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# Sun Quad FastEthernet SBus Adapter Installation and User's Guide

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# Sun Quad FastEthernet SBus Adapter Installation and User's Guide

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Revision A, September 1997

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# Contents

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	<b>Preface</b>	<b>viii</b>
<b>1.</b>	<b>Preparing for Installation</b>	<b>1</b>
	Features	2
	Hardware and Software Requirements	2
	Checking the OpenBoot PROM Revision Level	3
	▼ Displaying the OpenBoot PROM Revision Level	3
	Warning for SPARCserver 1000/1000E and SPARCcenter 2000/2000E Systems	4
<b>2.</b>	<b>Installing the Adapter</b>	<b>5</b>
	Installing the Adapter	5
	Verifying the Installation	6
	Diagnostics Testing	7
	Examining Network Activity	7
	Changing the Device Names on Solaris 2.4 Systems	8
	Rebooting the System	9
<b>3.</b>	<b>Using the Sun Quad FastEthernet Driver Software</b>	<b>11</b>
	Installing the Driver Software	11
	Host File Configuration	11
	Booting the System	13
	Booting From the Network	13

Booting a Diskless Client System	14
Performing a Net-Install of the Solaris Environment Over the <code>qfe</code> Interface	16
▼ Updating the Solaris Archive to Use the <code>qfe</code> Interface	16
Installing the Solaris Environment on a System with the Sun Quad FastEthernet SBus Adapter	18
Post-Installation Procedures (Optional)	19
Configuring Driver Parameters	19
Increasing TCP/IP Performance	20
Forcing Network Speed Between 10 Mbps and 100 Mbps	20
Auto-Negotiation	21
<code>local-mac-address</code> Property	22
<b>A. Specifications</b>	<b>23</b>
Physical Dimensions	23
Power Requirements	23
Environmental Specifications	24
Performance Specifications	25
<b>B. Interface Signals</b>	<b>27</b>
<b>C. Configuring the Quad FastEthernet Device Driver Parameters</b>	<b>29</b>
Internal Transceiver	29
Driver Parameter Values and Definitions	30
Defining the Current Status	31
Inter-Packet Gap Parameters	32
Defining an Additional Delay Before Transmitting a Packet Using <code>lance_mode</code> and <code>ipg0</code>	33
Operational Mode Parameters	34
Defining the Number of Back-to-Back Packets to Transmit	35
Reporting Transceiver Capabilities	35
Reporting the Link Partner Capabilities	36
Setting <code>qfe</code> Driver Parameters	37

Setting Parameters Using the ndd Utility	37
Setting Parameters in the /etc/system File	40
▼ Setting the ipg1 and ipg2 Parameters in the /etc/system File	42
Setting Parameters Using the qfe.conf File	42
Setting ipg Driver Parameters Using a qfe.conf File	43
<b>D. Running Diagnostics Tests</b>	<b>45</b>
Using the SunDiag System Exerciser	45
Editing the .usertest File	46
SunDiag Main Window	46
Starting the Test	47
Using the OpenBoot PROM FCode Selftest	48
▼ Running the Ethernet FCode Selftest Diagnostic	48
<b>E. Regulatory Compliance Statements</b>	<b>51</b>
FCC Class A Notice	51
FCC Class B Notice	52
DOC Class A Notice - Avis DOC, Classe A	53
DOC Class B Notice - Avis DOC, Classe B	53
Declaration of Conformity	54
EMC	54
Safety	55
Supplementary Information	55
<b>Index</b>	<b>57</b>





# Preface

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*Sun Quad FastEthernet SBus Adapter Installation and User's Guide* provides installation instructions for the Sun<sup>™</sup> Quad FastEthernet<sup>™</sup> SBus adapter. This manual also describes how to configure the driver software.

These instructions are designed for a system administrator with networking experience.

---

## How This Book Is Organized

Chapter 1," describes the hardware and software features for the Sun Quad FastEthernet SBus adapter.

Chapter 2," tells you how to install the Sun Quad FastEthernet SBus adapter into your system.

Chapter 3," describes how to use the driver software.

Appendix A," lists the specifications for the Sun Quad FastEthernet SBus adapter.

Appendix B," lists the pin descriptions.

Appendix C," describes how to configure the driver software.

Appendix D," describes the diagnostic procedures for testing the Sun Quad FastEthernet SBus adapter.

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## Related Documents

The following documents contain topics that relate to the information in the *Sun Quad FastEthernet SBus Adapter Installation and User's Guide*.

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Title	Part Number
Your system installation or service manual	(System dependent)
Solaris 2.x Handbook for SMCC Peripherals	(Release dependent)
SunVTS User's Guide	(Release dependent)
SunDiag User's Guide	801-6621
OpenBoot 2.x Command Reference Manual	802-3241
OpenBoot 3.x Command Reference Manual	802-5837

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## 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 2.x Handbook for SMCC Peripherals*
- AnswerBook™ online documentation for the Solaris™ 2.x software environment
- Other software documentation that you received with your system

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## Typographic Conventions

TABLE P-1 Typographic Conventions

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

## Shell Prompts

TABLE P-2 Shell Prompts

Shell	Prompt
C shell	<i>machine_name%</i>
C shell superuser	<i>machine_name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

---

# Ordering Sun Documents

SunDocs<sup>SM</sup> is a distribution program for Sun Microsystems technical documentation. Contact SunExpress for easy ordering and quick delivery. You can find a listing of available Sun documentation on the World Wide Web.

TABLE P-3 SunExpress Contact Information

Country	Telephone	Fax
Belgium	02-720-09-09	02-725-88-50
Canada	1-800-873-7869	1-800-944-0661
France	0800-90-61-57	0800-90-61-58
Germany	01-30-81-61-91	01-30-81-61-92
Holland	06-022-34-45	06-022-34-46
Japan	0120-33-9096	0120-33-9097
Luxembourg	32-2-720-09-09	32-2-725-88-50
Sweden	020-79-57-26	020-79-57-27
Switzerland	0800-55-19-26	0800-55-19-27
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United States	1-800-873-7869	1-800-944-0661

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World Wide Web: <http://www.sun.com/sunexpress/>

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- Email: [smcc-docs@sun.com](mailto:smcc-docs@sun.com)
- Fax: SMCC Document Feedback (1-650-786-6443)



## Preparing for Installation

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

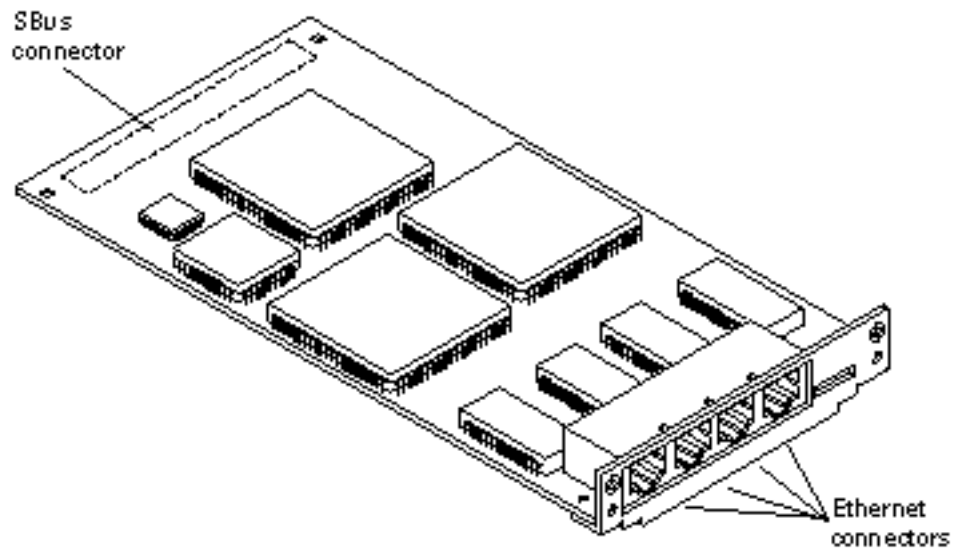


Figure 1-1 Sun Quad FastEthernet SBus Adapter

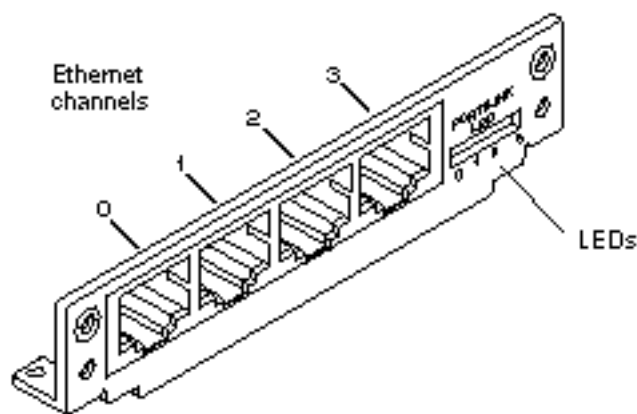


Figure 1-2 Sun Quad FastEthernet SBus Adapter Back Panel

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## Features

This SBus adapter offers the following features:

