

StorageWorks by Compaq

FCA2214 PCI-X Host Bus Adapter for Linux Installation Guide

Part Number: AA-RSBMA-TE

First Edition (September 2002)

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This guide describes how to install and configure the *StorageWorks*[™] FCA2214 PCI-X Host Bus Adapter for Linux by Compaq.

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About this Guide

This installation guide provides information to help you:

- Install the FCA2214 PCI-X to Fibre Channel Host Bus Adapter for Linux.
- Contact technical support for additional assistance.

Intended Audience

This book is intended for use by system administrators who are experienced with the following:

- Linux operating system
- Host bus adapters

Related Documentation

In addition to this guide, Compaq provides the following document for late-breaking information:

- FCA2214 PCI-X to Fibre Channel Host Bus Adapter for Linux Release Notes

Document Conventions

The conventions included in [Table 1](#) apply in most cases.

Table 1: Document Conventions

Element	Convention
Key names, menu items, buttons, and dialog box titles	Bold
File names and application names	<i>Italics</i>
User input, command names, system responses (output and messages)	Monospace font COMMAND NAMES are uppercase unless they are case sensitive
Variables	<i>Monospace, italic font</i>
Website addresses	Sans serif font (http://www.compaq.com)

Symbols in Text

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



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



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

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

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

Symbols on Equipment



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

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



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

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



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

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



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

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



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

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

Rack Stability



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - In single rack installations, the stabilizing feet are attached to the rack.
 - In multiple rack installations, the racks are coupled.
 - Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.
-

Getting Help

If you still have a question after reading this guide, contact service representatives or visit our website.

Compaq Technical Support

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

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

Outside North America, call Compaq technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the Compaq website: <http://www.compaq.com>.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions.

Compaq Website

The Compaq website has the latest information on this product, as well as the latest drivers. Access the Compaq website at: <http://www.compaq.com/products/storageworks/adapters.html>. From this website, select the appropriate product or solution.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

Adapter Features

This chapter describes the features of the FCA2214 Fibre Channel Bus Adapter (HBA) for Linux.

Adapter Features

The FCA2214 HBA is a high-performance, DMA bus master host adapter designed for high-end systems. The performance is derived from the ISP2312 chips.

The HBA has the following features:

- Combines a powerful RISC processor, a Fibre Channel protocol manager (FPM) with one 2-Gb Fibre Channel transceiver, and a peripheral component interconnect (PCI) or peripheral component interconnect-extended (PCI-X) local bus interface in a single-chip solution.
- Supports Private Loop Direct Attach (PLDA) and Fabric Loop Attach (FLA) connections.
- Fast!UTIL BIOS utility to customize the configuration parameters on the adapter and attached drives.
- Supports bus master DMA.
- Supports Fibre Channel protocol-SCSI (FCP-SCSI), IP, and Fibre Channel-Virtual Interface (FC-VI) protocols.
- Supports point-to-point fabric connection (F-PORT FABRIC LOGIN).
- Complies with:
 - PCI Local Bus Specification revision 2.2.
 - PCI-X Addendum (revision 1.0) to the PCI Local Bus Specification.
 - Third-generation Fibre Channel-Physical and Signaling Interface (FC-PH-3) standard.
 - Fibre Channel-Arbitrated Loop (FC-AL-2) standard.

- U.S. and international safety and emissions standards.

Figure 1-1 shows the FCA2214 HBA.

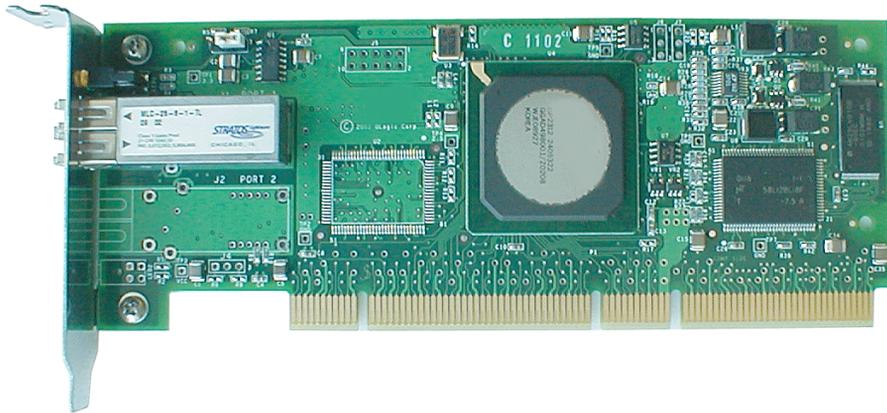


Figure 1-1: FCA2214 HBA

Installing the Adapter

This chapter describes the procedure for installing the FCA2214 Host Bus Adapter (HBA). This chapter includes:

- [Installation Prerequisites, page 2-1](#)
- [Installing the Adapter, page 2-4](#)
- [Installation Considerations, page 2-5](#)

Refer to your host documentation for 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.



