

HP Fibre Channel Mass Storage Adapters

Service and User Manual

Edition 4

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4 Troubleshooting

This chapter describes the troubleshooting tools available to help you diagnose any problems you may experience with your adapters. It covers adapter LEDs, online and offline diagnostic tools, and explains the diagnostic flowcharts in the latter part of the chapter

Introduction

Troubleshooting Fibre Channel problems can be difficult because a variety of hardware and software components may be involved. Also, the problem affecting the system may originate in another part of the Fibre Channel mass storage interconnect. A systematic approach to troubleshooting is, therefore, helpful.

If you cannot solve the problem on your own, contact your HP representative. Use the guidelines in Chapter 1 to help communicate what is wrong.

NOTE

Before using these troubleshooting steps, you must have installed, configured, and verified the Fibre Channel hardware and software on the host and on any devices.

Adapter LEDs

The status LEDs indicate the state of the adapter. The following tables describe the different states for each adapter. (The A3404A and A3636A adapters do not have status LEDs and are not listed in this section).

Table 4-1 A3591A/B LED Indicators

LNK (green)	ERR (yellow)	Probable Cause(s)	Recommended Action
ON	ON	Initial power on System reset	Normal state. No action required.
flashing	OFF	Link not configured	Normal state. No action required.
ON	OFF	Link configured	Normal state. No action required.
OFF	Flashing	Fibre Channel cable not connected FCMS device not powered on Fibre Channel cable defective Fibre Channel adapter defective	Make sure the cable is securely connected at both ends. Make sure the Fibre Channel device is powered on. Replace the cable with a cable that is working properly. If the condition continues, call you HP representative.
OFF	ON	Fibre Channel protocol error	Contact your HP representative.

Table 4-2 A3740A LED Indicators (dual LED version)

LINK (green)	STATUS (amber)	Probable Cause	Recommended Action
Off	Off	Machine not turned on	Turn on machine.
On	Off	The adapter is receiving a signal. The Fibre Channel link is usable for data transfer.	No action required Normal state
Off	On	The adapter is experiencing a fault.	Check cables and external devices. Check driver.
If the LINK LED remains off or the STATUS LED remains on, call your HP representative.			

Table 4-3 A3740A LED Indicators (single LED version)

LINK (green)	Probable Cause	Recommended Action
Off	Machine not turned on Adapter is not receiving a signal. Fibre Channel link is not usable for data transfer.	Turn on machine. Check cables and devices. Check that driver is installed.
On	The adapter is receiving a signal. Normal state.	No action required
If the LINK LED remains off, call your HP representative.		

Table 4-4 A5158A LED Indicators

PWR/ACT (green)	LINK (amber)	Probable Cause	Recommended Action
Off	Off	Machine not turned on	Turn on machine.
On	Off	During power up During link initialization	No action required
On	On	Fibre Channel link is usable for data transfer.	No action required
Flashing	Off	After initialization, flashes only when there is I/O activity.	No action required
If the LINK LED remains off, check cable connections, or call your HP representative.			

Table 4-5 A6684A LED Indicators

PWR/ACT (green)	LINK (amber)	Probable Cause	Recommended Action
Off	Off	Machine not turned on	Turn on machine.
On	Off	During power up During link initialization	No action required.
On	On	Fibre Channel link is usable for data transfer.	No action required
Flashing	On	After initialization, flashes only when there is I/O activity.	No action required
If the LINK LED remains off, check cable connections, or call your HP representative.			

Table 4-6 A6685A LED Indicators

PWR/ACT (green)	LINK (amber)	Probable Cause	Recommended Action
Off	Off	Machine not powered on	Power on machine
On	Off	During power up During link initialization	No action required
On	On	Fibre Channel link is usable for data transfer.	No action required
Flashing	On	After initialization, flashes only when there is I/O activity.	No action required
If the LINK LED remains off, check cable connections, or call your HP representative.			

