

Sun™ Trunking™ 1.0 Installation and User's Guide



THE NETWORK IS THE COMPUTER™

Sun Microsystems Computer Company

A Sun Microsystems, Inc. Business
901 San Antonio Road
Palo Alto, CA 94303-4900 USA
650 960-1300 fax 650 969-9131

Part No.: 805-2348-10
Revision A, October 1997

Copyright 1997 Sun Microsystems, Inc. 2550 Garcia Avenue, Mountain View, California 94043-1100 U.S.A. All rights reserved.

This product or document is protected by copyright and distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd.

Sun, Sun Microsystems, the Sun logo, AnswerBook, SunDocs, and Solaris are trademarks, registered trademarks, or service marks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

RESTRICTED RIGHTS: Use, duplication, or disclosure by the U.S. Government is subject to restrictions of FAR 52.227-14(g)(2)(6/87) and FAR 52.227-19(6/87), or DFAR 252.227-7015(b)(6/95) and DFAR 227.7202-3(a).

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

Copyright 1997 Sun Microsystems, Inc., 2550 Garcia Avenue, Mountain View, Californie 94043-1100 Etatis-Unis. Tous droits réservés.

Ce produit ou document est protégé par un copyright et distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées des systèmes Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd.

Sun, Sun Microsystems, le logo Sun, AnswerBook, SunDocs, et Solaris sont des marques de fabrique ou des marques déposées, ou marques de service, de Sun Microsystems, Inc. aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun™ a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui en outre se conforment aux licences écrites de Sun.

CETTE PUBLICATION EST FOURNIE "EN L'ETAT" ET AUCUNE GARANTIE, EXPRESSE OU IMPLICITE, N'EST ACCORDEE, Y COMPRIS DES GARANTIES CONCERNANT LA VALEUR MARCHANDE, L'APTITUDE DE LA PUBLICATION A REpondre A UNE UTILISATION PARTICULIERE, OU LE FAIT QU'ELLE NE SOIT PAS CONTREFAISANTE DE PRODUIT DE TIERS. CE DENI DE GARANTIE NE S'APPLIQUERAIT PAS, DANS LA MESURE OU IL SERAIT TENU JURIDIQUEMENT NUL ET NON AVENU.



Please
Recycle



Adobe PostScript

Contents

Preface v

- 1. Installing and Configuring the Sun Trunking 1.0 Software** 1
 - Hardware and Software Requirements 1
 - Key Features 2
 - Preparing for the Software Installation 2
 - Removing Previously Installed `qfe` Packages 3
 - Installing the Trunking 1.0 Software 4
 - ▼ To Install the Trunking Software 4
 - Sun Trunking Directories and Files 6
 - Configuring the Trunking Software 6
 - Determining the Instance Numbers of the FastEthernet Channels 7
 - Number of Links per Quad FastEthernet Adapter 9
 - Configuring the Trunking Software Files 10
 - ▼ To Edit the `qfetr.sh` File 10
 - ▼ To Configure the FastEthernet Host Files 12
 - Verifying the Trunking Interfaces 14
 - Disabling the Trunking Interface 16
 - Troubleshooting 17
 - Using the `debug` Command 17

Using the `stats` Command 19

Using the `snoop` Command 20

Using the `conf` Command 21

Getting Help 21

A. Changing Device Names to Use the Quad FastEthernet 2.0 Device Driver 23

- ▼ To Change the `hme` Device Name to Use the `qfe` Device Driver 23

Preface

Sun Trunking 1.0 Installation and User's Guide describes how to install and configure the Trunking 1.0 software. These instructions are designed for an experienced system administrator with networking knowledge.

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 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

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.
AaBbCc123	What you type, when contrasted with on-screen computer output.	% su 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	#

Related Documentation

TABLE P-3 Related Documentation

Application	Title	Part Number
Other	<i>Sun Quad FastEthernet SBus Installation and User's Guide</i>	805-0732-11
Other	<i>Sun Quad FastEthernet PCI Installation and User's Guide</i>	805-1797-10

Ordering Sun Documents

SunDocsSM 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-4 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
United Kingdom	0800-89-88-88	0800-89-88-87
United States	1-800-873-7869	1-800-944-0661

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

Sun Welcomes Your Comments

Please use the *Reader Comment Card* that accompanies this document. We are interested in improving our documentation and welcome your comments and suggestions.

If a card is not available, you can email or fax your comments to us. Please include the part number of your document in the subject line of your email or fax message.

- Email: smcc-docs@sun.com
- Fax: SMCC Document Feedback
1-650-786-6443

Installing and Configuring the Sun Trunking 1.0 Software

Sun™ Trunking™ 1.0 software provides the ability to aggregate up to four 10/100 Mbps Fast Ethernet ports into a single virtual link. Once aggregated, these point-to-point links act as a single “fat pipe” to deliver increased performance to areas of the network that are experiencing congestion.

