



Sun™ GigaSwift Ethernet Adapter Installation and User's Guide

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Product Name: Sun GigaSwift Ethernet UTP Adapter (X1150A)

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European Union

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EN55022:1998 / CISPR22:1997	Class A
EN550024:1998 EN61000-4-2	4 kV (Direct), 8 kV (Air)
EN61000-4-3	3 V/m
EN61000-4-4	1.0 kV Power Lines, 0.5 kV Signal Lines
EN61000-4-5	1 kV Line-Line, 2 kV Line-Gnd Power Lines
EN61000-4-6	3 V
EN61000-4-8	3 A/m
EN61000-4-11	Pass
EN61000-3-2:1995	Pass
EN61000-3-3:1995	Pass

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

EC Type Examination Certificates:

EN60950:1992, 2nd Edition, Amendments 1,2,3,4,11

Supplementary Information

This product was tested and complies with all the requirements for the CE Mark.

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Preface

The *Sun GigaSwift Ethernet Adapter Installation and User's Guide* provides installation instructions for both the Sun GigaSwift Ethernet UTP adapter and the Sun GigaSwift Ethernet MMF adapter. This manual also describes how to configure the driver software.

These instructions are designed for enterprise system administrators with experience installing network hardware and software.

How This Book Is Organized

Chapter 1, provides a description of the adapter, including hardware and software.

Chapter 2, describes how to install the adapter in your system and how to verify that it has been installed correctly.

Chapter 3, describes how to edit the network host files after the adapter has been installed on your system.

Chapter 4, describes how to configure the driver parameters used by the Sun GigaSwift Ethernet adapter.

Chapter 5, explains VLANs in detail and provides configuration instructions and examples.

Appendix A, lists the specifications for the Sun GigaSwift Ethernet adapter.

Appendix B, provides an overview of the SunVTS diagnostic application and instructions for testing the adapter using the onboard FCode selftest. There is also a section outlining some common troubleshooting issues.

Using UNIX Commands

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

See one or more of the following for this information:

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

Typographic Conventions

Typeface	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	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

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

Application	Title
PCI Adapter Installation	Your system installation or service manual
Storage Device Installation	Your storage device installation or service manual
Dynamic Reconfiguration Installation	<i>Sun Enterprise 6x00, 5x00, 4x00, and 3x00 Systems Dynamic Reconfiguration User's Guide</i>
Diagnostic Software	<i>SunVTS User's Guide</i> <i>SunVTS Test Reference Manual</i>
OpenBoot™ Commands	<i>OpenBoot 3.x Command Reference Manual</i>

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Product Overview

This chapter provides a description of the Sun GigaSwift Ethernet adapter hardware and software.

Hardware Overview

The adapter relieves congestion experienced at the backbone and server levels by today's networks, while providing a future upgrade path for high-end workstations that require more bandwidth than fast Ethernet can provide.

Sun GigaSwift Ethernet UTP Adapter

The Sun GigaSwift Ethernet UTP adapter is a single-port gigabit Ethernet copper-based PCI Bus card. It can be configured to operate in 10, 100, or 1000 Mbps Ethernet networks.

