

## Using the Sun Quad FastEthernet Driver Software

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

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### 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” section.

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### 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's example, you would need to create four files:

Filename	Instance Number	Adapter Ethernet Channel (See FIGURE 1-2 on page 2)
<code>/etc/hostname.qfe1</code>	1	0
<code>/etc/hostname.qfe2</code>	2	1
<code>/etc/hostname.qfe3</code>	3	2
<code>/etc/hostname.qfe4</code>	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, 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, 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” section for more information.

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## 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.

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

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**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.

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. 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 hsfs -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 14 for instructions on how to boot the client system.

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## 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.

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**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.

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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.

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. 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 hsfs -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>/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. On the client system, perform the tasks listed in the section “Booting the System” on page 14.**

**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.

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# 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.

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

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**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.

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## 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 23.)

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 “Configuring the Quad FastEthernet Device Driver Parameters” 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 nvramrc script, append these lines to it.

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

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

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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 “Configuring the Quad FastEthernet Device Driver Parameters” 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
```