- Fully complies with the ANSI/IEEE std. 802.3 CSMA/CD physical layer specification
- 1. Four Switchable 10BASE-T/100BASE-TX Ethernet channels with auto negotiation. Conforms to IEEE 802.3u Ethernet standard
- 2. Provides operations of up to 100 meters of twisted-pair without use of repeaters
- Four independent Ethernet channels capable of running at either 10 Mbps or 100 Mbps
- Multiple IDs with local media access control (MAC) storage
- Full packet buffering for transmit and receive packets 64 Kbytes of memory for data
- Link integrity LED for each channel

---

## Hardware and Software Requirements

Before installing the adapter, make sure your system meets the following hardware and software requirements:



TABLE 1-1 Hardware and Software Requirements

---

Supported Operating Environments	Solaris 2.4, 2.5, 2.5.1, 2.5.1 Hardware: 4/97 releases
Supported Systems	Sun <sup>™</sup> Ultra <sup>™</sup> 1 series*, Ultra 2 series*, Ultra Enterprise <sup>™</sup> 150, Ultra Enterprise 3000/4000/5000/6000, SPARCstation 5*, SPARCstation 10*, SPARCstation 20*, SPARCserver 1000/1000E, SPARCcenter 2000/2000E, SPARCserver 6x0MP*
OpenBoot <sup>™</sup> PROM (OBP)	Release 2.26 or later for SPARCserver 1000/1000E and SPARCcenter 2000/2000E systems  Release 2.10 version 3 or later for SPARCserver 6x0MP systems  Release 2.9 or later for all other supported systems

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\*One Sun Quad FastEthernet SBus adapter per system maximum.

---

**Note** - The information above is up-to-date as of the printing of this manual. Visit Sun on the World Wide Web at <http://www.sun.com/> for the latest information.

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## Checking the OpenBoot PROM Revision Level

Table 1-1 lists the required OpenBoot PROM revision levels for all of the supported systems. You can use the OpenBoot command `.version` to display your system's OpenBoot PROM revision level.

### ▼ Displaying the OpenBoot PROM Revision Level

1. At the `ok` prompt, type `.version` to check your system's OpenBoot PROM revision level.

```
ok .version
Release 2.26 Version 1203 created 96/04/19 09:44:48
```

---

# Warning for SPARCserver 1000/1000E and SPARCcenter 2000/2000E Systems

---



**Caution** - If you are installing the Sun Quad FastEthernet SBus adapter in a SPARCserver 1000/1000E or a SPARCcenter 2000/2000E system, your system's OpenBoot PROM must be release 2.26 or later. Release 2.26 is required on the master system board.

---

If you have installed the Sun Quad FastEthernet SBus adapter into a SPARCserver 1000/1000E or a SPARCcenter 2000/2000E system and the system's OpenBoot PROM is not 2.26 or later, attempting to reboot the system with the `reboot`, `sync sync halt`, or `init 0` commands will cause a system reset and display following error message:

```
OA>. TEST FAILED - System Reconfiguration .....  
OA>Swap to SBI Interrupt Status register caused trap
```

Contact your local service provider to order an upgrade kit if your SPARCserver 1000/1000E or SPARCcenter 2000/2000E OpenBoot PROM release is earlier than 2.26.

## Installing the Adapter

---

This chapter tells you how to install the Sun Quad FastEthernet SBus adapter in your system and how to verify that it has been installed correctly.

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## Installing the Adapter

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**Note** - Refer to your system installation or service manual for detailed instructions for the following tasks.

---

- 1. Power off your system, using the standard shut down procedures described in *Solaris 2.x Handbook for SMCC Peripherals*.**  
The *Solaris 2.x Handbook for SMCC Peripherals* is shipped with the Solaris operating environment software and is available in the on-line Solaris documentation.
- 2. Open the system unit.**
- 3. Attach the adhesive copper strip of the wrist strap to the metal casing of the power supply. Wrap the other end twice around your wrist, with the adhesive side against your skin.**
- 4. If you are replacing an SBus adapter with the Sun Quad FastEthernet SBus adapter, remove the old adapter now.**
- 5. Install the Sun Quad FastEthernet SBus adapter in the selected SBus slot.**

6. Detach the wrist strap and close the system unit.
7. Connect Ethernet cables to the Sun Quad FastEthernet SBus adapter and to an Ethernet network.

---

## Verifying the Installation

After you have installed the Sun Quad FastEthernet SBus adapter, but *before* you boot your system, perform the following tasks to verify the installation. Refer to the *Solaris 2.x Handbook for SMCC Peripherals* manual or your Solaris documentation for the detailed instructions.

1. Power on the system, and when the banner appears, press the Stop-A keys to interrupt the boot process and get to the `ok` prompt.
2. Use the `show-devs` command to list the system devices.

You should see lines in the list of devices, similar to the example below, specific to the Sun Quad FastEthernet SBus adapter:

```
ok show-devs
...
/sbus@1f,0/SUNW,qfe@1,8c30000
/sbus@1f,0/SUNW,qfe@1,8c20000
/sbus@1f,0/SUNW,qfe@1,8c10000
/sbus@1f,0/SUNW,qfe@1,8c00000
...
```

In this example, the `SUNW,qfe@1` entries identify the adapter's four Ethernet devices on a Sun Ultra 1 system with an OpenBoot PROM, revision 3.x.

---

**Note** - In the example above, the number 1 following `SUNW,qfe@` corresponds to the SBus slot in which the Sun Quad FastEthernet SBus adapter resides.

---

If you do not see the devices listed, check that the adapter is properly seated and, if necessary, reinstall the adapter.

# Diagnostics Testing

- For Sun Quad FastEthernet SBus adapter diagnostics testing on systems running Solaris 2.4, see “Using the SunDiag System Exerciser” on page 45.
- For Sun Quad FastEthernet SBus adapter diagnostics testing on systems running Solaris 2.5, 2.5.1, or 2.5.1 Hardware: 4/97, refer to the *SunVTS User’s Guide*.

---

## Examining Network Activity

After you have installed the Sun Quad FastEthernet SBus adapter, but *before booting the system*, verify the installation by examining the network interfaces with the OpenBoot PROM `watch-net-all` command.

Make sure that the interfaces are connected to an active network.

### 1. Examine network activity and incoming network packets by typing `watch-net-all` at the `ok` prompt.

The `watch-net-all` command monitors network traffic on all network interfaces in the system. In the example below, the `watch-net-all` command tests all four of the adapter’s interfaces, two of which are connected to a network.

#### CODE EXAMPLE 2-1 `watch-net-all` Command Output

```
ok watch-net-all
/sbus@1f,0/SUNW,qfe@1,8c30000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@1f,0/SUNW,qfe@1,8c20000
Internal loopback test -- succeeded.
Transceiver check -- passed
Looking for Ethernet Packets.
"." is a Good Packet. "X" is
a Bad Packet.
Type any key to stop.
..... (Press any key to continue.)

/sbus@1f,0/SUNW,qfe@1,8c10000
Internal loopback test -- succeeded.
Transceiver check -- failed

/sbus@1f,0/SUNW,qfe@1,8c00000
Internal loopback test -- succeeded.
Transceiver check -- passed
Looking for Ethernet Packets.
"." is a Good Packet. "X" is
a Bad Packet.
Type any key to stop.
..... (Press any key to continue.)
```

In addition to testing the adapter's interfaces, the `watch-net-all` command may also test other network devices on the system.

The network speed is the same as the speed of the network to which your system is connected. See the section "Forcing Network Speed Between 10 Mbps and 100 Mbps" on page 20 for more detailed information about speed selection.

---

## Changing the Device Names on Solaris 2.4 Systems

The device name of newer SBus cards is identified by a `SUNW`, prefix. If your system is running the Solaris 2.4 operating system, it will not recognize these device names. Perform the following tasks to set up your system so the device driver can recognize the Sun Quad FastEthernet SBus adapter.