WARNING: Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before beginning this procedure. See [Appendix C](#) for related ESD information.

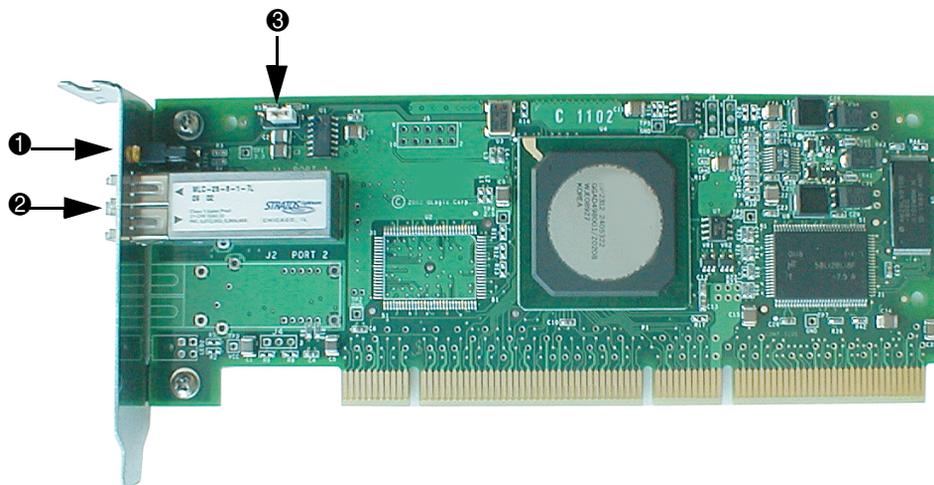
Installation Prerequisites

Before you begin, make sure you have the following:

- A screwdriver (Phillips #1).
- An optical multimode cable with an LC-style duplex connector.
- Each HBA has a unique serial number that is located on the bottom of the adapter. Check the HBA and record its serial number, in the unlikely event that the NVRAM is corrupted.

Adapter Components

Figure 2–1 shows the FCA2214 components that are referenced throughout this chapter.



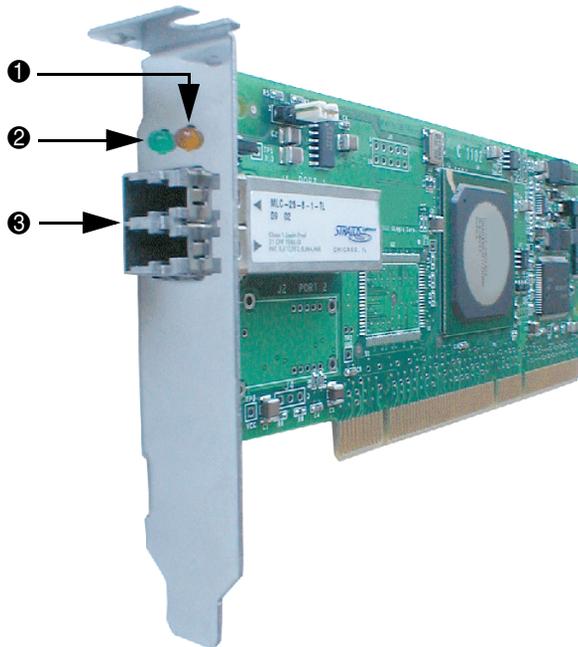
- ❶ LED Indicators
- ❷ J1 Connector

- ❸ J3 Jumpers

Figure 2–1: FCA2214 components

LED Indicators

Figure 2–2 identifies the location of the HBA LEDs and the J1 connector.



- ❶ Amber LED
- ❷ Green LED
- ❸ J1 Connector

Figure 2–2: LED indicators and connectors

Table 2–1 identifies and describes the activity of the LED indicators.

Table 2–1: LED Indicators Activity

Green LED ❷	Amber LED ❶	Activity
On	On	Power
On	Off	Online
Off	On	Signal Acquired
Off	Flashing	Loss of Synchronization
Flashing	Flashing	Firmware Error

Jumpers

The jumpers on the HBA are set to the default state of the laser and are set at the factory with a jumper plug on pins 2–3 of the J3 jumper.