Table 4-7 A6795A LED Indicators

PWR/ACT (green)	LNK/SPD (green/ amber)	Probable Cause	Recommended Action
Off	Off	Machine not powered on	Power on machine
On	Off	During power up During link initialization	No action required
On	Green	Fibre Channel link is at 2Gb speed	No action required
On	Amber	Fibre Channel link is at 1Gb speed	No action required
Flashing	On	After initialization, flashes only when there is I/O activity.	No action required
If the LNK/SPD LED remains off, check cable connections, or call your HP representative.			

fcmsutil

fcmsutil is a command line diagnostic tool used with the following host bus adapters:

- A3404A
- A3591B
- A3636A
- A3740A
- A5158A
- A6684A
- A6685A
- A6795A

This command provides the ability to perform test and echo functions, read the card's registers, and display information such as the N_Port ID, Node World-Wide Name, Port World-Wide Name, link speed, chip revision number, VPD (Vital Product Data) information and more.

The primary fcmsutil options for system administrators are `echo`, `test`, `reset`, and `get`. For detailed information on this utility and the available options, refer to the `fcmsutil` man page.

To use `fcmsutil`, you must know the device file name. To get the device file name, do the following:

1. Go to the `/opt/fcms/bin` directory.
2. Type the following command to determine the device file:

```
ioscan -fknd <driver_name>
```

The output will vary depending on the device, but it will be similar to the following:

```
fc      5    1/8/0/0    td    CLAIMED    INTERFACE    HP Tachyon XL2 Fibre
Channel Mass Storage Adapter /dev/td2
```

↙ (device file)

NOTE

If the device file does not display in the `ioscan` output, run

`/sbin/rc2.d/S900hpfcms` start to recreate the device file.

3. To use the basic `fcmsutil` command, enter the following:

```
fcmsutil /dev/<device_filename>
```

4. If you are using `fcmsutil` with the Tachyon adapters (A3404A, A3591A/B, A3636A, or A3740A), use the following command:

```
fcmsutil /dev/fcmsx (where x is the number assigned to the adapter).
```

The output will be similar to the following:

```

                Local N_Port_ID is = 0x000001
N_Port Node World Wide Name = 0x1000080009F608E6
N_Port Port World Wide Name = 0x1000080009F608E6
                Topology = IN_LOOP
                Speed = 1062500000 (bps)
                HPA of card = 0xFFB08000
                EIM of card = 0xFFFA400C
                Driver state = READY
                Bof EDB's in use = 0
                Number of OIB's in use = 0
Number of Active Outbound Exchanges = 1
                Number of Active Login Sessions = 2

```

Check to see that the driver state is **READY**.

5. If you are using `fcmsutil` with the Tachyon TL adapters (A5158A, A6684A A6685A) or Tachyon XL2 adapters (A6795A), use the following command:

```
fcmsutil /dev/tdx (where x is the number assigned to the adapter).
```

The output will be similar to the following examples:

Tachyon TL adapter

```
Vendor ID is = 0x00103c
Device ID is = 0x001028
TL Chip Revision No is = 2.3
PCI Sub-system Vendor ID is = 0x00103c
PCI Sub-system ID is = 0x000006
Topology = PTTOPT_FABRIC
Local N_Port_id is = 0x011400
N_Port Node World Wide Name = 0x50060b000009aa75
N_Port Port World Wide Name = 0x50060b000009aa74
Driver state = ONLINE
Hardware Path is = 0/1/0/0
Number of Assisted IOs = 129853902
Number of Active Login Sessions = 0
Dino Present on Card = NO
Maximum Frame Size = 960
Driver Version = @(#) libtd.a HP Fibre
Channel Tachyon TL/TS/XL2 Driver B.11.11.09 (AR1201)
```

Tachyon XL2 adapter

```
Vendor ID is = 0x00103c
Device ID is = 0x001029
XL2 Chip Revision No is = 2.2
PCI Sub-system Vendor ID is = 0x00103c
PCI Sub-system ID is = 0x00128c
Topology = PRIVATE_LOOP
Link Speed = 1Gb
Local N_Port_id is = 0x000001
Local Loop_id is = 125
N_Port Node World Wide Name = 0x50060b00001000b4
N_Port Port World Wide Name = 0x50060b00001000b3
Driver state = ONLINE
Hardware Path is = 0/5/0/0
Number of Assisted IOs = 51888794
Number of Active Login Sessions = 0
Dino Present on Card = NO
Maximum Frame Size = 960
Driver Version = @(#) libtd.a HP Fibre
Channel Tachyon TL/TS/XL2 Driver B.11.11.09 (AR1201)
```

Check to see that the driver state is ONLINE.