### 1. At the `ok` prompt, type:

```
ok setenv use-nvramrc? true
ok show-devs
```

The `show-devs` command lists the system devices. You should see the full path name of the `qfe` channels, similar to the example below:

```
/sbus@1f,0/SUNW,qfe@1,8c30000
/sbus@1f,0/SUNW,qfe@1,8c20000
/sbus@1f,0/SUNW,qfe@1,8c10000
/sbus@1f,0/SUNW,qfe@1,8c00000
```

### 2. Type:

```
ok nvedit
```

### 3. Type the following, spaces and quotation marks included, pressing the Return key at the end of all but the last line.

```
0: probe-all install-console banner
1: cd <full path to channel 1>
2: " qfe" nameprop
3: device-end
4: cd <full path to channel 2>
5: " qfe" nameprop
6: device-end
7: cd <full path to channel 3>
8: " qfe" nameprop
```

```
9: device-end
10: cd <full path to channel 4>
11: " qfe" nameprop
12: device-end
```

**4. Press the Control-C keys after typing the final device-end.**

**5. At the ok prompt, type:**

```
ok nvstore
ok reset-all
```

Your system will reset and the banner will appear.

**6. Press the Stop-A keys to get to the ok prompt.**

**7. At the ok prompt, type show-devs to list your system devices and verify that the name property was changed correctly.**

You should see the full path name of the qfe device, *excluding* SUNW prior to qfe, similar to the example below:

```
/sbus@1f,0/qfe@1,8c30000
/sbus@1f,0/qfe@1,8c20000
/sbus@1f,0/qfe@1,8c10000
/sbus@1f,0/qfe@1,8c00000
```

---

## Rebooting the System

After you have examined the network activity, perform a reconfiguration boot on your system so the operating environment can recognize the Sun Quad FastEthernet SBus adapter.

**1. Perform a reconfiguration boot on the system.**

```
ok boot -r
```

Refer to the *Solaris 2.x Peripheral's Handbook* for more information.





## Using the Sun Quad FastEthernet Driver Software

---

This chapter describes how to install and configure the Sun Quad FastEthernet driver software.

---

### Installing the Driver Software

The *Sun Quad FastEthernet 2.0* CD-ROM contains the software required by the Sun Quad FastEthernet SBus adapter. Install the software driver packages as described in the CD insert.

Before you can use the four channels of the adapter, you will need to create and edit system host files, as described in the “Host File Configuration” on page 11” section.

---

### Host File Configuration

After installing the Sun Quad FastEthernet driver software, you must create a `hostname.qfe<num>` file for the adapter’s Ethernet interfaces. You must also create both an IP address and a host name for its Ethernet interfaces in the `/etc/hosts` file.

To prepare your system for the Sun Quad FastEthernet SBus adapter:

1. **At the command line, use the `grep` command to search the `/etc/path_to_inst` file for `qfe` devices.**

```
# grep qfe /etc/path_to_inst
"/sbus@1f,0/SUNW,qfe@1,8c10000" 2 "qfe"
"/sbus@1f,0/SUNW,qfe@1,8c00000" 1 "qfe"
"/sbus@1f,0/SUNW,qfe@1,8c30000" 4 "qfe"
"/sbus@1f,0/SUNW,qfe@1,8c20000" 3 "qfe"
```

In the example above, the four SUNW,qfe@1 instances are from a Sun Quad FastEthernet SBus adapter installed in slot 1. For clarity, the instance numbers are bold.

**2. Create an /etc/hostname.qfe<num> file, where <num> corresponds to the instance number of each interface you plan to use.**

If you wanted to use all of the adapter's interfaces in Step 1 on page 11's example, you would need to create four files:

Filename	Instance Number	Adapter Ethernet Channel (See Figure 1-2)
/etc/hostname.qfe1	1	0
/etc/hostname.qfe2	2	1
/etc/hostname.qfe3	3	2
/etc/hostname.qfe4	4	3

- Do not create /etc/hostname.qfe<num> files for Sun Quad FastEthernet SBus adapter channels you plan to leave unused.
- The /etc/hostname.qfe<num> file must contain the hostname for the appropriate network interface.
- The host name should have an IP address and should be entered in the /etc/hosts file.
- The host name should be different from any other host name of any other interface, for example: /etc/hostname.le0 and /etc/hostname.qfe0 cannot share the same host name.

Using the instance examples in Step 1 on page 11, the following example shows the six /etc/hostname.qfe<num> files required for a system called zardoz that has an onboard FastEthernet device (zardoz) and a Sun Quad FastEthernet SBus adapter (zardoz-11, zardoz-12, zardoz-13, and zardoz-14).

```
# cat /etc/hostname.hme0
zardoz
# cat /etc/hostname.qfe1
zardoz-11
# cat /etc/hostname.qfe2
```

```
zardoz-12
# cat /etc/hostname.qfe3
zardoz-13
# cat /etc/hostname.qfe4
zardoz-14
```

**3. Create an appropriate entry in the `/etc/hosts` file for each active `qfe` channel.**

Using the example in Step 1 on page 11, you will have:

```
# cat /etc/hosts
...
127.0.0.1    localhost
129.144.10.57 zardoz    loghost
129.144.11.83 zardoz-11
129.144.12.41 zardoz-12
129.144.13.67 zardoz-13
129.144.14.30 zardoz-14
```

**4. Reboot your system.**

See the “Booting the System” on page 13” section for more information.

---

## Booting the System

The following sections discuss various ways of booting a system containing the Sun Quad FastEthernet SBus adapter. Refer to the *Solaris 2.x Handbook for SMCC Peripherals* manual or your Solaris documentation for more information about booting your system.

### Booting From the Network

To use a Sun Quad FastEthernet SBus adapter ethernet interface as the boot device for Solaris 2.5, 2.5.1, or 2.5.1 Hardware: 4/97 systems, perform the following tasks:

**1. At the `ok` prompt type:**

```
ok show-devs
```

The `show-devs` command lists the system devices. You should see the full path name of the `qfe` devices, similar to the example below:

```
/sbus@1f,0/SUNW,qfe@1,8c30000
/sbus@1f,0/SUNW,qfe@1,8c20000
```

```
/sbus@1f,0/SUNW,qfe@1,8c10000
/sbus@1f,0/SUNW,qfe@1,8c00000
```

If your system is running the Solaris 2.4 operating environment, make sure that you have changed device names from `SUNW,qfe` to `qfe`. See “Changing the Device Names on Solaris 2.4 Systems” on page 8 for more information.

---

**Note** - You need to select only one of these `qfe` devices for booting.

---

**2. At the `ok` prompt type:**

```
ok boot (full path name of the
qfe device)
```

## Booting a Diskless Client System

In order to boot a diskless client with a local Sun Quad FastEthernet SBus adapter interface (`qfe`), the following tasks must be performed on the boot server.

**1. Go to your client’s root partition by typing the following:**

```
# cd /export/root/<client name>/etc
```

**2. Search the `name_to_major` file for Quad FastEthernet (`qfe`) entries.**

```
# grep qfe name_to_major
```

If this file already has a Quad FastEthernet (`qfe`) entry, skip to Step 4 on page 14.

**3. If the `name_to_major` file does not contain a Quad FastEthernet (`qfe`) entry, use a text editor to add an entry for the Sun Quad FastEthernet SBus adapter device (`qfe`).**

If the major device number for the last file entry is  $n$ , use  $n+1$  for the `qfe` channel major device number. As shown in the example below, if the last entry for the major device number is 108, use 109 for the `qfe` device.

```
. . .
llcl 107
audiocs 108
qfe 109
```

**4. Check the `driver_aliases` file for the `qfe` line required by the adapter.**

```
# grep 'SUNW,qfe qfe' driver_aliases
```

If this line already exists in the `driver_aliases` file, you can skip to Step 6 on page 15. Otherwise, you will need to add this line to the file before installing the adapter.

5. Using a text editor, add the following line to the end of the `driver_aliases` file.

```
SUNW,qfe qfe
```

6. Insert and mount the *Sun Quad FastEthernet 2.0* CD-ROM.

- If your system is running Volume Manager, it should automatically mount the CD-ROM to the `/cdrom/sun_quadfast_2_0` directory.
- If your system is not running Volume Manager, mount the CD-ROM as follows:

```
# mkdir -p /cdrom/sun_quadfast_2_0
# mount -F hfs -r /dev/dsk/c0t6d0s2 /cdrom/sun_quadfast_2_0
```

7. Copy the `qfe` driver from the CD-ROM to the client's root partition.

In the steps below, replace `DIR` with the directory where the Solaris software is located on the client system.

