port
Interrupt Count
Target Command Count
Initiator Command Count

iSCSI Port Statistics
-----------------------
iSCSI Port
Interrupt Count
Target Command Count
Initiator Command Count
MAC Xmit Frames
MAC Xmit Byte Count
MAC Xmit Multicast Frames
MAC Xmit Broadcast Frames
MAC Xmit Pause Frames
MAC Xmit Control Frames
MAC Xmit Deferrals
MAC Xmit Late Collisions
MAC Xmit Aborted
MAC Xmit Single Collisions
MAC Xmit Multiple Collisions
MAC Xmit Collisions
MAC Xmit Dropped Frames
MAC Xmit Jumbo Frames
MAC Rcvd Frames
MAC Rcvd Byte Count
MAC Rcvd Unknown Control Frames
MAC Rcvd Pause Frames
MAC Rcvd Control Frames
MAC Rcvd Dribbles
MAC Rcvd Frame Length Errors
MAC Rcvd Jabbers
MAC Rcvd Carrier Sense Errors
MAC Rcvd Dropped Frames
MAC Rcvd CRC Errors
MAC Rcvd Encoding Errors
MAC Rcvd Length Errors Large
MAC Rcvd Small Errors Small
MAC Rcvd Multicast Frames
MAC Rcvd Broadcast Frames

FCIP Link Statistics
 --------------------
FCIP Link
FC Xmit Frames
FC Xmit Bytes
```

```
FC Rcvd Frames              FC Rcvd Bytes
IP Xmit Packets
IP Xmit Byte Count
IP Xmit Fragments
IP Rcvd Packets
IP Rcvd Byte Count
IP Rcvd Fragments
IP Datagram Reassembly Count
IP V6Pkt Rcvd
IP Error Packets
IP Reassembly Errors
TCP Xmit Segment Count
TCP Xmit Byte Count
TCP Xmit Acks
TCP Rcvd Segment Count
TCP Rcvd Byte Count
TCP Rcvd Acks
TCP Rcvd Window Probes
TCP Timer Expired
TCP ECC Error Corections
MAC Xmit Frames
MAC Xmit Bytes
MAC Xmit Multi Count
MAC Xmit Broad Count
MAC Xmit Pause Count
MAC Xmit Control Frames
MAC Xmit Deferrals
MAC Xmit Late Collisions
MAC Xmit Aborted
MAC Xmit Multiple Collisions
MAC Xmit Single Collisions
MAC Xmit Collisions
MAC Xmit Dropped Frames
MAC Xmit Jumbo Frames
MAC Rcvd Frames
MAC Rcvd Bytes
MAC Rcvd Multi Count
MAC Rcvd Broad Count
MAC Rcvd Pause Count
MAC Rcvd Control Frames
MAC Rcvd Dribbles
MAC Rcvd Frame Length Errors
MAC Rcvd Jabbers
MAC Rcvd Carrier Sense Errors
MAC Rcvd Dropped Frames
MAC Rcvd CRC Errors
MAC Rcvd Encoding Error
MAC Rcvd Length Errors

FCIP Link
FC Xmit Frames
FC Xmit Bytes
FC Rcvd Frames
FC Rcvd Bytes
IP Xmit Packets
IP Xmit Byte Count
IP Xmit Fragments
IP Rcvd Packets
IP Rcvd Byte Count
IP Rcvd Fragments
IP Datagram Reassembly Count
IP V6Pkt Rcvd
IP Error Packets
IP Reassembly Errors
TCP Xmit Segment Count
TCP Xmit Byte Count
```

```
TCP Xmit Acks
TCP Rcvd Segment Count
TCP Rcvd Byte Count
TCP Rcvd Acks
TCP Rcvd Window Probes
TCP Timer Expired
TCP ECC Error Corrections
MAC Xmit Frames
MAC Xmit Bytes
MAC Xmit Multi Count
MAC Xmit Broad Count
MAC Xmit Pause Count
MAC Xmit Control Frames
MAC Xmit Deferrals
MAC Xmit Late Collisions
MAC Xmit Aborted
MAC Xmit Multiple Collisions
MAC Xmit Single Collisions
MAC Xmit Collisions
MAC Xmit Dropped Frames
MAC Xmit Jumbo Frames
MAC Rcvd Frames
MAC Rcvd Bytes
MAC Rcvd Multi Count
MAC Rcvd Broad Count
MAC Rcvd Pause Count
MAC Rcvd Control Frames
MAC Rcvd Dribbles
MAC Rcvd Frame Length Errors
MAC Rcvd Jabbers
MAC Rcvd Carrier Sense Errors
MAC Rcvd Dropped Frames
MAC Rcvd CRC Errors
MAC Rcvd Encoding Error
MAC Rcvd Length Errors


FC Port
Interrupt Count
Target Command Count
Initiator Command Count


--------------------
FC Port
Interrupt Count
Target Command Count
Initiator Command Count

FC Port
Interrupt Count
Target Command Count
Initiator Command Count
```

Examples (continued)

```
iSCSI Port                                    2
Interrupt Count
Target Command Count
Initiator Command Count
MAC Xmit Frames
MAC Xmit Byte Count
MAC Xmit Multicast Frames
MAC Xmit Broadcast Frames
MAC Xmit Pause Frames
MAC Xmit Control Frames
MAC Xmit Deferrals
MAC Xmit Late Collisions
MAC Xmit Aborted
MAC Xmit Single Collisions
MAC Xmit Multiple Collisions
MAC Xmit Collisions
MAC Xmit Dropped Frames
MAC Xmit Jumbo Frames
MAC Rcvd Frames
MAC Rcvd Byte Count
MAC Rcvd Unknown Control Frames
MAC Rcvd Pause Frames
MAC Rcvd Control Frames
MAC Rcvd Dribbles
MAC Rcvd Frame Length Errors
MAC Rcvd Jabbers
MAC Rcvd Carrier Sense Errors
MAC Rcvd Dropped Frames
MAC Rcvd CRC Errors
MAC Rcvd Encoding Errors
MAC Rcvd Length Errors Large
MAC Rcvd Small Errors Small
MAC Rcvd Multicast Frames
MAC Rcvd Broadcast Frames
```

Examples (continued)

```
iSCSI Shared Statistics
-----------
PDUs Xmited
Data Bytes Xmited
PDUs Rcvd
Data Bytes Rcvd
I/O Completed
Unexpected I/O Rcvd
iSCSI Format Errors
Header Digest Errors
Data Digest Errors
Sequence Errors
PDU Xmit Count
PDU Xmit Count
PDU Xmit Count
IP Xmit Packets
IP Xmit Byte Count
IP Xmit Fragments
IP Rcvd Packets
IP Rcvd Byte Count
IP Rcvd Fragments
IP Datagram Reassembly Count
IP Error Packets
IP Fragment Rcvd Overlap
IP Fragment Rcvd Out of Order
IP Datagram Reassembly Timeouts
TCP Xmit Segment Count
TCP Xmit Byte Count
TCP Rcvd Segment Count
TCP Rcvd Byte Count
```

```
TCP Persist Timer Expirations
TCP Rxmit Timer Expired
TCP Rcvd Duplicate Acks
TCP Rcvd Pure Acks
TCP Xmit Delayed Acks
TCP Rcvd Pure Acks
TCP Rcvd Segment Errors
TCP Rcvd Segment Out of Order
TCP Rcvd Window Probes
TCP Rcvd Window Updates
TCP ECC Error Corrections
```

Show System command

Displays product information including the serial number, software version, hardware version, configuration, and temperature.

Authority   None

Syntax   **show system**

Examples   The following is an example of the `show system` command:

```
mpx110 #> show  system

System Information
--------------------
Product Name    HP StorageWorks mpx110
Symbolic Name
Serial Number   0608A00471
HW Version       3
SW Version      2.1.1.0
No. of FC Ports  2
No. of iSCSI Ports  2
Log Level      0
Log Length (KB)  32768
Temperature (C)  36
```

Show Targets command

Shows targets discovered by the mpx110: FC, iSCSI or both.

Authority   None

Syntax   **show targets**
                           fc
                           iscsi

Parameters   **fc**
                           Specifies the display of FC targets
                           iscsi
                           Specifies the display of iSCSI targets.

Examples   The following is an example of the `show targets fc` command:

```
mpx110 #> show targets fc

Target Information
--------------------
WWNN          50:00:1f:e1:50:01:11:50
WWPN          50:00:1f:e1:50:01:11:58
Port ID       01-0d-00
Portal No.    1
State         Online

WWNN          50:00:1f:e1:50:06:9d:20
WWPN          50:00:1f:e1:50:06:9d:2c
Port ID       01-08-00
Portal No.    1
State         Online
```

The following is an example of the `Show Targets iSCSI` command:

```
mpx110 #> show targets iscsi

No Targets found.
```

Show VLAN command

Displays the mpx110's VLAN configuration.

Authority	None
Syntax	**show vlan [<port_num>]**
Parameter	**port_num** The iSCSI port number whose VLAN configuration is to be displayed.
Example	The following is an example of the show vlan command:

```
mpx110 #> show vlan

VLAN Information
------------------
Port        1
VLAN        Disabled
ID          0
Priority    0

Port        2
VLAN        Disabled
ID          0
Priority    0

mpx110 #> show vlan 1

VLAN Information
------------------
Port        1
VLAN        Disabled
ID          0
Priority    0
```

Shutdown command

Provides for an orderly shutdown of mpx110 firmware. This command does not power down the mpx110.

Authority	Admin session only to set.
Syntax	**shutdown**
Examples	The following is an example of the shutdown command:

```
mpx110 (admin) #>shutdown
```

Target command

Removes targets from the mpx110's database. This command is typically used to remove targets which are no longer connected to the mpx110.

> **NOTE:**
> The `target add` command is not currently supported.

Authority	Admin session only to set.
Syntax	**target**
Parameter	**rm** Remove a target from the mpx110 target database.
Example	The following is an example of the `target rm` command:

```
mpx110 (admin) #> target rm

Index   (WWNN,WWPN/iSCSI Name)
---------------------------
0       20:00:00:20:37:fd:8b:ab:00:00:00:00:fc:b6:1f:fa

Please select an 'OFFLINE' Target from the list above ('q' to quit): q
Command aborted.
```

B Log data

The mpx110 maintains a message log that can be displayed and retrieved by the operator, either through the CLI or the mpx110 Manager GUI. The message log is persistent in that it is maintained across mpx110 power cycles and reboots. The three log message categories are:

- Informational log messages, page 115
- Error log messages, page 120
- Fatal log messages, page 129

The following sections describe the log message categories.

Informational log messages

The following sections list the informational log messages by reporting module.

Application modules

Table 15 lists informational log messages provided by application modules.

Table 15 Application modules—informational log messages

ID	Log message	No.	Description
53254	System (router) Booting up	6	Router is booting up
53357	QLBA_ProcessTpb: De-compression failed. Disabling compression temporarily	109	De-compression failed and will be temporarily disabled
54274	QLFC_Login: Origin 0x%x, VP Index 0x%x, Id 0x%x	1026	FC login occurred, origin xx (1 = HBA, 2 = target, 3 = initiator), VP (virtual port) xx, ID (loop ID) xx
54275	QLFC_Login: Port ID %.2x%.2x%.2x	1027	FC login occurred with port ID xx.xx.xx
54276	QLFC_Login: Node Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x	1028	FC login occurred with WWNN xx.xx.xx.xx.xx.xx.xx.xx
54277	QLFC_Login: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x	1029	FC login occurred with WWPN xx.xx.xx.xx.xx.xx.xx.xx
54306	QLFC_Logout: Origin 0x%x, VP Index 0x%x, Id 0x%x	1058	FC logout occurred, origin xx (1 = HBA, 2 = target, 3 = initiator) VP (virtual port) xx, ID (loop ID) x
54307	QLFC_Logout: Port ID %.2x%.2x%.2x	1059	FC logout occurred with port ID xx.xx.xx
54308	QLFC_Logout: Node Name %.2x%.2x%.2x%.2x%.2x%.2QLFC_Logout: Port Namex%.2x%.2x	1060	FC logout occurred with WWNN xx.xx.xx.xx.xx.xx.xx.xx
54309	QLFC_Logout: Port Name %.2x%.2x%.2x%.2x%.2x%.2x%.2x%.2x	1061	FC logout occurred with WWPN xx.xx.xx.xx.xx.xx.xx.xx

ID	Log message	No.	Description
54359	QLFC_HandleTeb: FC Login. VP 0x%x	1111	FC login event notification, VP (virtual port) xx
54368	QLFC_CreateVirtualInitiatorObject: Maximum host (%d) limit reached.	1120	Maximum number of support hosts dd has been reached
54938	QLIS_HandleTeb: UTM_EC_OPEN_CONNECTION	1690	Event notification; iSCSI open connection request
54939	QLIS_HandleTeb: UTM_EC_CLOSE_CONNECTION or UTM_EC_CONNECTION_CLOSED	1691	Event notification; iSCSI close connection request or connection closed.
54940	QLIS_HandleTeb: UTM_EC_CONNEC-TION_OPENED	1692	Event notification; iSCSI connection opened
54941	QLIS_HandleTeb:iSNS Server Open Connection succeeded	1693	Event notification; connection opened with iSNS server
54943	QLIS_HandleTeb: UTM_EC_ISNS_SCN	1695	Event notification; iSNS SCN received
54945	QLIS_HandleTeb: UTM_EC_ISNS_CLIENT_DISCOV-ERED	1697	Event notification; iSNS client discovered.
54947	QLIS_HandleTeb: UTM_EC_CLOSE_CONNECTION	1699	iSCSI close connection request received
54948	QLIS_HandleTeb: UTM_EC_CONNEC-TION_CLOSED	1700	iSCSI connection closed
54963	QLIS_SetDdbEntryContinue:[%d:%d] Remote system connection established	1715	Remote system connection established using DDB d:d
54986	QLIS_HandleSessionTimer: Re-enabling compression	1738	Re-enabling compression
55299	QLSC_CollectBUVUIO: Freeing dead TRB: State 0x%02X, AbortReason %d, Flags 0x%02X	2051	TRB freed, State xx, Abort Reason d, Flags xx

iSCSI driver

Table 16 lists log messages common to both iSCSI ports, 1 (GE1) and 2 (GE2). Log messages beginning with #0 apply to iSCSI port 1 (GE1), and log messages beginning with #1 apply to iSCSI port 2 (GE2).

Table 16 SCSI driver—informational log messages

ID	Log message	No.	Description
86343	#%d: QLPortUp: Set link configuration 0x%x	327	iSCSI port enabled, port up 331 Restart iSCSI processor (RISC)
86347	#%d: QLDisable: Restart RISC	331	Restart iSCSI processor (RISC)
86349	#%d: QLEnable: Restart RISC to update EEPROM	333	EEPROM updated, restart iSCSI processor (RISC)
86352	#%d: QLPortDown: Set link configuration 0x%x	336	iSCSI port disabled, port down
86874	#%d: QLIsrDecodeMailbox: Link up	858	Link up reported by iSCSI processor for GE1 or GE 2

Fibre Channel driver

Table 17 lists informational log messages common to both FC ports: 1 (FC1) and 2 (FC2). Log messages beginning with #0 apply to Fibre Channel port 1 (FC1) and log messages beginning with #1 apply to Fibre Channel port 2 (FC2).

Table 17 FC driver—informational log messages

ID	Log message	No.	Description
118882	#%d: QLIoctlDisable: Reset adapter	98	Request to reset the FC processor (adapter) received from IOCTL interface.
119088	#%d: QLIsrEventHandler: LIP occurred (%x): mailbox1 = %x	304	Fibre Channel loop initialization procedure (LIP) occurred. The LIP type is reported, as is the contents of the FC processor's mailbox 1 register.
119089	#%d: QLIsrEventHandler: LIP reset occurred (%x): mailbox1 = %x	305	Fibre Channel LIP reset occurred. The LIP reset type is reported, as is the contents of the FC processor's mailbox 1 register.
119090	#%d: QLIsrEventHandler: Link up (%x) mailbox1 = %x	306	Fibre Channel link up occurred. Event status is reported, as is the contents of the FC processor's mailbox 1 register.
119092	#%d: QLIsrEventHandler: Link mode up (%x): RunTimeMode=%x	308	Fibre Channel link up occurred. Event status is reported, as is the RunTimeMode (0 = loop, 1 = point-to-point).
119093	#%d: QLIsrEventHandler: RSCN update (%x) rscnInfo: %x	309	A RSCN was received. Event status is reported, as is the RSCN information.
119097	#%d: QLIsrEventHandler: Port update (%x) mb1-3 %x %x %x	313	Fibre Channel port update. Event status is reported, as is the contents of the FC processor's mailbox 1, 2, and 3 registers.
119552	#%d: QLFcipIsrEventHandler: Link up (%x) mailbox1 = %x	768	FCIP - Fibre Channel link up occurred. Event status is reported, as is the contents of the FC processor's mailbox 1 register.
119553	#%d: QLFcipIsrEventHandler: Link down (%x)	769	FCIP - Fibre Channel link down occurred.
119554	#%d: QLFcipIsrEventHandler: Link mode up (%x)	770	FCIP - Fibre Channel link up occurred. Event status is reported, as is the RunTimeMode (0 = loop, 1 = point-to-point).

User modules

Table 18 lists log messages provided by user modules

Table 18 User modules— log messages

ID	Log message	No.	Description
151842	FW Upgrade performed: new version is: %d.%d.%d.%d	290	Performed router firmware upgrade, new version number is d.d.d.d.
151843	REBOOT/SHUTDOWN Command from user. Code=%d	291	User performed a router reboot or shutdown.
151889	#%d: qapisetfcinterfaceparams_1_svc: FC port configuration changed	337	FC port configuration has been modified.
151890	#%d: qapisetiscsiinterfaceparams_1_svc: iSCSI port configuration changed	338	iSCSI port configuration has been modified.
151891	#%d: qapisetisns_1_svc:iSNS configuration changed	339	iSNS configuration has been modified.
151892	qapisetntpparams_1_svc: NTP configuration changed	340	NTP configuration has been modified.
151893	#%d: qapisetvlanparams_1_svc: VLAN configuration changed	341	VLAN configuration has been modified.
151896	qapisetmgmintfcparams_1_svc:Management port configuration changed	344	Management ethernet port configuration has been modified.
151897	qapisetbridgebasicinfo_1_svc:Bridge configuration changed	345	Router configuration has been modified.
151898	QBRPC_Initialize:GetFcSfp Mem Allocation error	346	Remotemap added for local FC device WWPN xx.xx.xx.xx.xx.xx.xx.xx
151899	qapimapremote_1_svc: Remotemap added to remote device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	347	Remotemap added for remote FC device WWPN xx.xx.xx.xx.xx.xx.xx.xx
151900	qapiunmapremote_1_svc: Remotemap removed for local device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	348	Remotemap removed for local FC device WWPN xx.xx.xx.xx.xx.xx.xx.xx
151901	qapiunmapremote_1_svc: Remotemap removed to remote device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	349	Remotemap removed for remote FC device WWPN xx.xx.xx.xx.xx.xx.xx.xx
151902	qapimaptargettoinitiator_1_svc: Localmap added for initiator %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	350	Localmap added for FC initiator WWPN xx.xx.xx.xx.xx.xx.xx.xx
151903	qapimaptargettoinitiator_1_svc: Localmap added to target device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	351	Localmap added to FC target device WWPN xx.xx.xx.xx.xx.xx.xx.xx
151904	qapiunmaptargettoinitiator_1_svc: Localmap removed for initiator device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	352	Localmap removed for FC initiator
151905	qapiunmaptargettoinitiator_1_svc: Localmap removed to target device %.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x:%.2x	353	Localmap removed to FC target device

ID	Log message	No.	Description
151906	qapimaptargettoinitiator_1_svc: Localmap added for initiator %s	354	Localmap added for iSCSI initiator iqn.dddd-dd.ttt.ttt.ttt…….
151907	qapiunmaptargettoinitiator_1_svc: Localmap removed for initiator %s	355	Localmap removed for iSCSI initiator iqn.dddd-dd.ttt.ttt.ttt…….
151908	GE%d: Port status changed by user to ENABLED.	356	User enabled GE port d
151909	GE%d: Port status changed by user to DISABLED.	357	User disabled GE port d
151910	FC%d: Port status changed by user to ENABLED.	358	User enabled FC port d
151911	FC%d: Port status changed by user to DISABLED.	359	User disabled FC port d
152069	qapisetfcipparams_1_svc: FCIPROUTE %d Added	517	FCIP route #d added
152070	qapisetfcipparams_1_svc: FCIPROUTE %d Modified	518	FCIP route #d modified
152071	qapisetfcipparams_1_svc: FCIPROUTE %d Removed	519	FCIP route #d removed

FCIP

Table 19 lists log messages provided by the FCIP modules.

Table 19 FCIP—informational log messages

ID	Log message	No.	Description
184524	qlFcip_Linkchange#%d: Gige Link Down	204	FCIP Route GigE link d (1 or 2) is down
184525	qlFcip_Linkchange#%d: Gige Link Up	205	FCIP Route GigE link d (1 or 2) is up

TOE driver

Table 20 lists log messages provided by the TOE driver.

Table 20 FCIP—informational log messages

ID	Log message	No.	Description
217350	QL3022:eth%x: Interface is down	262	The GigE interface d (0 or 1) used for an FCIP route is down