CAUTION

`fcmsutil` is a powerful diagnostic tool that may cause problems if used incorrectly. Read and understand the manpage carefully before using `fcmsutil` options.

You cannot use all `fcmsutil` options with all the adapters. Some options cannot be used with the A5158A, A6684A, A6685A and A6795A adapters, and some options can *only* be used with the these adapters. In the manpage for `fcmsutil`, the following letters indicate how to use the options.

- (T) follows the options that can be used only with the A3404A, A3591A, A3636A and A3740A adapters.
- (TL) follows the options that can be used only with the A5158A, A6684A and A6685A adapters.
- (XL2) follows the options that can be used only with the A6795A adapter.
- Options with none of the above indicators can be used with all adapters.

Except for the `echo`, `test`, `reset`, and `get` options, use `fcmsutil` options only at the request of your HP support representative.

Reading VPD Information

You can use fcmsutil with the **A6795A** adapter to read VPD (Vital Product Data) information on the adapter, which can be useful in troubleshooting problems remotely. The command for retrieving VPD information is:

```
fcmsutil <device file name> vpd
```

Following is an example of the information that displays:

```

          V I T A L   P R O D U C T   D A T A
          -----
Product Description      : 'A6795A 2Gbps/1Gbps Fibre Channel 4X
                           PCI HBA'
Part number              : 'A6795-62001'
Engineering Date Code   : 'A-4142'
Part Serial number      : 'A56466014504'
Misc. Information       : 'PW=15W'
Mfd. Date               : 'A-4142'
Check Sum               : 0x46
EFI version             : '000000'
Asset Tag               : 'NA'

```

Auto Speed Negotiation

The A6795A adapter is capable of transferring data at 1 Gb or 2 Gb per second. The adapter will automatically negotiate to find the highest speed that is common to the port and to the infrastructure connecting the port.

To display the link speed along with other existing adapter information, use the command, `fcmsutil <device file>`.

Once the adapter is operating at a certain speed, it will not attempt to negotiate again unless a link fails, or it detects a chip reset.

HP Support Tools Manager (STM)

This section describes how to use STM to gather information about the Fibre Channel adapters, diagnose problems, and update firmware.

If you are not familiar with STM, go to the Systems Hardware section of HP's online documentation web site (<http://www.docs.hp.com>). Click "Browse by Topic," then choose "diagnostics." Click on "Online Diagnostics: Support Tools Manager." This web site includes information on using STM, including a tutorial to get you started.

STM runs in three modes:

- **Menu Mode**
(use the `mstm` command to start STM in Menu Mode)
- **X Windows environment**
(use the `xstm &` command to start STM in X Windows)
- **Command Line Mode**
(use the `cstm` command to start STM in Command Line Mode)

Four tools are available in STM for Fibre Channel Mass Storage adapters:

- **Information tool** provides information about a Fibre Channel adapter without resetting the adapter.

The following is an example information log for a K-class system:

```
Log creation time: Tue Jun 6 14:12:23 2000
```

```
Hardware path: 8/12
```

```
Product ID:                Fibre Channel Interface
Hardware Path:              8/12
Module Type:                Type-A DMA I/O
Hardware Model:             0x15
Hardware Revision Number:   0
Software Revision Number:   0
Software Model Number:      0xa7
Software Option:            0x80
Hard Physical Address:      0xffb4c000
Slot Number:                3
```

IODC Revision: 0
World Wide Name: 1000080009F64883
Date Code: 3822

- **Logtool utility** extracts log errors and allows them to be viewed. This tool provides information about a Fibre Channel adapter without resetting the adapter.

The following is an example utility log for a K-class system:

Log creation time: Mon Sep 11 17:47:07 2000

Device Path : 8/12

Product ID: Fibre Channel Interface
Product Qualifier: 15
Logger: fcT1
Device Type: Interface
Device Qualifier: Fibre

Severity Level: Error
lBolt Value: 88417

Error 17: The Fibre Channel Driver received a LINK DOWN interrupt.