- a. For the Solaris 2.4 operating system, type:

```
# cp /cdrom/sun_quadfast_2_0/Sol_2.4/SUNWqfed/reloc/kernel/drv/qfe \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

- b. For the Solaris 2.5 operating system, type:

```
# cp /cdrom/sun_quadfast_2_0/Sol_2.5/SUNWqfed/reloc/kernel/drv/qfe \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

- c. For the Solaris 2.5.1 operating system, type:

```
# cp /cdrom/sun_quadfast_2_0/Sol_2.5.1/SUNWqfed/reloc/kernel/drv/qfe \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

- d. For the Solaris 2.5.1 Hardware: 4/97 operating system, type:

```
# cp /cdrom/sun_quadfast_2_0/Sol_2.5.1_hw_497/SUNWqfed/reloc/kernel/drv/qfe \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

8. Unmount and eject the CD-ROM as follows:

```
# cd /
# umount /cdrom
# eject cdrom
```

**9. Create a `hostname.qfe<num>` file for the client in the `/etc` directory of the client's root partition.**

See "Host File Configuration" on page 11 for more information.

**10. Reboot your system.**

See the section "Booting the System" on page 13 for instructions on how to boot the client system.

---

## Performing a Net-Install of the Solaris Environment Over the `qfe` Interface

### ▼ Updating the Solaris Archive to Use the `qfe` Interface

This section is only applicable if you are installing the Solaris operating environment on a net-install client system *over* the Quad FastEthernet (`qfe`) interface.

---

**Note** - The Solaris CD-ROM cannot be used to perform a net-install since it is a read-only medium. Therefore, the Solaris CD image archive is required so you can update certain software files.

---

**1. Determine the directory where the CD image is located on the boot server.**

For example, if the Solaris software is located within a directory named *DIR*, change to the `/etc` directory of the client's root partition by typing:

```
# cd DIR/export/exec/kvm/<archive_of_arch>/etc
```

**2. Search the `name_to_major` file for Quad FastEthernet (`qfe`) entries.**

```
# grep qfe name_to_major
qfe 119
```

If this file already has a Quad FastEthernet (qfe) entry, skip to Step 4 on page 17.

- 3. If the `name_to_major` file does not contain a FastEthernet (qfe) entry, use a text editor to add an entry for the Sun Quad FastEthernet SBus adapter device (qfe).**

If the major device number for the last file entry is  $n$  then use  $n+1$  for the qfe channel major device number. As shown in the example below, if the last entry for the major device number is 108, use 109 for the qfe device.

```
. . .
audiocs 108
qfe 109
```

- 4. Check the `driver_aliases` file for the qfe line required by the adapter.**

```
# grep 'SUNW,qfe qfe' driver_aliases
```

If this line already exists in the `driver_aliases` file, you can skip to Step 6 on page 17. Otherwise, you will need to add this line to the file before installing the adapter.

- 5. Using a text editor, add the following line to the end of the `driver_aliases` file.**

```
SUNW,qfe qfe
```

- 6. Insert and mount the *Sun Quad FastEthernet 2.0* CD-ROM.**

- If your system is running Volume Manager, it should automatically mount the CD-ROM to the `/cdrom/sun_quadfast_2_0` directory.
- If your system is not running Volume Manager, mount the CD-ROM as follows:

```
# mkdir -p /cdrom/sun_quadfast_2_0
# mount -F hfs -r /dev/dsk/c0t6d0s2 /cdrom/sun_quadfast_2_0
```

- 7. Copy the qfe driver from the CD-ROM to the client's root partition.**

In the steps below, replace `DIR` with the directory where the Solaris CD image is located on the boot server system.

- a. For the Solaris 2.4 operating system, type:**

```
# cp /cdrom/sun_quadfast_2_0/Sol_2.4/SUNWqfed/reloc/kernel/drv/qfe \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

- b. For the Solaris 2.5 operating system, type:**

```
# cp /cdrom/sun_quadfast_2_0/Sol_2.5/SUNWqfed/reloc/kernel/drv/qfe \
DIR/export/exec/kvm/<archive_of_arch>
```

**c. For the Solaris 2.5.1 operating system, type:**

```
# cp /cdrom/sun_quadfast_2_0/Sol_2.5.1/SUNWqfed/reloc/kernel/drv/qfe \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

**d. For the Solaris 2.5.1 Hardware: 4/97 operating system, type:**

```
# cp /cdrom/sun_quadfast_2_0/Sol_2.5.1_hw_497/SUNWqfed/reloc/kernel/drv/qfe \
DIR/export/exec/kvm/<archive_of_arch>/kernel/drv
```

**8. Unmount and eject the CD-ROM as follows:**

```
# cd /
# umount /cdrom
# eject cdrom
```

**9. On the client system, perform the tasks listed in the section “Booting the System” on page 13.**

**10. Complete the Solaris client installation.**

Refer to your Solaris documentation for detailed instructions.

**11. Install the software drivers from the *Sun Quad FastEthernet 2.0* CD-ROM that came with the Sun Quad FastEthernet SBus adapter.**

See “Installing the Driver Software” on page 11 for more information.

**12. Reboot the system.**

Refer to the *Solaris 2.x Peripheral's Handbook* for more information.

---

## Installing the Solaris Environment on a System with the Sun Quad FastEthernet SBus Adapter

After installing the Solaris environment on your system, you must install the Sun Quad FastEthernet software drivers *before* you reboot the system.



- 1. Complete the Solaris client installation.**

Refer to your Solaris documentation for detailed instructions.

---

**Note** - After you have installed the Solaris operating environment, you must reinstall the Sun Quad FastEthernet Driver Software before rebooting.

---

- 2. Install the software drivers from the Sun Quad FastEthernet Driver Software CD-ROM that came with the Sun Quad FastEthernet SBus adapter.**

See “Installing the Driver Software” on page 11 for more information.

- 3. Reboot the system.**

Refer to the *Solaris 2.x Peripheral's Handbook* for more information.

---

## Post-Installation Procedures (Optional)

Perform the tasks in the following sections to verify and customize the performance of the Sun Quad FastEthernet SBus adapter.

### Configuring Driver Parameters

The `qfe` device driver, which is loaded from the CD-ROM, controls the `SUNW,qfe` Ethernet devices. The device driver automatically selects the link speed using the auto-negotiation protocol with the link partner (see “Auto-Negotiation” on page 21).

You can manually configure the `qfe` device driver parameters to customize each `SUNW,qfe` device in your system in one of three ways:

- Configure the `qfe` driver parameters generally for all `SUNW,qfe` devices in the system by entering the parameter variables in the `/etc/system` file.
- Set a parameter on a per-device basis by creating the `qfe.conf` file in the `/kernel/drv` directory.
- Use the `ndd` utility to *temporarily* change a parameter. This change is lost when you reboot the system.

See Appendix C” for more information.

# Increasing TCP/IP Performance

The TCP/IP performance of the Sun Quad FastEthernet SBus adapter can be increased by changing the TCP high water mark to 64K. This can be done with the `ndd` utility as follows.

## 1. As superuser (root), type:

```
# ndd -set /dev/tcp tcp_xmit_hiwat 65535
# ndd -set /dev/tcp tcp_recv_hiwat 65535
# ndd -set /dev/tcp tcp_cwnd_max 65535
```

The changes take effect immediately and affect all the networking interfaces in the system.

# Forcing Network Speed Between 10 Mbps and 100 Mbps

## 1. At the `ok` prompt, use the `show-devs` command to list the system devices.

You should see the full path names of the `qfe` devices, similar to the example below:

```
/sbus@1f,0/SUNW,qfe@1,8c30000
/sbus@1f,0/SUNW,qfe@1,8c20000
/sbus@1f,0/SUNW,qfe@1,8c10000
/sbus@1f,0/SUNW,qfe@1,8c00000
```

## 2. Type:

```
ok nvedit
```

## 3. Type the following, pressing the Return key at the end of line 0:

```
0: probe-all install-console banner
1: apply transfer-speed=10 (full path name of a
qfe device)
```

---

**Note** - If you already have a `nvrामrc` script, append these lines to it.

---

## 4. Press the Control-C keys after typing (*full path name of a `qfe` device*).

---

**Note** - In the above two steps, the speed is forced to 10 Mbps. To force the speed to 100 Mbps, replace 10 with 100.

---

You will need to perform Steps 2 to 4 to set the network speed for each `qfe` channel.

**5. At the `ok` prompt type:**

```
ok nvstore
ok setenv use-nvramrc? true
```

**6. Reboot your system.**

See Appendix C” for more information on forcing network speed.

