HP PCIe 8Gb 1 port and 2 port Fibre Channel QLogic HBAs using Windows and HP-UX Installation Guide

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Table of Contents

List of Figures

List of Tables

List of Examples

About this guide

This guide provides information about installing, configuring, and troubleshooting the following single and dual channel host bus adapters.

Table 1 HP model numbers and product numbers for 8Gb HBAs

HP model number	HP product number	Description
81Q	AH400A	8Gb PCI-e Fibre Channel HBA
82Q	AH401A	8Gb PCI-e Fibre Channel HBA

Intended audience

This guide is intended for technical support personnel.

Related documentation

In addition to this guide, see the release notes for *HP StorageWorks QLogic host bus adapters for Windows*.

These and other HP documents can be found on the HP website http://www.docs.hp.com.

Document conventions and symbols

Table 2 Document conventions

Convention	Element
Medium blue text: Related documentation	Cross-reference links and email addresses
Medium blue, underlined text (http://www.hp.com)	website addresses
Bold font	• Key names • Text typed into a GUI element, such as into a box • GUI elements that are clicked or selected, such as menu and list items, buttons, and check boxes
Italic font	Text emphasis
`Monospace font`	• File and directory names • System output • Code • Text typed at the command line
`Monospace, italic font`	• Code variables • Command-line variables
`Monospace, bold font`	Emphasis of file and directory names, system output, code, and text typed at the command line

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.

TIP: Provides helpful hints and shortcuts.

HP technical support

Telephone numbers for worldwide technical support are listed on the HP support website: 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
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

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

HP strongly recommends that customers sign up online using the Subscriber's choice website: http://www.hp.com/go/e-updates.

- Subscribing to this service provides you with email updates on the latest product enhancements, newest versions of drivers, and firmware documentation updates as well as instant access to numerous other product resources.
- After signing up, you can quickly locate your products by selecting **Business support** and then **Storage** under Product Category.

Subscription service

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

Helpful websites

For other product information, see the following HP websites:

- http://www.hp.com
- http://www.hp.com/go/storage
- http://www.hp.com/support/
- http://www.docs.hp.com

1 HBA features

This chapter describes HBA features such as:

- Environmental specifications
- Physical specifications
- Media specifications

Environmental specifications

Table 1-1 "Environmental specifications" lists the HBAs environmental specifications.

Table 1-1 Environmental specifications

Environment	Minimum	Maximum
Operating temperature	0°C/32°F	55°C/131°F
Storage temperature	–20°C/–40°F	70°C/158°F
Relative humidity (non-condensing)	5%	95%
Airflow	100 lf/minute (minimum)	N/A

Physical specifications

Table 1-2 HBA specifications

Component	Specification
Host bus	Complies with: • PCI Express Base Specification 1.0a for 4Gb HBAs • PCI Express Base Specification 2.0 for 8Gb HBAs • PCI Express Card Electromechanical Specification 1.0 • PCI Bus Power Management Interface Specification 1.1
Fibre Channel specifications	Bus type: fiber optic media Bus transfer rate: • Single channel HBA – 4Gb/s FC increases aggregate throughput rate to 800 MB/s in full-duplex mode • Single channel HBA – 8Gb/s + 1.6Gb/s • Dual channel HBA – 4 Gb/s FC increases aggregate throughput rate to 1.6 Gb/s in full-duplex mode • Dual channel HBA – 8 Gb/s 3.2Gb/s
Central processing unit (CPU)	Single-chip design that includes the following: • RISC processor • Fibre Channel protocol manager • PCI-e DMA controller • integrated serializer/deserializer (SERDES) • electrical transceivers that can auto negotiate a data rate of 1, 2, 4 or 8Gb/s
Memory	1 MB SRAM, 1 MB flash (SPI), and 2 KB NVRAM (SPI)
Signal voltage	3.3 V (mode 1), 3.3 V/1.5 V (mode 2)
Distance	1 Gb/s: 500 meters 50/125 µm fiber, 300 meters 62.5/125 µm fiber 2 Gb/s: 300 meters 50/125 µm fiber, 150 meters 62.5/125 µm fiber 4 Gb/s: 150 meters 50/125 µm fiber, 70 meters 62.5/125 µm fiber 8Gb/s: 70 meters 50/125 µm fibre, 21 meters 62.5/125 µm fibre