Additional Information:

Frame Manager Status Register = 0x1
Received AL_PA Register = 0x2
Loss of Signal Counter = 3
Bad Received Character Count = 4
Loss of Synchronization Count = 5
Link Failure Count = 6
Received EOF Count = 9
Generated EOF Count = 8
Bad CRC Count = 9
Protocol Error Count = 10

Possible Causes/Recommended Actions:

It is possible for link down errors to occur under normal operation.

No action is required. The system will recover.

HP Support Tools Manager (STM)

- **Diagnose tool** runs a loopback test on a Fibre Channel adapter. This test is destructive and should only be run by qualified personnel.
- **Firmware Update** tool allows you to download a new version of the Fibre Channel adapter firmware. This test is destructive and must only be run by qualified personnel.

NOTE

The A5158A, A6684A, A6685A and A6795A adapters do not use the Firmware Update tool.

Event Monitoring Service (EMS)

Event Monitoring Service (EMS) notifies a system administrator when an event occurs on the system.

A hardware event monitor monitors the hardware for unusual behavior (known as an event) and sends a message to the Event Monitor Service, which notifies the system administrator of the event, along with suggestions for correcting the problem. This service is available for all of the Fibre Channel host bus Adapters.

For detailed information on how hardware monitors work, go to <http://www.docs.hp.com> and click on “Systems Hardware,” then “Browse by topic.” Go to the “Diagnostics” section to locate EMS information.

Fibre Channel Adapter Monitor

The Fibre Channel Adapter Monitor monitors the operation of all supported fibre channel host bus adapter cards on your system. If the monitor detects a problem with any of the adapters, it immediately sends an event to Event Monitoring Service, which alerts you by using the notification methods defined for the monitor. Error messages identify the problem, what caused it, and what must be done to correct it.

The FC adapter monitor employs asynchronous event detection. The monitor continuously watches for any errors or abnormal behavior reported by the device driver during I/O operations. If an error occurs, it passes directly to the monitor for immediate analysis. If the error warrants notification, the monitor immediately generates an event.

The monitor launches automatically when the system starts, ensuring protection for all supported Fibre Channel adapters from undetected hardware failure.

Supported Products

The Fibre Channel Adapter Monitor supports the following products:

- A3404A
- A3591A
- A3636A

- A3740A
- A5158A
- A6684A
- A6685A
- A6795A

Installation

System requirements:

- HP-UX computer (servers or workstations)
- HP-UX 10.20, 11.00, 11i or later operating systems
- Support Plus Media CD-ROM
- If you are using MC/ServiceGuard (optional), check for the correct version you must have for HP-UX 10.20, 11.00 or 11i.

Procedure

- Step 1.** Install the Support Tools Manager (STM) from the latest Support Plus Media CD. The EMS hardware monitors automatically install when you install STM.
- Step 2.** Examine the list of supported products to see if any of your devices have special requirements in order to be monitored.
- Step 3.** Add or modify monitoring requests to customize the monitoring configuration for your system.
 - a. Run sam.
 - b. Double click on Resource Management.
 - c. Double click on Event Monitoring Service.
 - d. Pull down the Action menu and select Add Monitoring Request.
 - e. Under Resource Classes, double click on adapters, then status, then the adapter name.
 - f. Under Resource Instances, select the instance you want (up/down) or just select All Instances.

- g. Click OK.
- h. Verify or modify the monitoring request parameters such as polling interval and notification methods.
- i. Click OK. You will get a Note Window stating that Monitoring request is added.
- j. Click OK again, and you will see the FC adapter listed in the Current Monitoring Request Window.

Step 4. (Recommended) Verify that monitors are correctly operating, for example, by simulating a hardware failure or event.

The default hardware monitoring configuration should meet most monitoring requirements. By default, messages regarding major warning, serious and critical events are written to `/var/adm/syslog/syslog.log` and sent to e-mail address `root`. All events are also stored in `/var/opt/resmon/log/event.log`.

If you find that the default monitoring should be customized, you can always return later and add or modify monitoring requests as needed.

