Sun Quad FastEthernet™ 6U CompactPCI Adapter Installation and User's Guide

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Figures

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Preface

The *Sun Quad FastEthernet 6U CompactPCI Adapter Installation and User's Guide* provides installation and configuration instructions for the Sun Quad FastEthernet™ 6U CompactPCI adapter. These instructions are designed for system administrators with experience installing similar hardware.

How This Book Is Organized

This manual contains the following chapters and appendixes:

Chapter 1 describes the adapter.

Chapter 2 tells you how to install the rear-access version of the adapter.

Chapter 3 tells you how to install the front-access version of the adapter.

Chapter 4 tells you how to configure the network host files associated with the adapter.

Appendix A lists the specifications for the adapters.

Appendix B tells you how to set advanced device driver parameters.

Appendix C tells you how to detach the device driver before removing the adapter, and how to activate the driver after replacing it.

Appendix D tells you how to test the adapter.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment
- Other software documentation that you received with your system

Typographic Conventions

TABLE P-1 Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls  -a` to list all files. `% You have mail.`
AaBbCc123	What you type, when contrasted with on-screen computer output	`% `**`su`** `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

Shell Prompts

TABLE P-2   Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

TABLE P-3   Related Documentation

Application	Title or Description
Adapter installation, removal, and replacement	Your system's: • Service Manual • Installation Manual • Administrator's Guide
Device driver configuration	*Platform Notes: The Sun Quad FastEthernet Device Driver*
Managing networks	*Solaris System Administration Guide*, Volumes 1 through 3
SunVTS™ diagnostic testing	*SunVTS User's Guide* *SunVTS Test Reference Manual*
OpenBoot™ PROM commands	*OpenBoot 3.x Command Reference Manual*