Hardware and Software Requirements

Before installing the Trunking 1.0 software, make sure your system meets the following hardware and software requirements:

Hardware and Software	Requirements
Hardware Requirements	<ul style="list-style-type: none">• Sun™ Ultra™ Sparc™ system, SPARCserver 1000, SPARCcenter 2000, or Sun Ultra Enterprise™ 3000, 4000, 5000, or 6000 system• Cisco Switch Cat 5000, 5002, or 5500 equipped with Fast EtherChannel module
Software Requirements	<ul style="list-style-type: none">• Solaris 2.5.1, 2.5.1 Hardware: 4/97, and 2.5.1 Hardware: 8/97• 2.3 CAT 5000 Series Software

Key Features

Sun Trunking 1.0 consists of the following key features:

- **Fast Ethernet Links**—The Sun Quad FastEthernet™ network interface card comprises the heart of Sun Trunking 1.0. Combining 100 Mbps performance with the high density of four high-speed 10/100 auto-negotiating Ethernet ports, Quad FastEthernet delivers scalable bandwidth, multi-homing and redundancy solutions in a single-wide interface card.
- **Load balancing**—Sun Trunking 1.0 supports true load balancing and failure recovery capabilities. It distributes traffic, including unicast, broadcast, and multicast traffic, evenly across the aggregated links. In the event of a link failure, Sun Trunking 1.0 automatically redistributes loads across the remaining links.
- **Single MAC address**—Because ports aggregated with Sun Trunking 1.0 share a single, logical MAC address, there is no need to assign individual MAC addresses to aggregated ports.

Preparing for the Software Installation

Before installing the Sun Trunking 1.0 software, you should have already installed either the Sun Quad FastEthernet SBus or PCI adapter. Refer to either *Sun Quad FastEthernet SBus Adapter Installation and User's Guide* or the *Sun Quad FastEthernet PCI Adapter Installation and User's Guide* for those installation instructions.

If you have also installed the driver software that came with it, you will have to remove it before installing the Sun Trunking 1.0 software.

Removing Previously Installed `qfe` Packages

If any `qfe` packages have been previously installed, you must remove them before installing Sun Trunking 1.0 packages.



Caution – If you are using `qfe` as your main network interface, do this de-installation and installation process from the system console *only*. Make sure no users or applications are on the system since a reboot will be necessary.

To remove previously installed packages:

1. At the system console, become superuser.

```
% su
Password: Type in your superuser password
#
```

2. Check to see if any `qfe` packages are currently installed.

```
# pkginfo | grep qfe
```

If no package names appear, you can immediately install the Sun Trunking software. If previous versions of `qfe` are installed, the package names appear. For example, if Sun Quad FastEthernet 2.0 is currently installed, the following output would appear:

```
system      SUNWqfed      Sun Quad FastEthernet Adapter Driver
system      SUNWqfedu     Sun Quad FastEthernet Adapter Driver Headers
```

3. Remove *all* existing `qfe` packages, for example:

```
# pkgrm SUNWqfed SUNWqfedu
```

Installing the Trunking 1.0 Software

The Trunking 1.0 software is composed of three software packages that are distributed on a CD-ROM.

▼ To Install the Trunking Software

Note – If the CD-ROM drive that you are using for software installation is attached to a remote machine, refer to your Solaris installation guide for remote CD-ROM access.

1. **At the system console, become superuser (root).**
2. **Place the CD-ROM in the CD-ROM drive.**
3. **Mount the CD-ROM on a local directory.**

If the Volume Manager (`vold`) is running on your machine, then the CD-ROM is mounted automatically under `/cdrom/sun_trunking_1_0` when it is loaded in the drive.

If the Volume Manager (`vold`) is not running on your machine, create a directory called `/cdrom/sun_trunking_1_0` and mount the CD-ROM manually.

```
# mkdir /cdrom/sun_trunking_1_0
# mount -F hsfs -r /dev/sr0 /cdrom/sun_trunking_1_0
```

4. Install the Sun Trunking 1.0 packages:

```
# cd /cdrom/sun_trunking_1_0/Product
# pkgadd -d .
```

The following then appears indicating the available packages:

```
The following packages are available:
 1 SUNWqfed      Sun Quad FastEthernet Adapter Driver
                   (sparc) 3.0
 2 SUNWqfedu    Sun Quad FastEthernet Adapter Driver Headers
                   (sparc) 3.0
 3 SUNWqfetr    Sun Trunking Utility
                   (sparc) 1.0

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,?,q]:
```

5. Type `all` and press Return to install all software packages.

6. After the installation is complete, verify that the Sun Trunking 1.0 software packages have been installed.

```
# pkginfo | grep qfe
```

The following packages should appear:

```
system      SUNWqfed      Sun Quad FastEthernet Adapter Driver
system      SUNWqfedu    Sun Quad FastEthernet Adapter Driver Headers
applicationSUNWqfetr    Sun Trunking Utility
```

7. After the software has been installed, unmount and eject the CD-ROM.

```
# cd /
# umount /cdrom/sun_trunking_1_0
# eject cdrom
```

8. Add `/etc/opt/SUNWqfetr/bin` to your `$PATH` variable and `/opt/SUNWqfetr/man` to your `$MANPATH` variable.

You should have now successfully installed the Trunking software. Before rebooting your system, however, you must first configure the Trunking software files as described in the next section.

Sun Trunking Directories and Files

FIGURE 1-1 shows the hierarchy of directories and files for Sun Trunking 1.0.