System

Table 21 lists log messages provided by the system modules.

Table 21 System—informational log messages

ID	Log message	No.	Description
249862	"Temperature is back to normal range %d\n	6	The router temperature has returned to the normal operating range and is d (C).

Error log messages

The following sections list and describe, by reporting module, the error log messages.

Application modules

Table 22 lists error log messages provided by application modules.

Table 22 Application module—error log messages

ID	Log message	No.	Description
40967	QLBA_NullDoorbell: driver unloaded, port disabled	7	NULL doorbell routine for unloaded drivers. When a driver is unloaded, the doorbell routine is redirected to this NULL routine.
40996	QLBA_ProcessTrb: Processing unsupported ordered tag command	36	Processing unsupported ordered tag task management command
41004	QLBA_ProcessTrb: Processing unsupported head of queue tag command	44	Processing unsupported head-of-queue task management command
41058	QLBA_CreateTargetDeviceObject: Too many devices	98	Unable to create an object for the target device; exceeded the maximum number of target devices
41060	QLBA_CreateTargetNodeObject: Too many devices	100	Unable to create an object for the target node; exceeded the maximum number of target devices
41067	QLBA_CreateLunObject: LunObject memory unavailable	107	Memory unavailable for LUN object
41077	QLBA_CreateInitiatorObject: Too many initiators	117	Unable to create an object for initiator object; exceeded the maximum number of initiators
41096	QLBA_DisplayTargetOperationStatus: PCI Error, Status 0x%.2x	136	Process control block status indicates that a PCI error occurred during a target operation
41106	QLBA_DisplayInitiatorOperationStatus: DMA Error, Status 0x%.2x	146	Process control block status indicates that a DMA error occurred during an initiator operation
41107	QLBA_DisplayInitiatorOperationStatus: Transport Error, Status 0x%.2x	147	Process control block status indicates that a transport error (protocol) occurred during an initiator operation

ID	Log message	No.	Description
41111	QLBA_DisplayInitiatorOperationStatus: Data Overrun, Status 0x%.2x	151	Process control block status indicates that a data overrun error occurred during an initiator operation
41234	QLIS_LoginPduContinue: Operation failed. Initiator 0x%x, TPB status 0x%x	274	iSCSI login failed between receipt of PDU and request for the data segment.
41238	QLKV_ValidateLoginTransitCsgNsgVersion failed (status 0x%x)	278	iSCSI login failed due to unsupported version number in received login PDU.
41257	QLIS_LoginPduContinue: Invalid initiator name. Initiator:	297	iSCSI Login PDU contains invalid initiator name. The format and character set used to form the initiator name is invalid.
41265	QLIS_LoginPduContinue: Target not configured for Portal	305	iSCSI target login was attempted to a portal (iSCSI1 or iSCSI2) on which the target is not presented.
41267	QLIS_LoginPduContinue: Target not found. Target name:	307	iSCSI Login PDU received for a target with a target name unknown to the router.
41268	iSCSI Login PDU received without a target name for a normal session.	308	iSCSI Login PDU received without a target name for a normal session.
41270	iSCSI Login PDU received without an initiator name key/value not provided.	310	iSCSI Login PDU received without an initiator name key/value.
41272	QLIS_LoginPduContinue: CONN_STATE_IN_LOGIN, Unknown InitTaskTag	312	iSCSI Login PDU received with an incorrect initiator task tag for a session which is partially logged in. This would occur if a login PDU other than the initial login PDU used an initiator task tag which was different than the initiator task tag provided in the initial login PDU.
41283	QLIS_LoginPduContinue: TSIH 0x%x out of range	323	iSCSI Login PDU was received with a TSIH out of range. This would occur if the iSCSI initiator attempting the login failed to used the TSIH value provided in the Target Login Response PDU (router is target) in subsequent login PDUs.
41284	QLIS_LoginPduContinue: Session does not exist, invalid TSIH 0x%x	324	iSCSI Login PDU was received with an invalid TSIH value. The TSIH is invalid because there is no session with that TSIH value.
41353	QLIS_LoginPduContinue CHAP Validation Failure	393	CHAP validation failed during login

ID	Log message	No.	Description
41354	QLIS_LoginPduContinue Unexpected CHAP key detected	394	Unexpected CHAP key
41508	QLBI_SetPortInfo: QLUT_AllocatePortalObject failed (PortType 0x%x, PortId 0x%x)	548	Failed to allocate object for Set Port Info IOCTL processing. PortType: 0 = FC, 1 = iSCSI. PortId: 0 = FC1 or iSCSI1(GE1), 1 = FC2 or iSCSI2 (GE2).
41626	QLBI_GetLunInfo: INQUIRY failed, TPB status 0x%x	666	Inquiry command failed. The Inquiry command was issued by the mpx110 as part of its discovery process.
41629	QLBI_GetLunInfo: QLBI_PassthruCommand failed for INQUIRY (page code 0x83)	669	Inquiry command for page 83 failed. The Inquiry command was issued by the mpx110 as part of its discovery process.
41635	QLBI_GetLunInfo: QLBI_PassthruCommand failed for READ CAPACITY.	675	Read Capacity command failed. The Read Capacity command was issued by the mpx110 as part of its discovery process.
41636	QLBI_GetLunInfo: READ CAPACITY failed, TPB status 0x%x	676	Read Capacity command failed. The Read Capacity command was issued by the mpx110 as part of its discovery process.
41696	QLBI_PassthruCommandCompletion: Passthru command aborted	736	Pass Through command issued by management application (such as GUI) was aborted.
41700	QLBI_Passthru: Invalid CDB length %d bytes	740	Pass Through command issued by management application (such as GUI) failed due to invalid CDB length.
41701	QLBI_Passthru: Invalid data length %d bytes	741	Pass Through command issued by management application (such as GUI) failed due to invalid data length.
41717	QLBI_PassthruCommand: command interrupted or timed out	757	Pass Through command issued by management application (such as GUI) was interrupted or timed out.
41750	QLBI_Ioctl: ERROR: Operation (0x%x) not supported in this mode	790	IOCTL operation unsupported. Operation code provided in log message.
41768	QLBI_GetLunList: REPORT LUNS command failed	808	Report LUNs command failed. The Report LUNs command was issued by the mpx110 as part of its discovery process.
41769	QLBI_GetLunList: REPORT LUNS command failed with CHECK CONDITION, SCSI STATUS 0x%02X	809	Report LUNs command failed with CHECK CONDITION status. The Report LUNs command was issued by the mpx110 as part of its discovery process.

ID	Log message	No.	Description
41771	QLBI_GetLunList: Lun allocation failed for LunId %d	811	Failed to allocate LUN object: out of resources.
41994	QLFC_Login: VpIndex (%d) out of range	1034	Failed to allocate LUN object: out of resources.
41995	QLFC_Login: VP Index 0x%x not configured	1035	Login attempted using Fibre Channel VP (virtual port) index which has not been configured. Operation attempted on an unconfigured VP.
42002	QLFC_Login: Can't open connection	1042	Attempting login but Fibre Channel connection cannot be opened.
42024	QLFC_Logout: No active path to device. WWPN: %.2X%.2X%.2X%.2X%.2X%.2X%.2X%.2X	1064	Attempting logout of device for which there is no active path (WWPN not found).
42027	QLFC_Logout: VP Index 0x%x not configured	1067	Logout attempted using Fibre Channel VP (virtual port) index which has not been configured. Operation attempted on an unconfigured VP.
42068	QLFC_HandleTeb: System Error	1108	Event notification: Fibre Channel processor encountered a system error (unrecoverable firmware error).
42069	QLFC_HandleTeb: Driver Fatal Error	1109	Event notification: Fibre Channel driver encountered a fatal error.
42072	QLFC_HandleTeb: FC Logout.	1112	Event notification: Fibre Channel port logged out.
42242	QLIS_AllocateSessionObject: Out of session resources.	1282	Failed to allocate object for iSCSI session: out of session resources.
42252	QLIS_EnqueueiScsiPdu: Duplicate PDU, CmdSN %d (0x%x), dropping it.	1292	Received iSCSI PDU with duplicate CmdSN (command sequence number). Command PDU will be dropped.
42258	QLIS_InstantiateSession: Can't add Initiator to the database	1298	Unable to allocate iSCSI initiator object while initiating a session.
42404	QLIS_ProcessStartTrb: [%d] CmdSN %ld is out of range (%ld—%ld), Cdb[0] 0x%02X, DataXferLen 0x%x.	1444	Failed to execute iSCSI command PDU due to its CmdSN (command sequence number) being out of range. Provided in log message are the incorrect CmdSN, the valid CmdSN range, the first byte of the CDB, and the data length.
42648	QLIS_HandleTeb: Driver Fatal Error	1688	Event notification: iSCSI driver encountered a fatal error.

ID	Log message	No.	Description
42649	QLIS_HandleTeb: Unload Driver.	1689	Event notification: an IOCTL request was received to unload the iSCSI driver.
42654	QLIS_HandleTeb: iSNS Connection Failed	1694	Event notification: attempt to connect to the iSNS server failed.
43012	QLSC_CollectBUVUIO: Allocation of DSD failed	2052	iSNS connection failed
43013	QLSC_CollectBUVUIORecover: Allocation of DSD failed	2053	Break up I/O DSD allocation failed
43265	QLUT_AllocateTpbExtension: TPB allocation failed	2305	Break up I/O recover DSD allocation failed
43267	QLUT_AllocateTpbExtension: Data buffer allocation failed (length %d)	2307	Data buffer allocation failed (length %d) during tpb extension allocation
43268	QLUT_AllocateTpbExtension: Alloc of DSD failed for buffer len %d	2308	Allocation of DSD failed during Tpb extension allocation. Buffer length %d
43269	QLFCIP_IncomingFrame: BUGCHECK: Trb (0x%p) ValidFlag (0x%x) Direction (0x%x)	2309	FCIP incoming frame: BUGCHECK: Trb (0x%p) ValidFlag (0x%x) Direction (0x%x
43270	QLFCIP_IncomingFrame: GetFcipMapPortal failed	2310	FCIP incoming frame: GetFcipMapPortal failed
43271	QLFCIP_IncomingFrame: Got Status aborted pTrb->pBufDescList[0]:%p Trb Direction:0x%x	2311	FCIP incoming frame: Got Status aborted pTrb->pBufDescList[0]:%p Trb Direction:0x%x
43272	QLFCIP_SystemError: System error	2312	FCIP system error
43273	QLFCIP_SystemError: QLOP_IssuePortEnable failed	2313	FCIP system error: QLOP_IssuePortEnable failed
43280	QLFCIP_HandleTeb: Driver Fatal error	2320	FCIP handle Teb: Driver Fatal error
43281	QLFCIP_ConfigPortal: Find portal object failed for QLUT_TYPE_FC, PortId (%d)	2321	FCIP configure portal: Find portal object failed for QLUT_TYPE_FC, PortId (%d)
43282	QLFCIP_ConfigPortal: QLFCIP_ConfigPortal: Invalid PortId for FCIP link PortID(%d)	2322	FCIP configure portal: QLFCIP_ConfigPortal: Invalid PortId for FCIP link PortID(%d)
43283	QLUT_AllocateFcipTrbPool: Allocation failed (size 0x%x))	2323	FCIP allocate TRB pool: Allocation failed (size 0x%x))
43284	QLUT_GetFcipTrb: Null portal object in map table	2324	FCIP Trb: Null portal object in map table