Table 1-2 HBA specifications *(continued)*

Component	Specification
Cable	50/125 μm multimode fiber, 62.5/125 μm multimode fiber
Connectors	LC connectors that support non-OFC, multimode fiber optic cabling using a SFF optical transceiver module
Form factor	Low-profile PCIe: 16.765 cm × 6.89 cm (6.6 in. × 2.713 in.)
Bracket	Standard: 1.84 cm × 12.08 cm (.73 in. × 4.76 in.) Low-profile: 1.84 cm × 8.01 cm (.73 in. × 3.15 in.)
Power consumption	~11.0 watts

Media specifications

Use multimode fiber optic cable, with short-wave lasers, that adheres to the specifications listed in Table 1-3 “Media specifications”.

Table 1-3 Media specifications

Fiber Optic cable	Maximum length	Minimum length	Connector
62.5/125 μm (multimode)200 MHz km bandwidth "	• 300 meters at 1.0625 Gb/s • 150 meters at 2.125 Gb/s • 70 meters at 4.25 Gb/s • 21 meters at 8.5Gb/s	0.5 meters	LC
50/125 μm (multimode) 500 MHz km bandwidth cable	• 500 meters at 1.0625 Gb/s • 300 meters at 2.125 Gb/s • 150 meters at 4.25 Gb/s • 50 meters at 8.5 Gb/s	0.5 meters	LC

2 Installing HBAs

This chapter describes the following topics for installing the HBAs:

- Installation prerequisites
- Installing the HBA

See your server's documentation for additional information about installing the HBA.

WARNING! Disconnect the host from the power source before installing the HBA. To reduce the risk of personal injury from hot surfaces, allow the internal server or workstation components to cool before touching.

CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before beginning this procedure, as described in Regulatory compliance and safety.

Installation prerequisites

Before you begin, make sure you have the following items available:

- An optical multimode cable with an LC-style duplex connector
- A server with an empty PCI bus slot that is based on and compatible with the PCI bus type of the HBA being installed.

NOTE: The HBAs do not allow normal data transmission on an optical link unless they are connected to another similar or compatible laser product (that is, multimode to multimode).

Recording reference numbers

Each HBA ships with a unique address identifier that is stored in flash memory. Fibre Channel industry standards issue two unique identifiers: world wide port name (WWPN) and world wide node name (WWNN), each of which is derived from the HBA's IEEE address. Combined, the WWPN and WWNN create the world wide name (WWN), which is an 8-byte identifier that uniquely identifies an HBA on an FC circuit.

The WWN address and serial number are clearly marked on the HBA. Record the addresses on the lines below for future reference.

In addition, each HBA has a unique serial number that is located on the bottom of the HBA. Check the HBA and record its serial number below so that you have the number in the unlikely event that the NVRAM is corrupted.

NOTE: The WWN is a permanent identifier that cannot be changed.

WWN address: _____

WWN serial number: _____

Installing the HBA

Use the following procedure for installing the HBA into a computer.

CAUTION: Be sure to observe the ESD precautions for this procedure as described in Regulatory compliance and safety.

1. Make sure the computer is powered off.
2. Remove the screws on the computer cover, and then remove the cover.
3. Wearing an anti-static wrist strap, remove the blank panel from an empty x4, x8, or x16 PCIe bus slot.

NOTE: The HBA comes with a standard PCI bracket installed. A low-profile bracket is included in the box with the HBA. The low-profile mounting bracket is shorter than the standard bracket: approximately 7.9 cm (3.11 in.) compared to 12.06 cm (4.75 in.) long.

4. If you require a different mounting bracket, change the bracket as follows. Otherwise, go to Step 5.
   a. Remove the mounting bracket screws from the top of the HBA.
   b. Remove the bracket and store it for future use.
   c. Align the new mounting bracket tabs with the holes in the HBA.

   NOTE: Be careful not to push the bracket past the transceiver housing's grounding tabs. Make sure the light emitting diodes (LEDs) are properly aligned with the holes in the bracket.

   d. Replace the screws that attach the HBA to the bracket.
5. Insert the HBA into the empty PCIe slot. Press firmly until the HBA is seated.

NOTE: In some HP server models only PCIe HBAs can be inserted in the optional PCLe riser cards or cages. For instructions on installing the riser card or cage, see your server documentation.

6. Secure the HBA's mounting bracket to the case with the panel clip.
7. Replace the computer case and tighten the screws on the case.
8. Attach the media:
   a. Connect one end of the fiber optic cable to the LC connector on the HBA.
   b. Connect the other end of the cable to the Fibre Channel device.