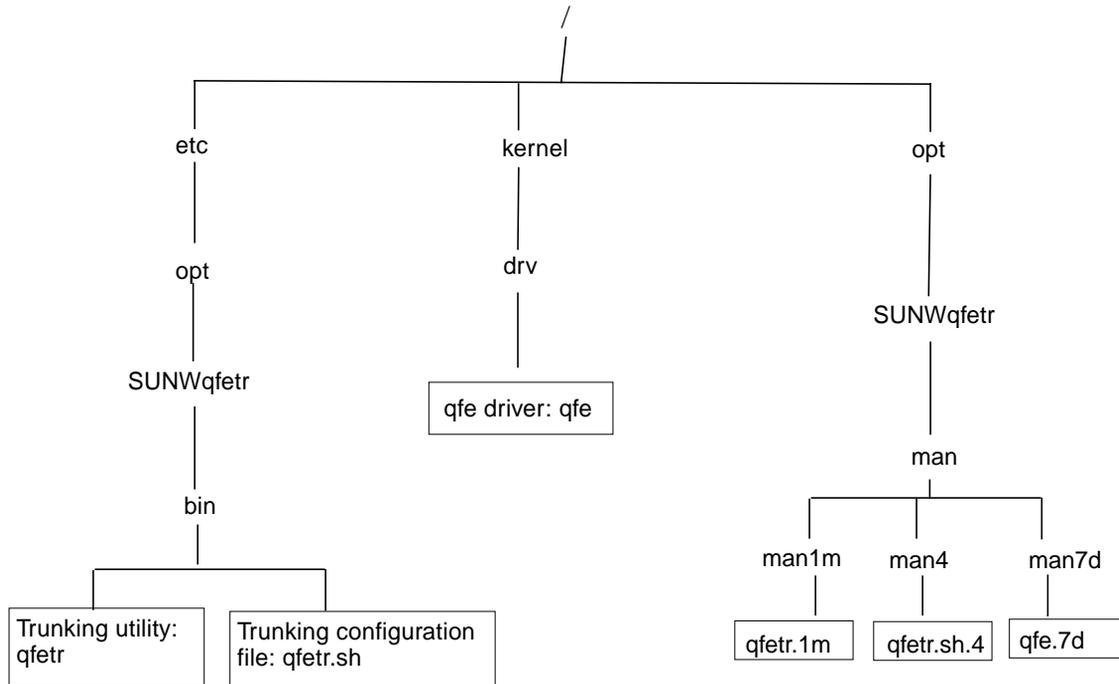


FIGURE 1-1 Sun Trunking 1.0 Directories and Files

Configuring the Trunking Software

Before rebooting your system, you must first edit and create configuration files that will define how you will link the Quad FastEthernet channels. In order to configure these files, you will need to know the following for each Quad FastEthernet adapter:

- The device instance numbers of each FastEthernet channel
- The number of trunks you want per adapter (2 or 4)
- The device instance number for each trunk (optional)
- The trunking policy you want to use: media access control (MAC) or round robin (See TABLE 1-2 on page 10.)

Determining the Instance Numbers of the FastEthernet Channels

There are four channels on each Quad FastEthernet adapter. FIGURE 1-2 shows the four FastEthernet channels of the Quad FastEthernet SBus adapter.

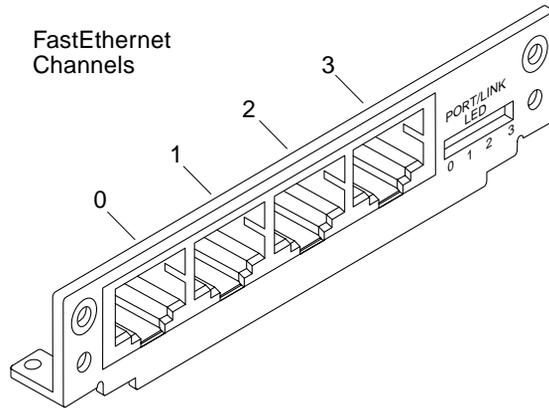


FIGURE 1-2 Four Channels of the Sun Quad FastEthernet SBus Adapter

While these channels are labeled 0 to 3 on the adapter's back plate, their device instance numbers are generated by the machine at boot time. You will need to know the device instance numbers of these channels before you can configure the Trunking software files.

You can find the instance numbers in two ways: by searching the `/etc/path_to_inst` file or by typing `qfetr -conf` in the `/etc/opt/SUNWqfetr/bin` directory.

Both files contain the physical name, the instance number, and driver name for each device on the system. By searching this file for FastEthernet (qfe) devices, you can find the instance numbers of the Quad FastEthernet channels that will be used with the Trunking software.

Using the `grep` command, you can search the `path_to_inst` file for all of the `qfe` devices on your system:

```
# grep qfe /etc/path_to_inst
"/sbus@3,0/SUNW,qfe@0,8c20000" 6 "qfe"
"/sbus@3,0/SUNW,qfe@0,8c30000" 7 "qfe"
"/sbus@3,0/SUNW,qfe@0,8c00000" 4 "qfe"
"/sbus@3,0/SUNW,qfe@0,8c10000" 5 "qfe"
"/sbus@2,0/SUNW,qfe@1,8c20000" 2 "qfe"
"/sbus@2,0/SUNW,qfe@1,8c30000" 3 "qfe"
"/sbus@2,0/SUNW,qfe@1,8c00000" 0 "qfe"
"/sbus@2,0/SUNW,qfe@1,8c10000" 1 "qfe"
```

In the example above, the `SUNW,qfe@0` instance is a FastEthernet adapter installed in SBus slot 0, and the four `SUNW,qfe@1` instances are from a Quad FastEthernet SBus Adapter installed in slot 1. For clarity, the instance numbers are bold. TABLE 1-1 lists the channel number, physical name, and instance number for each Quad FastEthernet instance on this example system.