Diagnostic Flowcharts

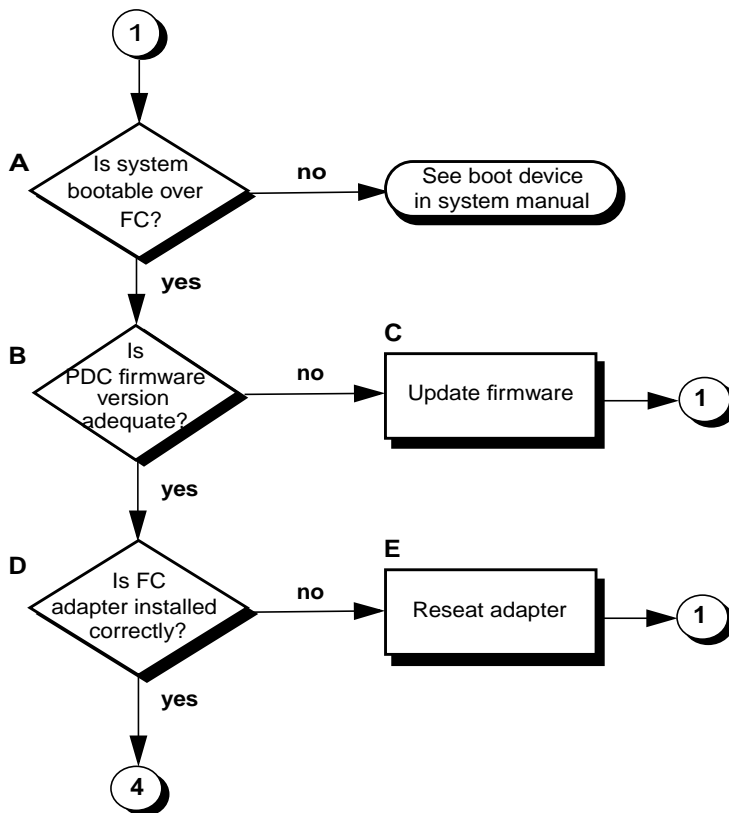
The diagnostic flowcharts provide the following tests:

- **Flowchart 1: Boot Test.** Verifies that the system boots correctly over Fibre Channel. Note that Fibre Channel boot is **not** supported on the following adapters:
 - Fibre Channel adapter A3636A
 - Fibre Channel adapter A3740A

For the latest boot information on all other Fibre Channel HBAs, log on to the ITRC web site (<http://itrc.hp.com>), and click on navigate knowledge trees and response center FAQs. In the Hardware area, navigate the links to networks/mass storage connectivity/fibre channel/technical support.

- **Flowchart 2: Configuration Test.** Verifies the configuration of the mass storage interface on a host using the ioscan (1M) command.
- **Flowchart 3: Fibre Channel Connections Test.** Checks that all the hardware connections between your system and the Fibre Channel mass storage devices are connected and operational.