CAUTION: Changing the jumper settings can result in the HBA being inoperable.

Before you Begin Installation

The HBA is self-configuring. However, some motherboards require manual configuration. See the documentation supplied with your computer, or contact your computer dealer to determine if your motherboard requires configuration.

Some motherboards have two kinds of PCI bus slots: master and slave. This HBA must be in a PCI bus master slot. (Some motherboards have PCI bus master slots that are shared with onboard devices. This HBA does not work in shared slots).

PCI connectors vary among system adapter manufacturers. This HBA is a 64-bit PCI device that can function in a 32-bit PCI slot; the slot conforms to the PCI specification (the rear edge of the PCI slot is notched).



CAUTION: If you try to install the adapter in a PCI slot that does not conform to the PCI specification, you may damage the device.

PCI and PCI-X slots look the same. If the PC contains both PCI and PCI-X slots, refer to the PC manufacturer's instructions to determine the slot type.

This HBA is designed and tested to operate at PCI bus speeds of up to 133 MHz.

Installing the Adapter

To install a FCA2214 HBA:

1. Check the motherboard and make any necessary configuration changes to accommodate the HBA.
2. Power down the peripherals, then turn off the computer.
3. Remove the computer cover and save the screws.
4. Choose any PCI bus slot that supports bus mastering.

5. Most motherboards automatically assign an IRQ level and interrupt line; if your motherboard does not, you must assign the IRQ level and use *interrupt line A* for this slot.
6. Remove the slot cover for the slot in which you will install the HBA.
7. Place the HBA in the slot. Carefully press the board into the slot until it seats firmly.
8. Secure the HBA to the chassis. Follow the PC manufacturer's instructions.
9. Connect the appropriate cable from the devices to the corresponding LC-connector.
10. Carefully reinstall the computer cover. Insert and tighten the computer cover screws.
11. Power up all external FC devices, then power up the PC and observe the monitor.
The BIOS is disabled by default. Sun Solaris systems do not display the BIOS banner.
12. Enable the BIOS only if the boot device is attached to the HBA.

This allows the system to boot faster. For further information about enabling the HBA BIOS, see [Appendix A](#). Consequently, the devices attached to the HBA are not identified. For example:

```
QLA23xx PCI Fibre Channel ROM BIOS Version x.xx  
Press <Alt-Q> for Fast!UTIL
```

```
BIOS for Adapter 0 is disabled  
ROM BIOS not installed
```

Installation Considerations

If your system has an IDE hard disk, it may be assigned device number 80, which is the boot device. If your system does not have an IDE hard disk, a parallel SCSI HBA, or a RAID HBA, the first bootable FC hard disk configured (the one with the lowest ID) is assigned device number 80 and becomes the boot device. This HBA BIOS must be enabled if the boot device is connected to it.

If you have a selectable boot BIOS and want to boot to an FC hard disk, set the motherboard BIOS parameters to None or Not Installed. The ROM BIOS on the HBA automatically configures the FC peripherals.

Some system BIOS support selectable boot, which supersedes the HBA BIOS selectable boot setting. Select the HBA Fibre Channel hard disk in the system BIOS to boot from a Fibre Channel hard disk attached to it.

Installing the Linux Driver

This section provides instructions for installing the Linux driver for the QLA2300 (V5.2 or later) driver on an already installed Linux Red Hat 7.2 and SuSE SLES 7 operating system.

The software kit that is included with the HBA contains the latest version of the software files at the time of shipment. Software files are updated periodically and can be obtained from the Compaq website:

<http://www.compaq.com/products/storageworks/adapters.html>

Installing the Driver

This section provides instructions for installing the QLA2300 driver into a Linux operating system.

To install the driver, you must be familiar with the operating system under which the HBA is to operate, and have access to standard system documentation.

To install the driver, you must perform the following:

- [Building a Driver from the Sources, page 3-1](#)
- [Installing the Driver on the Boot Drive, page 3-3](#)
- [Loading the Driver, page 3-4](#)

Building a Driver from the Sources

If your Linux kernel version does not match the prebuilt driver binaries, you need to build the driver in your configuration locally. To build a single-processor or uniprocessor (UP) version of the qla2300 driver, see section “[Building a Uniprocessor Version of the Driver](#)” on page 3-2 in this chapter. To build a symmetric multiprocessor (SMP) version of the qla2300 driver, see section “[Building a Multiprocessor Version of the Driver](#)” on page 3-2 in this chapter.