TABLE 1-1 Example Quad FastEthernet Instance Numbers

Channel Number	Device Name	Instance Number
0	/sbus@2,0/SUNW,qfe@1,8c00000	0
1	/sbus@2,0/SUNW,qfe@1,8c10000	1
2	/sbus@2,0/SUNW,qfe@1,8c20000	2
3	/sbus@2,0/SUNW,qfe@1,8c30000	3

To use the `qfetr -conf` command, you must be in the `/etc/opt/SUNWqfetr/bin` directory. If you added `/etc/opt/SUNWqfetr/bin` to your search path, you will not need to change directories.

```
# cd /etc/opt/SUNWqfetr/bin
# qfetr -conf
Name      Head      Policy  QFE Type      Original-Mac-Addr
qfe0      qfe0      1       qfe-sbus     8:0:20:81:e6:ac
qfe1      qfe0              qfe-sbus     8:0:20:81:e6:ac
qfe2      qfe0              qfe-sbus     8:0:20:81:e6:ac
qfe3      qfe0              qfe-sbus     8:0:20:81:e6:ac
```

You will need to know the instance numbers of the Quad FastEthernet channels in order to configure the Trunking software.

Number of Links per Quad FastEthernet Adapter

The four channels of the Quad FastEthernet (QFE) adapter can be linked in a number of ways, depending on the needs of your network. All four of the channels can be linked into one trunk, or two channels can be linked into a trunk. FIGURE 1-3 shows three different linking possibilities for a single adapter.

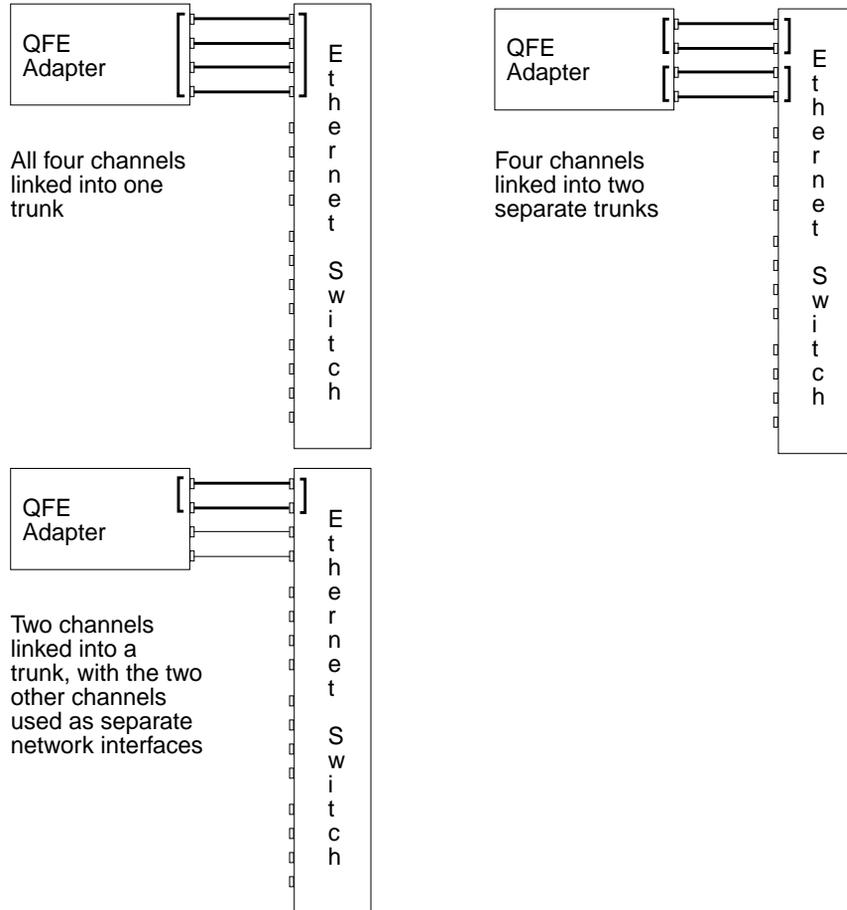


FIGURE 1-3 Three Trunking Network Configuration Examples

The configuration of the Trunking software files will depend on how you want to organize the Ethernet network. You must also configure the Ethernet switch software to be symmetrical with how you configured the Trunking software. Refer to your Ethernet switch documentation for the switch configuration instructions.

Configuring the Trunking Software Files

After locating the instance numbers of the Quad FastEthernet channels, and deciding how you want to organize your network, you can begin to configure the Trunking software.

▼ To Edit the `qfetr.sh` File

The main configuration file of the Trunking software is the `/etc/opt/SUNWqfetr/bin/qfetr.sh` file. You will define each trunk by adding commands to this file. Before editing the `qfetr.sh` file, you will need to know how many FastEthernet channels you are going to link into a trunk, the first instance number of each trunk (also called the “trunk head”), and the trunking policy used in the trunk.

The two supported trunking policies used in the Trunking software are MAC and round robin. TABLE 1-2 lists and defines these policies.

TABLE 1-2 Supported Trunking Policies

Trunking Policy	Definition
MAC	This is the default policy used by the Trunking software. This policy uses the last two bits of the MAC address of both the source and destination.
Round Robin	As the name suggests, each channel of the trunk is used in turn. This policy is useful when connecting two servers back-to-back, since the temporal ordering of the packet is not observed.