   NOTE: The HBA does not allow normal data transmission on an optical link unless the link is connected to a similar or compatible laser product. Both products must be multimode.

9. Apply power to the computer:
   a. Verify that the HBA is securely installed in the computer.
   b. Verify that the correct media is attached.
   c. Plug in and turn on the computer.
   d. Watch LEDs for Power On Self Test (POST) status results.

   For information about the meaning of the LED indicators, see HBA LEDs POST states and results.

3 Installing the Windows Smart Component driver kit

This chapter describes how to locate and download the Windows Smart Component driver kit from the web. This chapter also describes how to install or update your Windows driver. It contains the following topics:

Prerequisites

Perform the following tasks before you install or update the driver for your Windows server:

- Obtain a copy of the latest release notes for your HP StorageWorks Emulex HBAs at http://h18006.www1.hp.com/storage/saninfrastructure.html.
- Be familiar with the operating system under which the HBA is to operate, and have access to standard system documentation.
- Review any restrictions or mandatory hot fixes that apply to your configuration and operating system.

Locating and downloading the Windows Smart Component driver kit from the website

To locate and download the driver kit from the website:

1. Go to http://h18006.www1.hp.com/storage/saninfrastructure.html and select Host bus adapters.
2. Select your server type.
3. Using the HP model # as your guide, select your HBA.
4. In the support section, select the **HBAs Software and Driver** link.
5. Select **Download drivers and software**.
6. Select your HBA.
7. Select your operating system.
8. Select the Windows Smart Component driver kit and download it to your server.

Installing the Windows device driver using the HP Smart Component kit

To install HBA Windows drivers:

1. Obtain the latest Smart Component for your configuration and copy it to your Windows desktop.
2. Double-click the Smart Component executable to begin the installation, and then click **Install**.
1. Launch the Smart Component kit `CPxxxx.exe`.
2. Click **Install** to install the driver.
3. Click **Reboot** to complete the installation.
4. Click **Extract** to extract the contents of the Smart Component.

4 Installing HBAs for HP-UX operating systems

The following sections describe the HBA installation instructions for HP-UX operating systems

Fibre Channel Adapter Installation for HP-UX

This section contains installation prerequisites, guidelines, and procedures for the AH400A and AH401A HBA cards.

The following topics are addressed:

If you are installing an HP I/O card as an add-in device, please review this document before attempting installation.

Prerequisites

Before installing the adapter, follow these steps:

1. Verify compliance with supported configurations using the *HP Fibre Channel Host Bus Adapter Support Matrix* at:

   http://docs.hp.com/en/netcom.html#Fibre%20Channel.

2. Determine if the adapter is a Customer Replaceable Unit (CRU) using the *HP Fibre Channel Host Bus Adapter Support Matrix*. If the adapter is not a CRU, contact your HP representative for installation assistance.

   Field Replaceable Units (FRUs) must be installed or replaced by qualified Hewlett Packard service representatives only. CRUs can be installed or replaced by customers or qualified HP service representatives.

3. Check the following conditions:
   - Verify that the `/usr/bin`, `/usr/sbin`, and `/sbin` directories are in the `PATH`

     by entering the following command:

     ```
     echo $PATH
     ```

   - Verify that you have the following items:
     - Grounding wrist strap
     - Fibre Channel driver software media (included with the OS or application CD)
     - Fibre Channel host bus adapter with an optical port protector attached (not included with all adapters)
   - Verify that you have the following cable items:
     - Fiber optic cable terminated with a duplex LC connector
     - Cable map (optional)

Important patches and updates

Review the *FibrChanl-01 (fcd) Fibre Channel Mass Storage Driver for HP-UX Release Notes* located at:

http://docs.hp.com/ for the latest patch and dependency requirements.

Install all driver software and dependency patches before you install the adapter.

NOTE: Patches are available from the website:
http://h20392.www2.hp.com/portal/swdepot/index.do.

Installing driver software

NOTE: Use the following instructions if the driver is provided on a CD-ROM. If the driver software is downloaded, follow the instructions provided with that file. The driver software, `FibrChanl-01`, may be downloaded from the following website:

http://h20392.www2.hp.com/portal/swdepot/index.do.

The `FibrChnl-01` bundle is also provided on the Operating Environment media or Application Release media for HP-UX v3.