Building a Uniprocessor Version of the Driver

Perform the following steps to build a uniprocessor version of the qla2300 driver:

1. If not already installed, extract the kernel-header and kernel-source RPM files from your Linux CD-ROM distribution. For example:

```
# cd /mnt/cdrom/RedHat/RPMS
# rpm -iv kernel-headers*.rpm
# rpm -iv kernel-source*.rpm
```

2. Copy the qla2x00src-x.xx.tgz file to the /home/qla2x00 directory.

```
# cd /home
# mkdir qla2x00
# cd /home/qla2x00
# mcopy a:*.tgz . (The period [.] at the end is required.)
# tar -xvzf qla*.tgz
```

3. Build the qla2300 driver from the sources.

```
# make ISP2300=1
```

Building a Multiprocessor Version of the Driver

Perform the following steps to build an SMP version of the qla2300 driver:

1. If not already installed, extract the kernel-header and kernel-source RPM files from your Linux CD-ROM distribution. For example:

```
# cd /mnt/cdrom/RedHat/RPMS
# rpm -iv kernel-headers*.rpm
# rpm -iv kernel-source*.rpm
```

2. Change to the Linux source directory.

For Red Hat 7.2, enter:

```
# cd /usr/src/linux-2.4
```

For SuSE SLES, enter:

```
# cd /usr/src/linux
```

3. At the command prompt, enter the following:

```
# make menuconfig
```

- a. Choose **Processor type and features**, then press **ENTER**. The Processor Type and Features menu displays.
- b. Choose **Symmetric Multiprocessor**, then press **SPACEBAR**.

c. Click **Exit**. The system prompts:

```
Do you wish to save your new kernel configuration?
```

d. Click **Yes**. The system saves a new config file `.config` in the current directory.

4. At the command prompt, enter the following:

```
# make dep
```

5. Copy the `qla2x00src-vx.xx.tgz` file to the `/home/qla2x00` directory.

```
# cd /home
# mkdir qla2x00
# cd /home/qla2x00
# mcopy a:*.tgz . (The period [.] at the end is required.)
# tar -xvzf qla*.tgz
```

6. Build the `qla2300` driver from the sources.

```
# make SMP=1 ISP2300=1
```

Installing the Driver on the Boot Drive

NOTE: The FCA2214 HBA must be installed in the system *before* installing the `qla2300` driver.

Perform the following steps to install the `qla2300` driver on the boot drive:

1. Build the driver binary file. To build a driver binary from source files, see section [“Building a Driver from the Sources”](#) on page 3-1 in this chapter.
2. Copy the `qla2300.o` binary file to the `/lib/modules/<kernel version>/kernel/drivers/scsi` directory.
3. For Linux 7.2, add the following line to the file `/etc/modules.conf`.

```
alias scsi_hostadapter qla2300
```

4. At the command prompt, enter the following command to update the module dependency:

```
# depmod -a
```

The `qla2300` driver is now installed on your boot drive. However, the driver must be loaded before the system can access the devices attached to the HBA.

Loading the Driver

The qla2300 driver must be loaded before the system can access the devices attached to the FCA2214 HBA. To build a ramdisk image to automatically load the qla2300 driver at boot time, see section [“Building a Ramdisk Image to Load the qla2300 Driver” on page 3-4](#) in this chapter. To load the qla2300 driver manually, see section [“Loading and Unloading the qla2300 Driver Manually” on page 3-5](#) in this chapter.

Building a Ramdisk Image to Load the qla2300 Driver

You can load the qla2300 driver at boot time using a ramdisk image; as follows:

1. For Red Hat 7.2, add the following line to the file `/etc/modules.conf`:

```
alias scsi_hostadapter qla2300
```

NOTE: If there are other SCSI host adapter boards installed on your system and the `scsi_hostadapter` alias is used, define a different alias (for example, `scsi_hostadaptern` (where *n* is a number in the range 1–9)).

2. Build a new ramdisk image that contains the `qla2300.o` object file. The driver binary file `qla2300.o` must be copied to `/lib/modules/<kernel release version>/drivers/scsi`.

NOTE: The `<kernel release version>` is the Linux kernel, release, and version of your system.