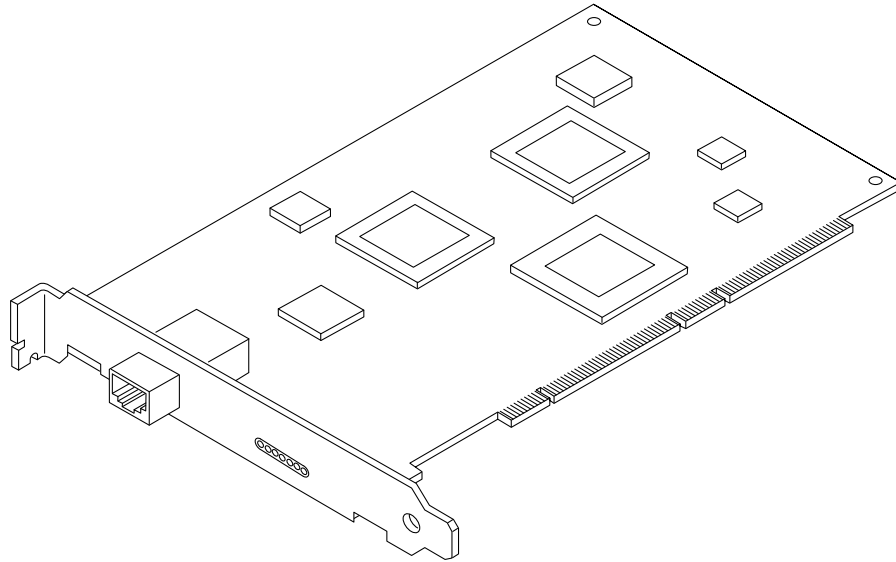


FIGURE 1-1 Sun GigaSwift Ethernet UTP Adapter

Hardware and Software Requirements

Before using the Sun GigaSwift Ethernet adapter, make sure your system meets the following hardware and software requirements:

Hardware and Software	Requirements
Hardware	Sun Ultra™ 5, 10, 60, 80 Sun Enterprise™ 220R, 250, 420R, 450, 3000/3500, 4000/4500, 5000/5500, 6000/6500, 10000 Sun Blade™ 1000
OpenBoot PROM	Revision 3.x, 4.x
Operating environment	Solaris 2.6, 7, 8 releases

Product Features

You can install or replace the Sun GigaSwift Ethernet adapter. You can also diagnose a failure using the built-in diagnostic tools.

Key Protocols and Interfaces

The Sun GigaSwift Ethernet adapter is interoperable with existing Ethernet equipment assuming standard Ethernet minimum and maximum frame size (64 to 1518 bytes), frame format, and compliance with the following standards and protocols:

- SNMP (limited MIB)
- Full- and half-duplex gigabit Ethernet interface
- Low CPU utilization—Frees up server system resource and bandwidth
- Dynamic reconfiguration (DR) and redundancy/failover support
- Full flow control support
- Duplex SC fiber connector (850 nm, SX)
- 33/66-MHz, 32- or 64-bit bus master
- Universal dual voltage signaling (3.3V and 5V)
- PCI Local Bus Rev 2.2-compliant (6.8-inch x 4.2-inch short card)
- IPv4 and IPv6 support
- Load balancing for RX packets among multiple CPUs
- IEEE 802.1Q VLAN

- IEEE 802.1P/802.1D Priority Tagging/Quality Of Service
- RAS support
- Energy Star® support

Diagnostic Support

- User-executable self-test using OpenBoot™ PROM
- SunVTS diagnostic tool

Installing the Adapter

This chapter describes how to install the adapter in your system and how to verify that it has been installed correctly. This chapter is divided into the following sections:

- “Installing the Driver Software” on page 5
- “Installing the Adapter Without Dynamic Reconfiguration” on page 8
 - “To Verify the Installation” on page 9
 - “Setting the `local-mac-address` Property” on page 12
 - “Rebooting the System” on page 13
- “Installing the Adapter With Dynamic Reconfiguration” on page 14

Note – If you have a Sun Enterprise system that supports dynamic reconfiguration (DR), refer to the *Sun Enterprise Dynamic Reconfiguration User's Guide* and your system's documentation for further information about dynamic reconfiguration.

Installing the Driver Software

The *Sun GigaSwift Ethernet Driver 1.0* CD contains the driver software required to operate the adapter. Future revisions of the Solaris operating environment might contain Sun GigaSwift Ethernet driver software. Refer to the documentation that shipped with the *Solaris Supplement* CD-ROM for a listing of the available network drivers.