43285	QLUT_GetFcipTrb: Unable to get the Free Trb	2325	FCIP eet TRB: Null portal object in map table
43286	QLUT_GetFcipTrb: Duplicate allocation of FcipTrb (0x%p)	2326	FCIP get TRB: Duplicate allocation of FcipTrb (0x%p)
43287	QLUT_FreeFcipTrb: Null portal object in map table	2327	FCIP free TRB: Null portal object in map table

ID	Log message	No.	Description
43288	QLUT_FreeFcipTrb: Duplicate Free of FcipTrb (0x%p)	2328	FCIP free TRB: Duplicate Free of FcipTrb (0x%p)
43289	QLUT_InitializeFcipBufDescPool: Memory allocation for FCIP_BUF_EXT_DESC failed (size 0x%x)	2329	FCIP initialize buffer descriptor pool: memory allocation for FCIP_BUF_EXT_DESC failed (size 0x%x)
43296	QLUT_FreeFcipDataBuffers: Duplicate Freeing of DataBuf (0x%p)	2336	FCIP free data buffers: Duplicate Freeing of DataBuf (0x%p)
43297	QLUT_AllocateFcipDataBuffers: Duplicate allocation of DataBuffer (0x%p)	2337	FCIP allocate data buffers: Duplicate allocation of DataBuffer (0x%p)
43298	QLUT_AllocateFcipDataBuffer: Got NULL PORTAL Object in map table MEM LEAK!!!!!	2338	FCIP allocate data buffer: Got NULL PORTAL Object in map table MEM LEAK!!!!!
43299	QLUT_DeallocateFcipDataBuffer: Null portal object in map table	2339	FCIP de-allocate data buffer: Null portal object in map table
43300	QLUT_CreateFcipDataBufferpool: Allocation of 32K buffers from LargeBufferPool failed	2340	FCIP create data buffer pool: Allocation of 32K buffers from LargeBufferPool failed
43521	QLSC_BreakupVUIOAllocPhase: TPB allocation failed	2561	Break up I/O: TPB allocation failed
43522	QLSC_BreakupVUIOAllocPhase: Data buffer and TPB allocation failed	2562	Break up I/O: Data buffer and TPB allocation failed

iSCSI driver

Table 23 lists error log messages common to both iSCSI ports, 1 (GE1) and 2 (GE2). Log messages beginning with #0 apply to iSCSI port 1 (GE1) and log messages beginning with #1 apply to iSCSI port 2 (GE2).

Table 23 iSCSI driver—error log messages

ID	Log message	No.	Description
73990	#%d: QLUtmIoctlEnable: Initialize FW failed	262	The iSCSI processor failed firmware initialization.
74046	#%d: QLPortUp: MBOX_CMD_SET_PORT_CONFIG %04x failed %04x	318	The iSCSI processor command to enable a GE port failed.
74056	#%d: QLRunDiag: MBOX Diag test internal loopback failed %x %x	328	The iSCSI processor failed the internal loopback test.
74057	#%d: QLRunDiag: MBOX Diag test external loopback failed %x %x	329	The iSCSI processor failed the external loopback test.
74065	#%d: QLPortDown: MBOX_CMD_SET_PORT_CONFIG %04x failed %04x	337	The iSCSI processor command to disable a GE port failed.
74241	#%d: QLiSNSEnableCallback: iSNS Server TCP Connect failed	513	The iSCSI processor could not connect with the iSCSI name server (iSNS).

ID	Log message	No.	Description
74577	#%d: QLIsrDecodeMailbox: NVRAM invalid	849	The iSCSI processor reported that the iSCSI port NVRAM contains invalid data (checksum error).
74587	#%d: QLIsrDecodeMailbox: Link down	859	The iSCSI processor reported a link down condition.
74656	#%d: QLReadyTimer: Adapter missed heartbeat for %d seconds. Time left %d	928	The driver failed to receive a heartbeat from the iSCSI processor for the specified number of seconds.
74661	#%d: QLTimer: Abort pTpb=%p, Type %x, Timeout 0x%x DrvCount 0x%x, DdbIndex 0x%x	933	The driver timed out an iSCSI processor operation and is aborting the operation.
74663	#%d: QLReadyTimer: MBOX_CMD %04x %04x %04x %04x %04x %04x %04x %04x timed out	935	The driver timed out an iSCSI processor mailbox command.
74665	#%d: QLReadyTimer: QLiSNSReenable failed	937	The driver timed out while attempting to reconnect with the iSNS.
74784	#%d: QLUpdateInitiatorData: No more room in Initiator Database	1056	The driver's initiator database is full. The driver is capable of storing 1024 iSCSI initiators in its database. Use the CLI or GUI to remove unwanted/unused iSCSI initiators.
74800	#%d: QLSetTargetData: No more room in Target Database	1072	The driver's target database is full. Use the CLI or GUI to remove unwanted/unused iSCSI targets.

Fibre Channel driver

Table 24 lists error log messages common to both Fibre Channel ports, 1 (FC1) and 2 (FC2). Log messages beginning with #0 apply to Fibre Channel port 1 (FC1) and log messages beginning with #1 apply to Fibre Channel port 2 (FC2).

Table 24 FC driver—error log messages

ID	Log message	No.	Description
106583	#%d: QLUtmReceiveIo: Path invalid/FW No resource count %x	87	The FC processor received a SCSI command for an unknown target path or has run out of resources to execute additional commands.
106589	#%d: QLIoctlEnable: Adapter disabled	93	The FC processor was disabled by an IOCTL request to the driver.
106590	#%d: QLIoctlEnable: Initialize FW error	94	The FC processor firmware failed initialization. The request to initialize was received by the driver in an IOCTL request.

ID	Log message	No.	Description
106592	#%d: QLIoctlRunDiag: Diagnostic loopback command failed %x %x %x %x	96	The FC processor failed the external loopback test.
106593	#%d: QLIoctlDisable: Re-initialize adapter failed	97	The FC processor failed to re-initialize in response to an IOCTL disable request.
106595	#%d: QLUtmReceiveIo: Invalid VP Loop Id 0x%x	99	Invalid Virtual Port loop ID
106803	#%d: QLIsrEventHandler: Link down (%x)	307	The FC processor reported a link down condition. Table B-10. Fibre Channel Driver—Error Log Messages (Continued) ID Log Messages No.
106813	#%d: QLIsrEventHandler: Unexpected async event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x	317	The FC processor reported an unexpected asynchronous event. The mailbox registers provide status, event code, and data related to the event.
106846	#%d: QLProcessResponseQueueFS: TRB is NULL: %d	350	FCIP Response queue entry TRB pointer is NULL
106853	#%d: QLTimer: Link error count (0x%x) exceeded, link down	357	The driver has determined that the FC link is unreliable and unusable due to the number of errors encountered. The link has been taken down.
106912	#%d: QLReserveLoopId: out of loop Ids	416	The FC processor was unable to obtain the number of loop IDs required. This failure occurs only when the FC processor is running multi-ID firmware.
106928	#%d: QLMarkDeviceOffline: Device Id: %x marked offline, cLinkDownTimeout = %x, cPortDownRetryCount=%x	432	The driver was unable to re-establish connection to the target within the timeout and retry counts, and is therefore marking it offline.
106948	#%d: QLSnsGetAllNext: Name server login FAILED %x	452	The FC processor is unable to log into the FC fabric name server.
107029	#%d: QLUpdateDeviceData: out of slots in host database	533	The driver's host (initiator) database is full.
107041	#%d: QLUpdateDeviceDatabase 0x%x: GET_ID failed %x	545	The driver's target database is full.
107056	#%d: QLUpdateDeviceDatabase 0x%x: out of slots in host database	560	The driver's host (initiator) database is full. Maximum host database is 64.
107058	#%d: QLUpdateDeviceDatabase 0x%x: MBOX_CMD_GET_VP_DATABASE failed %x	562	FC processor 'Get VP Database entry command failed

ID	Log message	No.	Description
107078	#%d: QLUpdatePort 0x%x: out of slots in host database	582	The drivers host (initiator) database is full.
107254	#%d: QLUpdatePort 0x%x: out of slots in host database	758	No slots available in host database
107267	#%d: QLFcipIsrEventHandler: System error event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x	771	FCIP system error event

Error log messages in user modules

Table 25 lists error log messages provided by user modules.

Table 25 User modules — error log messages

ID	Log message	No.	Description
139265	QBRPC_Initialize: Entered	1	RPC (remote procedure call) server initialization entry point.
139266	QBRPC_Initialize:GetBridge Mem Allocation error	2	Get System API memory allocation failed.
139267	QBRPC_Initialize:GetBridgeAdv Mem Allocation error	3	Get System Advanced API memory allocation failed.
139268	QBRPC_Initialize:GetMgmt Mem Allocation error	4	Get Management API memory allocation failed.
139269	QBRPC_Initialize:GetIscsi Mem Allocation error	5	Get iSCSI API memory allocation failed.
139270	QBRPC_Initialize:GetIscsiAdv Mem Allocation error	6	Get iSCSI advanced API memory allocation failed.
139271	QBRPC_Initialize:GetIsns Mem Allocation error	7	Get iSNS API memory allocation failed.
139272	QBRPC_Initialize:GetFcIntfc Mem Allocation error	8	Get FC Interface API memory allocation failed.
139273	QBRPC_Initialize:GetFcAdv Mem Allocation error	9	Get FC Advanced API memory allocation failed.
139280	QBRPC_Initialize:GetFcSfp Mem Allocation error	16	Failed memory allocation for Get FC SFP API.
139281	QBRPC_Initialize:GetLog Mem Allocation error	17	Failed memory allocation for Get Log API.
139282	QBRPC_Initialize:GetStats Mem Allocation error	18	Failed memory allocation for Get Statistics API.
139283	QBRPC_Initialize:InitListMem Allocation error	19	Failed memory allocation for Get Initiator List API.
139284	QBRPC_Initialize:TargetList Mem Allocation error	20	Failed memory allocation for Get Target List API.
139285	QBRPC_Initialize:LunList MemAllocation error	21	Failed memory allocation for Get LUN List API.
139286	QBRPC_Initialize:PresTarget Mem Allocation error	22	Failed memory allocation for Get Presented Targets List API.

ID	Log message	No.	Description
139287	QBRPC_Initialize:LunMask Mem Allocation error	23	Failed memory allocation for Get LUN Mask API.
139288	QBRPC_Initialize:Init Mem Allocation error	24	Failed memory allocation for Initiator API.
139289	QBRPC_Initialize:TgtDevice Mem Allocation error	25	Failed memory allocation for Target Device API.
139296	QBRPC_Initialize:FcTgt Mem Allocation error	32	Failed memory allocation for FC Target API.
139297	QBRPC_Initialize:BridgeStatus Mem Allocation error	33	Failed memory allocation for System Status API.
139298	QBRPC_Initialize:Diag Mem Allocation error	34	Failed memory allocation for Diagnostic API.
139299	QBRPC_Initialize:DiagLog Mem Allocation error	35	Failed memory allocation for Diagnostic Log API.
139300	QBRPC_Initialize:FruImage Mem Allocation error	36	Failed memory allocation for FRU Image API.
139301	QBRPC_Initialize:OemMfg Mem Allocation error	37	Failed memory allocation for OEM Manufacturing API.
139302	QBRPC_Initialize:Status Mem Allocation error	38	Failed memory allocation for Status API.
139303	QBRPC_Initialize:TcpIpStats Mem Allocation error	39	Failed memory allocation for TCP/IP Statistics API.
139304	QBRPC_Initialize:NtpStats Mem Allocation error	40	Failed memory allocation for NTP Status API.
139305	QBRPC_Initialize:LunList MemAlloc error	41	Failed memory allocation for LUN List API.
139315	QBRPC_FreeResources:Entered	51	RPC free resources entry point.
139553	checkDuplicateIp: Detected Error %08x %08x%04x	289	Detected duplicate IP address for management port.

System

Table 26 lists error log messages provided by system modules.

Table 26 System—error log messages

ID	Log message	No.	Description