## Auto-Negotiation

A key feature of the Sun Quad FastEthernet SBus adapter is auto-negotiation. The *auto-negotiation* protocol, as specified by the 100BASE-T standard, selects the operation mode (half-duplex or full-duplex), and the auto-sensing protocol selects the speed (10 Mbps or 100 Mbps) for the adapter.

The link speed and modes supported by the Sun Quad FastEthernet SBus 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 Sun Quad FastEthernet SBus 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 auto-negotiation, it will advertise its capabilities over the link. The common highest priority mode supported by both sides will be selected automatically for the link operation.

If the adapter is connected to a system or interface that supports auto-negotiation, the adapter will operate at full-duplex mode. If the adapter is connected to a system or interface that does not support auto-negotiation, the auto-sensing protocol will select the speed and the adapter will operate in half-duplex mode. If you have disabled the auto-negotiation protocol on your system, the auto-sensing protocol will

select the speed and the adapter will operate in full-duplex mode (unless you have forced the adapter to operate in half-duplex mode).

If the Sun Quad FastEthernet SBus adapter is connected to a link partner with which the auto-negotiation protocol fails to operate successfully, you can configure the device to not use this protocol and force the driver to set up the link in the mode and speed of your choice.

## local-mac-address Property

Each of the network interfaces of the Sun Quad FastEthernet SBus adapter have been assigned a unique MAC (Media Access Control) address, which represents the 48-bit ethernet address for that channel. The OpenBoot firmware reports this MAC address via 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 it. In future versions of the operating system, you will be able to use a channel's MAC address 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 Sun Quad FastEthernet SBus adapter, set the NVRAM configuration variable `local-mac-address?` to `true`.

```
ok setenv local-mac-address? true
```

## Specifications

---

---

### Physical Dimensions

TABLE A-1 Physical Dimensions

Dimension	Measurement
Length	5.776 in. (146.71 mm)
Width	3.3 in. (83.82 mm)
Weight	4.3 oz. (125g)

---

### Power Requirements

**TABLE A-2** 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

## Environmental Specifications

**TABLE A-3** Environmental Specifications

Condition	Operating Specification	Storage Specification
Temperature	0 to 70C (+32 to +131F)	-40 to 75C (-40 to +167F)
Relative Humidity	5 to 85% non-condensing (40C, wet bulb temperature)	0 to 95% non-condensing 40C /hour
Altitude	-1000 to +15,000 ft.	-1000 to +50,000 ft.
Shock	5g, 1/2 sine wave, 11 msec	30g, 1/2 sine wave, 11 msec
Vibration, pk to pk displacement	0.005 in. max. (5 to 32 Hz)	0.1 in. max (5 to 17 Hz)
Vibration, peak acceleration	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/ min.)	1.0g (5 to 500 Hz) (Sweep Rate = 1 octave/ min.)

---

# Performance Specifications

TABLE A-4 Performance Specifications

Specification	Performance
Maximum Ethernet Transfer Rate	10/100 Mbps per channel
Host Interface	IEEE 1496 SBus master interface with support for 64-bit mode accesses, and an SBus slave interface, at 32-bit mode only.
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
SBus Burst Sizes	16/32/64 bytes
SBus Parity	Yes
SBus Clock	25 MHz max., 16.67 MHz min.
Max SBus Burst Transfer Rate	67 (25 MHz), 44.89 (16.67 MHz) Mbytes/sec <sup>1</sup>
Steady State SBus Transfer Rate	50 Mbytes/sec <sup>2</sup>
Max Ethernet Transfer Rate	12.5 Mbytes/sec per channel
SBus Data/Address Lines	D (31:0)/PA (18:0)
SBus Modes	Master/Slave
Capacitance per SBus Signal Line	<= 20 pF
SBus Version	Conforms to IEEE 1496

<sup>1</sup> Assumes 64 Byte Burst and 0 SBus Latency

<sup>2</sup> 4 Channels Running At Max Ethernet Speed

---

**TABLE A-4** Performance Specifications *(continued)*



# Interface Signals

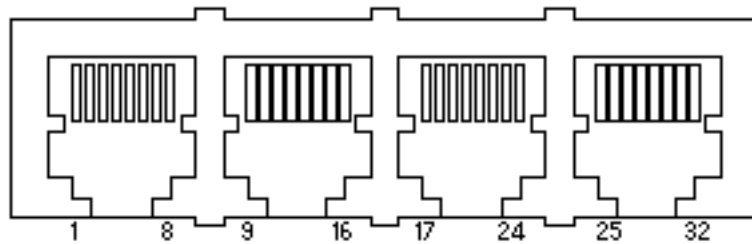


Figure B-1 32-Pin RJ-45 Connectors

TABLE B-1 Pin Descriptions for 32-Pin RJ-45 Connector: Channels 0 - 3

Description	CH0	CH1	CH2	CH3
TD+	1	9	17	25
TD-	2	10	18	26
RD+	3	11	19	27
Not Used	4	12	20	28
Not Used	5	13	21	29
RD-	6	14	22	30
Not Used	7	15	23	31
Not Used	8	16	24	32

**TABLE B-1** Pin Descriptions for 32-Pin RJ-45 Connector: Channels 0 - 3 *(continued)*

## Configuring the Quad FastEthernet Device Driver Parameters

---

The `qfe` device driver controls the Sun Quad FastEthernet SBus adapter's `SUNW,qfe` Ethernet devices. You can manually configure the `qfe` device driver parameters to customize each `SUNW,qfe` device in your system. This appendix provides an overview of the internal transceiver used in the adapter, lists the available `qfe` device driver parameters, and describes how you can configure these parameters.

---

### Internal Transceiver

The four `SUNW,qfe` channels provide 10BASE-TX or 100BASE-T networking interfaces using the Fast Ethernet Parallel Port SCSI (FEPS) ASIC and an internal transceiver. The driver automatically sets the link speed to 10 or 100 Mbps and conforms to the 100BASE-T IEEE 802.3u Ethernet standard. The FEPS ASIC provides the SBus interface and Media Access Control (MAC) functions. The internal transceiver, which connects to an RJ-45 connector, provides the physical layer functions.

The internal transceiver is capable of all the operating speeds and modes listed in the section “Auto-Negotiation” on page 21. The internal transceiver performs auto-negotiation with the remote end of the link (link partner) to select a common mode of operation.

The internal transceiver also supports a forced mode of operation. You can select the speed and mode using the `ndd` utility, by editing the `/etc/system` file, or creating a `qfe.conf` file.

# Driver Parameter Values and Definitions

This section describes the parameters and settings for the `qfe` device driver. Table C-1 lists these parameters.

**TABLE C-1** `qfe` Driver Parameter, Status, and Descriptions

<b>Parameter</b>	<b>Status</b>	<b>Description</b>
<code>transceiver_inuse</code>	Read only	Defines the current status
<code>link_status</code>	Read only	Defines the current status
<code>link_speed</code>	Read only	Defines the current status
<code>link_mode</code>	Read only	Defines the current status
<code>ipg1</code>	Read and write	Inter-packet gap parameter
<code>ipg2</code>	Read and write	Inter-packet gap parameter
<code>use_int_xcvr</code>	Read and write	Operational mode parameter
<code>pace_size</code>	Read and write	Operational mode parameter
<code>adv_autoneg_cap</code>	Read and write	Operational mode parameter
<code>adv_100fdx_cap</code>	Read and write	Operational mode parameter
<code>adv_100hdx_cap</code>	Read and write	Operational mode parameter
<code>adv_10fdx_cap</code>	Read and write	Operational mode parameter
<code>adv_10hdx_cap</code>	Read and write	Operational mode parameter
<code>autoneg_cap</code>	Read only	Local transceiver auto negotiation capability
<code>100fdx_cap</code>	Read only	Local transceiver capability of the hardware

**TABLE C-1** qfe Driver Parameter, Status, and Descriptions *(continued)*

<b>Parameter</b>	<b>Status</b>	<b>Description</b>
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 auto negotiation 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

## Defining the Current Status

The read-only parameters described in Table C-2 explain the operational mode of the interface. These parameters define the current status.

**TABLE C-2** Read-Only Parameters Defining the Current Status

Parameter	Values	Description
link_status	0	Current link status
	1	= Link down = Link up
link_speed	0	Valid only if the link is up
	1	= 10 Mbps = 100 Mbps
link_mode	0	Valid only if the link is up
	1	= Half duplex = Full duplex

## Inter-Packet Gap Parameters

The Fast Ethernet Parallel Port SCSI (FEPS) ASIC supports the programmable Inter-Packet 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 auto-negotiation protocol, is 10 Mbps. When the link speed is 100 Mbps, the total IPG is 0.96 microseconds.