Install all driver software and dependency patches before you install the adapter. See the *FibrChanl-01 (fcd) Fibre Channel Mass Storage Driver Release Notes* available at:

http://docs.hp.com/ for details.

Use the following procedure to load the driver from a CD-ROM:

1. Log in to the system as `root`.
2. Insert the CD into the CD drive.
3. Mount the CD using the following command:

   ```
   mount /dev/dsk/<cd_rom_dev_file> /<tmp_mnt>
   ```

4. Run `swinstall` to install the software. Enter the following command:

   ```
   /usr/sbin/swinstall
   ```

   The **Software Selection** window and the **Specify Source** window open.

5. In the **Specify Source** window, change the **Source Host Name** if necessary. Enter the mount point of the drive in the **Source Depot Path** field and click **OK** to return to the **Software Selection** Window.

   Click **Help** to get more information.

6. Select the appropriate software bundle for your adapter.
7. Select **Mark for Install** from the **Actions** menu.
8. Select **Install** from the **Actions** menu. Installation begins and the **Install Analysis** window opens.
9. Click **OK** in the **Install Analysis** window to confirm that you want to install the software. The **Install** window opens.

   View the **Install** window to read processing data while the software installs. When the **Status** field indicates **Ready**, the **Confirmation** window opens.

10. Click **OK**. A second **Confirmation** window opens.
11. Click **OK** again. The **Install** window opens.
12. Click **Done**. The **Note** window opens.
13. Click **OK** in the **Note** window to reboot. The user interface disappears and the system reboots.
14. Once the system returns to a login, log in as `root` and open the following files to see any error or warning messages that may have occurred during the installation:

    ```
    /var/adm/sw/swagent.log
    /var/adm/sw/swinstall.log
    ```

15. Install `OnlineDiag`, which is available at:

    http://h20392.www2.hp.com/portal/swdepot/index.do

    `OnlineDiag` is also available from the *HP Support PLUS CD*. Installation instructions are available at:

    http://docs.hp.com/en/diag/st/st_inst.htm

Installing adapter online

The *Online addition and replacement* feature (OL* for HP-UX v2 and later HP-UX releases) allows PCI host bus adapters to be added or replaced, without shutting down or rebooting the system, and without adversely affecting other system components. The system hardware uses slot-specific power control, combined with HP-UX operating system support, to enable these features.

Confirm whether OL* is supported on the system that you plan to install a Fibre Channel adapter. See the *HP Fibre Channel host bus adapter support matrix* at the website:

http://docs.hp.com/en/netcom.html#Fibre%20Channel

For detailed instructions on using OL* on HP-UX 11i v2 and later HP-UX releases, see the *Interface card OL* support guide* and the *Interface card OL* support matrix* at this website:

http://docs.hp.com/en/hpux11iv2.html

IMPORTANT: Superdome systems are not intended to be maintained by customers. HP recommends that Superdome systems only be opened by a qualified HP service provider. Failure to observe this recommendation can invalidate any support agreement or warranty you may be entitled.

Installing the adapter offline

The following procedure should only be performed by an authorized HP service provider. Failure to properly complete the steps in this procedure may result in erratic system behavior or system failure and may void the warranty. For assistance with this procedure, contact your local HP Authorized Service Provider.

NOTE: The optical port protector is used only to protect the adapter port when it is not in use. Do not use the protector as a diagnostic tool.

Install OnlineDiag, which is available at the following website:

http://h20392.www2.hp.com/portal/swdepot/index.do. OnlineDiag is also available from the HP Support Plus CD for PA-RISC systems or the IPF CD for Itanium®-based systems. Installation instructions are available at:

http://docs.hp.com/en/diag/st/st_inst.htm

Install all driver software and dependency patches before you install the adapter. See the *FibrChanl-01 (fcd) Fibre Channel mass storage driver release notes* available at:

http://docs.hp.com/.

Installing the host bus adapter

1. Access the system's IO slots.
   - If the system is running, enter the following command to shut it down:

     ```
     # shutdown -h
     ```

     Enter `y` when prompted to continue.
   - Wait for the system to shut down completely and then power off the system by pressing the system **OFF** button.
   - Do not disconnect power cord to ensure the system is grounded.
   - Remove system cover to expose and access the PCI card slots.

   NOTE: HP recommends the supported PCI-e slots (slot **5** and slot **6**) when inserting an HBA into an HP Integrity rx3600 or HP Integrity rx6600 server.