237572	Failed to kill sys killer %d\n	4	Failed to kill system task.
237573	Temperature over high threshold %d\n	5	Reporting router exceeds maximum operating temperature.

Fatal log messages

The following sections list fatal log messages by the reporting module.

iSCSI driver

Table 27 lists fatal log messages common to both iSCSI ports, 1 (GE1) and 2 (GE2). Log messages beginning with #0 apply to iSCSI port 1 (GE1) and log messages beginning with #1 apply to iSCSI port 2 (GE2).

Table 27 iSCSI driver—fatal log messages

ID	Log message	No.	Description
69652	#%d: qlutm_init: Diagnostic failed, invalid SRAM	20	iSCSI processor SRAM test failed.
69653	#%d: qlutm_init: Diagnostic failed, fail reboot	21	iSCSI processor failed diagnostic reboot.
69654	#%d: qlutm_init: Diagnostic failed, invalid NVRAM	22	iSCSI processor failed NVRAM diagnostic.
69655	#%d: qlutm_init: Diagnostic failed, invalid DRAM	23	iSCSI processor failed DRAM diagnostic.
69656	#%d: qlutm_init: Failed to return diagnostic result to Bridge	24	iSCSI processor failed to return diagnostic results.
69941	#%d: QLUtmProcessResponseQueue: Invalid handle %x EntryType %x	309	Response queue entry contains an invalid handle.
69951	#%d: QLSetNvram: QLRebootTimer failed AF %x RS %x Time %d	319	Set NVRAM reboot timer failed.
69964	#%d: QLDisable: QLRebootTimer failed AF %x RS %x Time %d	332	Port disable reboot timer failed.
69966	#%d: QLEnable: QLRebootTimer failed AF %x RS %x Time %d	334	Port enable reboot timer failed.
70224	#%d: QLProcSrblessiSNSResponse: Invalid handle %x	592	iSNS response contains an invalid handle.
70400	#%d: QLInitializeDevice: QLStartAdapter failed	768	Start iSCSI processor failed.
70417	#%d: QLInitializeAdapter: QLInitializeFW failed	785	iSCSI processor firmware initialization failed.
70432	#%d: QLDoInterruptServiceRoutine: PortFatal interrupt. PortFatalErrorStatus %08x CSR %08x AS %x AF %x	800	iSCSI processor port fatal error.
70448	#%d: QLStartAdapter: QLRebootTimer failed AF %x RS %x Time %d	816	Start iSCSI processor reboot timer failed.
70489	#%d: QLIsrDecodeMailbox: System Error 8002 MB[1-7] %04x %04x %04x %04x %04x %04x %04x	857	iSCSI processor fatal system error.
70499	#%d: QLProcessResponseQueue: Invalid handle for ET_PASSTHROUGH_STATUS	867	Response queue invalid handle for ET pass-through.
70501	#%d: QLProcessResponseQueue: Invalid entry type in response queue %x	869	Response queue invalid entry type.
70502	#%d: QLProcessResponseQueue: Invalid handle %x EntryType %x	870	Response queue invalid handle for specified entry type.
70524	#%d: QLProcessAen: Invalid event %x	892	Asynchronous event for unknown event type.
70544	#%d: QLRebootTimer: Reboot failed!	912	Reboot timer failed.

ID	Log message	No.	Description
70563	#%d: QLReadyTimer: Adapter missed heartbeat for 0x%x seconds. Rebooting	931	iSCSI driver missed iSCSI processor heartbeat. iSCSI processor rebooted.
70564	#%d: QLReadyTimer: Abort pTpb=%p failed, DrvCount 0x%x	932	iSCSI processor failed to complete operation before timeout.
70609	#%d: QLProcessSystemError: Restart RISC	977	iSCSI processor system error restart.
70610	#%d: QLProcessSystemError: RebootHba failed	978	iSCSI processor reboot failed.
70784	#%d: QLConfigChip: invalid NVRAM	1152	iSCSI processor NVRAM invalid (checksum error).
70835	#%d: QLStartFw: MBOX_CMD_SET_FLASH failed %x	1203	iSCSI FLASH (NVRAM) command failed
70836	#%d: QLStartFw: Invalid Fw loader state 0x%x	1204	iSCSI firmware loader invalid state
70837	#%d: QLStartFw: Load Fw loader timeout	1205	iSCSI failed to load firmware in time allotted

FC driver

Table 28 lists fatal log messages common to both Fibre Channel ports, 1 (FC1) and 2 (FC2). Log messages beginning with #0 apply to Fibre Channel port 1 (FC1) and log messages beginning with #1 apply to Fibre Channel port 2 (FC2).

Table 28 FC driver—fatal log messages

ID	Log message	No.	Description
102419	#%d: qlutm_init: Diagnostic failed, port 1 invalid SRAM	19	FC1 processor SRAM test failed.
102420	#%d: qlutm_init: Diagnostic failed, port 1 POST failed	20	FC1 processor power-on self-test (POST) failed.
102421	#%d: qlutm_init: Diagnostic failed, port 2 invalid SRAM	21	FC2 processor SRAM test failed.
102422	#%d: qlutm_init: Diagnostic failed, port 2 POST failed	22	FC2 processor POST failed.
102423	#%d: qlutm_init: Failed to return diagnostic result to Bridge	23	FC processor failed to return diagnostic results.
102656	#%d: QLInitializeAdapter: Reset ISP failed	256	FC processor failed reset.
102657	#%d: QLInitializeAdapter: Load RISC code failed	257	FC processor firmware load failed.
102658	#%d: QLInitializeAdapter: Load ISP2322 receive sequencer code failed	258	FC processor receive sequencer code load failed.
102659	#%d: QLInitializeAdapter: Load ISP2322 transmit sequencer code failed	259	FC processor transmit sequencer code load failed.
102662	#%d: QLInitializeAdapter: Verify Checksum command failed (%x)	262	FC processor firmware checksum failed.

ID	Log message	No.	Description
102680	#%d: QLInitializeFW: FAILED	280	FC processor firmware initialization failed.
102688	#%d: QLInterruptServiceRoutine: Risc pause %x with parity error hccr %x, Disable adapter	288	FC processor paused due to internal parity error.
102689	#%d: QLInterruptServiceRoutine: Invalid interrupt status: %x	289	FC processor returned an invalid interrupt status.
10691	#%d: QLFcipInterruptServiceRoutine: Risc pause %x with parity error hccr %x, Disable adapter	291	FC processor invalid interrupt status
10692	#%d: QLFcipInterruptServiceRoutine: Invalid interrupt status: %x	292	FC processor paused due to RAM parity error
102716	#%d: QLIsrEventHandler: System error event (%x), MB1=%x, MB2=%x, MB3=%x, MB4=%x, MB5=%x, MB6=%x, MB7=%x	316	FC processor system error.
102746	#%d: QLProcessResponseQueue: Invalid handle %x, type %x	346	Response queue entry contains an invalid handle.
102747	#%d: QLProcessResponseQueueFS: Invalid buffer type: %x	347	FCIP - Response queue entry contains an invalid buffer type
102748	#%d: QLProcessResponseQueueFS: Invalid EntryType (0x%x)	348	FCIP - Response queue entry contains an invalid entry type
102749	#%d: QLProcessResponseQueueFS: Invalid handle 0x%x, type 0x%x	349	FCIP - Response queue entry contains an invalid handle
102752	#%d: QLTimer: Ext Ram parity error exceed limit cnt 0x%x, limit 0x%x, Disabled adapter	352	FC processor external SRAM parity error count exceeded limit; FC port disabled.
102755	#%d: QLTimer: Heartbeat failed	355	FC processor heartbeat failed.
102800	#%d: QLRestartRisc: restart RISC	400	FC processor being restarted.

TOE driver

lists fatal log messages provided by the TOE driver.

Table 29 TOE—Fatal log messages

ID	Log message	No.	Description
200721	QL3022:ql3xxx_probe: Adapter eth#%d, Invalid NVRAM parameters	17	Encountered invalid parameters in TOE NVRAM.
200725	QL3022:eth%x: Resetting chip. PortFatalErrStatus register = 0x%x	21	TOE chip reset due to detection of fatal error.

System

lists fatal log messages provided by system modules.

Table 30 System—fatal log messages

ID	Log message	No.	Description
233473	memory monitor: Detected Uncorrectable Ecc %08lx system is rebooting in 5 secs\n	1	Uncorrectable memory error detected at address provided in log message.
233474	Failed to register interrupt handler!\n	2	Attempt to register the interrupt handler failed.
233475	%s class_simple_create failed\n	3	Failed class_simple_create system call from memory monitor initialization routine.

C Simple Network Management Protocol

This appendix includes the following sections:

- SNMP properties, page 135
- SNMP trap configuration, page 135
- Management Information Base (MIB), page 136
- Notifications, page 143

SNMP provides monitoring and trap functions for managing the mpx110 through third-party applications that support SNMP. The mpx110 firmware supports SNMP versions 1 and 2 and an HP MIB Management Information Base (MIB) on page 136. Traps can be formatted using SNMP versions 1 or 2 Notifications on page 143.

SNMP properties

The SNMP properties can be set using either the CLI or the GUI. Table 31 describes the SNMP properties.

Table 31 SNMP properties

Parameter	Description
Read Community	Read community password that authorizes an SNMP management server to read information from the mpx110. This is a write-only field. The value on the mpx110 and the SNMP management server must be the same. The read community password can be up to 32 characters excluding #, semicolon (;), and comma (,). The default is public.
Trap Community	Trap community password that authorizes an SNMP management server to receive traps. This is a write-only field. The value on the mpx110 and the SNMP management server must be the same. The trap community password can be up to 32 characters excluding #, semicolon (;), and comma (,). The default is public.
System Location	Specifies the name of the mpx110 location. The name can be up to 64 characters excluding #, semicolon (;), and comma (,). The default is undefined.
System Contact	Specifies the name of the person to be contacted to respond to trap events. The name can be up to 64 characters excluding #, semicolon (;), and comma (,). The default is undefined.
Authentication Traps	Enables or disables the generation of authentication traps in response to authentication failures. The default is disabled.

SNMP trap configuration

SNMP trap configuration supports the setting of up to eight trap destinations. Choose from Traps 1 - Trap 8 to configure each trap. Table 32 describes the parameters for configuring an SNMP trap.

Table 32 SNMP parameters

Parameter	Description
Trap *n* Enabled	Enables or disables trap *n*. If disabled, the trap is not configured.
Trap Address[1]	Specifies the IP address to which the SNMP traps are sent. A maximum of 8 trap addresses are supported. The default address for traps is 0.0.0.0.
Trap Port[1]	The port number on which the trap is sent. The default is 162.
Trap Version	Specifies the SNMP version (1 or 2) with which to format traps.

[1]Trap address (other than 0.0.0.) and trap port combinations must be unique. For example, if trap 1 and trap 2 have the same address, then they must have different port values. Similarly, if trap 1 and trap 2 have the same port value, they must have different addresses.

Management Information Base (MIB)

The following sections describe the MIB:

- System information, page 136
- Network port table, page 137
- Fibre Channel port table, page 139
- Sensor table, page 141

System information

The system information objects provide the system serial number, version numbers (hardware/software/agent), and number of ports (FC/GE).

qsrSerialNumber

Syntax	**SnmpAdminString**
Access	read-only
Description	The system serial number.

qsrHwVersion

Syntax	**SnmpAdminString**
Access	read-only
Description	The system hardware version number.

qsrSwVersion