- **Using a text editor, add commands to the `qfetr.sh` file to define your trunking network.**

In the `qfetr.sh` file, you will need to add lines containing the `qfetr` command to define the trunked network. The format of this command is:

```
qfetr -setup trunk head instance [-links=<2/4>] [-policy=<1/2>]  
[-members=<instance, instance, ...>]
```

In the command above, the *trunk head instance* is the instance number of the first linked channel of the trunk. The `links` option defines the number of channels, either 2 or 4, that are linked into a trunk (the default value is 4). The `policy` option can either be the default value of 1 for MAC or 2 for round robin. If you want to select your own instance member for a trunk member, the instance numbers must belong to the same adapter.

Below are some example `qfetr.sh` entries.

Note – In the examples below, the instance numbers found in TABLE 1-1 on page 8 will be used. *The instance numbers on your system will be different.* See the “Determining the Instance Numbers of the FastEthernet Channels” Section for more information.

For one trunk containing all four channels and using the default MAC trunking policy, you would only need to add this line to the `qfetr.sh` file:

```
qfetr -setup 0
qfe trunk members:
    qfe0 (head)
    qfe1
    qfe2
    qfe3
```

After editing the trunking software files, run the `qfetr -conf` command again.

```
# qfetr -conf
Name      Head      Policy QFE Type      Original-Mac-Addr
qfe0     qfe0      1      qfe-sbus  8:0:20:81:e6:ac
qfe1     qfe0      1      qfe-sbus  8:0:20:81:e6:ac
qfe2     qfe0      1      qfe-sbus  8:0:20:81:e6:ac
qfe3     qfe0      1      qfe-sbus  8:0:20:81:e6:ac
```

For two trunks, containing two channels each, you would add these two lines:

```
qfetr -setup 0 -links=2
qfetr -setup 2 -links=2
```

For one trunk, containing two channels and using the round robin policy, you would add this line:

```
qfetr -setup 0 -links=2 -policy=2
```

▼ To Configure the FastEthernet Host Files

Before you can use these trunked Ethernet channels, you will need to create an `/etc/hostname.qfe#` file, and you will need to add an entry in the `/etc/hosts` file for each trunk.

1. For each trunk, create a `/etc/hostname.qfe#` file, where # corresponds to the instance number used as the trunk head.

For example, if you had two trunks using two channels each, you would have to create two files containing the host name of the trunk as seen by network. The extensions of these files would have to correspond with the trunk head interface numbers of the trunks.

TABLE 1-3 Example `hostname.qfe#` Files

Filename	Trunk Head Instance Number	Quad FastEthernet Adapter Channels Used in the Trunk ¹
<code>/etc/hostname.qfe0</code>	0	0, 1
<code>/etc/hostname.qfe2</code>	2	2, 3

¹ See FIGURE 1-2 on page 7 for more information.

- The `/etc/hostname.qfe#` file must contain an appropriate host name for the trunk.
- The host name should be different from any other host name of any other interface, for example: `/etc/hostname.qfe0` and `/etc/hostname.qfe2` cannot share the same host name.
- The host name should have an IP address that should be entered in the `/etc/hosts` file (see Step 2).

Using the example trunk head instance numbers in TABLE 1-3, the following example shows the three `/etc/hostname.qfe#` files required for a system called `proboscis`, which has an onboard FastEthernet device (`proboscis`), and two trunks (`proboscis-11`, `proboscis-12`).

```
# cat /etc/hostname.hme0
proboscis
# cat /etc/hostname.qfe0
proboscis-11
# cat /etc/hostname.qfe2
proboscis-12
```

Note – Only trunk *heads* are visible.

2. Create an appropriate entry in the `/etc/hosts` file for each trunk.

Using the example from Step 1, you would have:

```
# cat /etc/hosts
#
# Internet host table
#
127.0.0.1    localhost
129.144.10.57 proboscis  loghost
129.144.11.83 proboscis-11
129.144.12.41 proboscis-12
```

Note – Make sure you configure the switch software to be symmetrical with how you configured the Trunking software. Refer to your Ethernet switch documentation for instructions.

After editing these files, you will need to reboot your system to make these trunked networks active.

3. Shut down your system and perform a reconfiguration boot.

```
# sync
# init 0
Shutdown messages.
ok boot -r
```

Verifying the Trunking Interfaces

You can verify trunking networks using the `ifconfig` and the `qfetr` commands.

Use the `ifconfig -a` command to print out the addressing information for each interface on the system.

```
% /usr/sbin/ifconfig -a
lo0: flags=849<UP,LOOPBACK,RUNNING,MULTICAST> mtu 8232
    inet 127.0.0.1 netmask ff000000
hme0: flags=863<UP,BROADCAST,NOTRAILERS,RUNNING,MULTICAST> mtu 1500
    inet 129.144.131.154 netmask ffffffff broadcast 129.144.131.255
    ether 8:0:20:81:e6:ac
qfe0: flags=863<UP,BROADCAST,NOTRAILERS,RUNNING,MULTICAST> mtu 1500
    inet 192.144.11.154 netmask ffffffff broadcast 192.144.11.255
    ether 8:0:20:81:e6:ac
```

Even though a trunk may be composed of four linked FastEthernet channels, the `ifconfig -a` command will only print out the addressing information for the trunk head interfaces (`qfe0` in the example above).