Table C-3 lists the default values and allowable values for the inter-packet gap (IPG) parameters `ipg1` and `ipg2`.

**TABLE C-3** Read-Write Inter-Packet Gap Parameter Values and Descriptions

Parameter	Values (Byte-time)	Description
<code>ipg1</code>	0, 255	<code>ipg1</code> = 8 (default at initialization)
<code>ipg2</code>	0, 255	<code>ipg2</code> = 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 machines seem to be slow in accessing the network, increase the values of `ipg1` and `ipg2` to match the longer IPGs of other machines.

## Defining an Additional Delay Before Transmitting a Packet Using `lance_mode` and `ipg0`

The Fast Ethernet Parallel Port SCSI (FEPS) ASIC supports a programmable mode called `lance_mode`. The `ipg0` parameter is associated with `lance_mode`.

After a packet is received with `lance_mode` enabled (default) an additional delay is added by setting the `ipg0` parameter 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 delay set by `ipg0` helps to reduce collisions. Systems that have `lance_mode` enabled might not have enough time on the network.

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.

You can add the additional delay by setting the `ipg0` parameter 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, nibble time is equal to 40 ns.

For example, if the link speed is 10 Mbps, and you set `ipg0` to 20 nibble times, multiply 20 by 400 ns to get 800 ns. If the link speed is 100 Mbps, and you set `ipg0` to 30 nibble-times, multiply 30 by 40 ns to get 120 ns.

Table C-4 defines the `lance_mode` and `ipg0` parameters.

TABLE C-4 Parameters Defining `lance_mode` and `ipg0`

Parameter	Values	Description
<code>lance_mode</code>	0	<code>lance_mode</code> disabled
	1	<code>lance_mode</code> enabled (default)
<code>ipg0</code>	0-31 <sup>1</sup>	Additional IPG before transmitting a packet (after receiving a packet)

1. The default value is 16 nibble-times, which is 6.4 microseconds for 10 Mbps and 0.64 microseconds for 100 Mbps.

# Operational Mode Parameters

Table C-5 describes the operational mode parameters and their default values.

**TABLE C-5** Operational Mode Parameters

Parameter	Values	Description
adv_autoneg_cap	0 1	Local transceiver capability advertised by the hardware = Forced mode = Auto-negotiation (default)
adv_100fdx_cap	0 1	Local transceiver capability advertised by the hardware; read/write parameter = Not 100Mbit/sec full-duplex capable (default in the Solaris 2.5 and 2.5.1 software environments) = 100Mbit/sec full-duplex capable (default in the Solaris 2.6 software environment)
adv_100hdx_cap	0 1	Local transceiver capability advertised by the hardware; read/write parameter = Not 100Mbit/sec half-duplex capable = 100Mbit/sec half-duplex capable (default)
adv_10fdx_cap	0 1	Local transceiver capability advertised by the hardware; read/write parameter = Not 10Mbit/sec full-duplex capable (default) = 10Mbit/sec full-duplex capable
adv_10hdx_cap	0 1	Local transceiver capability advertised by the hardware; read/write parameter = Not 10Mbit/sec half-duplex capable = 10Mbit/sec half-duplex capable (default)

1. The priority (in descending order) for these parameters is: adv\_100fdx\_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 C-6) defines the maximum number of back-to-back packets you can transmit at one time. If the value is zero, there is no limit to the number of back-to-back packets that can be transmitted.

TABLE C-6 Back-to-back Packet Transmission Capability

Parameter	Values	Description
<code>pace_size</code>	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)

## Reporting Transceiver Capabilities

Table C-7 describes the read-only transceiver capabilities. These parameters define the capabilities of the hardware. The internal transceiver can support all of these capabilities.

TABLE C-7 Read-Only Transceiver Capabilities

Parameter	Description
<code>autoneg_cap</code>	Local transceiver capability of the hardware 0 Not capable of auto-negotiation 1 = Auto negotiation capable
<code>100fdx_cap</code>	Local transceiver capability of the hardware; initialized at startup = Not 100Mbit/sec full-duplex capable 1 = 100Mbit/sec full-duplex capable
<code>100hdx_cap</code>	Local transceiver capability of the hardware; initialized at startup 0 Not 100Mbit/sec half-duplex capable 1 = 100Mbit/sec half-duplex capable

**TABLE C-7** Read-Only Transceiver Capabilities *(continued)*

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

## Reporting the Link Partner Capabilities

Table C-8 describes the read-only link partner capabilities.

**TABLE C-8** Read-Only Link Partner Capabilities

Parameter	Values	Description
lp_autoneg_cap	0 1	= No auto-negotiation = Auto-negotiation
lp_100fdx_cap	0 1	= No 100Mbit/sec full-duplex transmission = 100Mbit/sec full-duplex
lp_100hdx_cap	0 1	= No 100Mbit/sec half-duplex transmission = 100Mbit/sec half-duplex
lp_10fdx_cap	0 1	= No 10Mbit/sec full-duplex transmission = 10Mbit/sec full-duplex
lp_10hdx_cap	0 1	= No 10Mbit/sec half-duplex transmission = 10Mbit/sec half-duplex

If the link partner is not capable of auto-negotiation (when `lp_autoneg_cap` is 0) the information described in Table C-8 is not relevant and the parameter value = 0.

If the link partner is capable of auto-negotiation (when `lp_autoneg_cap` is 1) then the speed and mode information is displayed when you use auto-negotiation and get the link partner capabilities.

---

## Setting `qfe` Driver Parameters

You can set the `qfe` device driver parameters in three ways (`ndd`, `/etc/system`, and `qfe.conf`), depending on your needs. To set parameters that are valid until you reboot the system, use the `ndd` utility. Using `ndd` is a good way to test parameter settings.

To set parameters so they remain in effect after you reboot the system:

- Add the parameter values to the `/etc/system` file when you want to configure parameters for all devices in the system.
- Create a `/kernel/drv/qfe.conf` file and add parameter values to this file when you need to set a particular parameter for a device in the system.

## Setting Parameters Using the `ndd` Utility

Use the `ndd` utility to configure parameters that are valid until you reboot the system. The `ndd` utility supports any networking driver, which implements the Data Link Provider Interface (DLPI).

The following sections describe how you can use the `qfe` driver and 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 get or set a parameter for a `qfe` device, you must specify the device instance for the utility since there will be at least four `SUNW,qfe` devices.

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

1. Check the `/etc/path_to_inst` file to identify the instance associated with a particular device.

```
# grep qfe /etc/path_to_inst
"/sbus@1f,0/SUNW,qfe@1,8c10000" 2 "qfe"
```

```
"/sbus@1f,0/SUNW,qfe@1,8c00000" 1 "qfe"  
"/sbus@1f,0/SUNW,qfe@1,8c30000" 4 "qfe"  
"/sbus@1f,0/SUNW,qfe@1,8c20000" 3 "qfe"
```

In the example above, the four `SUNW,qfe@x,1` instances are from a Sun Quad FastEthernet SBus adapter installed in slot 1. For clarity, the instance numbers are bold.

## 2. Use the instance number to select the device.

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

The device remains selected until you change the selection.

## Non-Interactive and Interactive Modes

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

- Non-interactive
- Interactive

In non-interactive mode, you invoke the utility to execute a specific command. Once the command is executed, you exit the utility. In interactive mode, you can use the utility to get or set more than one parameter value. (Refer to the `ndd (1M)` man page for more information.)

### *Using the ndd Utility in Non-Interactive Mode*

This section describes how to modify and to display parameter values.

#### 1. To modify a parameter value, use the `-set` option.

If you invoke the `ndd` utility with the `-set` option, the utility passes *value*, which must be specified down to the named `/dev/qfe` driver instance, and assigns it to the parameter:

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

#### 1. To display the value of a parameter, specify the parameter name (and omit the value).

When you omit the `-set` option, a query operation is assumed and the utility queries the named driver instance, retrieves the value associated with the specified parameter, and prints it:

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

## Using the `ndd` Utility in Interactive Mode

1. To modify a parameter value in interactive mode, specify `ndd /dev/qfe`, as shown below.

The `ndd` utility then prompts you for the name of the parameter:

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

After entering the parameter name, the `ndd` utility prompts you for the parameter value (see Table C-1 through Table C-8).

1. To list all the parameters supported by the `qfe` driver, type `ndd /dev/qfe \?`. (See Table C-1 through Table C-8 for parameter descriptions.)

```
# 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)  
#
```

## Setting Forced Mode

This section describes how to set forced mode (not capable of auto-negotiation).