Syntax	**SnmpAdminString**
Access	read-only
Description	The system software (firmware) version number.

qsrNoOfFcPorts

Syntax	**Unsigned32**
Access	read-only
Description	The number of Fibre Channel ports on the system.

qsrNoOfGbEPorts

Syntax	**Unsigned32**
Access	read-only
Description	The number of Gigabit Ethernet ports on the system.

qsrAgentVersion

Syntax	**SnmpAdminString**
Access	read-only
Description	The version number of the agent software on the system.

Network port table

A list of network ports that are operational on the mpx110. The entries in this table include the management port and the iSCSI and TOE ports on the mpx110. Note that a single Gigabit Ethernet port can function as an iSCSI port and a TOE simultaneously; thus, there may be up to two entries for a given Gigabit Ethernet port.

qsrNwPorttable

Syntax	**QsrNwPortEntry**
Access	not-accessible
Description	The entries in this table include the management port and the iSCSI and TOE ports on the mpx110.

qsrNwPortEntry

Syntax	**QsrNwPortEntry**
Access	not-accessible
Description	Each entry (row) contains information about a specific network port.

QsrNwPortEntry

A network port entry consists of the following sequence of objects:

qsrNwPortRole	QsrPortRole
qsrNwPortIndex	unsigned32
qsrNwPortAddressMode	INTEGER
qsrIPAddressType	InetAddressType
qsrIPAddress	InetAddress
qsrNetMask	InetAddress
qsrGateway	InetAddress
qsrMacAddress	MacAddress
qsrNwLinkStatus	QsrLinkStatus
qsrNwLinkRate	QsrLinkRate

qsrNwPortRole

Syntax	**QsrPortRole**
Access	not-accessible
Description	The operational role of this port i.e. as a management port, an iSCSI port, or a TOE. A positive integer indexing each network port in a given role.

qsrNwPortIndex

Syntax	**Unsigned32**
Access	not-accessible
Description	A positive integer indexing each network port in a given role.

qsrNwPortAddressMode

Syntax	**INTEGER 1 - Static 2 - DHCP 3 - Bootp 4 - RARP**
Access	read-only
Description	The method using which the port gets its IP address.

qsrIPAddressType

Syntax	**InetAddressType**
Access	read-only
Description	The type of the IP address i.e. ipv4 or ipv6.

qsrIPAddress

Syntax	**InetAddress**
Access	read-only
Description	The IP address of the port.

qsrNetMask

Syntax	**InetAddress**
Access	read-only
Description	The subnet mask of the port.

qsrGateway

Syntax	**InetAddress**
Access	read-only
Description	The gateway for this port.

qsrMacAddress

Syntax	**IMacAddress**
Access	read-only
Description	The MAC address for this port.

qstNwLinkStatus

Syntax	**QsrLinkStatus**
Access	read-only
Description	The operational link for this port.

qsrNwLinkRate

Syntax	**QsrLinkRate**
Access	read-only
Description	The operational link rate for this port.

Fibre Channel port table

A list of the FC ports on the mpx110. There are as many entries in this table as there are FC ports on the mpx110.

qsrFcPortTable

Syntax	**QsrFcPortEntry**
Access	not-accessible
Description	A list of the FC ports on the mpx110. There are as many entries in this table as there are FC ports on the mpx110.

qsrFcPortEntry

Syntax	**QsrFcPortEntry**
Access	not-accessible
Description	Each entry (row) contains information about a specific FC port.

QsrFcPortEntry

A Fibre Channel port entry consists of the following sequence of objects:

qsrFcPortRole	QsrPortRole
qsrFcPortIndex	Unsigned32
qsrFcPortNodeWwn	PhysAddress
qsrFcPortWwn	PhysAddress
qsrFcPortId	PhysAddress
qsrFcPortType	Unsigned32
qsrFcLinkStatus	QsrLinkStatus
qsrFcLinkRate	QsrLinkRate

qsrFcPortRole

Syntax	**QsrPortRole**
Access	not-accessible
Description	The operational role of this port (that is in FCP mode or in frame shuttle mode).

qsrFcPortIndex

Syntax	**Unsigned32**
Access	not-accessible
Description	A positive integer indexing each FC port in a given role.

qsrFcPortNodeWwn

Syntax	**PhysAddress**
Access	read-only
Description	The world wide name of the node that contains this port.

qsrFcPortWwn

Syntax	**PhysAddress**
Access	read-only
Description	The world wide name for this port.

qsrFcPortId

Syntax	**PhysAddress**
Access	read-only
Description	The interface's 24-bit Fibre Channel address identifier.

qsrFcPortType

Syntax	**Unsigned32**
Access	read-only
Description	The type of a Fibre Channel port, as indicated by the use of the appropriate value assigned by IANA. The IANA-maintained registry for Fibre Channel port types is at http://www.iana.org/assignments/fc-por)t-types.

qsrFcLinkStatus

Syntax	**QsrLinkStatus**
Access	read-only
Description	The current link status for this port.

qsrFcLinkRate

Syntax	**QsrLinkRate**
Access	read-only
Description	The current link rate for this port.

Sensor table

A list of all the sensors on the mpx110. There are as many entries (rows) in this table as there are sensors.

qsrSensorTable

Syntax	**QsrSensorEntry**
Access	not-accessible
Description	A list of all the sensors on the mpx110. There are as many entries (rows) in this table as there are sensors.

qsrSensorEntry

Syntax	**QsrSensorEntry**
Access	not-accessible
Description	Each entry (row) corresponds to a single sensor.

QsrSensorEntry

A sensor entry consists of the following sequence of objects:

qsrSensorType	INTEGER
qsrSensorIndex	Unsigned32
qsrSensorUnits	INTEGER
qsrSensorValue	Integer32
qsrUpperThreshold	Integer32
qsrLowerThreshold	Integer32
qsrSensorState	INTEGER

qsrSensorType

Syntax	**INTEGER temperature = 1**
Access	not-accessible
Description	The type of data being measured by this sensor.

qsrSensorIndex

Syntax	**Unsigned32**
Access	not-accessible
Description	A positive integer identifying each sensor of a given type.

qsrSensorUnits

Syntax	**INTEGER celsius = 1**
Access	read-only
Description	The unit of measurement for the sensor.

qsrSensorValue

Syntax	**Integer32**
Access	read-only
Description	The current value of the sensor.

qsrUpperThreshold

Syntax	**Integer32**
Access	read-only
Description	The upper-level threshold for this sensor.

qsrLowerThreshold

Syntax	**Integer32**
Access	read-only
Description	The lower-level threshold for this sensor.

qsrSensorState

Syntax	**INTEGER**
Access	read-only
Description	The state of this sensor, indicating the health of the system.

- **unknown**—The sensor value/threshold(s) cannot be determined.
- **normal**—The sensor value is within normal operational limits.
- **warning**—The sensor value is approaching a threshold.
- **critical**—The sensor value has crossed a threshold.

Notifications

The mpx110 provides six notification types. The following sections describe these notifications and the objects they use:

- Notification objects, page 143
- Agent startup notification, page 144
- Agent shutdown notification, page 144
- Network port down notification, page 144
- Fibre Channel port down notification, page 144
- Sensor notification, page 144
- Generic notification, page 144

Notification objects

This section defines objects used in notifications.

qsrEventSeverity

Syntax	**INTEGER**
Access	accessible-for-notify
Description	This indicates the severity of the event. The value `clear` is used to specify that a condition that caused an earlier trap is not present now.

qsrEventDescription

Syntax	**SnmpAdminString**
Access	accessible-for-notify
Description	A textual description of the event that occurred.

qsrEventTimeStamp

Syntax	**DateAndTime**
Access	accessible-for-notify
Description	This indicates when the event occurred.

Agent startup notification

The agent startup notification indicates that the agent on the mpx110 has started running.

qsrAgentStartup—uses the following objects:

- qsrEventTimeStamp

Agent shutdown notification

The agent shutdown notification indicates that the agent on the mpx110 is shutting down.

qsrAgentShutdown—uses the following objects:

- qsrEventTimeStamp

Network port down notification

The network port down notification indicates that the specified network port is down. If the port comes up thereafter, this event is sent with the qsrEventSeverity object set to `clear`.

qsrNwPortDown—Uses the following object:

- qsrNwLinkStatus
- qsrEventTimeStamp
- qsrEventSeverity

Fibre Channel port down notification

The Fibre Channel port down notification indicates that the specified Fibre Channel port is down. If the port comes up thereafter, this event is sent with the qsrEventSeverity object set to `clear`.

qsrFcPortDown—Uses the following object:

- qsrFcLinkStatus
- qsrEventTimeStamp
- qsrEventSeverity

Sensor notification

The sensor notification indicates that the state for the specified sensor is not normal. Once the sensor goes back to normal, this event is sent with the qsrEventSeverity object set to `clear`.

qsrSensorNotification—Uses the following object:

- qsrSensorValue
- qsrSensorState
- qsrEventTimeStamp
- qsrEventSeverity

Generic notification

The generic notification is used to report events other than the defined event types. It provides a description object that identifies the event.

qsrGenericEvent—Uses the following object:

- qsrEventTimeStamp
- qsrEventSeverity
- qsrEventDescription

D Saving and restoring the mpx110 configuration

The mpx110 configuration information is saved as a `.bin` or `.tgz` file, depending on the save method that is used to restore the mpx110 persistent data. The mpx110 configuration information is saved and restored using the mpx110 manager GUI or mpx110 CLI commands. This appendix includes the following sections:

- Saving the mpx110 configuration, page 145
- Restoring the mpx110 configuration, page 146

NOTE:

As with any important database, the mpx110 persistent data should be periodically saved to avoid data loss from hardware or software errors. It is also important to save the configuration information before replacing the mpx110.

Saving the mpx110 configuration

Using the mpx110 GUI to save configuration information allows you to save the file to any location available to the server running the GUI.

Using the mpx110 CLI command to save the configuration information places the file in the mpx110's FTP directory. You must then move the file using FTP from the mpx110.

Saving the configuration using the mpx110 GUI

To save the configuration using the mpx110 GUI:

1. Select **File > Save FRU**.

   The Save FRU dialog box is displayed.
2. Click **Save**.
3. Enter a file name and select a location to save to.

   NOTE:

   Do not change the Files of Type value.

4. Enter the password `config`, and then click **OK**.

   The configuration is saved to the selected location.

Saving the configuration using the mpx110 CLI

To save the configuration using the mpx110 CLI:

1. Log in to the mpx110 using a Telnet session to the management port or the console port.

   ```
   Username:  guest
   Password:  password
   ```
2. Enter the following command:

   ```
   mpx110> admin start
   ```

3. Enter `config` as the password.
4. Enter the following command:

```
mpx110 (admin) #> fru save
FRU save completed.  Configuration File is HP_Storage-
Works_mpx110_FRU.bin.  Please use FTP to extract the file out from
the System.
mpx110 (admin) #>
```

> **NOTE:**
> The FRU save creates a `bin` file containing the mpx110's persistent data, configuration, and LUN mappings. The file is stored in the mpx110s `/var/ftp` directory. You must then FTP the `tar` file from the mpx110.

5. Establish an FTP connection to the mpx110 management port and login:

```
Username:  ftp
Password:  ftp
```
6. Enter the following command to set the FTP transfer type to Binary:

```
ftp> bin
```
7. Enter the following command to get the `HP_StorageWorks_mpx110_FRU.bin` file:

```
ftp> get HP_StorageWorks_mpx110_FRU.bin
```

Restoring the mpx110 configuration

Use the **Full Configuration Restore** option to fully restore the mpx110 configuration. The restored configuration takes effect after the mpx110 is rebooted.

> **NOTE:**
> Always use the **Full Configuration Restore** option with the mpx110.

Restoring the configuration using the mpx110 GUI

To restore the configuration using the mpx110 GUI:

1. Select **File > Restore FRU**.
   The Restore FRU dialog box is displayed.
2. Click **Browse** and select the appropriate file name to restore.
3. Select **Full Configuration Restore** or **Partial Restore (Mappings)**.
4. Click **Start**.
   The Security Check dialog box is displayed.
5. Enter the password `config`, and then click **OK**.
6. Reboot the system for the configuration to take effect.

Restoring the configuration using the mpx110 CLI

To restore the configuration using the mpx110 CLI:

1. Establish an FTP connection to the mpx110 management port and login:

```
Username:  ftp
Password:  ftp
```
2. Enter the following command to set the FTP transfer type to binary:

```
ftp> bin
```

3. Enter the following command to put the `HP_StorageWorks_mpx110_FRU.bin` file:

   ```
   ftp> put HP_StorageWorks_mpx110_FRU.bin
   ```

4. Log in to the mpx110 using a Telnet session to the management port or console port.

   ```
   Username:  guest
   Password:  password
   ```

5. Enter the following command:

   ```
   mpx110> admin start
   ```

6. Enter `config` as the password.

7. Enter the following command:

   ```
   mpx110 (admin) #> fru restore

   A list of attributes with formatting and current values will
   follow.  Enter a new value or simply press the ENTER key to accept
   the current value.  If you wish to terminate this process before
   reaching the end of the list press 'q' or 'Q' and the ENTER key to
   do so.  Type of restore (0=full, 1=mappings only) [full]

   FRU restore completed.
   ```

8. Reboot the system for the configuration to take effect.

E Regulatory compliance and safety

This appendix describes the following sections:

Regulatory compliance

Federal Communications Commission notice for 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 instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Hewlett-Packard could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

Declaration of conformity for products marked with the FCC logo, United States only

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.

For questions regarding your product, visit http://www.hp.com/.

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
  P.O. Box 692000, Mailstop 510101
  Houston, TX 77269–2000
- 1–281–514–3333

To identify this product, refer to the part, Regulatory Model Number, or product 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 Company my 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.

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, your product has been assigned a unique Regulatory Model Number. The RMN can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this RMN. The Regulatory Model Number should not be confused with the marketing name or model number of the product.

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.

Laser safety warning

⚠ **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.

Laser product label

The optional label in Figure 45 or equivalent may be located on the surface of the HP supplied laser device.

CLASS 1 LASER PRODUCT

Figure 45 Class 1 laser product label

This optional label indicates that the product is classified as a CLASS 1 LASER PRODUCT. This label may appear on the laser device installed in your product.

International notices and statements

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.

European Union notice

Products bearing 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 and if this product has telecommunication functionality, the R&TTE Directive (1995/5/EC).

Compliance with these directives implies conformity to the following European Norms (the equivalent international standards and regulations are in parentheses):

- EN55022 (CISPR 22) – Electromagnetic Interference
- EN55024 (IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8, IEC61000-4-11) – Electromagnetic Immunity
- EN61000-3-2 (IEC61000-3-2) — Power Line Harmonics
- EN61000-3-3 (IEC61000-3-3) — Power Line Flicker
- EN60950 (IEC60950) — Product Safety
- Also approved under UL 60950/CSA C22.2 No. 60950–00, Safety of Information Technology Equipment.

BSMI 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。

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。

Korean notices

A급 기기 (업무용 정보통신기기)

이 기기는 업무용으로 전자파적합등록을 한 기기이오니
판매자 또는 사용자는 이 점을 주의하시기 바라며, 만약
잘못판매 또는 구입하였을 때에는 가정용으로 교환하시기
바랍니다.

Safety

Battery replacement notice

Your switch is equipped with a lithium manganese dioxide, a vanadium pentoxide, or an alkaline internal battery or battery pack. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Replacement is to be done by an HP authorized service provider using the HP spare part designated for this product. For more information about battery replacement or proper disposal, contact an HP authorized service provider.

⚠ **WARNING!**

Your switch contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. There is risk of fire and burns if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose to temperatures higher than 60 °C.
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the HP spare part designated for this product.

Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, please use the public collection system or return them to HP, an authorized HP Partner, or their agents.

For more information about battery replacement or proper disposal, contact an HP authorized reseller or service provider.

Taiwan battery recycling notice

The Taiwan EPA requires dry battery manufacturing or importing firms in accordance with Article 15 of the Waste Disposal Act to indicate the recovery marks on the batteries used in sales, giveaway, or promotion. Contact a qualified Taiwanese recycler for proper battery disposal.

Power cords

The power cord set must meet the requirements for use in the country where the product was purchased. If the product is to be used in another country, 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 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 diameter of the wire must be a minimum of 1.00

mm2 or 18 AWG, and the length of the cord must be between 1.8 m, (6 ft) and 3.6 m (12 ft). If you have questions about the type of power cord to use, contact an HP authorized service provider.

> **NOTE:**
> Route power cords so that they will not be walked on and cannot be pinched by items placed upon or against them. Pay particular attention to the plug, electrical outlet, and the point where the cords exit from the product.

Japanese power cord statement

製品には、同梱された電源コードをお使い下さい。
同梱された電源コード は、他の製品では使用出来ません。

glossary

CHAP   Challenge Handshake Authentication Protocol.
An authentication technique for confirming the identity of one computer to another.

Direct Connect   Connecting a server or mpx110 Fibre Channel port directly to the EVA Fibre Channel port without a the need for a Fibre Channel switch.

Fabric Connect   Connecting a server or mpx110 Fibre Channel port to a Fibre Channel switch to access the EVA Fibre Channel ports.

GbE   Gigabit Ethernet
Packet-based signaling technology that transmits data at throughput speeds up to 1000 megabits per second (Mbps), or1 Gigabit per second (Gb/s).

high availability   Refers to the availability of resources in a computer system, if there are component failures in the system.

Initiator   A device that begins an iSCSI transaction by issuing a command to another device (the iSCSI target), giving it a task to perform

IP   Internet Protocol
The standard Internet protocol for moving packets of information from one computer to another. Commonly combined with TCP in the phrase TCP/IP.

IP SAN   A Storage Area Network (SAN) created using the Internet SCSI (iSCSI) protocol to connect servers and storage over a Gigabit Ethernet network.

IQN   iSCSI Qualified Name
A name format for iSCSI that uniquely identifies every device in the world. For example: `iqn.5886.com.acme.tapedrive.sn-a12345678`.

iSCSI   Internet SCSI.
An IP-based standard for linking data storage devices over a network and transferring data by carrying SCSI commands over IP networks.

iSCSI CRC   iSCSI cyclic redundancy check.
A shortened cyclic code check used for error detection.

iSNS   Internet Storage Name Service
A protocol designed to facilitate the automated discovery, management, and configuration of iSCSI and Fibre Channel devices on a TCP/IP network.

mpx110   Serves as the iSCSI data transport that transfers data to and from the server and the storage system.

SCSI   small computer system interface.
A parallel interface standard used to attach peripheral devices to computers.

Switch   An IP network communications device that routes packets (messages or fragments of messages) between nodes across virtual circuits.

teaming   The concept of multiple network adapters working together as a single network adapter.
See also virtual network adapter.

target   An iSCSI device that executes a command from an iSCSI initiator to perform
                    some task.

TOE   TCP Offload Engine
                    A piece of hardware that replaces a NIC and shifts TCP packet processing tasks
                    from the server CPU to specialized TCP processors on the network adapter
                    or storage device.

VLAN   virtual local area network.
                    A network of computers that behave as if they are connected to the same wire
                    even though they may actually be physically located on different segments of
                    a LAN.

virtual network The concept of multiple network adapters working together as a single network
adapter   adapter, also referred to as teaming.

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