1. **Become superuser.**

2. Insert the Sun GigaSwift Ethernet Driver 1.0 CD into a CD-ROM drive that is connected to your system.

- If your system is running Sun Enterprise Volume Manager™, it should automatically mount the CD-ROM to the `/cdrom/cdrom0` directory.
- If your system is not running Volume Manager, mount the CD-ROM as follows:

```
# mkdir /cdrom
# mkdir /cdrom/cdrom0
# mount -F hsfs -o ro /dev/dsk/c0t6d0s2 /cdrom/cdrom0
```

You will see the following files and directories in the `/cdrom/GigaSwiftEthernet` directory or the `/cdrom/cdrom0` directory, depending on how you mounted the CD-ROM.

TABLE 2-1 Files and Directories on the CD-ROM

File or Directory	Contents
Copyright	U.S. copyright file
FR_Copyright	French copyright file
Docs/	Contains PDF copy of the user manual
GigaSwiftEthernet/ Solaris_OS-VER/ Packages/	Contains the Sun GigaSwift Ethernet software packages applicable to your version (<i>OS-VER</i>) of the Solaris software <ul style="list-style-type: none">• SUNWcea—32-bit adb macros• SUNWceax—64-bit adb macros• SUNWced—32-bit adapter driver• SUNWcedx—64-bit adapter driver• SUNWcedu—adapter driver headers• SUNWcem—man pages (optional) The optional VLAN packages for Solaris 8 only <ul style="list-style-type: none">• SUNWvld—VLAN utility routines• SUNWvldx—VLAN utility routines (64-bit)• SUNWvldu—VLAN utility headers

Note – If you intend to use VLAN, you must install VLAN packages when you install the GigaSwift Ethernet software packages.

- 3. Install the software packages by typing the following at the command line, replacing the *OS_VER* with your version (2.6, 7, or 8) of the Solaris Operating Environment:**

```
# /usr/sbin/pkgadd -d /cdrom/cdrom0/GigaSwiftEthernet/Solaris_OS_VER/Packages/
```

For example, if your system is running the Solaris 8 Operating Environment, you would type the following:

```
# /usr/sbin/pkgadd -d /cdrom/cdrom0/GigaSwiftEthernet/Solaris_8/Packages/
```