3. Add the dependency for the qla2300 driver and build the ramdisk image:

You can either run `depmod -a` or make sure the following line is in the `/lib/modules/<kernel release version>/modules.dep` file:

```
/lib/modules/<kernel version>/kernel/drivers/scsi/  
qla2300.o: /lib/modules/<kernel version>/kernel/  
drivers/scsi/scsi_mod.o
```

4. Build the ramdisk image file:

For a single-processor system, enter the following commands, replacing `x.x.xx-x.x` with your Linux version number:

```
/sbin/mkinitrd /boot/newinitrd-image x.x.xx-x.x
```

For a multiprocessor system, enter the following commands, replacing `x.x.xx-x.x` with your Linux version number.

```
/sbin/mkinitrd /boot/newinitrd-image x.x.xx-x.xsmp
```

For SuSE SLES, enter the following commands, replacing `x.x.xx-x.x` with your Linux version number.

```
/sbin/mk_initrd /boot/newinitrd-image x.x.xx-x.xsmp
```

5. Modify the `/etc/lilo.conf` file to load the new ramdisk image.

change the following line:

```
initrd=/boot/initrd file name
```

For example:

```
initrd=/boot/newinitrd-image
```

6. At the command prompt, enter the following command to load the new lilo file:

```
# lilo
```

7. Reboot the system. The `qla2300` driver loads automatically.

Loading and Unloading the `qla2300` Driver Manually

Before loading the driver manually, first build the driver from the driver source files obtained from the driver source floppy disk. After manually loading the `qla2300` driver, you can access the devices and unload the driver manually without rebooting the system. The driver is also unloaded each time the system is rebooted.

To load the `qla2300` driver:

1. Manually install the driver binary:

- a. Copy `qla2300.o` to `/lib/modules/<kernel release version>/kernel/drivers/scsi` directory.

NOTE: The `<kernel release version>` is the Linux kernel, release, and version of your system.

- b. Update the dependency file.

You can either run `depmod -a` or make sure that the following line is in the `/lib/modules/<kernel release version>/modules.dep` file:

```
/lib/modules/<kernel version>/kernel/drivers/scsi/qla2300.o:  
/lib/modules/<kernel version>/kernel/drivers/scsi/scsi_mod.o
```

- c. At the command prompt, enter the following command to load the driver:

```
# modprobe qla2300
```

- d. Under the directory that contains the *qla2300.o* file, you can also enter the following command:

```
# insmod qla2300.o
```

NOTE: Compaq recommends loading the driver using the `modprobe` command so that any driver parameter value specified in the `/etc/modules.conf` file will take effect.

2. At the command prompt, enter the following command to unload the `qla2x00` driver manually:

```
# modprobe -r qla2300
```

Troubleshooting

Problems After Installation

Three basic types of installation problems can cause your FCA2214 HBA to function incorrectly: hardware problems, system configuration problems, and Fibre Channel problems. The following section provides checklists to help you determine why your HBA is not functioning.

Hardware Problem Checklist

- Are all of the circuit cards installed securely in the system?
- Are all of the cables securely connected to the correct connectors? Be sure that the FC cables that attach from the HBA connectors to the device are connected correctly. For example, the optical transmit connector on the HBA must be connected to the optical receive connector on the device. Some connectors require a firm push to ensure proper seating. An easy way to check for correct seating is to switch the connectors on either the HBA or the device, then reboot your system. If the BIOS is enabled, devices attached to the HBA are displayed on the screen.
- Is the HBA installed correctly in the PCI slot? Is it seated firmly in the slot?
- Check for interference due to nonstandard PCI connectors.
- Is the Fast!UTIL data rate setting correct? See [Appendix A](#) for information about setting the data rate.
- Are all external peripherals properly powered up? [Appendix A](#) for information about displaying attached devices.

System Configuration Problems

If you have problems with the motherboard connection, your adapter may not function properly.

All PCI-compliant and PCI-X-compliant systems automatically detect 32-bit or 64-bit adapters and set the appropriate bus speed (for example, 33 MHz or 133 MHz). Check the motherboard for proper configuration.

See the documentation supplied with your computer, or contact your computer dealer to determine if your motherboard requires special configuration.

Fibre Channel Problem Checklist

- Were all of the FC devices powered up before you powered up the PC?
- Check that all cables are properly connected.
- Have you configured your RAID controller using the utilities provided by the manufacturer?
- Some Fibre Channel switches support zoning. Make sure that your switch is configured correctly.

Introduction

This appendix provides detailed configuration information for advanced users who want to customize the configuration of the FCA2214 HBA and the connected devices.

This HBA can be configured using Fast!UTIL, Compaq's BIOS-resident configuration tool. Access Fast!UTIL by pressing ALT+Q during the HBA BIOS initialization (it may take a few seconds for the Fast!UTIL Options menu to display). If you have more than one HBA, Fast!UTIL asks you to select the HBA you want to configure. After changing the settings and exiting the utility, Fast!UTIL reboots your system to load the new parameters.