## ▼ To Select One Local Transceiver Capability and Setting Forced Mode

1. **Select one of the following capabilities:** `adv_100fdx_cap`, `adv_100hdx_cap`, `adv_10fdx_cap`, **or** `adv_10hdx_cap`, **and set its value to 1.**

If you select more than one of the local transceiver capabilities, the driver selects the one that is highest in the priority order (see the footnote from Table C-5).

2. **Set the local transceiver capabilities advertised by the hardware to forced mode = 0, which is not capable of auto-negotiation:** `adv_autoneg_cap 0`

Use the `ndd` utility as described in “Using the `ndd` Utility in Interactive Mode” on page 39.

## Auto-Negotiation Mode

This section describes how to select at least one of the four local transceiver capabilities and set the mode to auto-negotiation.

## ▼ To Set the Mode to Auto-Negotiation

1. **Select *at least one of the four capabilities*** (`adv_100fdx_cap`, `adv_100hdx_cap`, `adv_10fdx_cap`, `adv_10hdx_cap`) **that you want to advertise to the remote system, and set its value to 1.**

2. **Set the local transceiver capabilities advertised by the hardware to 1, the auto-negotiation setting:** `adv_autoneg_cap 1`

Use the `ndd` utility as described in “Using the `ndd` Utility in Interactive Mode” on page 39.

---

## Setting Parameters in the `/etc/system` File

To configure the `qfe` driver parameters for all `SUNW,qfe` devices in the system so that the parameter variables are always effective (even after rebooting the system), enter the parameter variables in the `/etc/system` file. When you reboot the system,

the system reads the `/etc/system` file and sets these parameter variables in the `qfe` module in the operating system kernel.

Table C-9 lists the variables you can set in the `/etc/system` file.

**TABLE C-9** Setting Variables in the `/etc/system` File

Parameter	Variable
<code>ipg1</code>	<code>qfe_ipg1</code>
<code>ipg2</code>	<code>qfe_ipg2</code>
<code>use_int_xcvr</code>	<code>qfe_use_int_xcvr</code>
<code>pace_size</code>	<code>qfe_pace_size</code>
<code>adv_autoneg_cap</code>	<code>qfe_adv_autoneg_cap</code>
<code>adv_100fdx_cap</code>	<code>qfe_adv_100fdx_cap</code>
<code>adv_100hdx_cap</code>	<code>qfe_adv_100hdx_cap</code>
<code>adv_10fdx_cap</code>	<code>qfe_adv_10fdx_cap</code>
<code>adv_10hdx_cap</code>	<code>qfe_adv_10hdx_cap</code>
<code>lance_mode</code>	<code>qfe_lance_mode</code>
<code>ipg0</code>	<code>qfe_ipg0</code>

These parameter values, described in “Driver Parameter Values and Definitions” on page 30, are applicable to all `SUNW,qfe` devices on the system. See Table C-1 through Table C-8 for the descriptions of these parameters.

Here’s an example of setting parameters in a `/etc/system` file:

## ▼ Setting the ipg1 and ipg2 Parameters in the /etc/system File

1. Become superuser.
2. Add the following lines to the `/etc/system` file:

```
set qfe:qfe_ipg1 = 10
set qfe:qfe_ipg2 = 5
```

3. Save the `/etc/system` file.
4. Save all files and exit all programs, then exit the windowing system.
5. Reboot the system by typing `init 6` at the superuser prompt.

---

## Setting Parameters Using the `qfe.conf` File

You can also specify the properties described in the section, “Setting Parameters in the `/etc/system` File” on page 40,” on a per-device basis by creating a `qfe.conf` file in the `/kernel/drv` directory. The properties set in the `qfe.conf` file will override the parameters set in the `/etc/system` file. Use a `qfe.conf` file when you need to set a particular parameter for a device in the system. The parameters you set are read and write parameters that are listed in “Driver Parameter Values and Definitions” on page 30.

The man pages for `prtconf` (1M), `system` (4) and `driver.conf` (4) include additional details. The next section shows an example of setting parameters in a `qfe.conf` file.



# Setting ipg Driver Parameters Using a qfe.conf File

1. Invoke the `prtconf -v` command and pipe the output to the `more` command (`prtconf -v | more`) or redirect the output of the command to a file name (`prtconf -v > filename`) and print the redirected file.
2. Find the section in the `prtconf -v` output for `SUNW,qfe,instance #0`, or `SUNW,qfe,instance #1`, and so on.

The output for `SUNW,qfe,instance #0` for a Sun Ultra 1 Creator Series system follows:

```
SUNW,qfe, instance #0
  Driver software properties:
    name <pm_norm_pwr> length <4>
    value <0x00000001>.
    name <pm_timestamp> length <4>
    value <0x30743b26>.
  Register Specifications:
    Bus Type=0xe, Address=0x8c00000, Size=108
    Bus Type=0xe, Address=0x8c02000, Size=2000
    Bus Type=0xe, Address=0x8c04000, Size=2000
    Bus Type=0xe, Address=0x8c06000, Size=2000
    Bus Type=0xe, Address=0x8c07000, Size=20
```

3. Become superuser.
4. Create the `qfe.conf` file in the `/kernel/drv` directory using a text editor and add lines similar to the following to the file:
  - a. Specify `name="qfe"` and `class="sbus"`.
  - b. Use the `reg` property to specify the device, `0xe` in this case. Use the value following `Bus Type` in the `prtconf -v` output.
  - c. Type the addresses followed by the specified sizes. Precede each size with `0x` and leading zeros, as indicated in the following screen.
  - d. Set `ipg1` and `ipg2`. Type a semicolon (`;`) after the last value.

These parameters are set to 20 and 10, respectively, in this example. The `ipg` parameters are defined in Chapter 3.

```
name='qfe' class='sbus'
reg=0xe,0x8c00000,0x00000108,0xe,0x8c02000,0x00002000,0xe,
0x8c04000,0x00002000,0xe,0x8c06000,0x00002000,0xe,0x8c07000,
0x00000020
ipg1=20 ipg2=10;
```

5. **Save the `qfe.conf` file.**
6. **Save and close all files and exit all programs; exit the windowing system.**
7. **Halt and reboot the system by typing the `init 6` command at the `#` prompt.**

## Running Diagnostics Tests

---

This appendix describes how to test the Sun Quad FastEthernet SBus adapter by creating a `.usertest` file for the SunDiag<sup>™</sup> system exerciser. There is also a section describing how to test the adapter with its FCode PROM `selftest`.

---

**Note** - To test the Sun Quad FastEthernet SBus adapter on systems running the Solaris 2.5, 2.5.1, or 2.5.1 Hardware: 4/97 operating environments, refer to the *SunVTS User's Guide* that shipped with your operating system. The SunVTS<sup>™</sup> `nettest` diagnostic test automatically probes the network for `qfe` devices, so creating a `.usertest` file is not needed.

---

---

## Using the SunDiag System Exerciser

The SunDiag system exerciser is an on-line diagnostic application that runs hardware tests. It is used primarily with the OpenWindows software interface to enable you to quickly and easily set test parameters while running tests.

---

**Note** - The SunDiag software does not probe for Sun Quad FastEthernet SBus adapter devices by default. For the software to acknowledge a `qfe<num>` channel, the `.usertest` file must be edited (described in "Editing the `.usertest` File" on page 46) before bringing up the SunDiag exerciser.

---

## Editing the .usertest File

1. Log into the system as root (superuser) and change directories to the SunDiag bin directory:

```
# cd /opt/SUNWdiag/bin
```

2. Using a text editor, add the following line to the .usertest file.

```
qfe0, nettest, IF=qfe0 v
```

---

**Note** - The format for .usertest entries is *test label, test name, and command-line arguments*.

---

The example given is for a single qfe0 interface; for multiple channels add an additional line for each channel using qfe1, qfe2, etc.

Because testing the Sun Quad FastEthernet SBus adapter is user defined, default options are not displayed in SunDiag interface. Test options for a qfe<num> channel can be defined in the .usertest file using the command nettest. Type the command nettest without arguments for a list of options, for example:

```
# nettest
Usage: nettest [TARGET=h1+h2...]
[IF=interface] {TEST=0..7} N=nopkts} {P=pattern} [T=seconds]
```

## SunDiag Main Window

To start the SunDiag exerciser, change directories to the SunDiag bin directory (/opt/SUNWdiag/bin) and then type sundiag. After you type the sundiag command, the main SunDiag window is displayed on your screen (see Figure D-1). This window is the primary interface for running the SunDiag system exerciser. Refer to the *SunDiag User's Guide*, which was shipped with the Solaris 2.4 operating environment, for more information about using this window.