   There are limitations considering slot **3** and slot **4** in these same servers. A *Customer Notice* explains their use by entering **c01506831** in the **search** box at the following website:

   http://welcome.hp.com/country/us/en/welcome.html

2. Install the HBA card.
   - Insert the adapter's edge connector firmly into the PCI-e slot until it's seated.
   - Secure the card and reassemble the system.

Attaching the adapter to other Fibre Channel devices

To attach the adapter to other Fibre Channel devices, follow these steps:

1. Remove the Fibre Channel host bus adapter's optical port protector (if included)
2. Attach a connector cable to the Fibre Channel HBA.
   a. Align the slotted plug with the keyed connector.
   b. Push the connector in. Listen for an audible click when it seats correctly.
3. Attach the free end of the cable to a compatible Fibre Channel device.
4. Power on the system.

Table 5 lists the Fibre Channel cables used when connecting devices to Fibre Channel HBAs.

NOTE: Ensure that LC-LC or LC-SC cables are used with Fibre Channel HBAs using the FCD driver.

Table 4-1 Fibre Channel cable products

LC-LC	
221692–B21	Fibre Channel Cable 2m LC-LC 50/125 Duplex
221692–B22	Fibre Channel Cable 5m LC-LC 50/125 Duplex M/M
221692–B23	Fibre Channel Cable 15m LC-LC 50/125 Duplex M/M
221692–B26	Fibre Channel Cable 30m LC-LC 50/125 Duplex M/M
221692–B27	Fibre Channel Cable 50m LC-LC 50/125 Duplex M/M
LC-SC	
221691–B21	Fibre Channel Cable 2m LC-SC 50/125 Duplex M/M
221691–B23	Fibre Channel Cable 15m LC-SC 50/125 Duplex M/M

Table 4-1 Fibre Channel cable products *(continued)*

LC-LC	
SC-SC	
234457–B23	Fibre Channel Cable 15m SC-SC 50/125 Duplex M/M

Verify the Fibre Channel adapter installation

1. To verify that the system recognizes the HBA, view the output listing from the following command:

   ```
   # ioscan -fnC lan
   ```

2. Verify the following drivers appear for each installed adapter. If all the drivers are listed, proceed to the section titled verifying connectivity.

   The `ioscan -fnC lan` output will display the following:

   ```
   Class     I  H/W Path     Driver S/W State   H/W Type     Description
   ============================================================================
    fc       4  0/4/0/0/0/0   fcd   CLAIMED     INTERFACE    HP AH401A 8Gb Dual Port PCIe Fibre Channel
   Adapter (FC Port 1)
    fc       5  0/4/0/0/0/1   fcd   CLAIMED     INTERFACE    HP AH401A 8Gb Dual Port PCIe Fibre Channel
   Adapter (FC Port 2)
   ```

   The third column represents the hardware path of the slot that the adapter is installed. This path will be different for each installed adapter port.

3. Observe whether the `ioscan` output reports the following:

   ```
   fc  0/7/0/0/0/0 UNCLAIMED UNKNOWN
   ```

   If reported, HP-UX detected the adapter but the `fcd` driver is not recognized.

4. If the correct driver is installed and the adapter is not listed in the `ioscan` output, contact HP for assistance.

Obtaining card information after installation

Review the following reports for HBA card information after installation.

Example 4-1 Example of the "fcmsutil /dev/fcd5" command

```
# fcmsutil /dev/fcd5

                        Vendor ID is = 0x1077
                        Device ID is = 0x2532
           PCI Sub-system Vendor ID is = 0x103C
                  PCI Sub-system ID is = 0x3263
                              PCI Mode = PCI Express x8
                      ISP Code version = 4.3.2
                      ISP Chip version = 2
                              Topology = PTTOPT_FABRIC
                            Link Speed = 8Gb
                    Local N_Port_id is = 0x010e00
                 Previous N_Port_id is = None
           N_Port Node World Wide Name = 0x50014380023cb8fb
           N_Port Port World Wide Name = 0x50014380023cb8fa
           Switch Port World Wide Name = 0x200e00c0dd0d78f6
           Switch Node World Wide Name = 0x100000c0dd0d78f6
             N_Port Symbolic Port Name = vmj231_fcd5
             N_Port Symbolic Node Name = vmj231_HP-UX_B.11.31
                         Driver state = ONLINE
                       Hardware Path is = 0/4/0/0/0/1
                     Maximum Frame Size = 2048
        Driver-Firmware Dump Available = NO
        Driver-Firmware Dump Timestamp = N/A
                       Driver Version = @(#) fcd B.11.31.0809.%319 Jul  7 2008
```

This card is capable of running at bus speeds up to PCI-e x8 link width. The actual link width is displayed as the PCI Mode.