CAUTION: If the configuration settings are incorrect, your HBA may not function properly.

The following sections describe the Fast!UTIL options.

Configuration Settings

The first selection on the Fast!UTIL Options menu is Configuration Settings. These settings configure the Fibre Channel devices and the HBA to which they are attached.

Host Adapter Settings

From the **Configuration Settings** menu in Fast!UTIL, select **Host Adapter Settings**. [Table A-1](#) lists the default settings for the HBA:

Table A-1: Host Adapter Settings

Setting	Options	Default
Host Adapter BIOS	Enabled, Disabled	Disabled
Frame Size	512, 1024, 2048	2048
Loop Reset Delay	0–60 seconds	5 seconds
Adapter Hard Loop ID	Enabled, Disabled	Disabled
Hard Loop ID	0–125	0

The following section describes the settings:

- **Host Adapter BIOS**—When this setting is Disabled, the ROM BIOS on the HBA is disabled, freeing space in upper memory. This setting must be enabled if you are booting from an FC hard disk attached to the HBA. The default is Disabled.
- **Frame Size**—This setting specifies the maximum frame length supported by the HBA. The default size is 2048, which provides maximum performance for F-Port (point-to-point) connections.
- **Loop Reset Delay**—After resetting the loop, the firmware refrains from initiating any loop activity for the number of seconds specified in this setting. The default is 5 seconds.
- **Adapter Hard Loop ID**—This setting forces the adapter to attempt to use the ID specified in the Hard Loop ID setting. The default is Disabled.
- **Hard Loop ID**—If the Adapter Hard Loop ID setting is enabled, the adapter attempts to use the ID specified in this setting. The default ID is 0.

Selectable Boot Settings

This option enables you to select the node name from which you want to boot. Once enabled, this option forces the system to boot on the selected FC hard disk, ignoring any IDE hard disks attached to your system. If you disable this option, the system looks for a boot device (as selected in the system BIOS). In disabled mode, the Boot ID and Boot LUN parameters have no effect.

Some new system BIOS support selectable boot, which supersedes the Fast!UTIL selectable boot setting. To boot from an FC hard disk attached to the HBA, select the HBA Fibre Channel hard disk on the system BIOS.

NOTE: This option applies only to hard disks; it does not apply to tape drives and other nondisk devices.

Restore Default Settings

This restores the HBA default settings.

Raw NVRAM Data

This option displays the adapter's NVRAM contents in hexadecimal format. This is a qLogic troubleshooting tool; you cannot modify the data.

Advanced Adapter Settings

From the **Configuration Settings** menu in Fast!UTIL, select **Advanced Adapter Settings**. [Table A-2](#) lists the default settings for the HBA:

Table A-2: Advanced Adapter Settings

Setting	Options	Default
Execution Throttle	1-256	16
Fast Command Posting	Enabled, Disabled	Disabled
4GByte Addressing	Enabled, Disabled	Disabled
Luns per Target	0, 8, 16, 32, 64, 128, 256	8
Enable LIP Reset	Yes, No	No
Enable LIP Full Login	Yes, No	Yes
Enable Target Reset	Yes, No	No
Login Retry Count	0-255	8
Port Down Retry Count	0-255	8
Drivers Load RISC Code	Enabled, Disabled	Enabled
Enable Database Updates	Yes, No	No
Disable Database Load	Yes, No	No
IOCB Allocation	1-512 buffers	256 buffers
Extended Error Logging	Enabled, Disabled	Disabled

The following section describes the settings:

- **Execution Throttle**—This setting specifies the maximum number of commands executing on any one port. When a port's execution throttle is reached, no new commands are executed until the current command finishes executing. The valid options for this setting are 1–256. The default is 16.
- **Fast Command Posting**—This setting decreases command execution time by minimizing the number of interrupts. The default is Disabled.
- **>4GByte Addressing**—This option should be Enabled if the system has more than 4 GB of memory available. The default is Disabled.
- **LUNs per Target**—This setting specifies the number of LUNs per target. Multiple LUN support is typically for RAID boxes that use LUNs to map drives. The default is 8. If you do not need multiple LUN support, set the number of LUNs to 0.
- **Enable LIP Reset**—This setting determines the type of loop initialization process (LIP) reset that is used when the operating system initiates a bus reset routine. When this setting is Yes, the driver initiates a global LIP reset to clear the target device reservations. When this setting is No, the driver initiates a global LIP reset with full login. The default is No.
- **Enable LIP Full Login**—This setting instructs the ISP chip to re-login to all ports after any LIP. The default is Yes.
- **Enable Target Reset**—This setting enables the drivers to issue a Target Reset command to all devices on the loop when a SCSI Bus Reset command is issued. The default is No.
- **Login Retry Count**—This setting specifies the number of times the software tries to log in to a device. The default is 8 retries.
- **Port Down Retry Count**—This setting specifies the number of times the software retries a command to a port returning port down status. The default is 8 retries.
- **Drivers Load RISC Code**—When this setting is Enabled, the HBA uses the RISC firmware that is embedded in the software driver. When this setting is Disabled, the software driver loads the RISC firmware that is stored in the HBA BIOS. The default is Enabled.
 - The driver being loaded must support this setting. If the driver does not support this setting, the result is the same as Disabled regardless of the setting. Leaving this option enabled guaranties a certified combination of software driver and RISC firmware.