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```
http://docs.sun.com
```

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```
http://www.sun.com/netra
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Overview of the Sun Quad FastEthernet 6U CompactPCI Adapter

This chapter contains an overview of the Sun Quad FastEthernet 6U CompactPCI adapter, including:

■ "Product Description" on page 2

■ "Features" on page 3

■ "Overview of the Installation Procedure" on page 4

Product Description

The Sun Quad FastEthernet 6U CompactPCI adapter contains four fully buffered twisted-pair Ethernet ports (RJ-45), providing four switchable 10BASE-T/100BASE-TX channels, on a CompactPCI adapter.

The adapter is available for front- and rear-access CompactPCI systems. For rear-access systems, the adapter consists of two cards: the front card and the rear transition card (see FIGURE 1-1). For front-access systems, the adapter consists of one front card (see FIGURE 1-2).

⚠️ **Caution –** The front-access version the adapter is designed for front-access systems only. Do not attempt to install this adapter into a rear access system.

Front card   Rear transition card
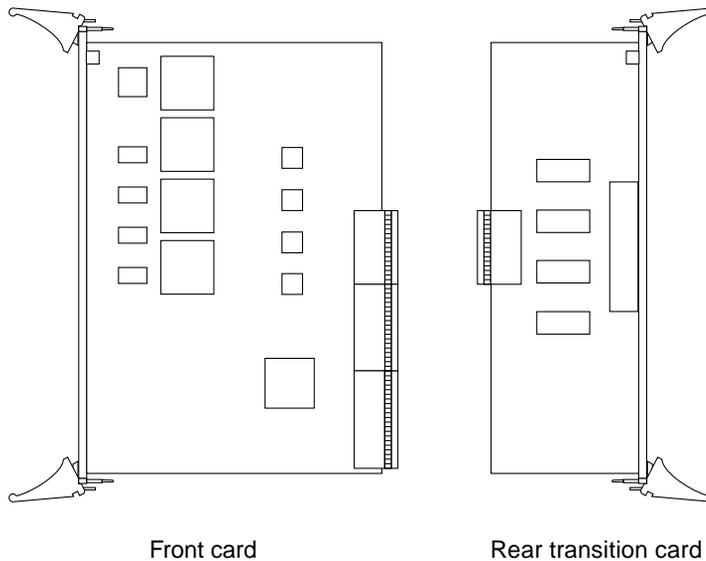
FIGURE 1-1   Sun Quad FastEthernet 6U CompactPCI Adapter (Rear-Access Version)
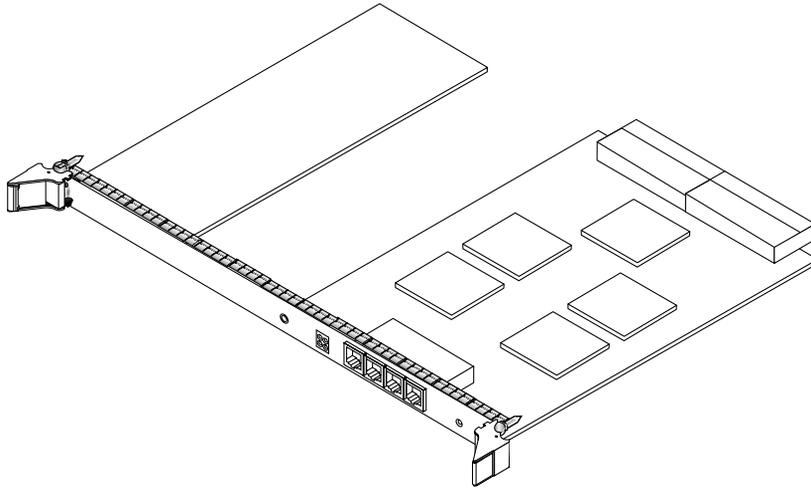
FIGURE 1-2 Sun Quad FastEthernet 6U CompactPCI Adapter (Front-Access Version)

⚠ **Caution –** Do *not* attempt to use the rear-access adapter's rear transition card (FIGURE 1-1) with the front-access adapter (FIGURE 1-2). Using this combination is not supported and may damage the cards and the system. The front-access adapter is for front-access systems *only*, and the rear-access adapter is for rear-access systems *only*.

Features

This adapter offers the following features:

- Fully compliant with the ANSI/IEEE standard 802.3 CSMA/CD physical-layer specification.
    - Four Switchable 10BASE-T/100BASE-TX Ethernet channels with autonegotiation. Conforms to IEEE 802.3u Ethernet standard.
    - Provides operation of up to 100 meters of twisted-pair without use of repeaters.
- Four independent Ethernet channels that run at either 10 Mbps or 100 Mbps.
- Half-duplex or full-duplex operation modes.
- Multiple 48-bit IEEE 802.3 style medium access control (MAC) identifiers, one for each channel.
- Link integrity LED for each channel.
- Hot-swappable using the Intel 21554 chip.

Overview of the Installation Procedure

This section presents an overview of the terminology and lists the major tasks you will perform when installing the adapter into your system. Because of the complexity of the networking environment, your specific installation procedure may require tasks not listed below.

Installation Methods

The adapter is a hot-swappable component that can be installed in a hot-swap-compliant server without interrupting the operation of the system. The adapter can also be installed in cold-swap mode, where you power off the system before you install the adapter.

Before beginning the installation, you should determine whether you want to perform a hot-swap or a cold-swap installation of the adapter.

- In a hot-swap installation, you can install the adapter while the system is running, without interrupting the operation of the server. Depending on the level of hot swap your server is running (full or basic), you may be required to enter software commands during the installation.

- In a cold-swap installation, you must shut down the operating system and power off the server before installing the adapter. After the installation, you must power the system back on in order for the server to recognize the new adapter. You may be required to use system-specific software commands to power off and power on your system.

Note – This manual describes the general procedure needed for either a hot-swap or a cold-swap installation. Because software commands and LED displays can differ for each server, refer to your server's documentation for the exact installation procedures. For example, if you are installing the adapter in a Sun™ Netra™ ct server, refer to the *Netra ct Server Service Manual.*

Models of Hot Swap

Hot swap, a key feature of the PCI Industrial Computer Manufacturers Group (PICMG) standard, means that a CompactPCI adapter that meets the PICMG standard can be reliably inserted into or extracted from a powered and operating

CompactPCI platform without affecting the other functions of the platform. The standard also defines state transitions for the hardware and software connection processes that allow the card to be connected and configured.

The adapter supports two models of hot swap:

- Basic hot swap
- Full hot swap

The models can be explained by first defining these two processes:

- Hardware connection process—the electrical connection (and disconnection) of an I/O card.
- Software connection process—the software management by the operating system of the board (allocating and releasing resources, attaching and detaching device drivers, and so on).

In the basic hot-swap model, the hardware connection process can be performed automatically by the hardware, while the software connection process requires operator assistance.

In the full hot-swap model, both the hardware and the software connection process are performed automatically.

If you install the adapter in a server set to full hot-swap mode, you will not need to type in any software commands during the installation. However, if you install the adapter in a server set to basic hot-swap mode, you will need to type in software commands during the installation. For example, if you were installing the adapter in a Netra ct server set to basic hot-swap mode, you would use the `cfgadm` command to identify and attach the adapter during the installation.

Installing the Rear-Access Adapter

The following table lists the main procedures you will perform when you install and configure the rear-access adapter (FIGURE 1-1).

TABLE 1-1 Rear-Access Installation Overview

Task	Chapter or Section Documented
Installing the adapter into the system	Chapter 2
Connecting the Ethernet cables	"Connecting the Cables to the Rear Transition Card" on page 26
Configuring the network interfaces	"Attaching the Sun Quad FastEthernet Interfaces to the Network" on page 42

Installing the Front-Access Adapter

The following table lists the main procedures you will perform when you install and configure the front-access adapter (FIGURE 1-2).

TABLE 1-2   Front-Access Installation Overview

Task	Chapter or Section Documented
Installing the adapter into the system	Chapter 3
Connecting the Ethernet cables	"Connecting the Cables to the Front-Access Adapter" on page 40
Configuring the network interfaces	"Attaching the Sun Quad FastEthernet Interfaces to the Network" on page 42

Installing the Rear-Access Adapter

This chapter describes how to install the rear-access version of the Sun Quad FastEthernet 6U CompactPCI adapter in a hot-swap-compatible server.

The rear-access version of the adapter is composed of two separate cards: a front card, which contains the hot-swap LED, and a rear transition card, which contains the cable connections and link LEDs. This chapter includes instructions for installing the adapter's two cards in both *hot-swap* mode (with the system powered on) and *cold-swap* mode (with the system powered off).

To install the adapter, you must first install the rear transition card in a rear CompactPCI slot of the server, and then you can install the front card in the associated front slot of the server. After installing the cards, connect the cables to the connectors on the rear transition card.

Caution – Wherever possible, this chapter provides explicit instructions for installing the adapter in your system. However, you *must* refer to your system's documentation for the specific I/O card installation instructions. Your system's service manual will describe the system-specific software commands and the usage of system LEDs required for installation.

This chapter contains the following sections:

- "Preparing for the Installation" on page 8
- "Installing the Rear-Access Adapter in Hot-Swap Mode" on page 10
- "Installing the Rear-Access Adapter in Cold-Swap Mode" on page 21
- "Connecting the Cables to the Rear Transition Card" on page 26

Note – After installing the adapter in the system, see Chapter 4 for the software configuration instructions.

Preparing for the Installation

Before installing the adapter, prepare for the installation by assembling the appropriate tools, unpacking the ship kit, selecting a CompactPCI slot, and determining a mode of installation.

Tools and Equipment Needed

You will need:

- A No. 0 Phillips screwdriver
- An antistatic wrist strap (included in the ship kit)
- Ethernet cables to connect the adapter to an Ethernet network
- Electrostatic discharge (ESD) mat (optional)

Contents of the Ship Kit

The ship kit contains the following items:

- Front card
- Rear transition card
- Antistatic wrist strap
- This manual
- A product note document

Caution – Electrostatic discharge can damage the integrated circuits on the cards. Leave the cards in their antistatic envelopes until you are ready to install them in the system.

Selecting a CompactPCI Slot Pair in the System

The rear-access version of the adapter is exclusively designed to be installed in a rear-accessible 6U system. You must first install the rear transition card in a rear CompactPCI slot of the server, and then you can install the front card in the associated front slot of the server. Before starting to install the adapter, select an available CompactPCI slot pair in the server.

For example, in a Sun Netra ct 800 server (see FIGURE 2-1), there are seven 6U CompactPCI I/O slot pairs available (slot 1 of this server will always be occupied by a CPU card). Install the adapter's front card and rear transition card (RTC) into an open slot pair. (Slot 8, in some configurations, may be occupied by an alarm card.)

Note – Refer to your system's service manual for the exact locations of the CompactPCI I/O slots in the system, and to determine the most appropriate slot in which to install the adapter.

Front of chassis		Midplane	Rear of chassis
	Hard disk drives		
Slot 1	CPU card	CPU RTC	Slot 1
Slot 2	6U CompactPCI I/O card	I/O rear card	Slot 2
Slot 3	6U CompactPCI I/O card	I/O rear card	Slot 3
Slot 4	6U CompactPCI I/O card	I/O rear card	Slot 4
Slot 5	6U CompactPCI I/O card	I/O rear card	Slot 5