Example 4-2 Example of Vital Product Data (VPD) after installation

```
# fcmsutil /dev/fcd5 vpd
                V I T A L   P R O D U C T   D A T A
                ---------   -------------   -------

 Product Description    : HP 8Gb Dual Channel PCI-e 2.0 FC HBA

 Part number            : AJ764A or AH401A

 Engineering Date Code  : A-4832

 Part Serial number     : MXK8325000

 Misc. Information      : PW=15W

 Mfd. Date              : 4831

 Mfd. ID                : PX2810403-20  B

 Check Sum              : 0x4e

 EFI version            : 02.01

 ROM Firmware version   : 04.03.02

 BIOS version           : 02.02

 FCODE version          : 02.00

 Asset Tag              : NA
```

Example 4-3 Example of "ioscan" report after installation

```
# ioscan -fNH 0/4/0/0/0/1
Class     I  H/W Path     Driver S/W State   H/W Type     Description
===================================================================
fc        5  0/4/0/0/0/1  fcd     CLAIMED     INTERFACE    HP AH401A 8Gb Dual Port PCIe Fibre Channel Adapter
(FC Port 2)
                       /dev/fcd5
tgtpath   0  0/4/0/0/0/1.0x50001fe1500d6f3a                    estp   CLAIMED     TGT_PATH     fibre_channel
target served by fcd driver, target port id

0x10b00
lunpath   0  0/4/0/0/0/1.0x50001fe1500d6f3a.0x0                 eslpt  CLAIMEDLUN_PATH     LUN path for ctl31
lunpath   2  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4001000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10257
lunpath   3  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4002000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10258
lunpath   4  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4003000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10259
lunpath   5  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4004000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10260
lunpath   6  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4005000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10261
lunpath   7  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4006000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10262
lunpath   8  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4007000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10263
lunpath   9  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4008000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10264
lunpath  10  0/4/0/0/0/1.0x50001fe1500d6f3a.0x4009000000000000  eslpt  CLAIMEDLUN_PATH     LUN path for disk10265
```

Verifying connectivity

Once the HP Fibre Channel Mass Storage software and hardware are installed and running, use the following steps to verify connectivity:

1. Check the state of all Fibre Channel hardware and interfaces. Enter the `ioscan` command and verify the *Hardware State* and the hw *Interface* state are *CLAIMED*.

   If the Fibre Channel device file has not been created, enter the following commands:

   ```
   # insf -e
   # ioscan -f
   ```

2. Verify that all devices you have attached to the Fibre Channel adapter are listed in the `ioscan` output. For example, if you have a direct attach Fibre Channel device installed in the system, the `ioscan` output may look like the following:

   ```
   8/12.8.0.255.0.1.0  sdisk  CLAIMED  DEVICE  DGC C3400WDR5
   ```

   The example above is the hardware path of `LUN0` of a directly attached Fibre Channel Mass Storage device with a `Loop ID` of **1**.

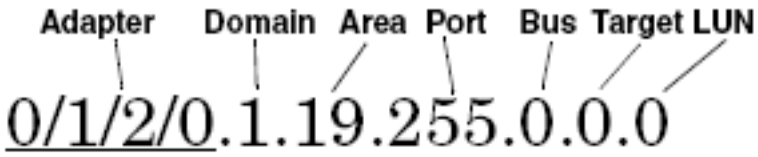
If all the attached devices are listed and appear as *CLAIMED*, the HP Fibre Channel Mass Storage installation is verified.

If all the attached devices are not listed or appear as *CLAIMED*, see the *Troubleshooting* and *Maintenance* chapter of the *HP Fibre Channel Adapters Support Guide*.

Interpreting hardware paths

The following examples illustrate the Fibre Channel hardware path format.