- **Enable Database Updates**—When enabled, this setting allows the software to save the loop configuration information in flash memory when the system powers down. The default is No.
- **Disable Database Load**—When enabled, the device database is read from the Registry during driver initialization. When disabled, the device database is created dynamically during driver initialization. The default is No.
- **IOCB Allocation**—This setting specifies the maximum number of buffers from the firmware’s buffer pool that are allocated to any one port. The default is 256 buffers.
- **Extended Error Logging**—This setting provides additional error and debug information to the operating system. When Enabled, events are logged into the Windows NT/Windows 2000 Event Viewer. The default is Disabled.

Extended Firmware Settings

From the **Configuration Settings** menu in Fast!UTIL, select **Extended Firmware Settings**. [Table A-3](#) lists the default settings for the HBA:

Table A-3: Extended Firmware Settings

Setting	Options	Default
Extended Control Block	Enabled, Disabled	Enabled
RIO Operation Mode	0, 1, 2, 3, 4	0
Connection Options	0, 1, 2	2
Class 2 Service	Enabled, Disabled	Disabled
ACK0	Enabled, Disabled	Disabled
Fibre Channel Tape Support	Enabled, Disabled	Enabled
Fibre Channel Confirm	Enabled, Disabled	Enabled
Command Reference Number	Enabled, Disabled	Disabled
Read Transfer Ready	Enabled, Disabled	Disabled
Response Timer	0-255	0
Interrupt Delay Timer	0-255	0
Data Rate	0, 1, 2	0

The following section describes the settings:

- **Extended Control Block**—This setting enables all other extended firmware settings. The default is Enabled.

- **RIO Operation Mode**—This setting specifies the reduced interrupt operation (RIO) modes, if supported by the software driver. RIO modes allow posting multiple command completions in a single interrupt (see [Table A-4](#)). The default is 0.

Table A-4: RIO Operation Modes

Option	Operation Mode
0	No multiple responses
1	Multiple responses, 16-bit handles, interrupt host
2	Multiple responses, 32-bit handles, interrupt host
3	Multiple responses, 16-bit handles, delay host interrupt
4	Multiple responses, 32-bit handles, delay host interrupt

- **Connection Options**—This setting defines the type of connection (loop or point-to-point) or connection preference (see [Table A-5](#)). The default is 2.

Table A-5: Connection Options

Option	Type of Connection
0	Loop only
1	Point-to-point only
2	Loop preferred, otherwise point-to-point

- **Class 2 Service**—This setting enables Class 2 service parameters to be provided during all automatic logins (loop ports). The default is Disabled.
- **ACK0**—This setting determines the type of ACK used. When this setting is Enabled, sequence ACK is used. When this setting is Disabled, frame ACK is used. The default is Disabled.
 - The Class 2 Service setting must be Enabled to use the ACK0 setting.
- **Fibre Channel Tape Support**—This setting enables FCP-2 recovery. The default is Enabled.
- **Fibre Channel Confirm**—This setting enables the host to send the FCP confirmation frame when requested by the target. The default is Enabled. This setting must be Enabled if the Fibre Channel Tape Support setting is Enabled.
- **Command Reference Number**—This setting is reserved. The default is Disabled.
- **Read Transfer Ready**—This setting is reserved. The default is Disabled.

- **Response Timer**—This setting contains the value (in 100-microsecond increments) used by a timer to limit the time waiting accumulating multiple responses. For example, if this field is 8, the time limit is 800 microseconds. The default is 0.
- **Interrupt Delay Timer**—This setting contains the value (in 100-microsecond increments) used by a timer to set the wait time between accessing (DMA) a set of handles and generating an interrupt. The default is 0.
- **Data Rate**—This setting determines the data rate. When this setting is 1, the HBA runs at 2 Gbps. When this setting is 2, Fast!UTIL determines what rate your system can accommodate and sets the rate accordingly. The default is 0 (the HBA runs at 1 Gbps).