A menu similar to the following displays:

```
The following packages are available:
 1  SUNWcea      Sun GigaSwift Ethernet Adapter Driver 32 bit adb Macros
                   (sparc) 1.0,REV=2000.12.11
 2  SUNWceax     Sun GigaSwift Ethernet Adapter Driver 64 bit adb Macros
                   (sparc) 1.0,REV=2000.12.11
 3  SUNWced      Sun GigaSwift Ethernet Adapter (32-bit Driver)
                   (sparc) 1.0,REV=2000.12.11
 4  SUNWcedu     Sun GigaSwift Ethernet Adapter Driver Headers
                   (sparc) 1.0,REV=2000.12.11
 5  SUNWcedx     Sun GigaSwift Ethernet Adapter (64-bit Driver)
                   (sparc) 1.0,REV=2000.12.11
 6  SUNWcem      Sun GigaSwift Ethernet Adapter Driver Man Pages
                   (sparc) 1.0,REV=2000.12.11
 7  SUNWvld      Sun Ethernet Vlan Utility Routines
                   (sparc) 1.0,REV=2000.09.28
 8  SUNWvldu     Sun Ethernet Vlan Utility Headers
                   (sparc) 1.0,REV=2000.09.28
 9  SUNWvldx     Sun Ethernet Vlan Utility Routines (64-bit)
                   (sparc) 1.0,REV=2000.09.28

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

- 4. Press Return or type `all` to accept the default and install all packages.**

OR

- 5. If you prefer not to install the optional packages, type the number of all but the optional packages**

See TABLE 2-1 to identify the optional packages.

Installing the Adapter Without Dynamic Reconfiguration

▼ To Install the Adapter

Note – The following instructions describe the basic tasks required to install the adapter. Refer to your system installation or service manual for detailed PCI adapter installation instructions.

1. **Halt and power off your system.**
2. **Power off all of the peripherals connected to your system.**
3. **Open the system unit.**
4. **Attach the adhesive copper strip of the antistatic 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.**
5. **Holding the PCI adapter by the edges, unpack it and place it on an antistatic surface.**
6. **Using a No. 1 Phillips screwdriver, remove the PCI filler panel from the slot in which you want to insert the PCI adapter.**
Save the filler panel screw for Step 9.
7. **Holding the PCI adapter by the edges, align the adapter edge connector with the PCI slot. Slide the adapter face plate into the small slot at the end of the PCI opening.**

8. Applying even pressure at both corners of the adapter, push the PCI adapter until it is firmly seated in the slot.



Caution – Do not use excessive force when installing the adapter into the PCI slot. You may damage the adapter's PCI connector. If the adapter does not seat properly when you apply even pressure, remove the adapter and carefully reinstall it again.

9. Secure the adapter to the PCI slot using the screw you removed in Step 6.
10. Detach the wrist strap and close the system unit.
11. Connect the cables.
 - For the Sun GigaSwift Ethernet UTP PCI Bus card, connect a Cat-5 twisted-pair cable.

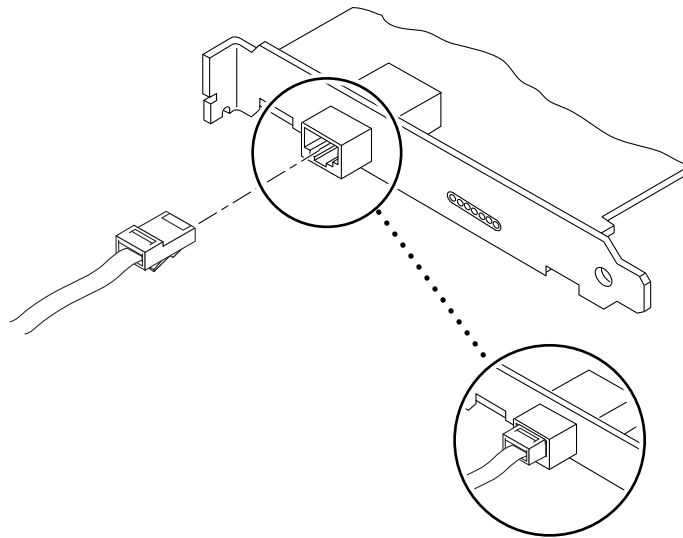


FIGURE 2-1 Cat-5 Twisted-Pair Cable

▼ To Verify the Installation

After you have installed the Sun GigaSwift Ethernet adapter, but *before* you boot your system, perform the following tasks to verify the installation. Refer to the *Solaris Handbook for Sun Peripherals* manual or your Solaris documentation for the detailed instructions.

Note – Verification is not required if your system supports dynamic reconfiguration (DR).

1. **Power on the system, and when the banner appears, press the Stop-A key sequence to interrupt the boot process and display the OpenBoot (ok) prompt. If a keyboard is not attached then send the appropriate Break sequence on the serial port.**

If the card is properly installed and the cables are properly connected to a compatible network, you will see the following message:

```
xcvr addr:0x00 - link up 1000 Mbps half duplex
xcvr addr:0x00 - link up 1000 Mbps full duplex
```

2. **List the network devices on your system.**

```
ok show-nets
```

Use the `show-nets` command to list the system devices. You should see the full path name of the network devices, similar to the Ultra 30 system example below. In this example, the `network@4` device is the Sun GigaSwift Ethernet adapter and the `network@1,1` is the onboard Ethernet device.