Example 4-4 Hardware path for a direct fabric attach device



Example 4-5 Hardware path for a private loop device

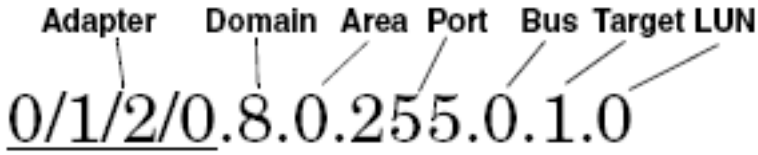


Table 7 describes each field in the hardware path.

Table 4-2 Hardware path field descriptions

Field	Value	Fibre channel topology	
		Fabric topologies	Private loop
Adapter	This is the hardware path of the Fibre Channel adapter that the Logical Unit Number (LUN) is seen. For multiport adapters, this field describes a specific port on the adapter.		
Domain	Dependent on the Fibre Channel topology of the HBA.	Typically the Domain ID of the switch the target device is attached, taken from the most significant byte of the N_Port ID of the target device.	8 HP-UX uses a Domain ID of **8** to indicate private loops. Fibre Channel switches seen by HP-UX hosts cannot be configured with domain ID of 8.

Table 4-2 Hardware path field descriptions *(continued)*

Area	Depends on the Fibre Channel topology of the HBA.	Taken from the second byte of the N_Port ID of the target device. On some switches, the second byte of the N_POrt encodes the switch port to the connected device. The encoding method depends on the switch. See your switch manual to interpret this field.	0
Port	Depends on the Fibre Channel topology of the HBA, the target device, and the LUN addressing method used.	For LUNs with Peripheral Device Addressing, the value of the field is always 255.	
		For other LUN methods, the value of this field is the least significant byte of the N_Port ID of the target device.	For other LUN methods, the value of this field is the Loop ID of the target device.
Bus	Depends on the Fibre Channel topology of the HBA, the target device, and the LUN addressing method used.	For LUNs with Peripheral Device Addressing, the value of this field is the **upper** 4 bits of the least significant byte of the N_Port ID of the target device.	For LUNs with Peripheral Device Addressing, the value of this field is the **upper** 4 bits of the Loop ID of the target device.
		For LUNs with Logical Unit Addressing, the value is the Bus Number field of the LUN.	
		For LUNs with Volume Set Addressing (Flat Space Addressing), the value are bits 7–13 of the LUN.	
Target	Depends on the Fibre Channel topology and the LUN addressing method used.	For Luns with Peripheral Device Addressing, the value of this field is the **lower** 4 bits of the third byte of the N_Port ID of the target device. This field usually corresponds to the Arbitrated Loop Physical Address (AL_PA_ of the target device.	With Peripheral Device Addressing, the value of this field is the **lower** 4 bits of the Loop ID of the target device.
		For LUNs with Logical Unit Addressing, the value id the Target field of the LUN.	
		For LUNs with Volume Set Addressing (Flat Space Addressing), the value are bits 3–6 of the LUN.	
LUN	Depends only on the LUN addressing method used.		

LUN Addressing Method	Value of LUN field in Fibre Channel hardware path.
Peripheral Device Addressing	The Target or LUN field of the Logical Unit Number.
Logical Unit Addressing	The LUN field of the Logical Unit Number.
Volume Set Addressing (Flat Space Addressing)	Bits 0 — 2 of the Logical Unit Number.

For more information about the fields in the Logical Unit Number, see the *SCSI Architechture Model — 3 (SAM-3)* standards document.

5 Troubleshooting

This chapter provides the following information, which is useful in the event of an HBA problem:

- HBA LEDs POST states and results
- Using the Event Viewer

HBA LEDs POST states and results

Table 6 POST LED states lists the HBA LED states and describes each state.

If the LEDs indicate a failure during POST:

1. Make sure the HBA is seated firmly in the PCI slot.
2. Verify that the fiber cable connection to the HBA is secure.
3. Check the POST LED states listed in Table 6 POST LED states to determine the HBA status.