For a more complete listing of the `qfe` devices, use the `qfetr -conf` command. This command will print out a list of all of the `qfe` instances on the system, including how the `qfe` instances are organized into trunks.

```
# /etc/opt/SUNWqfetr/bin/qfetr -conf
Name   Head   Policy QFE Type   Original-Mac-Addr
qfe0   qfe0   1      qfe-sbus 8:0:20:81:e6:ac
qfe1   qfe0   1      qfe-sbus 8:0:20:81:e6:ac
qfe2   qfe0   1      qfe-sbus 8:0:20:81:e6:ac
qfe3   qfe0   1      qfe-sbus 8:0:20:81:e6:ac
```

In the example above, the `qfe0` interface is the trunk head for a four channel trunk, composed of the `qfe0`, `qfe1`, `qfe2`, and `qfe3` interfaces. The `qfetr -conf` command will also show the policy of each trunk on the system, as well as listing the original MAC address of each interface.

Use the `qfetr -stat trunkhead` command to monitor the network statistics of each interface on the system (replace *trunkhead* with the trunk head interface number of the trunk you want to monitor).

```
# /etc/opt/SUNWqfetr/bin/qfetr -stats 0
Name      Ipkts      Ierrs  Opkts      Oerrs  Collis    Crc
-----
qfe0     18254004   101    0           0      0         0
qfe1     18418495  1150   14496974   0      0         0
qfe2      0          0     13224734   0      0         0
qfe3      635        0      3           0      0         0
```

This command will list each interface and the network performance statistics, summarized in TABLE 1-4, of the specified trunk.

TABLE 1-4 Output of the `qfetr -stats` Command

Network Statistic	Definition
Ipkts	The number of Ethernet packets inputted into the interface.
Ierrs	The number of errors that occurred while inputting these Ethernet packages.
Opkts	The number of Ethernet packets outputted through the interface.
Oerrs	The number of errors that occurred while outputting these Ethernet packages.
Collis	The number of collisions detected on the interface.
Crc	The number of cyclic redundancy check (CRC) errors detected on the interface.

You can also monitor the network statistics of a trunk at regular intervals. The full usage of the command is `qfetr -stats trunkhead interval`, with *interval* being the number of seconds between monitoring the trunk's interfaces. In the example below, the trunk is monitored once each second.

```
# /etc/opt/SUNWqfetr/bin/qfetr -stats 0 1
```

Name	Ipkts	Ierrs	Opkts	Oerrs	Collis	Crc
qfe0	18254004	101	0	0	0	0
qfe1	18418495	1150	14496974	0	0	0
qfe2	0	0	13224734	0	0	0
qfe3	635	0	3	0	0	0

Name	Ipkts	Ierrs	Opkts	Oerrs	Collis	Crc
qfe0	9408	0	0	0	0	0
qfe1	9407	0	7681	0	0	0
qfe2	0	0	6773	0	0	0
qfe3	0	0	0	0	0	0

You can also use the `netstat(1M)` command to monitor the network statistics. Refer to the `netstat(1M)` man page for more information.

Disabling the Trunking Interface

If you need to disable a trunk for any reason, use the `qfetr -release trunkhead` command, with *trunkhead* being the trunk head interface number of the trunk you want to disable.

```
# /etc/opt/SUNWqfetr/bin/qfetr -release 0
```

To permanently disable the trunking interface, comment out the `qfetr` command in the `/etc/opt/SUNWqfetr/bin/qfetr.sh` file. You will need to reconfigure the `/etc/hostname.qfe#` and `/etc/hosts` files if you want to use the FastEthernet channels separately. Refer to the *Sun Quad FastEthernet SBus Adapter Installation and User's Guide* more information.

Troubleshooting

If you have problems with Sun Trunking 1.0, use the following commands to gather information that may help resolve the problems.

Using the debug Command

Use the `qfetr -debug` command to check for configuration and connection problems.

```
# /etc/opt/SUNWqfetr/bin/qfetr -debug

Name  Head  Pcy   Link Spd  Mode Xcvr ipg0 ipg1 ipg2 adv  our  lp
qfe0  qfe1           Up   100  Fdx  Intl 16   8   4   2f  2f  2f
qfe1  qfe1    1     Up   100  Fdx  Intl 16   8   4   2f  2f  2f
qfe2  qfe1           Up   100  Fdx  Intl 16   8   4   2f  2f  2f
qfe3  qfe1           Up   100  Fdx  Intl 16   8   4   2f  2f  2f
```

In this instance, there are no problems. All the links are Up and the speed is 100 Mbps. The trunk head is using the `qfe1` interface, as it was set. The trunking policy 1 (MAC) is set.

TABLE 1-5 describes the information shown by the `qfetr -debug` command, lists likely problems, and their solutions.

TABLE 1-5 Output of the `qfetr -debug` Command

Configuration	Definition	Problem	Solution
Name	Interface name	See ¹ .	See ¹ .
Head	Interface name of trunk head	Wrong interface listed as the trunk head	Re-configure using configuration instructions
Pcy	Number of trunking policy: 1 is MAC, 2 is Round Robin.	Incorrect policy	Re-configure using configuration instructions
Link	Shows whether link is Up or Down.	Link is Down	Check connection to the ethernet switch, card, and cable.