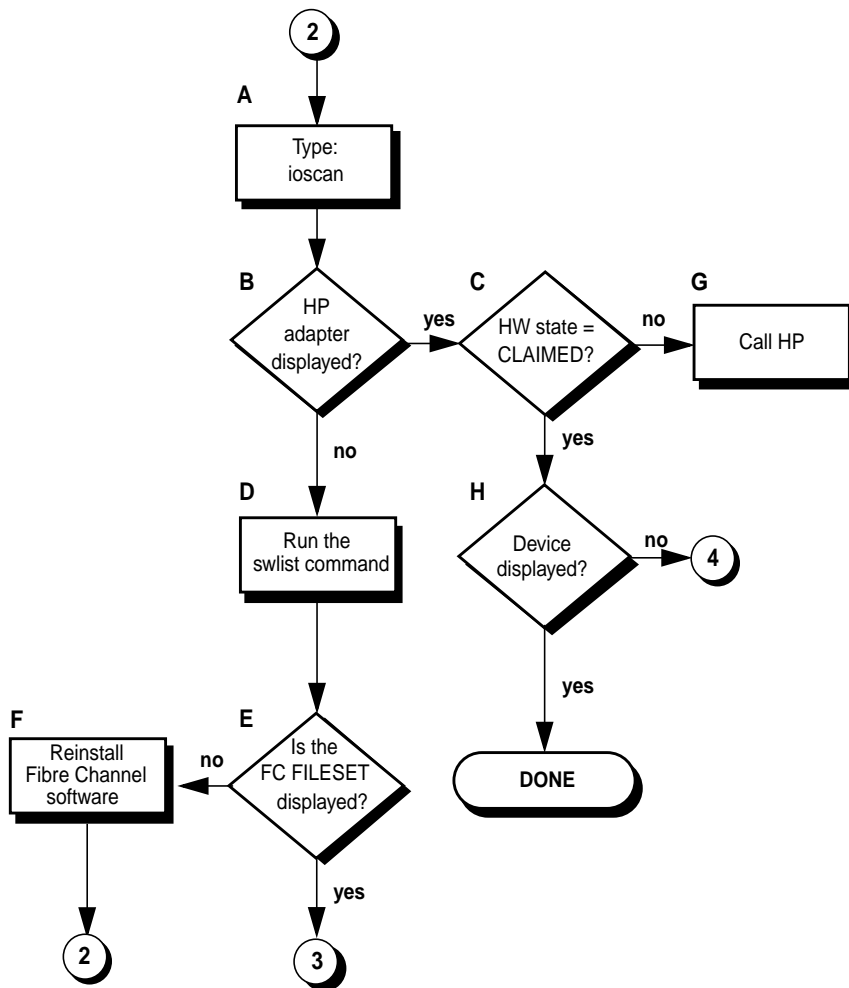
Figure 4-1 **Flowchart 1: Boot Test**



Flowchart 1 Procedures

- A** **Is the system bootable over the Fibre Channel?** Only certain systems can boot over the Fibre Channel adapter. If your system is not capable, you must boot from a SCSI device.
- B** **Is firmware version adequate?** Check the firmware revision on your system for the minimum required date code for your adapter. If Yes, go to step D; if No, go to C.
- C** **Update firmware.** Update the firmware to the appropriate level.
- D** **Is the Fibre Channel adapter installed correctly?** If yes, go to 4. If no, go to step E.
- E** **Is the Fibre Channel adapter properly seated?** Shut down the system by entering: `/usr/sbin/shutdown -h`. Power down the system and disconnect the cables. Check that the adapter is properly seated in the backplane. To verify the installation, go back to step A.