Table 5-1 POST LED states for 8Gb HBAs

Yellow LED	Green LED	Amber LED	Activity
Off	Off	Off	Power off
On	On	On	Power on before or after firmware initialization
Flashing	Flashing	Flashing	Power on after firmware initialization
Alternately flashing	Alternately flashing	Alternately flashing	Firmware fault
Off	Off	Flashing	Activity at 1 Gb/s
Off	Flashing	Off	Activity at 2 Gb/s
Flashing	Off	Off	Activity at 4 Gb/s
Flashing	Flashing	Flashing	Beacon

Table 5-2 POST LED states for 8Gb HBAs

Yellow LED	Green LED	Amber LED	Activity
Off	Off	Off	Power off
On	On	On	Power on before firmware initialization
Flash	Flash	Flash	Power on after firmware initialization
Flash in sequence	Flash in sequence	Flash in sequence	Firmware fault
Off	Off	On/Flash	1/2 Gbps Link UP/ACT
Off	On/Flash	Off	4 Gbps Link UP/ACT
On/Flash	Off	Off	8 Gbps Link UP/ACT
Flash	Off	Flashing	Beacon

4. If a problem occurs, follow the instructions in the next sections to troubleshoot and resolve the issue.

HBA LEDs

Figure 5-1 Dual Channel HBA

Figure 5-2 shows the LEDs that are referenced in this document.

Figure 5-2 LED location

Using the Event Viewer

The miniport drivers verify the condition of the HBA's POST LED states. If there is a failure or a suspected failure, an error log entry appears in the Windows Event Log. Use the Event viewer to access the Event log

To open the Event Viewer:

1. Click **Start > Programs > Administrative Tools > Event Viewer**, or right-click **My Computer** and select **Manage**.
2. Click **Event Viewer** in Computer Management. The Event Viewer window appears.
3. See the website http://www.qlogic.com/support/logs/evlogV9xxx_error.asp for information about interpreting the event codes.

Viewing the Event log

Use the following procedure to view the event log.

1. Click **Start > Programs > Administrative Tools >Event Viewer**, or right-click **My Computer**, and then select **Manage**.
2. Click **Event Viewer** in Computer Management.

   The Event Viewer window appears.
3. See the website http://www.qlogic.com/support/logs/evlogV9xxx_error.asp for information about interpreting the event codes.

6 Regulatory compliance and safety

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 in this document.
- Allow only HP-authorized service technicians to repair the laser device.

Certification and classification information

This product contains a laser internal to the fiber optic (FO) transceiver for connection to the Fibre Channel communications port.

In the USA, the FO transceiver is certified as a Class 1 laser product conforming to the requirements contained in the Department of Health and Human Services (DHHS) regulation 21 CFR, Subchapter J. A label on the plastic FO transceiver housing indicates the certification.

Outside the USA, the FO transceiver is certified as a Class 1 laser product conforming to the requirements contained in IEC 825-1:1993 and EN 60825-1:1994, including Amendment 11:1996 and Amendment 2:2001.

Laser product label

The optional label in Figure 6-1 "Class 1 laser product label" or equivalent may be located on the surface of the HP-supplied laser device.

Figure 6-1 Class 1 laser product label

This 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 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 (1999/5/EC).

Compliance with these directives implies conformity to the following European Norms, followed by the equivalent international standards and regulations 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
- Power Quality:
  - 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

Figure 6-2 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

Figure 6-3 Japanese notice

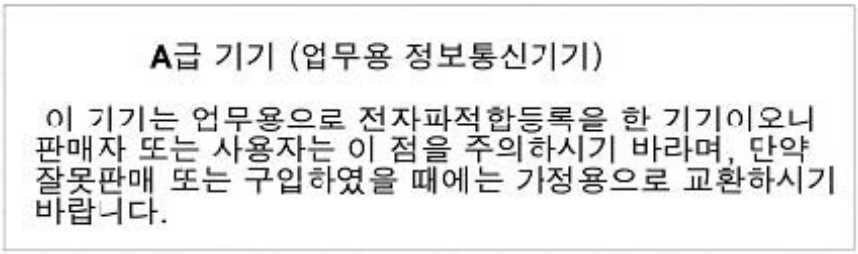
ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

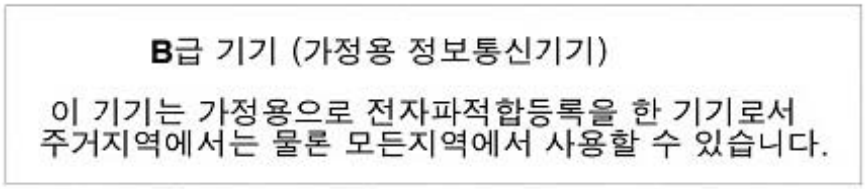
この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

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





Electrostatic discharge

To prevent damage to the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly (see Grounding methods).

Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm (±10 percent) resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an HP-authorized reseller install the part.

NOTE: For more information on static electricity, or assistance with product installation, contact your HP-authorized reseller.

Index