TABLE 1-5 Output of the `qfetr -debug` Command (Continued)

Configuration	Definition	Problem	Solution
<code>Spd</code>	Shows speed in Mbps.	Speed is less than 100.	Configure the switch for the proper speed and use the <code>ndd</code> command to check the device status.
<code>Mode</code>	Shows whether full-duplex (Fdx) is running.	Half-duplex (hdx) is running.	Configure the switch for the proper mode and use the <code>ndd</code> command to check the device status.
<code>Xcvr</code>	Shows whether transceiver is internal (Intl) or external.	Transceiver is external (Extl).	Sun Quad FastEthernet card is probably bad.
<code>ipg</code>	Shows inner packet gap value (ipg0, ipg2, ipg2).	See ¹ .	See ¹ .
<code>adv</code>	Shows the local transceiver capabilities advertised by the hardware.	See ¹ .	See ¹ .
<code>our</code>	Shows the read-only transceiver capabilities.	See ¹ .	See ¹ .
<code>lp</code>	Shows the read-only link partner capabilities.	See ¹ .	See ¹ .

1. There are several problems and solutions that might occur for this field. Refer to the Quad FastEthernet SBus Adaptor Installation and User's Guide or the Quad FastEthernet PCI Adapter Installation and User's Guide for more information.

Using the stats Command

Use the `qfetr - stats` command to check whether network packets are showing in each trunk instance. In the following example, 1 represents the trunk head instance being monitored.

```
# /etc/opt/SUNWqfetr/bin/qfetr -stats 1 1
```

Name	Ipkts	Ierrs	Opkts	Oerrs	Collis	Crc
qfe0	81207377	221596	39254129	0	0	0
qfe1	77282679	273118	104051423	0	0	0
qfe2	77501339	271540	97093100	0	0	0
qfe3	0	0	262	0	0	0

Name	Ipkts	Ierrs	Opkts	Oerrs	Collis	Crc
qfe0	7614	32	3549	0	0	0
qfe1	7307	34	10756	0	0	0
qfe2	6896	40	10073	0	0	0
qfe3	0	0	0	0	0	0

Name	Ipkts	Ierrs	Opkts	Oerrs	Collis	Crc
qfe0	8040	31	3651	0	0	0
qfe1	6983	29	10349	0	0	0
qfe2	7259	30	9718	0	0	0
qfe3	0	0	0	0	0	0

If you use MAC policy, you may not see packets on certain interfaces, as shown in the example. This occurs because two or more clients may have MAC addresses with the last two bits identical. See TABLE 1-2 on page 10 for more information.

Using the snoop Command

Use the `snoop -d` command to capture and inspect network packets. This command enables you to troubleshoot network problems at the packet level, allowing examination of the contents of a packet. The following shows example output for `qfe1`.

```
# snoop -d qfe1

Seq=1433697461 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6102 S=32802    Ack=3609213440
Seq=1433698921 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6102 S=32802    Ack=3609213440
Seq=1433700381 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6102 S=32802    Ack=3609213440
Seq=1433701841 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6103 S=32803    Ack=3609335122
Seq=1521211593 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6103 S=32803    Ack=3609335122
Seq=1521213053 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6103 S=32803    Ack=3609335122
Seq=1521214513 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6103 S=32803    Ack=3609335122
Seq=1521215973 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6103 S=32803    Ack=3609335122
Seq=1521217433 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6103 S=32803    Ack=3609335122
Seq=1521218893 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6102 S=32802    Ack=3609213440
Seq=1433703301 Len=1460 Win=8760
  hs4-net11 -> hs2-net11    TCP D=6102 S=32802    Ack=3609213440
```

In this example, if there were packets meant for hostname `hs4-net11`, but none showed in the output from the `snoop` command, you would know a problem existed. In that case, you should check your host file, network connect, or your ethernet switch setup. Refer to the `snoop(1M)` man page for more information.

Using the `conf` Command

Use the `qfetr -conf` command to verify your trunking configuration.

```
# /etc/opt/SUNWqfetr/bin/qfetr -conf
Name      Head      Policy  QFE Type  Original-Mac-Addr
qfe0      qfe0      1       qfe-sbus  8:0:20:81:e6:ac
qfe1      qfe0              qfe-sbus  8:0:20:81:e6:ac
qfe2      qfe0              qfe-sbus  8:0:20:81:e6:ac
qfe3      qfe0              qfe-sbus  8:0:20:81:e6:ac
```

Make sure the Ethernet switch software and the trunking software are configured symmetrically. For example, both Sun Trunking and the switch should be configured with the same number of links per trunk.

Once you have configured Sun Trunking, be sure to re-configure your switch to match the trunking configuration.

Getting Help

If you cannot resolve the problems and you have a SunService contract, send the information gathered from these commands to your SunService representative. You must have the following information ready:

- Product name and release number (Sun Trunking 1.0)
- Model number of your machine
- Solaris release number

Use the `showrev` command to display your software release:

```
% showrev
Hostname: proboscis-11
Hostid: 8081d6ca
Release: 5.5.1
Kernel architecture: sun4u
Application architecture: sparc
Hardware provider: Sun_Microsystems
```


Changing Device Names to Use the Quad FastEthernet 2.0 Device Driver

To use the Sun Quad FastEthernet 2.0 with the `qfe` driver software, you must change the device names of the Sun Quad FastEthernet SBus adapter's four channels. These device names must be changed to `SUNW,qfe` so that the device driver can recognize the adapter's four Ethernet channels. You must make this change *before* installing the Sun Quad FastEthernet 2.0 driver software.