```
ok show-nets
a) /pci@1f,2000/pci@1/network@0
b) /pci@1f,4000/network@1,1
q) NO SELECTION
Enter Selection, q to quit: q
```

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

3. **View the device that you installed.**

Using the previous example, type:

```
ok cd /pci@1f,2000/pci@1/network@4
```

4. View the .properties file for a list of device properties.

It might be difficult to tell if the devices on your network are GigaSwift Ethernet devices or other network interface cards. The .properties command displays the specific information about the installed adapter.

To make sure that the device you just installed is connected to the network, type:

```
ok .properties
assigned-addresses      82810010 00000000 00200000 00000000 00200000
                        82810030 00000000 00400000 00000000 00100000
local-mac-address       08 00 20 e5 bf cf
phy-type                 mif
max-frame-size           00 00 40 00
address-bits             00 00 00 30
compatible               70 63 69 31 30 38 65 2c 61 62 62 61 00 70 63 69
board-model              501-5902
model                   SUNW,pci-ce
device_type              network
reg                      00810000 00000000 00000000 00000000 00000000
                        02810010 00000000 00000000 00000000 00200000
                        02810030 00000000 00000000 00000000 00100000
name                     network
version                  1.10
fcode-rom-offset         00000000
66mhz-capable
fast-back-to-back
devsel-speed             00000002
class-code               00020000
interrupts               00000001
max-latency              00000040
min-grant                 00000040
revision-id              00000001
device-id                0000abba
vendor-id                0000108e
```

Note – If you are going to set the local-mac-address property, note the local-mac-address of your device at this time. See “Setting the local-mac-address Property” on page 12 for more information.

Setting the local-mac-address Property

Note – Setting the `local-mac-address` property is only required if you will be booting from the network.

The network interface of the Sun GigaSwift Ethernet adapter has been assigned a unique media access control (MAC) address that represents the 48-bit Ethernet address for that interface. The OpenBoot firmware reports this MAC address via the `local-mac-address` property in the device nodes corresponding to the network interface.

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 the Solaris operating environment, you can use the 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 address assigned to the network interface of the Sun GigaSwift Ethernet adapter, set the NVRAM configuration variable `local-mac-address?` to `true`.

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

▼ To Set the GigaSwift Ethernet Device Primary Boot Device

Use this procedure *only* if you want the GigaSwift Ethernet device to be your primary boot device.

1. List the network devices on your system.

```
ok show-nets
a) /pci@1f,2000/pci@1/network@4
b) /pci@1f,4000/network@1,1
q) NO SELECTION
Enter Selection, q to quit: q
```


2. View the device that you installed.

Using the previous example, type:

```
ok cd /pci@1f,2000/pci@1/network@4
```

3. Set the Sun GigaSwift Ethernet device to be your default boot device, type:

```
# setenv boot-device=/pci@1f,2000/pci@1/network@4
```

Rebooting the System

After verifying the adapter installation, use the `boot -r` command to perform a reconfiguration boot on your system.

```
ok boot -r
```

Installing the Adapter With Dynamic Reconfiguration

If you have a Sun Enterprise system that supports dynamic reconfiguration (DR), you do not have to reboot your system after installing the adapter.

The process of adding and configuring an adapter with DR involves (1) connecting the attachment point and (2) configuring its occupant. In most cases, the `cfgadm(1M)` command can perform both steps at once.

▼ To Install an Adapter in a Dynamic Reconfiguration System

1. Verify that the selected board slot is ready for the adapter.

```
# cfgadm
```

The states and conditions should be:

```
Receptacle state=Empty
Occupant state=Unconfigured
Condition=Unknown
```

Or:

```
Receptacle state=Disconnected
Occupant state=Unconfigured
Condition=Unknown
```

2. If the status of the slot is not “empty” or “disconnected”, type:

```
# cfgadm -c disconnect sysctrl#:slot#
```

where the *sysctrl#* = 0 for the Enterprise 10000 and *slot#*= the slot available for the adapter. For example, if you were installing the adapter into slot #3 on an Enterprise 10000, you would type the following:

```
# cfgadm -c disconnect sysctrl0:3
```

3. Physically insert the adapter into the slot and look for an acknowledgement on the console, such as, “*name* board inserted into slot3.”

After the adapter is inserted, the states and conditions should become:

```
Receptacle state-Disconnected  
Occupant state-Unconfigured  
Condition-Unknown
```

Any other states or conditions should be considered an error.

4. Connect any peripheral cables and interface modules to the adapter.
5. Connect the cables to the card and to an Ethernet network.
6. Configure the adapter with the following command:

```
# cfgadm -v -c configure sysctrl#:slot#
```

This command should both connect and configure the receptacle. Verify with the `cfgadm` command.

The states and conditions for a connected and configured attachment point should be:

```
Receptacle state-Connected  
Occupant state-Configured  
Condition-OK
```

Now the system is also aware of the usable devices which reside on the adapter and all devices may be mounted or configured to be used.

If the command fails to connect and configure the adapter and slot (the status should be shown as “configured” and “ok”), do the connection and configuration as separate steps:

a. Connect the adapter and slot:

```
# cfgadm -v -c connect sysctrl#:slot#
```

The states and conditions for a connected attachment point should be:

```
Receptacle state-Connected  
Occupant state-Unconfigured  
Condition-OK
```

Now the system is aware of the adapter, but not the usable devices which reside on the adapter. Temperature is monitored and power and cooling affect the attachment point condition.

b. Configure the adapter and slot:

```
# cfgadm -v -c configure sysctrl#:slot#
```

The states and conditions for a configured attachment point should be:

```
Receptacle state-Connected  
Occupant state-Configured  
Condition-OK
```

Now the system is also aware of the usable devices which reside on the adapter and all devices may be mounted or configured to be used.

7. Reconfigure the devices on the adapter

```
# drvconfig; devlinks; disks; ports; tapes;
```

The console should now display a list of devices and their addresses.

Network Configuration

This chapter describes how to edit the network host files after the adapter has been installed on your system. The chapter contains the following sections:

- “Configuring the Network Host Files” on page 17
- “Setting Up a Diskless Client System on a GigaSwift Ethernet Network” on page 19
- “Installing the Solaris Operating Environment Over a GigaSwift Ethernet Network” on page 21

Configuring the Network Host Files

After installing the driver software, you must create a `hostname.cenumber` file for the adapter’s Ethernet interface. You must also create both an IP address and a host name for its Ethernet interface in the `/etc/hosts` file.

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

```
# grep ce /etc/path_to_inst
"/pci@1f,4000/pci@1/network@4" 0 "ce"
```

In the example above, the device instance is from a Sun GigaSwift Ethernet adapter installed in slot 1. For clarity, the instance number is in bold italics.

2. **Use the `ifconfig` command to setup the adapter’s `ce` interface.**

Use the `ifconfig` command to assign an IP address to the network interface. Type the following at the command line, replacing *ip_address* with the adapter's IP address:

```
# ifconfig ce0 plumb ip_address up
```

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

- If you want a set-up that will remain the same after you reboot, create an `/etc/hostname.ce $number$` file, where *number* corresponds to the instance number of the `ce` interface you plan to use.

To use the adapter's `ce` interface in the Step 1 example, create an `/etc/hostname.ce0` file, where 0 is the number of the `ce` interface. If the instance number were 1, the filename would be `/etc/hostname.ce1`.

- Do not create an `/etc/hostname.ce $number$` file for a Sun GigaSwift Ethernet adapter interface you plan to leave unused.
- The `/etc/hostname.ce $number$` file must contain the hostname for the appropriate `ce` interface.
- The host name should have an IP address and should be listed in the `/etc/hosts` file.
- The host name should be different from any other host name of any other interface, for example: `/etc/hostname.ce0` and `/etc/hostname.ce1` cannot share the same host name.

The following example shows the `/etc/hostname.ce $number$` file required for a system called `zardoz` that has a Sun GigaSwift Ethernet adapter (`zardoz-11`).