Figure 4-2 **Flowchart 2: Configuration Test**

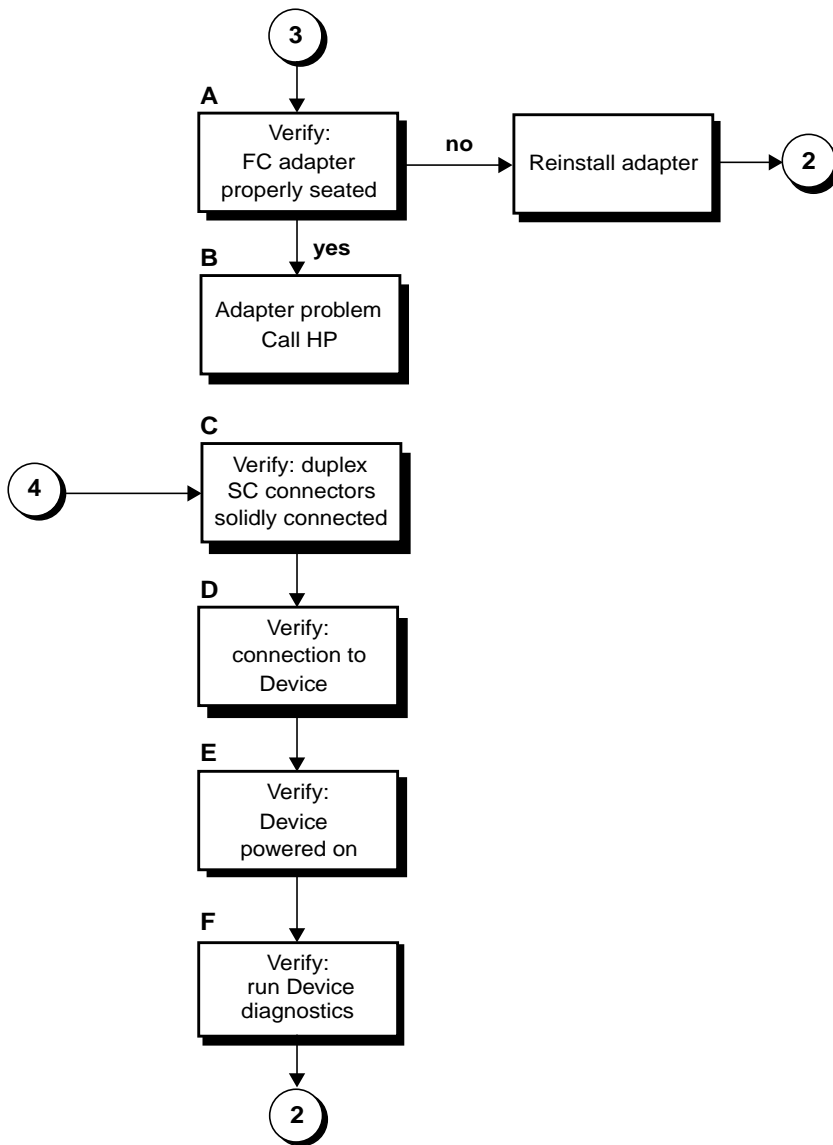


Flowchart 2 Procedures

- A** **Enter the `ioscan` command** to display information about attached peripherals that are successfully bound to the system; for example, enter `/etc/ioscan-f`. See the `ioscan` man page for more information.
- B** **HP adapter displayed?** `ioscan` shows information about every peripheral adapter in the system backplane.
- C** **HW state = CLAIMED?** The hardware state is operational if “CLAIMED” displays for the Fibre Channel adapter under the Hardware State heading. If it is not operational, go to G (contact HP). If it appears operational, continue with H.
- D** **Run the `swlist` command** to see if the Fibre Channel Mass Storage filesets have been installed. For example, enter `swlist -l fileset`.
- E** **Does FC FILESET display?** The filesets displayed depend on the Fibre Channel adapter product you are using. An example of some filesets for the PCI Tachyon TL and XL2 adapters is:
FC-TACHYON-TL-FC-TL-KRN and FC-TACHYON-TL-RUN
An example of some filesets for the other Fibre Channel adapters is:
FCMassStorage.FCMS-KRN and FCMassStorage.FCMS-RUN
If the proper FILESET displays, and you still do not see the adapter, the adapter may have a problem. Go to flowchart 3. If the filesets do not display, proceed to F.
- F** **Reinstall Fibre Channel software.** A problem may have occurred during installation. Reinstall the software and begin again with flowchart 2.
- G** **Call HP.** Use the guidelines in “Contacting Your HP Representative” to help communicate what is wrong.
- H** **Device Displayed?** If devices do not display, go to number 4 on flowchart 3.

Figure 4-3

Flowchart 3: Fibre Channel Connections Test



Flowchart 3 Procedures

- A **Verify: Fibre Channel adapter properly seated.** Shut down the system by entering `/usr/sbin/shutdown -h`. Power down the system and disconnect the cables. Check that the adapter is properly seated in the backplane. To verify, power up the system.
- B **Adapter problem: call HP.** Use the guidelines in “Contacting Your HP Representative” to help communicate what is wrong.
- C **Verify: connectors solidly connected.** Without powering down the system, make sure the connectors on the fiber optic cable match the keyed connectors on the adapter and are solidly connected.
- D **Verify: connection to Fibre Channel Mass Storage device.** Make sure the Fibre Channel cable is fully connected to the Fibre Channel Mass Storage device and the device is operating. Follow the instructions in the device manual to check the device state. Try changing the connection to a different port on the Fibre Channel Mass Storage device, if possible. After checking the connections, go back to flowchart 1
- E **Verify: Fibre Channel Mass Storage device powered on.** Make sure the Fibre Channel Mass Storage device is powered on.
- F **Verify: run Fibre Channel Mass Storage device-specific diagnostics.** If diagnostics are available to troubleshoot the Fibre Channel Mass Storage device, follow the steps to verify that the device is functioning properly. After verification, go back to flowchart 1.