Note – This workaround is not supported by the SunServicesm organization. If you wish to use the Sun Quad FastEthernet 2.0 driver software, contact your local SunService representative for assistance, or contact your local SunService authorized service provider for information on how to receive a replacement adapter.

▼ To Change the `hme` Device Name to Use the `qfe` Device Driver

1. Shut down your system.

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

2. 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 `hme` channels, similar to the example below:

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

3. Type:

```
ok nvedit
```

4. 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: " SUNW,qfe" nameprop  
3: device-end  
4: cd <full path to channel 2>  
5: " SUNW,qfe" nameprop  
6: device-end  
7: cd <full path to channel 3>  
8: " SUNW,qfe" nameprop  
9: device-end  
10: cd <full path to channel 4>  
11: " SUNW,qfe" nameprop  
12: device-end
```

5. Press the Control-C keys after typing the final `device-end`.

6. At the ok prompt, type:

```
ok nvstore
```

7. Reset your system.

Use the command to reset your system that exists in your system's version of the OpenBoot PROM. Refer to the *OpenBoot Command Reference* manual for more information.

Your system will reset and the banner will be displayed.

8. Press the Stop-A keys to get to the `ok` prompt.

9. 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` 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
```

10. Perform a reconfiguration boot on the system.

```
ok boot -r
```

Note – You may need to install a Feature Enhancement patch on your system before you can use the Sun Quad FastEthernet SBus Adapter. Refer to the *Sun Quad FastEthernet SBus Adapter Release Notes (805-1444-12)* for more information.

Index

C

- configure
 - switch software, 13
- configure host files, 12
- create configuration files, 6

D

- define each trunk, 10
- device instance, 6
- device names
 - changing, 23
- disabling the trunking interface, 16

G

- grep command, 8

H

- hierarchy of directories and files, 6

I

- ifconfig -a command, 14
- instance numbers, 6, 8
 - determining, 7

L

- link into a trunk, 10
- linked FastEthernet channels, 14
- linking channels, 9
- linking Quad FastEthernet channels, 6
- links
 - number per Quad FastEthernet adapter, 9

M

- MAC
 - networking policy, 10
- main network interface, 3
- monitor the network statistics, 15

N

- networking policies
 - MAC, Round Robin, 10

O

- OpenBoot PROM, 25

P

- path_to_inst, 8

Q

- qfe instances, 14
- qfe packages
 - removing, 3
- qfetr - stats command, 19
- qfetr -conf command, 14, 21
 - shows policy, 14
- qfetr -confcommand, 8
- qfetr -debug command, 17
- qfetr -stat trunkhead command
 - monitor network statistics, 15
- qfetr -stats trunkhead interval, 16
- qfetr.sh
 - editing the file, 10

R

- reconfiguration boot, 13
- requirements
 - hardware
 - software, 1
- Round Robin
 - networking policy, 10

S

- show-devs, 25
- show-devs command, 24
- snoop -d qfe1 command, 20
- switch configuration, 9

T

- trunk head, 10
- trunk head instance, 10
- trunk head interfaces, 14
- trunking policy, 6
- trunks, 6

V

- verify trunking interfaces, 14

Ordering Sun Documents

SunDocsSM is a distribution program for technical documentation and is available from SunExpress. To order or for more information:

Country	Phone	Fax	Country	Phone	Fax
Belgium	02-720-09-09	02-725-88-50	Luxembourg	32-2-720-09-09	32-2-725-88-50
Canada	1-800-873-7869	1-800-944-0661	Sweden	020-79-57-26	020-79-57-27
France	0800-90-61-57	0800-90-61-58	Switzerland	0800-55-19-26	0800-55-19-27
Germany	01-30-81-61-91	01-30-81-61-92	United Kingdom	0800-89-88-88	0800-89-88-87
Holland	06-022-34-45	06-022-34-46	United States	1-800-873-7869	1-800-944-0661
Japan	0120-33-9096	0120-33-9097			

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

Sun Welcomes Your Comments

We are interested in improving our documentation and welcome your comments. Use the reader comment card or send comments via email to: smcc-docs@sun.com.

You can also send a fax to SMCC Doc Feedback at 1-650-786-6443.

Please include the part number of your document in the subject line of your email or fax message.

Reader Comment Card

For the Sun Trunking 1.0 Installation and User's Guide, part number 805-2348-10.

1. Were the procedures documented thoroughly? _____

 2. Were the illustrations helpful? _____

 3. Was the information accurate and easy to follow? _____

 4. Did you refer to this manual online? _____

 5. Additional comments. _____

- Your Name: _____
Title: _____
Company Name: _____
Address: _____
City: _____ State/Province: _____
Zip/Postal Code: _____ Country: _____
Email Address: _____
Telephone: _____

**AIR MAIL
PAR AVION**

IBRS/CCRI No. 808



NE PAS AFFRANCHIR

NO POSTAGE
NECESSARY
IF MAILED
TO THE
UNITED STATES

INTERNATIONAL BUSINESS REPLY MAIL/RESPONSE PAYEE

PERMIT NO. 808

MOUNTAIN VIEW CA

POSTAGE WILL BE PAID BY ADDRESSEE

INFORMATION PRODUCTS
M/S MPK14-108
SUN MICROSYSTEMS INC
2550 GARCIA AVE
MOUNTAIN VIEW CA 94043-9551
UNITED STATES OF AMERICA