The SunDiag main window is divided into four small windows:

- The system status window at the upper-left of the screen displays the status of the tests.
- The performance monitor panel in the upper-middle of the screen displays the performance statistics for the system that is being tested.

- The control panel is located at the right. The panel includes buttons, exclusive choice, toggle, and pop-up menus that allow you to select test parameters and options.
- The console window at the bottom-left displays test messages, and allows you, as a superuser, to use operating system commands.

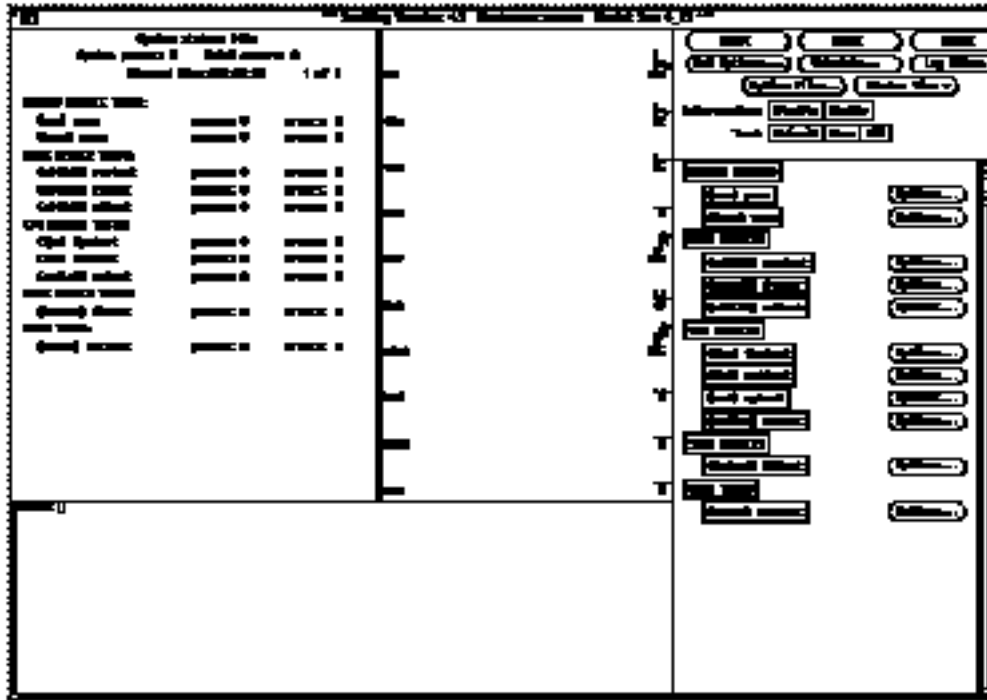


Figure D-1 SunDiag Main Window

## Starting the Test

1. **Review the information in the control panel, which identifies the devices that are available for testing.**  
Click on the device that you want to test — in this case (*USER 0*) *nettest*. Your selection is confirmed with the display of a highlighted box next to the device name.
2. **Click on the Start button.**
3. **Watch the console window for messages.**

4. To interrupt a test or to stop after a test is completed, click on the Stop button.

If no problems are identified during the testing, the Sun Quad FastEthernet SBus adapter is ready for operation in your system. Click the Quit button to exit the SunDiag exerciser.

---

## Using the OpenBoot PROM FCode Selftest

The following tests are available to help identify problems with the Sun Quad FastEthernet SBus adapter if the system does not boot.

You can invoke the FCode `selftest` diagnostics by using the OpenBoot user interface `test` or `test-all` commands. If you encounter an error while running diagnostics, appropriate messages will be displayed. Refer to the appropriate *OpenBoot Command Reference Manual* for more information on the `test` and `test-all` commands.

Selftest exercises most functionality sub-section by sub-section and ensures the following:

- Isolates faulty field replaceable units (FRUs)
- Checks connectivity during adapter card installation
- Verifies that all components required for a system boot are functional

### ▼ Running the Ethernet FCode Selftest Diagnostic

To run the ethernet diagnostics, you must first bring the system to a stop at the OpenBoot prompt after issuing a reset. If you do not reset the system, the diagnostic tests may cause the system to hang.

For more information about the OpenBoot commands in this section, refer to the appropriate *OpenBoot Command Reference* manual.

#### 1. Shut down the system.

Use the standard shut down procedures described in *Solaris 2.x Handbook for SMCC Peripherals*.

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

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

**3. Reset the system.**

Refer to the appropriate *OpenBoot Command Reference* manual for more information.

**4. Type `show-devs` to display the list of devices.**

You should see lines in the list of devices, similar to the example below, specific to the Sun Quad FastEthernet SBus adapter:

```
ok show-devs
. . .
/sbus@1f,0/SUNW,qfe@1,8c30000
/sbus@1f,0/SUNW,qfe@1,8c20000
/sbus@1f,0/SUNW,qfe@1,8c10000
/sbus@1f,0/SUNW,qfe@1,8c00000
. . .
```

In this example, the `SUNW,qfe@1` entries identify the device paths to the four Ethernet channels.

**5. Type the following to put the OpenBoot PROM into diagnostic mode:**

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

**6. Type the following to run the selftest using the `test` command on one of the adapters four Ethernet channels:**

```
ok test <device path>
```

The following tests are run when the `test` command is executed:

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

If the test passes, you will see these messages:

```
Hme register test --- succeeded.
Internal loopback test -- succeeded
Transceiver check -- Using onboard transceiver -- Link up
passed
```

If the channel is not connected to a network, you will see the following error messages:

```
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
```

---

**Note** - To test other channels of the adapter, you will need to execute the `test` command separately on each channel.

---

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

```
ok setenv diag-switch? false
```

**8. Set the `auto-boot?` configuration parameter to `true`.**

```
ok setenv auto-boot? true
```

**9. Reset and reboot the system.**

Refer to the appropriate *OpenBoot Command Reference* manual for more information.



## Regulatory Compliance Statements

---

Your Sun product is marked to indicate its compliance class:

- Federal Communications Commission (FCC) — USA
- Department of Communications (DOC) — Canada
- Voluntary Control Council for Interference (VCCI) — Japan

Please read the appropriate section that corresponds to the marking on your Sun product before attempting to install the product.

---

### FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

---

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

---

*Shielded Cables:* Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted-pair (UTP) cables.

*Modifications:* Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

---

## FCC Class B Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

---

**Note** - This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- 
- Reorient or relocate the receiving antenna.
  - Increase the separation between the equipment and receiver.
  - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
  - Consult the dealer or an experienced radio/television technician for help.

*Shielded Cables:* Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted pair (UTP) cables.

*Modifications:* Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

## DOC Class A Notice - Avis DOC, Classe A

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## DOC Class B Notice - Avis DOC, Classe B

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### VCCI基準について

#### 第一種VCCI基準について

第一種VCCIの表示があるワークステーションおよびオプション製品は、第一種情報装置です。これらの製品には、下記の項目が該当します。

この装置は、第一種情報装置(工業地域において使用されるべき情報装置)で工業地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会(VCCI)基準に適合しております。したがって、本製品を、住宅地域または住宅地域に隣接した地域でご使用になりますと、ラジオ、テレビジョン受信機等に電波障害を与えることがあります。

取り扱い説明書に従って正しくお取り扱いください。

## 第二種VCCI基準について

第二種VCCIの表示  があるワークステーションおよびアプリケーション製品は、第二種情報機器です。これらの製品には、下記の項目が該当します。

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取り扱い説明書に従って正しくお取り扱いください。

---

## Declaration of Conformity

Compliance ID: QFESBUS

Product Name: Sun Quad FastEthernet SBus Adapter

This product has been tested and complies with:

### EMC

#### FCC Class B—USA

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference, including interference that may cause undesired operation.

## European Union—EC

This equipment complies with the following requirements of the EMC Directive 89/336/EEC:

---

EN55022 / CISPR22 (1985)		Class B
EN50082-1	IEC801-2 (1991)	4 kV (Direct), 8 kV (Air)
	IEC801-3 (1984)	3 V/m
	IEC801-4 (1988)	1.0 kV Power Lines, 0.5 kV Signal Lines
EN61000-3-2/IEC1000-3-2(1994)		Pass

---

## Safety

This equipment complies with the following requirements of the Low Voltage Directive 73/23/EEC:

- EN60950/IEC950 (1993)

## Supplementary Information

This product was tested and complies with all the requirements for the CE Mark when connected to a Sun workstation or server.

---

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# Index

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