Scan Fibre Channel Devices

This option scans the FC loop and lists all the connected devices by loop ID. Information about each device is listed, for example, vendor name, product name, and revision. This information is useful when configuring your HBA and attached devices.

Fibre Disk Utility

This option scans the FC loop and lists all the connected devices by loop ID. You can select a hard disk and perform a low-level format or verify the hard disk.



CAUTION: Performing a low-level format destroys all data on the hard disk.

Select Host Adapter

If you have multiple HBAs in your system, use this setting to select and then configure or view the settings of a specific HBA.

Specifications

Specifications

This appendix provides the specifications for the FCA2214 Host Bus Adapter (HBA) for Linux.

Environmental Specifications

[Table B-1](#) lists the FCA2214 HBA environmental specifications.

Table B-1: FCA2214 HBA Environmental Specifications

Environment	Minimum	Maximum
Operating temperature	0 °C/32 °F	55 °C/131 °F
Storage temperature	-20 °C/-4 °F	70 °C/158 °F
Relative humidity (noncondensing)	10%	90%
Storage humidity (noncondensing)	5%	95%

Adapter Specifications

Table B–2 lists the FCA2214 HBA specifications.

Table B–2: FCA2214 HBA Specifications

Type	Specification
Host bus	Conforms to <i>PCI Local Bus Specification, Revision 2.2</i>
Fibre Channel specifications	Bus type: fiber optic media Bus transfer rate: 200 MB/s maximum at half duplex 400 MB/s maximum at full duplex Interface chip: SP2300
Central processing unit (CPU)	Single-chip design that includes a RISC processor, Fibre Channel protocol manager, DMA controller, integrated serializer/deserializer (SEREDES) and electrical transceivers that can auto-negotiate a data rate of 1 GB/s or 2 GB/s.
RAM	256B
NVRAM	256KB, field programmable
Flash	128KB of flash ROM in two 64KB, software selectable banks, field programmable
Onboard DMA	Five channel DMA controller: two data and one command, one auto-DMA request, and one auto-DMA response. Integrated frame buffer FIFOs (4KB receive and 6KB transmit) for each data channel.
Connectors	LC-style connector that supports non-OFC, multimode fiber optic cabling using a small form factor optical transceiver module.
Form factor	17.78 cm x 10.67 cm (7.0 in x 4.2 in)
Operating power	Less than 15 W

Regulatory Compliance Notices

Federal Communications Commission Notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device and additional operating instructions for the user.

The rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or FCC ID on the label. Class A devices do not have an FCC logo or ID on the label. After the class of the device is determined, refer to the corresponding statement in the sections below.

Class A Equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

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, contact:

Compaq Computer Corporation
P. O. Box 692000, Mail Stop 530113
Houston, Texas 77269-2000

Or call 1-800-652-6672 (1-800-OK COMPAQ). (For continuous quality improvement, calls may be recorded or monitored.)

To identify the device, refer to the part, series or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Compaq Computer Corporation may void the user's authority to operate the equipment.

Network and Serial 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.

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.

Japanese Notice

Japanese Class A Notice

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。

Laser Devices

All Compaq systems equipped with a laser device comply with safety standards, including International Electrotechnical Commission (IEC) 825. With specific regard to the laser, the equipment complies with laser product performance standards set by government agencies as a Class 1 laser product. The product does not emit hazardous light; the beam is totally enclosed during all modes of customer operation and maintenance.

Laser Safety Warnings



WARNING: To reduce the risk of exposure to hazardous radiation:
Do not try to open the laser device enclosure. There are no user-serviceable components inside.
Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
Allow only Compaq authorized service technicians to repair the laser device.

Compliance with CDRH Regulations

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Compliance with International Regulations

All Compaq systems equipped with laser devices comply with appropriate safety standards including IEC 825.

Label

The transceiver on the adapter is a Class I laser product. It complies with IEC 825-1 and FDA 21 CFR 1040.10 and 1040.11. The transceiver must be operated under recommended operating conditions.

CLASS I LASER PRODUCT

Electrostatic Discharge

To prevent damaging the system, you must take precautions when setting up the system or when handling parts. A discharge of static electricity from a finger or other conductor may damage system adapters or other static-sensitive devices. This type of damage can 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 make sure you are properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

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

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

If you do not have any of the suggested equipment for proper grounding, have a Compaq authorized reseller install the part.

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

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