```
# cat /etc/hostname.hme0
zardoz
# cat /etc/hostname.ce0
zardoz-11
```

3. Create an appropriate entry in the `/etc/hosts` file for each active `ce` interface.

For example:

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

Setting Up a Diskless Client System on a GigaSwift Ethernet Network

Note – Setting up a diskless client over GigaSwift Ethernet adapter in VLAN configuration is not supported. For setting up a diskless client, the switch port to which the GigaSwift Ethernet adapter is connected must be in normal LAN mode.

Before you can boot and operate a diskless client system across a gigabit Ethernet network, you must first install the GigaSwift Ethernet software packages into the root directory of the diskless client. You can find the GigaSwift Ethernet software packages on the *Sun GigaSwift Ethernet Driver 1.0* CD. Refer to the *Solaris Advanced Installation Guide* and the *System Administration Guide* for more information about installing and administering diskless client systems.

Note – The Solaris 8 operating environment does not support diskless clients. Solaris 8 Update 1/01 does support diskless clients. Refer to the *Solaris Advanced Installation Guide* and the *System Administration Guide* for more information about installing and administering diskless client systems.

▼ To Set Up a Diskless Client on a GigaSwift Ethernet Network

1. Locate the root directory of the diskless client on the host server.

The root directory of diskless client system is commonly installed in the host server's `/export/root/client_name` directory, where *client_name* is the diskless client's host name. In this procedure, the root directory will be:

```
# ls /export/root
systest157-38/  systest162-38/  systest180-38/
systest160-38/  systest177-38/  systest182-38/
```

2. Insert the Sun GigaSwift Ethernet Driver 1.0 CD into the server's CD-ROM drive.

The CD should automatically mount to the `/cdrom/cdrom0` directory. If the CD did not get mounted to this directory, refer to "Installing the Driver Software" on page 5 for mounting instructions.

3. Use the `pkgadd -R` command to install the three GigaSwift Ethernet software packages to the diskless client's root directory on the server.

You will need to install the `SUNWced`, `SUNWcedm`, and `SUNWcedu` software packages to the client's root directory.

```
# cd /cdrom/cdrom0/GigaSwiftEthernet/Packages
# pkgadd -R /export/root/client_name -d . SUNWced SUNWcem SUNWcedu
# cd /
```

4. Eject the Sun GigaSwift Ethernet Driver 1.0 CD from the CD-ROM drive.

5. Create a `hostname.cenumber` file in the diskless client's root directory.

You will need to create an `/export/root/client_name/etc/hostname.cenumber` file for the GigaSwift Ethernet interface. See "Configuring the Network Host Files" on page 17 for instructions.

6. Edit the `hosts` in the diskless client's root directory.

You will need to edit the `/export/root/client_name/etc/hosts` file to include the IP address of the GigaSwift Ethernet interface. See "Configuring the Network Host Files" on page 17 for instructions.

Installing the Solaris Operating Environment Over a GigaSwift Ethernet Network

The *Solaris Advanced Installation Guide* describes the full procedure for installing the Solaris operating environment over the network. The procedure below assumes that you have created an install server, which contains the image of the Solaris CD, and that you have set up the client system to be installed over the network.

Before you can install the Solaris operating environment on a client system with a GigaSwift Ethernet adapter, you must first add the GigaSwift Ethernet software packages to the install server. These software packages are on *Sun GigaSwift Ethernet Driver 1.0* CD.

Note – You cannot install Solaris over VLAN configurations. The switch port to which GigaSwift Ethernet Adapter is connected, must be in normal LAN mode.

▼ To Install the Solaris Environment Over a GigaSwift Ethernet Network

1. **Prepare the install server and client system to install the Solaris operating environment over the network.**

The *Solaris Advanced Installation Guide* describes how to create the install server and set up the client systems.

Note – If you want to install the client system over a network that is not part of the same subnet, you must also create a boot server. The *Solaris Advanced Installation Guide* describes how to create a boot server.

2. Find the root directory of the client system.

The client system's root directory can be found in the install server's `/etc/bootparams` file. Use the `grep` command to search this file for the root directory.