Slot 6	6U CompactPCI I/O card	I/O rear card	Slot 6
Slot 7	6U CompactPCI I/O card	I/O rear card	Slot 7
Slot 8	Alarm card	Alarm RTC	Slot 8

FIGURE 2-1   CompactPCI Slot Pairs in a Sun Netra ct 800 Server (Top View)

Caution – The rear transition card and the front card *must* be installed in associated CompactPCI slots. For example, if you install the rear transition card in the server's rear I/O slot 3, you must install the front card in the server's front I/O slot 3. You can panic the server if you install the cards in nonassociated slots.

Determining the Installation Type

You can install the adapter in the system in either a hot-swap mode or in a cold-swap mode. (See "Installation Methods" on page 4 for more information.)

- Hot swap—see "Installing the Rear-Access Adapter in Hot-Swap Mode" on page 10 for the procedure.
- Cold swap—see "Installing the Rear-Access Adapter in Cold-Swap Mode" on page 21 for the procedure.

After installing the adapter, see "Connecting the Cables to the Rear Transition Card" on page 26 for instructions on connecting the cables.

Installing the Rear-Access Adapter in Hot-Swap Mode

When installing the adapter in a server in hot-swap mode, you *must* consult the documentation that shipped with the server. The server's documentation will describe the specific software commands and hardware components such as LEDs that are used when installing the adapter.

This section contains two procedures:

- "To Install the Rear Transition Card" on page 11
- "To Install the Rear-Access Front Card" on page 16

After installing the adapter, see "Connecting the Cables to the Rear Transition Card" on page 26 for instructions on connecting the Ethernet cables.

⚠ **Caution –** Always install the adapter's rear transition card *before* installing the front card. In a hot-swap environment, you can panic the system if you install the front card first.

⚠ **Caution –** Do not use excessive force when installing the adapter's front or rear transition card into the CompactPCI slot. You may damage the card's connector or the pins on the midplane, causing permanent damage to the card or to the system. If a card does not seat properly when you apply even pressure, remove the card and carefully reinstall it.

▼ To Install the Rear Transition Card

Install the rear transition card in the rear CompactPCI slot that you selected in "Selecting a CompactPCI Slot Pair in the System" on page 9.

1. **Retrieve the wrist strap from the adapter's ship kit.**

2. **Attach the adhesive copper strip of the antistatic wrist strap to the metal chassis of the system. Wrap the other end twice around your wrist, with the adhesive side against your skin.**

3. **If the rear slot contains a factory-installed filler panel, remove the filler panel before installing the rear transition card.**

   Refer to the system's documentation for instructions on how to remove the filler panel. Typically, you will need to loosen the filler panel's captive screws before removing the panel from the system.

4. **Remove the rear transition card from its antistatic envelope and place it on an ESD mat (if available) near the system.**

   If an ESD mat is not available, you can place the card on the antistatic envelope it was packaged in.

   Before installing the card in the system, you will need to open the card's ejection levers (see FIGURE 2-2).

FIGURE 2-2 Location of the Rear Transition Card's Ejection Levers

5. **With the card resting on the mat, press the levers outward to open the ejection levers.**

   The card may contain different types of ejection levers. For example, FIGURE 2-3 shows two possible types of levers. The levers may also contain a locking mechanism that must be unlocked before you can open the levers.
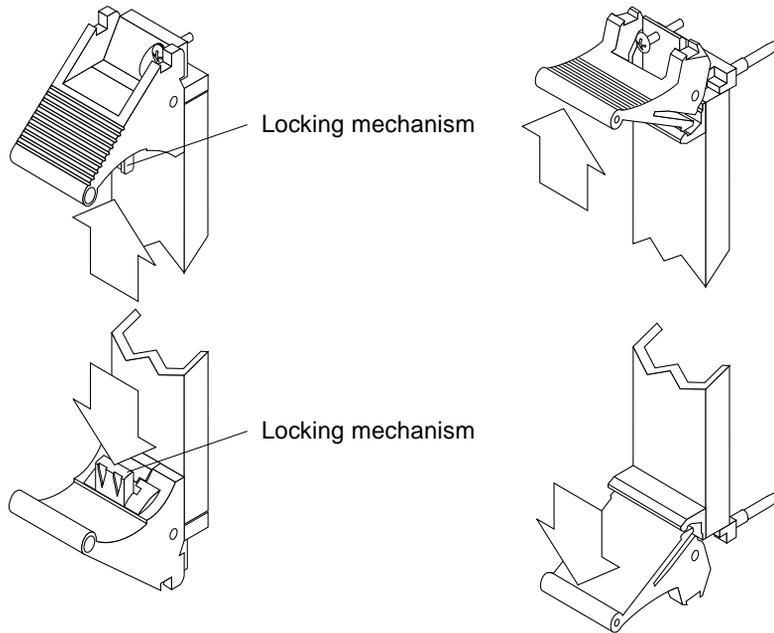
FIGURE 2-3 Opening the Ejection Levers (Two Types of Levers)

6. **Lift up the card, and keeping it perfectly vertical, carefully slide the card in the selected rear slot.**

   Be sure to align the top and bottom of the card in the slot's card guides (FIGURE 2-4). Also, make sure the ejection levers remain open while you slide the card into the slot.
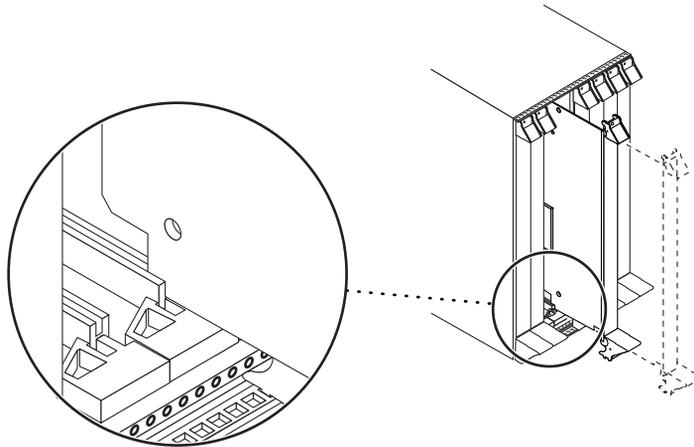
FIGURE 2-4   Aligning the Rear Transition Card With the CompactPCI Slot Card Guide

7. Push the card all the way in the slot until the two ejection levers move inward.

The tabs of the ejection levers (see FIGURE 2-5) should fit smoothly into the rectangular cutouts in the top and bottom of the slot.
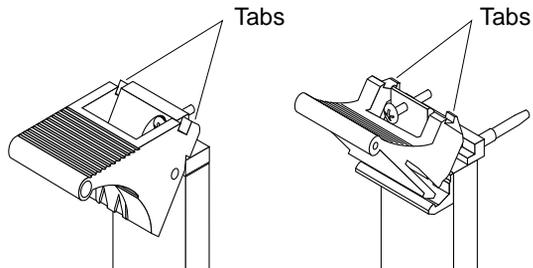
FIGURE 2-5   Location of the Ejection Lever Tabs (Two Types of Levers)

8. Close the ejection levers by pushing the levers in toward the card.

The card may contain different types of ejection levers. For example, FIGURE 2-6 shows two possible types of levers. The levers may also contain a locking mechanism that will lock when the levers have been properly closed.
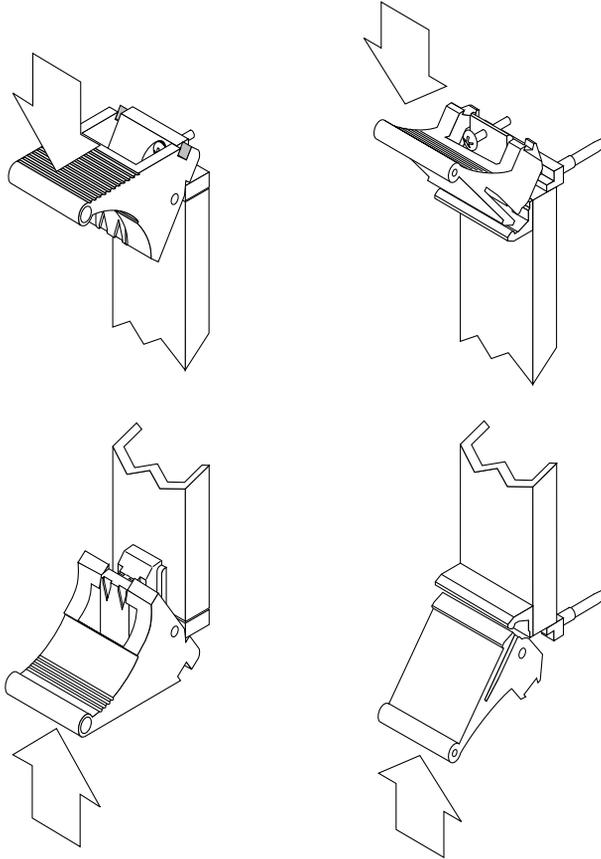
FIGURE 2-6 Closing the Ejection Levers (Two Types of Levers)

When installed correctly, the ejection lever tabs will fit smoothly into the rectangular cutouts in the top and bottom of the slot (FIGURE 2-7).
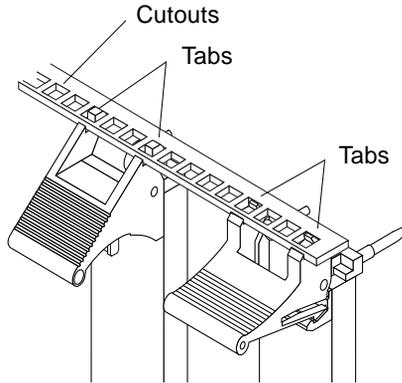
FIGURE 2-7   Ejection Levers Installed in the Slot's Cutouts (Two Types of Levers)

9. **Using a No. 0 Phillips screwdriver, tighten the captive screws inside the card's top and bottom ejection levers.**

   The card may contain different types of ejection levers. For example, FIGURE 2-8 shows two possible types of levers.
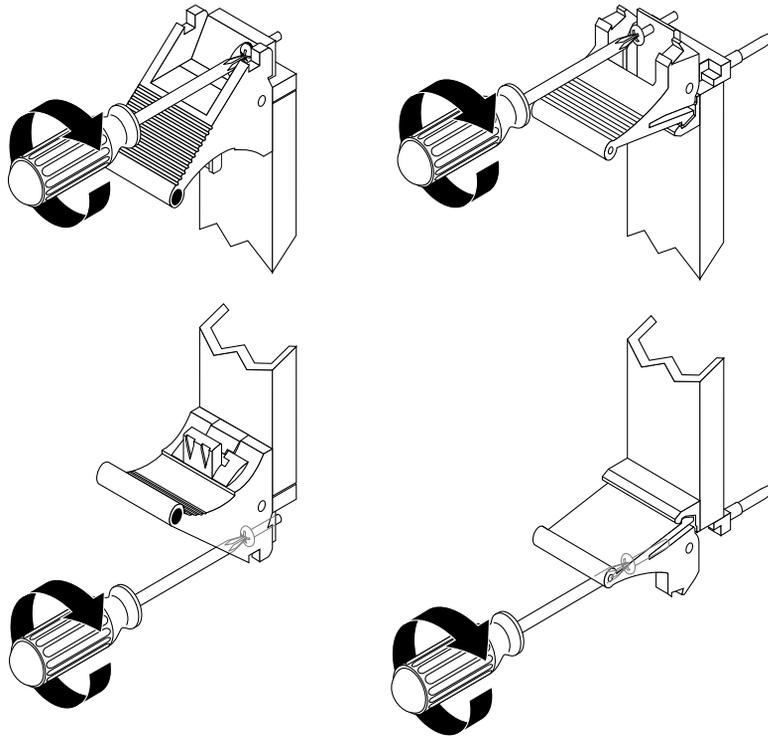
FIGURE 2-8   Tightening the Ejection Lever Captive Screws (Two Types of Levers)

▼ To Install the Rear-Access Front Card

After installing the rear transition card, you can install the front card. The front card is hot-swap aware, which means the system will recognize the card during the installation.

1. **Walk to the front of the server.**

2. **Confirm or reattach your wrist strap to the system's chassis and to your wrist.**

   If necessary, remove the strap from the rear of the chassis and attach it to the front of the chassis.

3. **Locate the slot where you plan to install the front card.**

   Caution – This card *must* be installed in the front CompactPCI slot that is directly associated with the rear slot where you installed the rear transition card. If you install the card in a different slot, the system may panic.

   For example, if you installed the rear transition card into the rear slot 3, you must install the front card into the front slot 3. See "Selecting a CompactPCI Slot Pair in the System" on page 9 for more information.

4. **If the front slot contains a factory-installed filler panel, remove the filler panel before installing the card.**

   Refer to the system's documentation for instructions on how to remove the filler panel. Typically, you will need to loosen the filler panel's captive screws before removing the panel from the system.

5. **Remove the card from its antistatic envelope and place it on an ESD mat (if available) near the system.**

   If an ESD mat is not available, you can place the card on the antistatic envelope it was packaged in.

Before installing the card in the system, you will need to open the card's ejection levers (see FIGURE 2-9).

FIGURE 2-9   Location of the Front Card's Ejection Levers

6. With the card resting on the on the mat, press the levers outward to open the ejection levers.

The card may contain different types of ejection levers. For example, FIGURE 2-3 shows two possible types of levers. The levers may also contain a locking mechanism that must be unlocked before you can open the levers. The ejection levers may be different than the ones on the rear transition card.

7. **Lift up the card, and keeping it perfectly vertical, carefully slide the card into the selected slot.**

   Be sure to align the top and bottom of the card into the slot's card guides (FIGURE 2-10). Also, make sure the ejection levers remain open while you slide the card into the slot.

FIGURE 2-10   Aligning the Front Card With the CompactPCI Slot Card Guide

8. **Push the card all the way into the slot until the two ejection levers move inward.**

   The tabs of the ejection levers (see FIGURE 2-5) should fit smoothly into the rectangular cutouts in the top and bottom of the slot.

9. **Close the ejection levers by pushing the levers in toward the card.**

   The card may contain different types of ejection levers. For example, FIGURE 2-6 shows two possible types of levers. The levers may also contain a locking mechanism that will lock when the levers have been properly closed. When installed correctly, the ejection lever tabs will fit smoothly into the rectangular cutouts of the slot (FIGURE 2-7).

10. **Locate the hot-swap LED on the front card to determine if the card has been activated and is attached to the system (see** FIGURE 2-11**).**

Hot-swap LED

Compact PCI

Hot
Swap
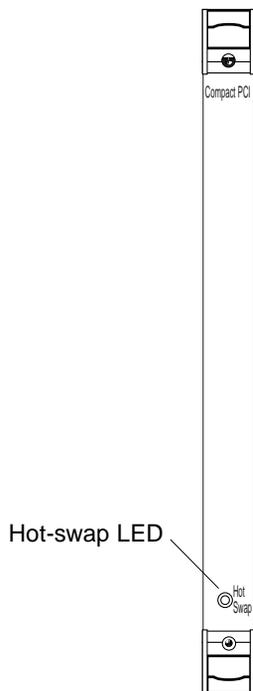
FIGURE 2-11 Location of the Rear-Access Adapter's Hot-Swap LED on the Front Card

The hot-swap LED shows whether the adapter has been activated.

- If the hot-swap LED is OFF (unlit), the I/O slots in the server have been set to *full* hot swap and the adapter has been activated. Go to Step 15.

- If the hot-swap LED is ON, then the I/O slots in the server have been set to *basic* hot swap. You must use software commands to activate the I/O card. Go to Step 11.

Note – You should also use the hot-swap LEDs on the server when installing the adapter. For example, Netra ct servers contain an OK to Remove LED (↩️) on the system status panel that is used like the hot-swap LED on this adapter. Refer to your system's service manual for a description on how the hot-swap LEDs are used during a hot-swap installation.

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11. **Remove the wrist strap from the chassis and from your wrist.**

12. **Log in to the server.**

    Refer to the server's documentation for the procedure.

13. **At the terminal prompt, type the hot-swap software commands to identify and attach the adapter to the server.**

    These commands may be specific to the server. Refer to the server's documentation for the correct commands and procedures.

    For example, if you are installing the adapter into a Netra ct server, you would use the `cfgadm pci` command to list the attachment point IDs in the server. On a Netra ct 800 server, you should see feedback similar to the following:

```
# cfgadm pci
Ap_Id                  Type            Receptacle      Occupant        Condition
pci_pci0:cpci_slot2    unknown         empty           unconfigured    unknown
pci_pci0:cpci_slot3    stpcipci/fhs    connected       configured      ok
pci_pci0:cpci_slot4    stpcipci/fhs    connected       configured      ok
pci_pci0:cpci_slot5    unknown         empty           unconfigured    unknown
pci_pci0:cpci_slot6    unknown         empty           unconfigured    unknown
pci_pci0:cpci_slot7    unknown         empty           unconfigured    unknown
pci_pci0:cpci_slot8    stpcipci/fhs    connected       configured      ok
```

Once you have identified the attachment point ID on the Netra ct server, you can use the following commands to attach the adapter to the server:

```
# cfgadm -c connect attachment-point-id
# cfgadm -c configure attachment-point-id
```

For example, if the attachment point ID is `pci_pci0:cpci_slot3` (the third CompactPCI slot on the server), you would type:

```
# cfgadm -c connect pci_pci0:cpci_slot3
# cfgadm -c configure pci_pci0:cpci_slot3
```

The hot-swap LED should go off, indicating that the card has been activated. The LEDs on the system should also show that the card has been successfully connected.

14. **Reattach the wrist strap to the chassis and your wrist.**

15. **Using a No. 0 Phillips screwdriver, tighten the captive screws inside the card's top and bottom ejection levers.**

    The card may contain different types of ejection levers. For example, FIGURE 2-8 shows two possible types of levers.

16. **Remove the wrist strap from the chassis and from your wrist.**

See "Connecting the Cables to the Rear Transition Card" on page 26 for instructions on connecting the cables to the rear transition card.

Installing the Rear-Access Adapter in Cold-Swap Mode

Note – When installing the adapter in a server in cold-swap mode, you *must* consult the documentation that shipped with the server. The server's documentation will describe the specific software commands required to power off and power on the server.

Installing the rear-access adapter in cold-swap mode involves the following procedures:

- "To Power Off the Server" on page 21
- "To Install the Rear Transition Card" on page 22
- "To Install the Rear-Access Front Card" on page 23
- "To Power On the Server" on page 25

After installing the adapter, see "Connecting the Cables to the Rear Transition Card" on page 26 for instructions on connecting the cables to the rear card.

Caution – Do not use excessive force when installing the adapter's front or rear transition card into the CompactPCI slot. You may damage the card's connector or the pins on the midplane, causing permanent damage to the card or to the system. If a card does not seat properly when you apply even pressure, remove the card and carefully reinstall it.

▼ To Power Off the Server

This procedure describes a general overview of powering off the server. Refer to your system's documentation for the exact procedure.

1. **Before shutting down the operating environment and halting the system, ensure that all significant application activity on the server has stopped.**

2. **Follow the appropriate procedures, as documented in the system's service manual, to shut down and power off the server.**

   Refer to the system's documentation for the complete power off procedure. For example, if you installed the adapter in a Netra ct server, refer to the *Netra ct Server Service Manual*. This manual contains the power on procedures.

3. **Verify that the system's power LED is off (unlit), indicating that the system has completely powered off.**

   Refer to the system's documentation for the location of the power LED. For example, on a Netra ct server, the power LED is on the front panel.

   Once the system has been shut down and powered off, you can safely install the rear and front cards.

▼ To Install the Rear Transition Card

Install the rear transition card in the rear CompactPCI slot that you selected in "Selecting a CompactPCI Slot Pair in the System" on page 9.

1. **Retrieve the wrist strap from the adapter's ship kit.**

2. **Attach the adhesive copper strip of the antistatic wrist strap to the metal chassis of the system. Wrap the other end twice around your wrist, with the adhesive side against your skin.**

3. **If the rear slot contains a factory-installed filler panel, remove the filler panel before installing the rear transition card.**

   Refer to the system's documentation for instructions on how to remove the filler panel. Typically, you will need to loosen the filler panel's captive screws before removing the panel from the system.

4. **Remove the rear transition card from its antistatic envelope and place it on an ESD mat (if available) near the system.**

   If an ESD mat is not available, you can place the card on the antistatic envelope it was packaged in.

   Before installing the card in the system, you will need to open the card's ejection levers (see FIGURE 2-2).
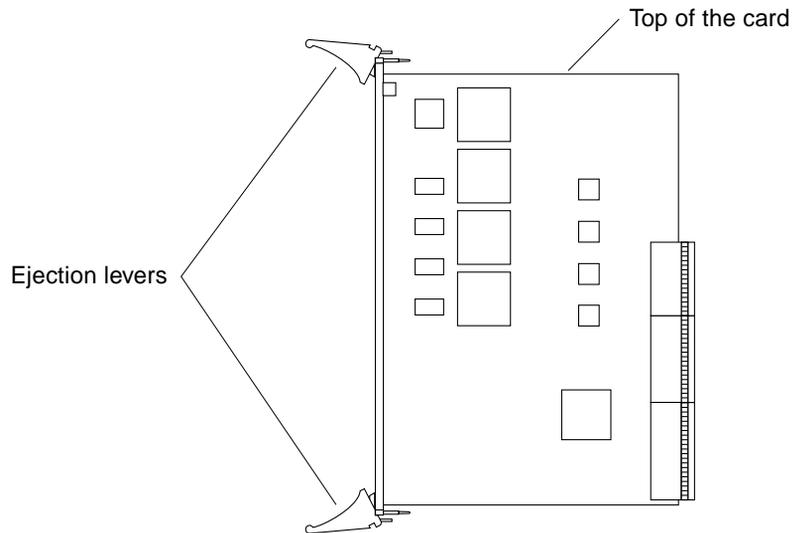
5. **With the card resting on the mat, press the levers outward to open the ejection levers.**

   The card may contain different types of ejection levers. For example, FIGURE 2-3 shows two possible types of levers. The levers may also contain a locking mechanism that must be unlocked before you can open the levers.

6. **Lift up the card, and keeping it perfectly vertical, carefully slide the card into the selected rear slot.**

   Be sure to align the top and bottom of the card into the slot's card guides (FIGURE 2-4). Also, make sure the ejection levers remain open while you slide the card into the slot.
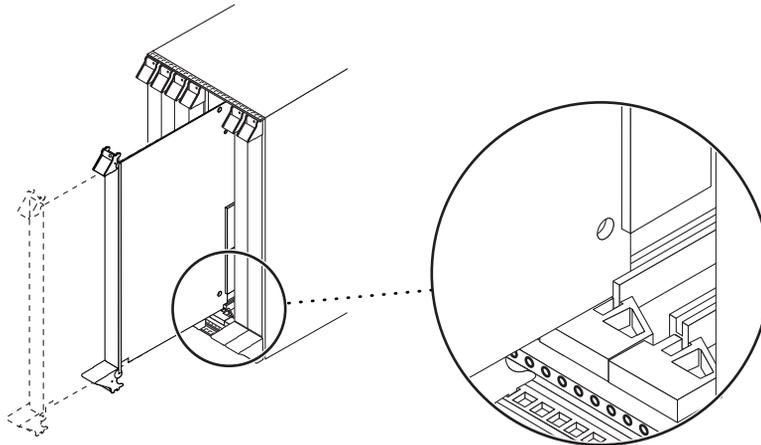
7. **Push the card all the way into the slot until the two ejection levers move inward.**

   The tabs of the ejection levers (see FIGURE 2-5) should fit smoothly into the rectangular cutouts in the top and bottom of the slot.

8. **Close the ejection levers by pushing the levers in toward the card.**

   The card may contain different types of ejection levers. For example, FIGURE 2-6 shows two possible types of levers. The levers may also contain a locking mechanism that will lock when the levers have been properly closed. When installed correctly, the ejection lever tabs will fit smoothly into the rectangular cutouts in the top and bottom of the slot (FIGURE 2-7).

9. **Using a No. 0 Phillips screwdriver, tighten the captive screws inside the card's top and bottom ejection levers.**

   The card may contain different types of ejection levers. For example, FIGURE 2-8 shows two possible types of levers.

▼ To Install the Rear-Access Front Card

After installing the rear transition card, you can install the front card.

1. **Walk to the front of the server.**

2. **Confirm or reattach your wrist strap to the system's chassis and to your wrist.**

   If necessary, remove the strap from the rear of the chassis and attach it to the front of the chassis.

3. **Locate the slot where you plan to install the front card.**

Caution – This card must be installed in the front CompactPCI slot that is directly associated with the rear slot where you installed the rear transition card. If you install the card in a different slot, the system may panic.

For example, if you installed the rear transition card into the rear slot 3, you must install the front card into the front slot 3. See "Selecting a CompactPCI Slot Pair in the System" on page 9 for more information.

4. **If the front slot contains a factory-installed filler panel, remove the filler panel before installing the card.**

   Refer to the system's documentation for instructions on how to remove the filler panel. Typically, you will need to loosen the filler panel's captive screws before removing the panel from the system.

5. **Remove the card from its antistatic envelope and place it on an ESD mat (if available) near the system.**

   If an ESD mat is not available, you can place the card on the antistatic envelope it was packaged in.

   Before installing the card in the system, you will need to open the card's ejection levers (see FIGURE 2-9).

6. **With the card resting on the on the mat, press the levers outward to open the ejection levers.**

   The card may contain different types of ejection levers. For example, FIGURE 2-3 shows two possible types of levers. The levers may also contain a locking mechanism that must be unlocked before you can open the levers. The ejection levers may be different than the ones on the rear transition card.

7. **Lift up the card, and keeping it perfectly vertical, carefully slide the card into the selected slot.**

   Be sure to align the top and bottom of the card into the slot's card guides (FIGURE 2-10). Also, make sure the ejection levers remain open while you slide the card into the slot.

8. **Push the card all the way into the slot until the two ejection levers move inward.**

   The tabs of the ejection levers (see FIGURE 2-5) should fit smoothly into the rectangular cutouts in the top and bottom of the slot.

9. **Close the ejection levers by pushing the levers in toward the card.**

   The card may contain different types of ejection levers. For example, FIGURE 2-6 shows two possible types of levers. The levers may also contain a locking mechanism that will lock when the levers have been properly closed. When installed correctly, the ejection lever tabs will fit smoothly into the rectangular cutouts of the slot (FIGURE 2-7).

10. **Using a No. 0 Phillips screwdriver, tighten the captive screws inside the card's top and bottom ejection levers.**

    The card may contain different types of ejection levers. For example, FIGURE 2-8 shows two possible types of levers.

11. **Remove the wrist strap from the chassis and from your wrist.**

    After installing the adapter, see "Connecting the Cables to the Rear Transition Card" on page 26 for instructions on connecting the cables to the rear card.

▼ To Power On the Server

This procedure describes a general overview for powering on the server. Refer to your server's documentation for the exact procedure.

1. **Before powering on the server, make sure that all any peripheral devices connected to the server are powered on.**

2. **Follow the appropriate procedures, as documented in the server's service manual, to power on the system.**

   Refer to the server's documentation for the complete power on procedure.

   For example, if you installed the adapter in a Netra ct server, refer to the *Netra ct Server Service Manual*. This manual contains the power on procedures.

3. **During the power on sequence, watch the hot-swap LED on the adapter's front card (**FIGURE 2-11**).**

   - The LED should blink quickly and then stay off if the adapter was installed correctly.

   - If the hot-swap LED remains on (lit), the adapter was not installed correctly. One or both of the cards may not be seated correctly in the slot. You must remove and reinstall the adapter's two cards to make sure that they sit correctly in the slots. Use the cold-swap procedures to re-install the two cards:

     - Power off the server
     - Remove and replace the rear transition card
     - Remove and replace the front card
     - Power on the server

     Refer to the system's documentation for additional troubleshooting instructions.

4. **Verify that the server's power LED is on (lit), indicating that the system has completely powered on.**

   Refer to the server's documentation for the location of the power LED. For example, on a Netra ct server, the power LED is on the front panel.

Connecting the Cables to the Rear Transition Card

After installing the adapter in the system, you can attach the Ethernet cables to the Ethernet ports on the rear transition card.

▼ To Connect the Cables to the Rear Ethernet Ports

1. **Locate the adapter's rear transition card that you installed in the system.**

2. **Connect one end of an Ethernet cable to an Ethernet port on the rear transition card (see** FIGURE 2-12**).**
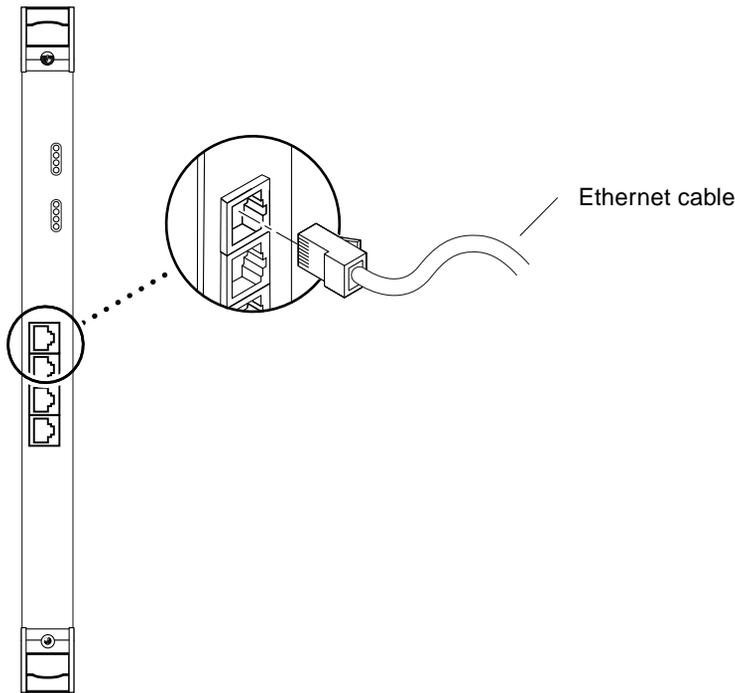
Ethernet cable

FIGURE 2-12 Connecting Cables to the Rear Transition Card

3. **Connect the other end of the Ethernet cable to an active Ethernet network.**

   Repeat Steps 2 and 3 for each Ethernet cable you need to connect.

Installing the Front-Access Adapter

This chapter describes how to install the front-access version of the Sun Quad FastEthernet 6U CompactPCI adapter in a CompactPCI hot-swap-compatible server.

The front-access version of the Sun Quad FastEthernet 6U CompactPCI adapter contains a hot-swap LED, four Ethernet ports, and link LEDs. This chapter includes instructions for installing the adapter in both *hot-swap* mode (with the system powered on) and *cold-swap* mode (with the system powered off).

⚠ **Caution –** Wherever possible, this chapter provides explicit instructions for installing the adapter in your system. However, you *must* refer to your system's documentation for the specific I/O card installation instructions. Your system's service manual will describe the system-specific software commands and the usage of system LEDs required for installation.

This chapter contains the following sections:

- "Preparing for the Installation" on page 28
- "Installing the Front-Access Adapter in Hot-Swap Mode" on page 29
- "Installing the Front-Access Adapter in Cold-Swap Mode" on page 36
- "Connecting the Cables to the Front-Access Adapter" on page 40

Note – After installing the adapter in the system, see Chapter 4 for the software configuration instructions.

⚠ **Caution –** The front-access version of the adapter is designed to be installed in front-access systems only. Do *not* attempt to install this adapter in a rear-access system.

Preparing for the Installation

Before installing the adapter, prepare for the installation by assembling the appropriate tools, unpacking the ship kit, selecting a CompactPCI slot, and determining a mode of installation.

Tools and Equipment Needed

You will need:

- A No. 0 Phillips screwdriver
- An antistatic wrist strap (included in the ship kit)
- Ethernet cables to connect the adapter to an Ethernet network
- Electrostatic discharge (ESD) mat (optional)

Contents of the Ship Kit

The ship kit contains the following items:

- Front-access adapter
- Antistatic wrist strap
- This manual
- A product note document

Caution – Electrostatic discharge can damage the integrated circuits on the adapter. Leave the adapter in its antistatic envelope until you are ready to install it in the system.

Selecting a CompactPCI Slot in the System

The front-access version of the adapter is exclusively designed to be installed in a front-access system with 6U CompactPCI slots. Before installing the adapter, select a CompactPCI slot in the server where you want to install the adapter.

Note – Refer to your system's service manual for the exact locations of the CompactPCI I/O slots in the system, and to determine the most appropriate slot to install the adapter.

Determining the Installation Type

You can install the adapter in the system in either a hot-swap mode or in a cold-swap mode. (See "Installation Methods" on page 4 for more information.)

- Hot swap—see "Installing the Front-Access Adapter in Hot-Swap Mode" on page 29 for the procedure.
- Cold swap—see "Installing the Front-Access Adapter in Cold-Swap Mode" on page 36 for the procedure.

After installing the adapter, see "Connecting the Cables to the Front-Access Adapter" on page 40 for instructions on connecting the cables.

Installing the Front-Access Adapter in Hot-Swap Mode

When installing the adapter in a server in hot-swap mode, you *must* consult the documentation that shipped with the server. The server's documentation will describe the hot-swap commands and system LEDs that will be used when installing the adapter.

Caution – Do not use excessive force when installing the adapter into the CompactPCI slot. You may damage the adapter's connector or the pins on the midplane, causing permanent damage to the adapter or to the system. If the adapter does not seat properly when you apply even pressure, remove the adapter and carefully reinstall it.

▼ To Install the Front-Access Adapter in Hot-Swap Mode

The adapter is hot-swap aware, which means the system will recognize the adapter during the installation.

1. **Retrieve the wrist strap from the adapter's ship kit.**

2. **Attach the adhesive copper strip of the antistatic wrist strap to the metal chassis of the system. Wrap the other end twice around your wrist, with the adhesive side against your skin.**

3. **Locate the slot where you will install the adapter.**

4. **If the slot contains a factory-installed filler panel, remove the filler panel before installing the adapter.**

   Refer to the system's documentation for instructions on how to remove the filler panel. Typically, you will need to loosen the filler panel's captive screws before removing the panel from the system.

5. **Remove the adapter from its antistatic envelope and place it on an ESD mat (if available) near the system.**

   If an ESD mat is not available, you can place the adapter on the antistatic envelope it was packaged in.

   Before installing the adapter in the system, you will need to open the adapter's ejection levers (see FIGURE 3-1).

FIGURE 3-1   Location of the Front-Access Adapter's Ejection Levers

6. **With the adapter resting on the mat, press the levers outward to open the ejection levers.**

   The adapter may contain different types of ejection levers. For example, FIGURE 3-2 shows two possible types of levers. The levers may also contain a locking mechanism that must be unlocked before you can open the levers.
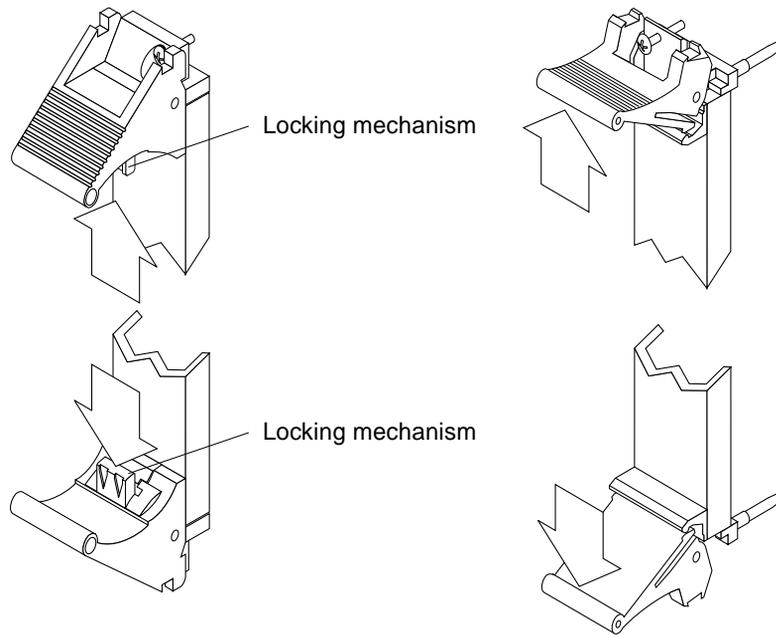
FIGURE 3-2   Opening the Ejection Levers (Two Types of Levers)

7. **Lift up the adapter, and keeping it perfectly vertical, carefully slide the adapter into the selected slot.**

   Be sure to align the top and bottom of the adapter into the slot's card guides (FIGURE 3-3). Also, make sure the ejection levers remain open while you slide the adapter into the slot.
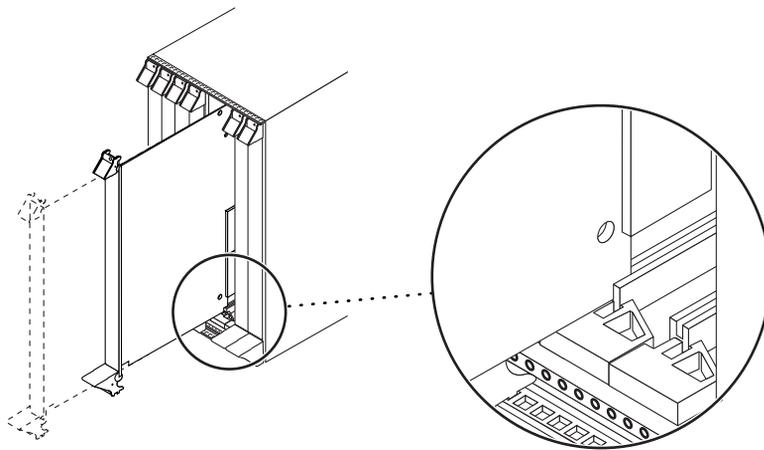
FIGURE 3-3   Aligning the Front Adapter in CompactPCI Slot Card Guide

8. **Push the adapter all the way into the slot until the two ejection levers move inward.**

The tabs of the ejection levers (see FIGURE 3-4) should fit smoothly into the rectangular cutouts in the top and bottom of the slot.
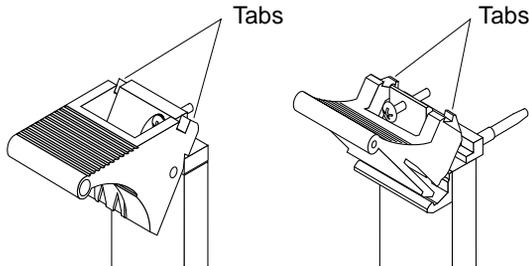
FIGURE 3-4   Location of the Ejection Lever Tabs (Two Types of Levers)

9. **Close the ejection levers by pushing the levers in toward the adapter.**

The adapter may contain different types of ejection levers. For example, FIGURE 3-5 shows two possible types of levers. The levers may also contain a locking mechanism that will lock when the levers have been properly closed.
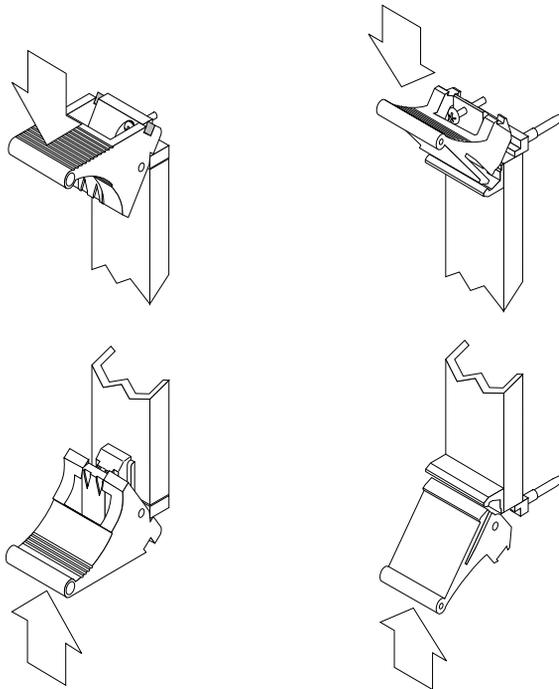
FIGURE 3-5   Closing the Ejection Levers (Two Types of Levers)

When installed correctly, the ejection lever tabs will fit smoothly into the rectangular cutouts in the top and bottom of the slot (FIGURE 3-6).
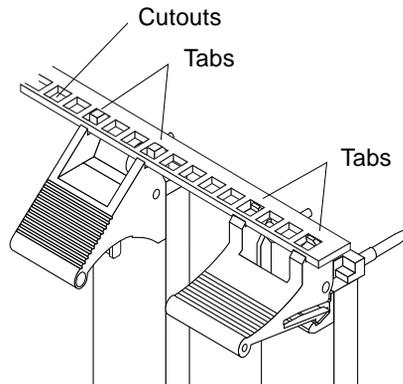
Cutouts

Tabs

Tabs

FIGURE 3-6   Ejection Lever Tabs Installed in the Slot's Cutouts (Two Types of Levers)

10. **Locate the hot-swap LED on the adapter to determine if the adapter has been activated and is attached to the system (see** FIGURE 3-7**).**
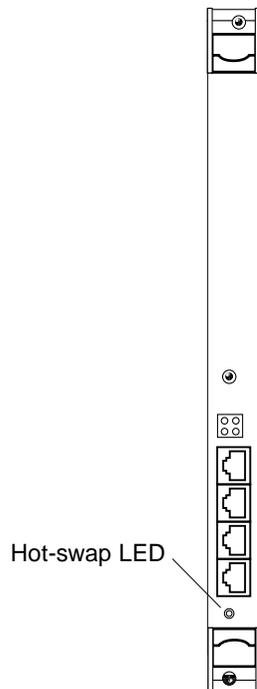
Hot-swap LED

FIGURE 3-7   Location of the Front-Access Adapter's Hot-Swap LED

The hot-swap LED shows whether the adapter has been activated.

- If the hot-swap LED is OFF (unlit), the I/O slots in the server have been set to *full* hot swap and the adapter has been activated. Go to Step 15.
- If the hot-swap LED is ON, then the I/O slots in the server have been set to *basic* hot swap. You must use software commands to activate the I/O card. Go to Step 11.

Note – You should also use the hot-swap LEDs on the server when installing the adapter. For example, Netra ct servers contain an OK to Remove LED (🔄) on the system status panel that is used like the hot-swap LED on this adapter. Refer to your system's service manual for a description on how the hot-swap LEDs are used during a hot-swap installation.

---

11. **Remove the wrist strap from the chassis and from your wrist.**

12. **Log in to the server.**

    Refer to the server's documentation for the procedure.

13. **At the terminal prompt, type the hot-swap software commands to identify and attach the adapter to the server.**

    These commands may be specific to the server's hot-swap software. Refer to the server's documentation for the correct commands and procedures.

    For example, if you are installing the adapter into a Netra ct server, you would use the cfgadm pci command to list the attachment point IDs in the server. On a Netra ct 800 server, you should see feedback similar to the following:

```
# cfgadm pci
Ap_Id                   Type            Receptacle      Occupant        Condition
pci_pci0:cpci_slot2     unknown         empty           unconfigured    unknown
pci_pci0:cpci_slot3     stpcipci/fhs    connected       configured      ok
pci_pci0:cpci_slot4     stpcipci/fhs    connected       configured      ok
pci_pci0:cpci_slot5     unknown         empty           unconfigured    unknown
pci_pci0:cpci_slot6     unknown         empty           unconfigured    unknown
pci_pci0:cpci_slot7     unknown         empty           unconfigured    unknown
pci_pci0:cpci_slot8     stpcipci/fhs    connected       configured      ok
```

Once you have identified the attachment point ID on the Netra ct server, you can use the following commands to attach the adapter to the server:

```
# cfgadm -c connect attachment-point-id
# cfgadm -c configure attachment-point-id
```

For example, if the attachment point ID is `pci_pci0:cpci_slot3` (the third CompactPCI slot on the server), you would type:

```
# cfgadm -c connect pci_pci0:cpci_slot3
# cfgadm -c configure pci_pci0:cpci_slot3
```

The hot-swap LED should go off, indicating that the adapter has been activated.

14. **Reattach the wrist strap to the chassis and to your wrist.**

15. **Using a No. 0 Phillips screwdriver, tighten the captive screws inside the adapter's top and bottom ejection levers.**

    The adapter may contain different types of ejection levers. For example, FIGURE 3-8 shows two possible types of levers.

FIGURE 3-8   Tightening the Ejection Lever Captive Screws (Two Types of Levers)

16. **Remove the wrist strap from the chassis and from your wrist.**

    After installing the adapter, see "Connecting the Cables to the Front-Access Adapter" on page 40 for instructions on connecting the cables to the front-access adapter.

Installing the Front-Access Adapter in Cold-Swap Mode

> **Note –** When installing the adapter in a server in cold-swap mode, you *must* consult the documentation that shipped with the server. The server's documentation describes the specific software commands required to power off and power on the server.

Installing the front-access adapter in cold-swap mode involves the following procedures:

- "To Power Off the Server" on page 36
- "To Install the Front-Access Adapter in Cold-Swap Mode" on page 37
- "To Power On the Server" on page 38

> **Caution –** Do not use excessive force when installing the adapter into the CompactPCI slot. You may damage the adapter's connector or the pins on the midplane, causing permanent damage to the adapter or to the system. If the adapter does not seat properly when you apply even pressure, remove the adapter and carefully reinstall it.

▼ To Power Off the Server

This procedure describes a general overview of powering off the server. Refer to your system's documentation for the exact procedure.

1. **Before shutting down the operating environment and halting the system, ensure that all significant application activity on the server has stopped.**

2. **Follow the appropriate procedures, as documented in the system's service manual, to shut down and halt the system.**

   Refer to the system's documentation for the complete power off procedure.

   For example, if you were installing the adapter in a Netra ct server, you would refer to the *Netra ct Server Service Manual*. The service manual contains the hardware and software powering off procedures.

3. **Verify that the system's power LED is off (unlit), indicating that the system is completely powered off.**

Refer to the system's documentation for the location of the power LED. For example, on a Netra ct server, the power LED is on the front panel.

Once the system has been shut down and powered off, you can safely install the adapter.

▼ To Install the Front-Access Adapter in Cold-Swap Mode

1. **Retrieve the wrist strap from the adapter's ship kit.**

2. **Attach the adhesive copper strip of the antistatic wrist strap to the metal chassis of the system. Wrap the other end twice around your wrist, with the adhesive side against your skin.**

3. **Locate the slot where you will install the adapter.**

4. **If the slot contains a factory installed filler panel, remove the filler panel before installing the adapter.**

Refer to the system's documentation for instructions on how to remove the filler panel. Typically, you will need to loosen the filler panel's captive screws before removing the panel from the system.

5. **Remove the adapter from its antistatic envelope and place it on an ESD mat (if available) near the system.**

If an ESD mat is not available, you can place the adapter on the antistatic envelope it was shipped in.

Before installing the adapter in the system, you will need to open the adapter's ejection levers (see FIGURE 3-1).

6. **With the adapter resting on the on the mat, press the levers outward to open the ejection levers.**

The adapter may contain different types of ejection levers. For example, FIGURE 3-2 shows two possible types of levers. The levers may also contain a locking mechanism that must be unlocked before you can open the levers.

7. **Lift up the adapter, and keeping it perfectly vertical, carefully slide the adapter into the selected slot.**

Be sure to align the top and bottom of the adapter into the slot's card guides (FIGURE 3-3). Also, make sure the ejection levers remain open while you slide the adapter into the slot.

8. **Push the adapter all the way into the slot until the two ejection levers move inward.**

   The tabs of the ejection levers (see FIGURE 3-4) should fit smoothly in the rectangular cutouts in the top and bottom of the slot.

9. **Close the ejection levers by pushing the levers in toward the adapter.**

   The adapter may contain different types of ejection levers. For example, FIGURE 3-5 shows two possible types of levers. The levers may also contain a locking mechanism that will lock when the levers have been properly closed. When installed correctly, the ejection lever tabs will fit smoothly into the rectangular cutouts in the top and bottom of the slot (FIGURE 3-6).

10. **Using a No. 0 Phillips screwdriver, tighten the captive screws inside the adapter's top and bottom ejection levers.**

    The adapter may contain different types of ejection levers. For example, FIGURE 3-8 shows two possible types of levers.
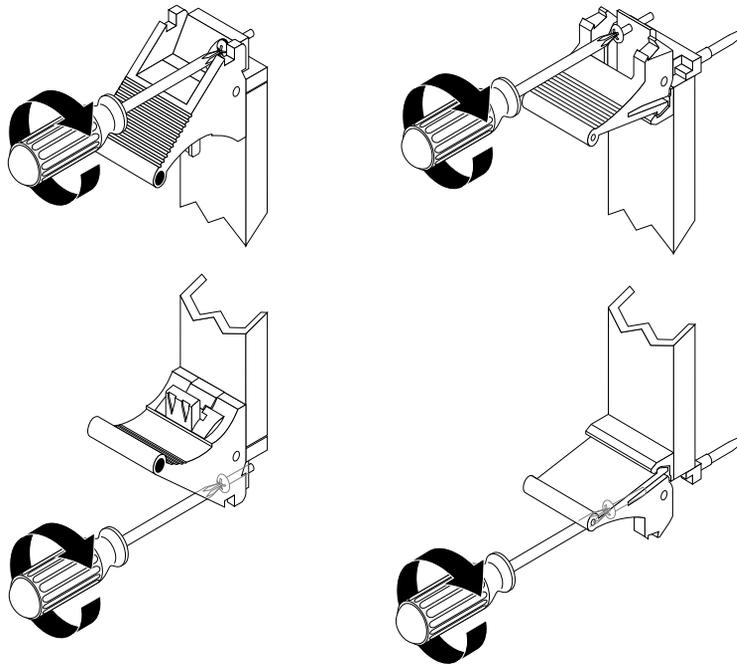
11. **Remove the wrist strap from the chassis and your wrist.**

    See "Connecting the Cables to the Front-Access Adapter" on page 40 for instructions on connecting the cables to the adapter.

▼ To Power On the Server

This procedure describes a general overview of powering on the server. Refer to your server's documentation for the exact procedure.

1. **Before powering on the server, make sure that any peripheral devices connected to the server are powered on.**

2. **Follow the appropriate procedures, as documented in the server's hardware installation manual, to power on the system.**

   Refer to the server's documentation for the complete power on procedure.

   For example, if you installed the adapter in a Netra ct server, refer to the *Netra ct Server Service Manual*. This manual contains the powering on procedures.

3. **During the power on sequence, watch the hot-swap LED on the adapter** (FIGURE 3-7).

   - The LED should blink quickly and then stay off if the adapter was installed correctly.

   - If the hot-swap LED remains on (lit), the adapter was not installed correctly. The adapter may not be seated correctly in the slot. You will need to remove and reinstall the adapter using the cold-swap procedures to make sure that it sits correctly in the slot:

     - Power off the server
     - Remove and replace the adapter
     - Power on the server

     Refer to the server's documentation for additional troubleshooting instructions.

4. **Verify that the server's power LED is on (lit), indicating that the server has completely powered on.**

   Refer to the server's documentation for the location of the power LED. For example, on a Netra ct server, the power LED is on the front panel.

Connecting the Cables to the Front-Access Adapter

After installing the adapter, you can attach the Ethernet cables to the adapter's connectors.

▼ To Connect the Cables to the Front-Access Ethernet Ports

1. **Locate the adapter that you installed in the system.**

2. **Connect one end of an Ethernet cable to an Ethernet port on the adapter (see** FIGURE 3-9**).**
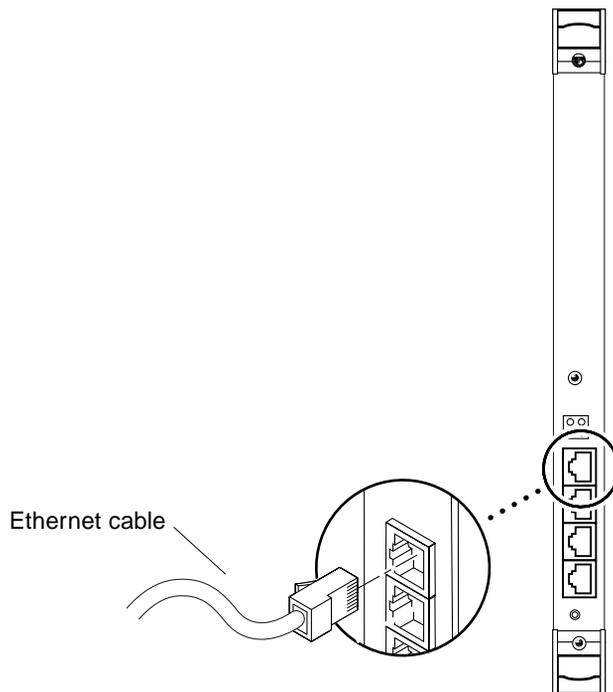
Ethernet cable

FIGURE 3-9   Connecting Ethernet Cables to the Front-Access Adapter

3. **Connect the other end of the Ethernet cable to an active Ethernet network.**

   Repeat Steps 2 and 3 for each Ethernet cable you need to connect.

Configuring the Network Software

This chapter describes how to configure the network software files associated with the Sun Quad FastEthernet 6U CompactPCI adapter. This chapter also contains additional software and firmware procedures that may be needed when configuring the adapter.

This chapter contains the following sections:

- "Attaching the Sun Quad FastEthernet Interfaces to the Network" on page 42
- "Autonegotiation Protocol" on page 45
- "Setting the `local-mac-address` Property" on page 46
- "Booting the System Over a Sun Quad FastEthernet Interface" on page 48

Note – The configuration procedures in this chapter are correct for the Solaris 8 6/00 operating environment. If your system is running a future compatible operating environment, refer to the *Platform Notes: The Sun Quad FastEthernet Device Driver* document for the latest configuration procedures. You can view this document on the `http://docs.sun.com` website.

Attaching the Sun Quad FastEthernet Interfaces to the Network

The adapter's four FastEthernet network interfaces are controlled by the Sun Quad FastEthernet `qfe`(1M) device driver. In order to use the adapter's `qfe` interfaces, you must use the Solaris `ifconfig`(1M) command to activate the interfaces and to assign them Internet protocol (IP) addresses.

To make the interface changes persist over system reboots, you must create a `hostname.qfe`*instance* file for each Ethernet interface on the adapter that you plan to use. For example, if you plan to use only two of the four Ethernet interfaces on the adapter, you will need to create two `hostname.qfe`*instance* files. You must also add both an IP address and a host name for the new Ethernet interfaces to the `/etc/inet/hosts` file.

Note – For more information about configuring Solaris networks, refer to the *Solaris System Administration Guide*, volumes 1 through 3. You can view these documents on the `http://docs.sun.com` website.

▼ To Attach the Sun Quad FastEthernet Interfaces to the Network

1. **Log in to the server.**

   Refer to your server's documentation for the correct procedure.

2. **At the terminal prompt, use the `grep` command to search the `/etc/path_to_inst` file for `qfe` devices.**

   ```
   # grep qfe /etc/path_to_inst
   "/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@1,1" 1 "qfe"
   "/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@0,1" 0 "qfe"
   "/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@3,1" 3 "qfe"
   "/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@2,1" 2 "qfe"
   ```

In the preceding example, the four SUNW,qfe instances are from a Sun Quad FastEthernet 6U CompactPCI adapter. The path_to_inst file contains the full device path names to the four SUNW,qfe instances, the instance numbers (shown in bold type), and the driver names (qfe). Refer to the path_to_inst(4) man page for more information about this file.

You will need to know the instance numbers when creating the /etc/hostname.qfe*instance* files in Step 3.

Note – Refer to your system's service manual for more information on how the adapter's device path names correspond to the CompactPCI slot numbers in the system. For example, the /pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@*x*,1 path names shown above correspond to I/O slot 7 of a Netra ct 800 server.

---

3. **Create an** /etc/hostname.qfe*instance* **file for each network interface you plan to use.**

   For each file, replace *instance* with the instance number you found in Step 2. For example, if you want to use all of the network interfaces from the example in Step 2, you must create four files.

File Name	Instance Number	Adapter Ethernet Network Interface
/etc/hostname.qfe0	0	0
/etc/hostname.qfe1	1	1
/etc/hostname.qfe2	2	2
/etc/hostname.qfe3	3	3

   Follow these rules when creating /etc/hostname.qfe*instance* files:

   - Do not create /etc/hostname.qfe*instance* files for adapter network interfaces you plan to leave unused.
   - The /etc/hostname.qfe*instance* file must contain the host name for the appropriate network interface.
   - The host name must be different from any other host name of any other interface. For example: /etc/hostname.hme0 and /etc/hostname.qfe2 cannot have the same host name.
   - The host name must have an IP address entered in the /etc/hosts file (see Step 4).

Using the instance examples in Step 2, the following example shows the four
/etc/hostname.qfe*instance* files required for a system called zardoz, which has a
Sun Quad FastEthernet 6U CompactPCI adapter (zardoz-11, zardoz-12,
zardoz-13, and zardoz-14).

```
# cat /etc/hostname.qfe0
zardoz-11
# cat /etc/hostname.qfe1
zardoz-12
# cat /etc/hostname.qfe2
zardoz-13
# cat /etc/hostname.qfe3
zardoz-14
```

4. **Create an entry in the** /etc/inet/hosts **file for each active** qfe **network
interface.**

You must create an entry for each /etc/hostname.qfe*instance* file you created in
Step 3.

Using the examples from Step 3, you would have:

```
# cat /etc/inet/hosts
#
# Internet host table
#
127.0.0.1      localhost
129.144.10.57 zardoz     loghost
129.144.10.83 zardoz-11
129.144.10.41 zardoz-12
129.144.10.67 zardoz-13
129.144.10.30 zardoz-14
```

Refer to the hosts(4) man page and the Solaris documentation for more information
about this file.

Note – The Internet protocol, version 6 (IPv6), expands the capabilities of IPv4,
which is the current and default version. The device driver included in the
Solaris operating environment supports both IPv4 and IPv6. IPv4 uses the
/etc/inet/hosts configuration file, but IPv6 uses different configuration files. To
transition to, manage, and implement IPv6, refer to the *Solaris System Administration
Guide, Volume 3.*

---

5. **Activate the new** `qfe` **interfaces using the** `ifconfig` **command.**

   For each adapter interface, type the following at the command line, replacing *instance* with the interface's instance number and *ip_address* with the interface's IP address:

   ```
   # ifconfig qfeinstance ip_address plumb up
   ```

   For example, if you wanted to activate all of the sample `qfe` interfaces shown in Step 4, you would type:

   ```
   # ifconfig qfe0 129.144.10.83 plumb up
   # ifconfig qfe1 129.144.10.41 plumb up
   # ifconfig qfe2 129.144.10.67 plumb up
   # ifconfig qfe3 129.144.10.30 plumb up
   ```

Autonegotiation Protocol

A key feature of the Sun Quad FastEthernet 6U CompactPCI adapter is autonegotiation. The autonegotiation protocol, as specified by the 100BASE-TX standard, selects the operational mode (half-duplex or full-duplex), and the autosensing protocol selects the speed (10 Mbps or 100 Mbps) for the adapter.

The link speed and modes supported by the Sun Quad FastEthernet 6U CompactPCI adapter are listed as follows, in decreasing order of priority:

- 100 Mbps, full-duplex
- 100 Mbps, half-duplex
- 10 Mbps, full-duplex
- 10 Mbps, half-duplex

When the system is booted, the adapter advertises these capabilities to the link partner at the other end of the link (a hub, switch, or another network interface card [NIC] in a host system). If the link partner also supports autonegotiation, it advertises its capabilities over the link. The common highest priority mode supported by both sides is selected for the link operation.

If the adapter is connected to a remote system or interface that is not capable of autonegotiation, your system automatically selects the speed and the half-duplex mode.

If the adapter is connected to a link partner with which the autonegotiation protocol fails to operate successfully, you can configure the device not to use this protocol and force the driver to set up the link in the mode and speed of your choice. See "Setting Forced Mode Using the `ndd` Utility" on page 70 for more information.

Setting the `local-mac-address` Property

Each of the four network interfaces of the adapter has been assigned a unique medium access control (MAC) address, which represents the 48-bit Ethernet address for that network interface. The OpenBoot firmware reports this MAC address by means of the `local-mac-address` property in the device nodes corresponding to the network interfaces.

A system is not obligated to use this assigned MAC address if it has a system-wide MAC address. In such cases, the system-wide MAC address applies to all network interfaces on the system.

The device driver, or any other adapter utility, can use the network device's MAC address (`local-mac-address`) while configuring the device. A network interface's MAC address can be used when booting over the network.

The `mac-address` property of the network device specifies the network address (system-wide or `local-mac-address`) used for booting the system. To start using the MAC addresses assigned to the network interfaces of the adapter, set the NVRAM configuration variable `local-mac-address?` to `true`, as shown in the procedure below.

▼ To Set the `local-mac-address` Property to the Network Interfaces

Before starting this procedure, make sure that all network activity over the adapter's network interfaces has stopped.

1. **Log in to the system as superuser.**

Refer to the system's documentation for the correct procedure. For example, if you are logging into a Netra ct series server, refer to the *Netra ct Server Service Manual*.

2. **At a terminal prompt, type the following command to set the property to true:**

```
# eeprom local-mac-address\?=true
```

3. **Use the** `ifconfig` **command to stop all network activity travelling over the adapter's Ethernet interfaces.**

   For example, if you were using the adapter's four interfaces, and they were named `qfe0`, `qfe1`, `qfe2`, and `qfe3`, you would type:

```
# ifconfig qfe0 unplumb
# ifconfig qfe1 unplumb
# ifconfig qfe2 unplumb
# ifconfig qfe3 unplumb
```

   Refer to the `ifconfig`(1M) man page and the Solaris documentation for more information about this command.

4. **Disconnect and unconfigure the adapter from the system using the appropriate basic hot-swap command.**

   The command and usage may be unique to different systems, so refer to your system's service manual for the appropriate procedure.

   The following example is for a Netra ct series system with a Sun Quad FastEthernet adapter installed in the second CompactPCI slot (with the `pci_pci0:cpci_slot2` attachment point ID):

```
# cfgadm -c unconfigure pci_pci0:cpci_slot2
# cfgadm -c disconnect pci_pci0:cpci_slot2
```

5. **To make the adapter's network interfaces use the local MAC addresses, connect and configure the adapter to the system using the appropriate basic hot-swap command.**

   The command and usage may be unique to different systems, so refer to your system's service manual for the appropriate procedure.

   The following example is for a Netra ct series system with a Sun Quad FastEthernet adapter installed in the second CompactPCI slot (with the `pci_pci0:cpci_slot2` attachment point ID):

```
# cfgadm -c connect pci_pci0:cpci_slot2
# cfgadm -c configure pci_pci0:cpci_slot2
```

6. **Use the** `ifconfig` **command to activate the adapter's Ethernet interfaces.**

For each adapter interface, type the following at the command line, replacing *instance* with the interface's instance number and *ip_address* with the interface's IP address:

```
# ifconfig qfeinstance ip_address plumb up
```

For example, if you were using the adapter's four interfaces, and they were named `qfe0`, `qfe1`, `qfe2`, and `qfe3`, you would type:

```
# ifconfig qfe0 ip_address plumb up
# ifconfig qfe1 ip_address plumb up
# ifconfig qfe2 ip_address plumb up
# ifconfig qfe3 ip_address plumb up
```

The adapter's network interfaces should now be using the unique MAC addresses.

Booting the System Over a Sun Quad FastEthernet Interface

Perform the following procedure to use a Sun Quad FastEthernet 6U CompactPCI adapter Ethernet interface as the boot device.

▼ To Boot the System Over the Network

1. **Before shutting down the operating environment and halting the system, make sure that all significant application activity on the server has stopped.**

2. **Follow the appropriate procedures, as documented in the system's service manual, to shut down and halt the system.**

Refer to the system's documentation for the complete power off procedure. For example, if you were powering off a Netra ct server, you would refer to the *Netra ct Server Service Manual.*

After shutting down the system, you should see the OpenBoot PROM `ok` prompt on the system console.

3. **At the** ok **prompt, type** show-nets **to list the network devices on your system.**

   You should see the full path name of the qfe devices, similar to the following example:

   ```
   ok show-nets
   a) /pci@1f,0/pci@1/pci@1/pci@e/SUNW,hme@0,1
   b) /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@3,1
   c) /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@2,1
   d) /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@1,1
   e) /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@0,1
   f) /pci@1f,0/pci@1/pci@1/pci@b/SUNW,hme@0,1
   g) /pci@1f,0/pci@1/pci@1/pci@a/SUNW,hme@0,1
   h) /pci@1f,0/pci@1,1/network@3,1
   i) /pci@1f,0/pci@1,1/network@1,1
   q) NO SELECTION
   Enter Selection, q to quit:
   ```

4. **Select the** qfe **device that you want to use as a boot device.**

   Using the show-nets command, select the letter of the device you wish to use. For example:

   ```
   Enter Selection, q to quit: b
   /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@3,1 has been selected.
   Type ^Y ( Control-Y ) to insert it in the command line.
   e.g. ok nvalias mydev ^Y
            for creating devalias mydev for
   /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@3,1
   ```

   Note – You need to select only one of these qfe devices for booting.

   ---

5. **At the** ok **prompt type the** boot **command and the Control-Y key sequence to paste the full path name of the selected** qfe **device.**

   You can either type boot and the full path name to the qfe device, or you can type boot and press the Control-Y key sequence. In this example, the Control-Y key sequence would be replaced by:

   ```
   ok boot /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@3,1
   ```

6. **Press the Return key to boot the system over the** qfe **device.**

Specifications

This appendix defines the connector pin descriptions and lists the specifications for the rear- and front-access versions of the Sun Quad FastEthernet 6U CompactPCI adapter.

This appendix contains the following sections:

Ethernet Port Locations and Descriptions

FIGURE A-1 shows the four Ethernet port connectors of both the rear-access and front-access versions of the Sun Quad FastEthernet 6U CompactPCI adapter. TABLE A-1 lists the pin descriptions for the four RJ-45 Ethernet ports.

Rear-access   Front-access

Port 3
Port 2
Port 1
Port 0

Port 0
Port 1
Port 2
Port 3
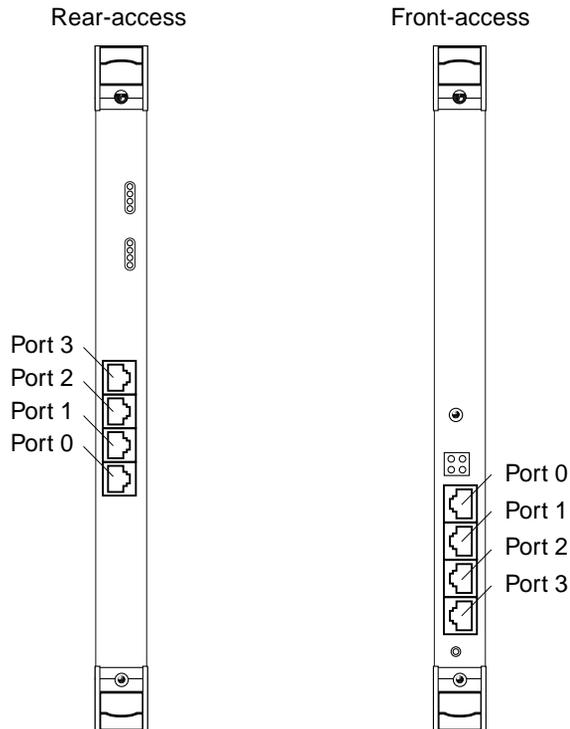
FIGURE A-1   RJ-45 Ethernet Port Locations

TABLE A-1   Pin Descriptions for the Four 8-Pin RJ-45 Connectors (Ports 0 to 3)

Description	Port 0	Port 1	Port 2	Port 3
Not Used	1	1	1	1
Not Used	2	2	2	2
TD+	3	3	3	3
Not Used	4	4	4	4
TD–	5	5	5	5
RD+	6	6	6	6
RD–	7	7	7	7
Not Used	8	8	8	8

Operation Specifications

TABLE A-2   Operation Specifications

Specification	Performance
Maximum Ethernet transfer rate	10/100 Mbps per channel
Host interface	• 256-pin PBGA PCI to PCI bridge with a 64-bit primary and 32-bit secondary interface. • Operates transparently in either 64-bit or 32-bit slots. • Supports both 3.3v and 5v signalling environments. • Fully compliant with PCI Local Bus Specification, Rev. 2.1.
Network interface	100BASE-TX using Category 5 (data-grade) cable; 10BASE-T using Category 3 (voice-grade) cable or better Single UTP RJ-45 for both 10 and 100 Mbps per channel
Ethernet version	Conforms to IEEE 802.3u
PCI clock	33 MHz max.
PCI data burst transfer rate	133 Mbps
PCI data/address Lines	AD63-0
PCI modes	Master/slave

Physical Dimensions

Physical Dimensions of the Rear-Access Adapter

TABLE A-3 Physical Dimensions (Rear-Access)

Dimension	Measurement
Front card:	
Length	233.35 mm (9.19 in.)
Width	160 mm (6.3 in.)
Height	
Primary component side	Meets the CompactPCI specs of 13.71 mm (0.54 in.)
Back side	Meets the CompactPCI specs of 1.52 mm (0.06 in.)
Weight	312 g (10.4 oz)
Rear transition card:	
Length	233.35 mm (9.19 in.)
Width	80 mm (3.15 in.)
Height	
Primary component side	Meets the CompactPCI specs of 13.71 mm (0.54 in.)
Back side	Meets the CompactPCI specs of 1.52 mm (0.06 in.)
Weight	195 g (6.5 oz)

Physical Dimensions of the Front-Access Adapter

TABLE A-4   Physical Dimensions (Front-Access)

Dimension	Measurement
Length (with the card guide)	233.35 mm (9.19 in.)
Length (without the card guide)	100.00 mm (3.94 in.)
Width	160 mm (6.3 in.)
Height	
Primary component side	Meets the CompactPCI specs of 13.71 mm (0.54 in.)
Back side	Meets the CompactPCI specs of 1.52 mm (0.06 in.)
Weight	312 g (10.4 oz)

Environmental Specifications

TABLE A-5   Environmental Specifications

Condition	Operating Specification	Nonoperating Specification
Temperature	-5˚ to 50˚ C (23˚ to 122˚ F)	-40˚ to 70˚ C (-40˚ to 158˚ F)
Relative humidity	5 to 95% RH noncondensing (maximum wet bulb temperature 40 C)	95% RH noncondensing
Altitude	-392 m to 4000 m (-1,285 ft to 13,123 ft)	4000 m (13,123 ft)
Shock	10 g, 11 msec, 1/2 sine wave	100 m drop
Vibration (sine)	0.2 g, 5 to 500 Hz	1.5 g, 5 to 500 Hz
Vibration (random)	Zone 4 Earthquake	0.01 g^2/Hz, 10 to 200 Hz 0.003 g^2/Hz, 200 to 2000 Hz

Power Requirements

Specification	Measurement
Maximum power dissipation	14 watts
Maximum power consumption	2.8 amps @ 5V
Voltage tolerance	5V +/- 5%
Ripple	Maximum 100 mV
Operational current	5V, 2.0 amps

Configuring the Sun Quad FastEthernet Device Driver Parameters

The qfe(1M) device driver controls the four Sun Quad FastEthernet 6U CompactPCI adapter SUNW,qfe Ethernet devices. You can manually set the qfe device driver parameters to customize each SUNW,qfe device in your system. This appendix lists the available qfe device driver parameters and describes how you can set these parameters.

This appendix contains these sections:

Note – The configuration procedures in this chapter are correct for the Solaris 8 6/00 operating environment. If your system is running a future compatible operating environment, refer to the *Platform Notes: The Sun Quad FastEthernet Device Driver* document for the latest configuration procedures. You can view this manual on the http://docs.sun.com website.

Sun Quad FastEthernet Device Driver Parameters

This section describes the hardware overview of the local transceiver used in the adapter and defines the `qfe` device driver parameters.

Hardware Overview

The four `SUNW,qfe` channels each provide 10BASE-T or 100BASE-TX networking interfaces, using the PCI FastEthernet and Expansion (PFEX) ASIC and a local transceiver. The device driver automatically sets the link speed to 10 or 100 Mbps and conforms to the 100BASE-T IEEE 802.3u Ethernet standard. The PFEX ASIC provides the PCI interface and medium access control (MAC) functions. The local transceiver, which connects to an RJ-45 connector, provides the physical-layer functions.

The local transceiver is capable of all the operating speeds and modes listed below:

- 100 Mbps, full-duplex
- 100 Mbps, half-duplex
- 10 Mbps, full-duplex
- 10 Mbps, half-duplex

The local transceiver performs autonegotiation with the remote end of the link (the link partner) to select a common mode of operation. See "Autonegotiation Protocol" on page 45 for more information.

The local transceiver also supports a forced mode of operation. You can set the speed and mode using the `ndd` utility, or, to make sure the changes persist after a system reboot, you can create a `qfe.conf` file. See "Setting the `qfe` Device Driver Parameters" on page 65 for more information about setting driver parameters.

Device Driver Parameter Values and Definitions

TABLE B-1 lists the `qfe` device driver parameters.

TABLE B-1   `qfe` Driver Parameters, Status, and Descriptions

Parameter	Status	Description
transceiver_inuse	Read only	Defines the current status
link_status	Read only	Defines the current status
link_speed	Read only	Defines the current status
link_mode	Read only	Defines the current status
ipg1	Read and write	Interpacket gap parameter
ipg2	Read and write	Interpacket gap parameter
use_int_xcvr	Read and write	Operational mode parameter
pace_size	Read and write	Operational mode parameter
adv_autoneg_cap	Read and write	Operational mode parameter
adv_100fdx_cap	Read and write	Operational mode parameter
adv_100hdx_cap	Read and write	Operational mode parameter
adv_10fdx_cap	Read and write	Operational mode parameter
adv_10hdx_cap	Read and write	Operational mode parameter
autoneg_cap	Read only	Local transceiver autonegotiation capability
100fdx_cap	Read only	Local transceiver capability of the hardware
100hdx_cap	Read only	Local transceiver capability of the hardware
10fdx_cap	Read only	Local transceiver capability of the hardware
10hdx_cap	Read only	Local transceiver capability of the hardware
lp_autoneg_cap	Read only	Link partner autonegotiation capability
lp_100fdx_cap	Read only	Link partner capability
lp_100hdx_cap	Read only	Link partner capability
lp_10fdx_cap	Read only	Link partner capability
lp_10hdx_cap	Read only	Link partner capability
instance	Read and write	Device instance
lance_mode	Read and write	Additional delay before transmitting a packet
ipg0	Read and write	Additional delay before transmitting a packet

Parameters that Define the Current Status

The read-only parameters described in TABLE B-2 explain the operational mode of the interface. The following parameters display the current status of an interface.

TABLE B-2   Read-Only Parameters Defining the Current Status

Parameter	Description
link_status	Current link status 0 = Link down 1 = Link up
link_speed	Current link speed (valid only if the link is up) 0 = 10 Mbps 1 = 100 Mbps
link_mode	Current link mode (valid only if the link is up) 0 = Half duplex 1 = Full duplex

Interpacket Gap Parameters

The adapter's PCI fast Ethernet and expansion (PFEX) ASIC supports programmable Interpacket Gap (IPG) parameters ipg1 and ipg2. The total IPG is the sum of ipg1 and ipg2. The total IPG is 9.6 microseconds when the link speed set by the autonegotiation protocol is 10 Mbps. When the link speed is 100 Mbps, the total IPG is 0.96 microseconds.

TABLE B-3 lists the default values and allowable values for the IPG parameters ipg1 and ipg2.

TABLE B-3   Read-Write Interpacket Gap Parameter Values and Descriptions

Parameter	Values (Byte-time)	Description
ipg1	0 to 255	ipg1 = 8 (default at initialization)
ipg2	0 to 255	ipg2 = 4 (default at initialization)

By default, the driver sets ipg1 to 8-byte time and ipg2 to 4-byte time, which are the standard values. (Byte time is the time it takes to transmit one byte on the link, with a link speed of either 100 Mbps or 10 Mbps.)

If your network has systems that use longer IPG (the sum of ipg1 and ipg2), and if those systems seem to be slow when accessing the network, increase the values of ipg1 and ipg2 to match the longer IPGs of the other systems.

Defining an Additional Delay Before Transmitting a Packet

The adapter's PFEX ASIC supports a programmable mode called local area network controller for Ethernet (LANCE) mode, which is set with the lance_mode parameter.

When a driver receives a packet with lance_mode enabled (the default), it adds an additional time delay before transmitting the packet. This delay, set by the ipg0 parameter, is in addition to the delay set by the ipg1 and ipg2 parameters. The additional ipg0 delay helps to reduce collisions.

If lance_mode is disabled, the value of ipg0 is ignored and no additional delay is set. Only the delays set by ipg1 and ipg2 are used. Disable lance_mode if other systems keep sending a large number of back-to-back packets. Systems that have lance_mode enabled might not have enough time to transmit a large number of back-to-back packets on the network.

You can add an additional delay by setting the ipg0 parameter to a value from 0 to 31, which is the nibble time delay. Note that nibble time is the time it takes to transfer four bits on the link. If the link speed is 10 Mbps, nibble time is equal to 400 ns. If the link speed is 100 Mbps, the nibble time is equal to 40 ns.

For example, if the link speed is 10 Mbps, and you set ipg0 to 20, multiply 20 by 400 ns to get 8000 ns. If the link speed is 100 Mbps, and you set ipg0 to 30, you would multiply 30 by 40 ns to get 1200 ns.

TABLE B-4 defines the lance_mode and ipg0 parameters.

TABLE B-4   Parameters Defining lance_mode and ipg0

Parameter	Values	Description
lance_mode	0 1	0 = lance_mode disabled 1 = lance_mode enabled (default)
ipg0	0 to 31	Additional media byte time delay before transmitting a packet (after receiving a packet)

Note – The default value of ipg0 is 16, which is 6.4 microseconds for 10 Mbps and 0.64 microseconds for 100 Mbps.

Operational Mode Parameters

TABLE B-5 describes the operational mode parameters and their default values.

TABLE B-5 Operational Mode Parameters

Parameter	Description
adv_autoneg_cap	Local transceiver capability advertised by the hardware 0 = Forced mode 1 = Autonegotiation (default)
adv_100fdx_cap	Local transceiver capability advertised by the hardware; read/write parameter 0 = Not 100 Mbit/sec full-duplex capable 1 = 100 Mbit/sec full-duplex capable (default)
adv_100hdx_cap	Local transceiver capability advertised by the hardware; read/write parameter 0 = Not 100 Mbit/sec half-duplex capable 1 = 100 Mbit/sec half-duplex capable (default)
adv_10fdx_cap	Local transceiver capability advertised by the hardware; read/write parameter 0 = Not 10 Mbit/sec full-duplex capable (default) 1 = 10 Mbit/sec full-duplex capable
adv_10hdx_cap	Local transceiver capability advertised by the hardware; read/write parameter 0 = Not 10 Mbit/sec half-duplex capable 1 = 10 Mbit/sec half-duplex capable (default)

Note – The priority (in descending order) for these parameters is:
adv_100fdx_cap, adv_100T4_cap, adv_100hdx_cap, adv_10fdx_cap, and
adv_10hdx_cap.

Defining the Number of Back-to-Back Packets to Transmit

The `pace_size` parameter (see TABLE B-6) defines the maximum number of back-to-back packets you can transmit at one time. If the value is zero, there will be no limit to the number of back-to-back packets that can be transmitted.

TABLE B-6   Back-to-Back Packet Transmission Capability

Parameter	Values
pace_size	1 to 255 = Number of back-to-back packets transmitted at one time 0 = No limit to the number of back-to-back packets that can be transmitted (default)

Parameters That Report Transceiver Capabilities

TABLE B-7 describes the read-only transceiver capabilities. These parameters define the capabilities of the local transceiver.

TABLE B-7   Read-Only Transceiver Capabilities

Parameter	Description
autoneg_cap	Local transceiver capability of the hardware 0 = Not capable of autonegotiation 1 = Autonegotiation capable
100fdx_cap	Local transceiver capability of the hardware; initialized at startup 0 = Not 100 Mbit/sec full-duplex capable 1 = 100 Mbit/sec full-duplex capable
100hdx_cap	Local transceiver capability of the hardware; initialized at startup 0 = Not 100 Mbit/sec half-duplex capable 1 = 100 Mbit/sec half-duplex capable
10fdx_cap	Local transceiver capability of the hardware; initialized at startup 0 = Not 10 Mbit/sec full-duplex capable 1 = 10 Mbit/sec full-duplex capable
10hdx_cap	Local transceiver capability of the hardware; initialized at startup 0 = Not 10 Mbit/sec half-duplex capable 1 = 10 Mbit/sec half-duplex capable

Parameters That Report the Link Partner Capabilities

TABLE B-8 describes the read-only link partner capabilities.

TABLE B-8   Read-Only Link Partner Capabilities

Parameter	Values
lp_autoneg_cap	0 = No autonegotiation 1 = Autonegotiation
lp_100fdx_cap	0 = No 100 Mbit/sec full-duplex transmission 1 = 100 Mbit/sec full-duplex
lp_100hdx_cap	0 = No 100 Mbit/sec half-duplex transmission 1 = 100 Mbit/sec half-duplex
lp_10fdx_cap	0 = No 10 Mbit/sec full-duplex transmission 1 = 10 Mbit/sec full-duplex
lp_10hdx_cap	0 = No 10 Mbit/sec half-duplex transmission 1 = 10 Mbit/sec half-duplex

If the link partner is not capable of autonegotiation (when lp_autoneg_cap is 0) the information described in TABLE B-8 is not relevant and the parameter value equals 0.

If the link partner is capable of autonegotiation (when lp_autoneg_cap is 1), the speed and mode information are displayed when you use autonegotiation and get the link partner capabilities.

Setting the `qfe` Device Driver Parameters

This section describes how to set the `qfe` device driver parameters in three ways:

- Using the `ndd` utility
- Using the `qfe.conf` file

To set device driver parameters dynamically while the system is running, use the `ndd` utility. For example, on a hot-swap system, you can use the `ndd` utility to display and set parameters for `qfe` devices without rebooting the system. However, if you reboot the system, or if the system shuts down, the parameters revert back to their default settings. Using the `ndd` utility is a good way to display the current configuration and to test different parameter settings.

To set parameters for a single `qfe` device (or a subset of `qfe` devices) in the system permanently, set the parameters in the `/kernel/drv/qfe.conf` file. While the parameters values set in the `qfe.conf` file persist after the system is rebooted, you do not need to reboot the system in order for the parameter changes to take effect. You can use your system's hot-swap commands to apply the `qfe.conf` changes to the `qfe` devices.

Using the `ndd` Utility to Set and Display Parameters

The following sections describe how you can use the `ndd` utility to modify (with the `-set` option) or display (without the `-set` option) the parameters for each `SUNW,qfe` device.

Identifying Device Instances

Before you use the `ndd` utility to display or to set a parameter for a `qfe` device, you must specify the device instance number for the utility, because there will be at least four `SUNW,qfe` devices. You can find the instance numbers of the `qfe` devices in the `/etc/path_to_inst` file.

▼ To Specify the Device Instance for the `ndd` Utility

1. Check the `/etc/path_to_inst` **file to identify the instance number associated with a particular** `SUNW,qfe` **device.**

For example:

```
# grep qfe /etc/path_to_inst
"/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@1,1" 1 "qfe"
"/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@0,1" 0 "qfe"
"/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@3,1" 3 "qfe"
"/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@2,1" 2 "qfe"
```

In the preceding example, the four `SUNW,qfe@`*x*`,1` instances are from a Sun Quad FastEthernet 6U CompactPCI adapter. For clarity, the instance numbers are shown in boldface type.

2. Use the `ndd` **command to select the** `SUNW,qfe` **device using the instance number.**

```
# ndd -set /dev/qfe instance instance-number
```

The device instance will remain selected until you change the selection.

Using the `ndd` Utility in Noninteractive and Interactive Modes

You can use the `ndd` utility in two modes:

- Noninteractive
- Interactive

In the noninteractive mode, you can invoke the utility to set or display a single device driver parameter. Once you execute the `ndd` command, the utility will exit back to the terminal prompt. In the interactive mode, you can display or set more than one driver parameter value using the utility's prompt. Refer to the `ndd`(1M) man page for more information about using the `ndd` utility.

Using the ndd *Utility in Noninteractive Mode*

This section describes how to modify a parameter value and how to display a parameter value using the ndd utility in noninteractive mode.

● **To modify a parameter value, use the** -set **option.**

If you invoke the ndd utility with the -set option, the utility will set the specified device driver *parameter* to *value*:

```
# ndd -set /dev/qfe parameter value
```

For example, if you want to disable LANCE mode, you would type:

```
# ndd -set /dev/qfe lance_mode 0
```

● **To display the value of a parameter, specify the parameter name, omitting the** -set **option.**

When you omit the -set option (and omit the parameter *value*), the utility assumes that you want to display the current parameter value.

```
# ndd /dev/qfe parameter
```

For example, if you wanted view the link speed of the device, you would type:

```
# ndd /dev/qfe link_speed
1
```

In the preceding example, the link speed is set to 100 Mbps.

● **To list all the parameters supported by the** `qfe` **driver, type** `ndd /dev/qfe \?` **at a terminal prompt.**

```
# ndd /dev/qfe \?
?                               (read only)
transceiver_inuse               (read only)
link_status                     (read only)
link_speed                      (read only)
link_mode                       (read only)
ipg1                            (read and write)
ipg2                            (read and write)
use_int_xcvr                    (read and write)
pace_size                       (read and write)
adv_autoneg_cap                 (read and write)
adv_100fdx_cap                  (read and write)
adv_100hdx_cap                  (read and write)
adv_10fdx_cap                   (read and write)
adv_10hdx_cap                   (read and write)
autoneg_cap                     (read only)
100fdx_cap                      (read only)
100hdx_cap                      (read only)
10fdx_cap                       (read only)
10hdx_cap                       (read only)
lp_autoneg_cap                  (read only)
lp_100fdx_cap                   (read only)
lp_100hdx_cap                   (read only)
lp_10fdx_cap                    (read only)
lp_10hdx_cap                    (read only)
instance                        (read and write)
lance_mode                      (read and write)
ipg0                            (read and write)
#
```

Using the `ndd` *Utility in Interactive Mode*

- **To modify a parameter value in interactive mode, start the utility as shown below.**

  The `ndd` utility prompts for the name of a parameter:

  ```
  # ndd /dev/qfe
  name to get/set? (Enter the parameter name or ? to view all parameters)
  ```

  After you type the parameter name, the `ndd` utility prompts for the parameter value.
  For example, if you want to disable LANCE mode, you would type:

  ```
  # ndd /dev/qfe
  name to get/set ? lance_mode
  value ? 0
  name to get/set ? q
  #
  ```

- **To display a parameter value, start the `ndd` utility, type a parameter name, and press the Return key until the value is displayed.**

  Press the Return key at the `value` and `length` prompts to display the current value
  of a selected parameter. For example, to display the value of the `lance_mode`
  parameter, you would type:

  ```
  # ndd /dev/qfe
  name to get/set ? lance_mode
  value ?
  length ?
  0
  name to get/set ? q
  #
  ```

- **Type `q` to exit interactive mode.**

  ```
  name to get/set ? q
  #
  ```

Setting Forced Mode Using the `ndd` Utility

This section describes how to force a network speed over an interface (forced mode) and to disable autonegotiation.

▼ To Set Forced Mode and Disable Autonegotiation

1. **Use the `ndd` utility to select the `qfe` instance that you want to set.**

   ```
   # ndd -set /dev/qfe instance instance-number
   ```

   See "Identifying Device Instances" on page 65 for more information.

2. **Select one of the four operational mode parameters (`adv_100fdx_cap`, `adv_100hdx_cap`, `adv_10fdx_cap`, or `adv_10hdx_cap`), and use the `ndd` utility to set its value to 1.**

   For example, to set the 10 Mbps, half-duplex mode, you would set the `adv_10hdx_cap` parameter to 1.

   ```
   # ndd -set /dev/qfe adv_10hdx_cap 1
   ```

   If you set more than one of the operational mode parameters to 1, the driver will select the mode that is highest in the priority order (see "Operational Mode Parameters" on page 62 for more information).

3. **Use the `ndd` utility to disable autonegotiation by setting the `adv_autoneg_cap` parameter to 0.**

   ```
   # ndd -set /dev/qfe adv_autoneg_cap 0
   ```

To Enable Autonegotiation Using the `ndd` Utility

This section describes how to set at least one of the four operational modes and enable autonegotiation. See "Autonegotiation Protocol" on page 45 for more information about the autonegotiation and operational modes.

▼ To Enable Autonegotiation

1. **Use the** `ndd` **utility to select the** `qfe` **instance that you want to set.**

```
# ndd -set /dev/qfe instance instance-number
```

See "Identifying Device Instances" on page 65 for more information.

2. **Select** *at least one* **of the four operational mode parameters (**`adv_100fdx_cap`**,** `adv_100hdx_cap`**,** `adv_10fdx_cap`**,** `adv_10hdx_cap`**) that you want to advertise to the remote link partner, and set its value to 1.**

For example, to make the interface advertise a 10 Mbps, full-duplex mode, you would type:

```
# ndd -set /dev/qfe adv_10fdx_cap 1
```

3. **Use the** `ndd` **utility to enable autonegotiation mode by setting the** `adv_autoneg_cap` **parameter to 1.**

```
# ndd -set /dev/qfe adv_autoneg_cap 1
```

Setting Parameters Using the `qfe.conf` File

To set the `qfe` driver parameters for `qfe` devices so that the parameter variables stay in effect after rebooting the system, create a `qfe.conf` file in your system's `/kernel/drv` directory.

You can also create a `qfe.conf` file when you need to set parameters for a specific `qfe` device in the system. The parameters you set are *read and write* parameters listed in "Device Driver Parameter Values and Definitions" on page 59, and in TABLE B-9.

TABLE B-9   `qfe.conf` File Parameters

`qfe` **Driver Parameter**	**Description**
`ipg1`	Interpacket gap delay parameter
`ipg2`	Interpacket gap delay parameter
`use_int_xcvr`	Force the use of the internal transceiver
`pace_size`	Set the maximum number of back-to-back packets that can be transmitted at one time
`adv_autoneg_cap`	Advertise to the link partner whether or not the local transceiver is capable of autonegotiation
`adv_100fdx_cap`	Advertise to the link partner whether or not the local transceiver is capable of 100 Mbps, full-duplex
`adv_100hdx_cap`	Advertise to the link partner whether or not the local transceiver is capable of 100 Mbps, half-duplex
`adv_10fdx_cap`	Advertise to the link partner whether or not the local transceiver is capable of 10 Mbps, full-duplex
`adv_10hdx_cap`	Advertise to the link partner whether or not the local transceiver is capable of 10 Mbps, half-duplex
`lance_mode`	Allow an additional interpacket gap delay to be set by the `ipg0` parameter
`ipg0`	Additional interpacket gap delay parameter

The man pages for `prtconf`(1M), `system`(4) and `driver.conf`(4) include additional details about driver configuration files.

▼ To Set Driver Parameters By Creating a `qfe.conf` File

1. **Log in to the system.**

   Refer to the server's documentation for the procedure.

2. **Obtain the hardware path names for the `qfe` devices in the device tree.**

   The path names and the associated instance numbers are in the `/etc/path_to_inst` file.

   ```
   # grep qfe /etc/path_to_inst
   "/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@0,1" 0 "qfe"
   "/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@1,1" 1 "qfe"
   "/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@2,1" 2 "qfe"
   "/pci@1f,0/pci@1/pci@1/pci@a/SUNW,qfe@3,1" 3 "qfe"
   ```

   In the preceding lines:

   - The first part within the double quotes specifies the hardware node name in the device tree.
   - The second number is the instance number.
   - The last part in the double quotation marks is the driver name.
   - In the device path name, the last component after the last `/` character and before the `@` character is the device name.
   - The path name before the last component is the parent name.
   - The comma-separated numbers after the `@` character at the end represent the device and function numbers, which are together referred to as the unit-address.

   To identify a `qfe` device unambiguously in the `qfe.conf` file, use the name, the parent name, and the unit-address for the device. Refer to the `pci`(4) man page for more information about the PCI device specification.

   In the first line of the previous example:

   - Name = `SUNW,qfe`
   - Parent = `/pci@1f,0/pci@1/pci@1/pci@a`
   - Unit-address = `0,1`

   In the second line of the previous example:

   - Name = `SUNW,qfe`
   - Parent = `/pci@1f,0/pci@1/pci@1/pci@a`
   - Unit-address = `1,1`

In the third line of the previous example:

- Name = `SUNW,qfe`
- Parent = `/pci@1f,0/pci@1/pci@1/pci@a`
- Unit-address = `2,1`

In the fourth line of the previous example:

- Name = `SUNW,qfe`
- Parent = `/pci@1f,0/pci@1/pci@1/pci@a`
- Unit-address = `3,1`

3. **Using a text editor, create a** `/kernel/drv/qfe.conf` **file.**

4. **Add entries to the** `qfe.conf` **file that follow this format:**

```
name="name" parent="parent" unit-address="address" parameter=value;
```

For example, to set the `ipg1` and `ipg2` parameters for the four devices listed in Step 2, you would add these lines:

```
name= "SUNW,qfe" parent="/pci@1f,0/pci@1/pci@1/pci@a" unit-address="0,1" ipg1=20 ipg2=10;
name= "SUNW,qfe" parent="/pci@1f,0/pci@1/pci@1/pci@a" unit-address="1,1" ipg1=20 ipg2=10;
name= "SUNW,qfe" parent="/pci@1f,0/pci@1/pci@1/pci@a" unit-address="2,1" ipg1=20 ipg2=10;
name= "SUNW,qfe" parent="/pci@1f,0/pci@1/pci@1/pci@a" unit-address="3,1" ipg1=20 ipg2=10;
```

5. **Save the** `qfe.conf` **file.**

After editing the `qfe.conf` file, you can either reboot the system or use a hot-swap command to disconnect and connect the interface to the system. For example, the `cfgadm` command used by the Netra ct systems will access the `qfe.conf` file when it attaches the `qfe` devices to the system. See your system's documentation for more information about using hot-swap commands.

Removing and Replacing the Adapter

This appendix describes how to disable the adapter's `qfe` interfaces prior to removing the adapter from a system, and how to activate the interfaces after replacing the adapter.

This appendix contains the following sections:

■ "Disabling the Network Interfaces and Removing the Adapter" on page 76

■ "Replacing the Adapter and Activating the Network Interfaces" on page 78

These procedures apply to both the rear-access and front-access versions of the adapter.

Note – The procedures for removing and replacing the adapters are system-specific and are beyond the scope of this manual. If you are required to reinstall the cards, you *must* follow the instructions outlined in your system's service manual for the removal and replacement of network interface I/O cards.

Disabling the Network Interfaces and Removing the Adapter

This procedure describes how to disable the adapter's `qfe` interfaces before removing the adapter from a hot-swap server. This procedure also lists cautions that must be read before removing the adapter from the server.

▼ To Disable the Network Interfaces and Remove the Adapter

Before starting this procedure, make sure that all network activity over the adapter's network interfaces has stopped.

1. **Log in to the system as superuser.**

   Refer to the system's documentation for the correct procedure.

2. **Use the** `ifconfig` **command to disable the** `qfe` **interfaces.**

   To disable each active `qfe` interface on the adapter, use the following command to disable and unplumb each interface (replace *instance* with the instance number of the interface):

   ```
   # ifconfig qfeinstance unplumb
   ```

   For example, if the adapter had four active `qfe` devices named `qfe0`, `qfe1`, `qfe2`, and `qfe3`, you would type:

   ```
   # ifconfig qfe0 unplumb
   # ifconfig qfe1 unplumb
   # ifconfig qfe2 unplumb
   # ifconfig qfe3 unplumb
   ```

   The preceding commands will stop the system from transmitting messages through `qfe` devices, which will allow you to safely remove the adapter from the system.

3. Remove the adapter from the system as documented in the system's service manual.

⚠

Caution – You *must* follow the instructions outlined in your system's service manual for the removal of network interface I/O cards. If you do not follow the procedures in the service manual, you may cause your system to panic.

In addition to the procedures documented in the server's service manual, consider the following caution statements when removing faulty adapters, or when moving adapters to other slots, in hot-swap mode:

- If you are removing a rear-access version of the adapter, you must *always* remove the adapter's front card before removing the rear transition card. If you remove the rear transition card first, you may panic the system.

- Do not trust the hot-swap LED on the adapter when removing the card from the system. On some systems, the hot-swap LED may turn on before the software has completely detached from the adapter. Use the LEDs on the system, as documented in the system's service manual, when removing the adapter.

- If the server is set to full hot-swap mode, *do not* rapidly open and close the ejection levers. When you open the ejection levers, you will begin the software detachment process. This detachment process must end before you can safely close the ejection levers, which begins the software attachment process. If you open and close the levers rapidly, you can panic or hang the system.

- When moving more than one adapter to different slots in the system, move the adapters one at a time. If you move multiple adapters in rapid succession and at the same time, you may panic or hang the system.

Replacing the Adapter and Activating the Network Interfaces

This procedure describes how to activate the `qfe` interfaces after replacing the adapter into the system.

▼ To Replace the Adapter and Activate the Network Interfaces

1. **Replace the adapter as documented in your system's service manual.**

   Caution – You *must* follow the instructions outlined in your system's service manual for the replacement of network interface I/O cards. If you do not follow the procedures in service manual, you may cause your system to panic.

2. **Log in to the system as superuser.**

   Refer to the system's documentation for the procedure.

3. **Activate the** `qfe` **interfaces using the** `ifconfig` **command.**

   For each adapter interface, type the following at the terminal prompt, replacing *instance* with the interface's instance number and *ip_address* with the interface's IP address:

   ```
   # ifconfig qfeinstance ip_address plumb up
   ```

   For example, if you want to activate four `qfe` devices named `qfe0`, `qfe1`, `qfe2`, and `qfe3`, you would type:

   ```
   # ifconfig qfe0 129.144.10.83 plumb up
   # ifconfig qfe1 129.144.10.41 plumb up
   # ifconfig qfe2 129.144.10.67 plumb up
   # ifconfig qfe3 129.144.10.30 plumb up
   ```

   Note – The IP addresses shown above are examples. Your interfaces will have different IP addresses.

Testing the Adapter

This appendix describes how to test the adapter using either the SunVTS diagnostic application or the onboard FCode self-test.

This appendix contains the following sections:

- "Using the SunVTS Diagnostic Software" on page 80
- "Using the OpenBoot PROM FCode Self-Test" on page 81

Using the SunVTS Diagnostic Software

The SunVTS software executes multiple diagnostic hardware tests from a single user interface. It is used to verify the configuration and functionality of most hardware controllers and devices. The SunVTS software operates primarily from a user interface that enables you to set test parameters while diagnostic operations are being performed.

The SunVTS `nettest` diagnostic can be used to test all of the networking interfaces on the system, including the interfaces on the adapter.

To use the `nettest` diagnostic, you must have the SunVTS software installed on your system. Refer to the *Solaris on Sun Hardware Platform Guide* for SunVTS installation instructions.

Refer to the SunVTS documentation (listed in TABLE D-1) for instructions on how to run and monitor the `nettest` diagnostic. These SunVTS documents are available on the *Solaris on Sun Hardware Collection*, which is provided on the Solaris Supplement CD for the Solaris release on your system.

TABLE D-1   SunVTS Documentation

Title	Description
SunVTS User's Guide	Describes the SunVTS diagnostic environment
SunVTS Test Reference Manual	Describes each SunVTS test (including the `nettest`) and describes the various test options and command-line arguments
SunVTS Quick Reference	Provides an overview of the user interface

Using the OpenBoot PROM FCode Self-Test

The Sun Quad FastEthernet adapter's self-test verifies the correct operation of the adapter and identifies any hardware problems with the adapter. The self-test is a suite of tests that reside in the adapter's FCode PROM.

You can only invoke the FCode self-test diagnostics using the OpenBoot PROM `test` or `test-all` commands. In order to access the OpenBoot PROM, you must shut down and halt your system to display the `ok` prompt.

You can use the adapter's self-test any time you want to determine the status of the hardware. If you encounter an error while running the diagnostic test, the self-test displays appropriate error messages.

Note – Although the self-test does not require the adapter's interface to be connected to an active network, you will see failing error messages if it is not connected.

▼ To Run the FCode Self-Test Diagnostic

For more information about the OpenBoot commands (including `test`) in this section, refer to the *OpenBoot Command Reference* manual.

1. **Make sure that all significant application and network activity on the server has stopped.**

2. **Follow the appropriate procedures, as documented in the system's service manual, to shut down and halt the system.**

   Refer to the system's documentation for the complete shutdown procedure.

   After shutting down the system, you should see the OpenBoot PROM's `ok` prompt on the system console.

3. **At the `ok` prompt, set the `auto-boot?` configuration variable to false.**

   ```
   ok setenv auto-boot? false
   ```

4. **Set the** `diag-switch?` **parameter to true to see the diagnostic power-on self-test (POST) messages.**

```
ok setenv diag-switch? true
```

5. **Reset the system to activate these parameter changes.**

```
ok reset-all
```

6. **Use the** `show-nets` **command to display the list of network devices on the system.**

Among the list of devices, you should see the four `SUNW,qfe` devices specific to the Sun Quad FastEthernet 6U CompactPCI adapter you want to test, as shown in the following example.

```
ok show-nets
a) /pci@1f,0/pci@1/pci@1/pci@e/SUNW,hme@0,1
b) /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@3,1
c) /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@2,1
d) /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@1,1
e) /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@0,1
f) /pci@1f,0/pci@1/pci@1/pci@b/SUNW,hme@0,1
g) /pci@1f,0/pci@1/pci@1/pci@a/SUNW,hme@0,1
h) /pci@1f,0/pci@1,1/network@3,1
i) /pci@1f,0/pci@1,1/network@1,1
q) NO SELECTION
Enter Selection, q to quit: q
```

Note – The preceding device paths are examples. The actual device paths on your system may be different from the examples shown here.

7. **Use the** `test` **command, and the device paths found in Step 6, to test the adapter when you use the FCode self-test.**

```
ok test device_path
```

Refer to the appropriate *OpenBoot Command Reference Manual* for more information on the `test` command.

The following tests are run when you execute the `test` command:

- HME register
- MAC internal loopback
- 100 Mbps PHY loopback
- 10 Mbps PHY loopback

Note – To test all of the interfaces of the adapter, you will need to execute the `test` command separately for each `SUNW,qfe` interface.

If all of the tests pass, you will see these messages:

```
ok test /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@3,1
Hme register test --- succeeded.
Internal loopback test -- succeeded
Transceiver check -- Using onboard transceiver -- Link up passed
ok
```

If the adapter's interface is not connected to a network, you will see the following error messages:

```
ok test /pci@1f,0/pci@1/pci@1/pci@d/SUNW,qfe@3,1
Hme register test --- succeeded.
Internal loopback test -- succeeded
Transceiver check -- Using onboard transceiver -- Link down
Autonegotiation timeout
Check Cable or contact system administrator
Failed
selftest failed. return code = -1
ok
```

Note – If the `test` command fails, verify that the adapter hardware is installed correctly and the Ethernet device is connected to an active network. If necessary, replace the adapter or contact your service provider for support.

---

8. **After testing the adapter, type the following commands to return the OpenBoot PROM to the standard operating mode.**

```
ok setenv diag-switch? false
ok setenv auto-boot? true
```

9. Reset and reboot the system.

```
ok reset-all
```

Refer to the system's documentation for the correct procedures for bringing up the system.

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