```
# grep client_name /etc/bootparams
client_name root=server_name:/netinstall/Solaris_2.7/Tools/Boot
install=server_name:/netinstall boottype=:in rootopts=:rsize=32768
```

In the example above, the root directory for the Solaris 7 client is `/netinstall`. In Step 4, you would replace `root_directory` with `/netinstall`.

Note – If the root directory is not found in the `/etc/bootparams` file, refer to the *Solaris Advanced Installation Guide* for configuration instructions.

3. Insert the Sun GigaSwift Ethernet Driver 1.0 CD into the install server's CD-ROM drive.

The CD should automatically mount to the `/cdrom/cdrom0` directory. If the CD did not get mounted to this directory, refer to “Installing the Driver Software” on page 5 for mounting instructions.

4. On the install server, install the GigaSwift Ethernet software to the client's root directory, as determined in Step 2.

Replace `root_directory` with the location of the client's root directory.

```
# cd /cdrom/cdrom0/GigaSwiftEthernet/Packages
# ls SUNWce*
SUNWcea SUNWceax SUNWced SUNWcedu SUNWcem
# pkgadd -R root_directory/Solaris_2.7/Tools/Boot -d . SUNWced SUNWcem SUNWcedu
# cd /
```

Note – The directory paths for these files might change in future Solaris releases. If the commands above do not work correctly, refer to the documentation that shipped with your version of the Solaris operating environment.

5. Eject the Sun GigaSwift Ethernet Driver 1.0 CD from the CD-ROM drive.

Note – Perform the following steps on the client system.

6. Shut down and halt the client system.

Use the `shutdown` command to display the OpenBoot (`ok`) prompt.

```
# shutdown -i0 -g0 -y
. . .
(shutdown command messages omitted)
. . .
ok
```

7. At the `ok` prompt, use the `show-nets` command to find the device path of the GigaSwift Ethernet device.

The `show-nets` command lists the system devices. You should see the full path name of the network device, similar to the example below. In this example, the `network@4` device is the Sun GigaSwift Ethernet adapter.

```
ok show-nets
a) /pci@1f,2000/pci@1/network@4
b) /pci@1f,4000/network@1,1
q) NO SELECTION
Enter Selection, q to quit: q
```

8. At the `ok` prompt, boot the client system using the full device path of the Gigabit Ethernet device.

For example:

```
ok boot /pci@1f,2000/pci@1/network@4
```

9. Proceed with the Solaris operating environment installation.

Refer to the *Solaris Advanced Installation Guide* for more information about installing the Solaris operating environment over the network.

10. After installing the Solaris operating environment, install the Sun GigaSwift Ethernet software on the client system.

The software installed in Step 4 was required to boot the client system over the GigaSwift Ethernet interface. You now need to install the software in order for the operating system to use the client's GigaSwift Ethernet interfaces in normal operation.

Before installing the Sun GigaSwift Ethernet software, make sure that the client system does not already have the software installed. Use the `pkginfo` command to see if the Sun GigaSwift Ethernet software packages are installed on the client system.

```
# pkginfo | grep SUNWce
system SUNWced  Sun Gigabit Ethernet Adapter Driver
system SUNWcem  Sun Gigabit Ethernet Adapter Driver Man Pages
system SUNWcedu Sun Gigabit Ethernet Adapter Driver Headers
```

- If the software is installed (as shown in the example above), skip to Step 11.
- If the software is not installed, install the software from *Solaris Supplement CD*.
Refer to “Installing the Driver Software” on page 5 for instructions on installing the required software packages.

11. Confirm that the network host files have been configured correctly during the Solaris installation.

Although the Solaris software installation creates the client's network configuration files, you may need to edit these files to match your specific networking environment. See “Configuring the Network Host Files” on page 17 for more information about editing these files.

Configuring Driver Parameters

This chapter describes how to configure the driver parameters used by the Sun GigaSwift Ethernet adapter. This chapter contains the following sections:

- “GigaSwift Ethernet Device Driver Parameters” on page 25
- “Setting `ce` Driver Parameters” on page 33
- “GigaSwift Ethernet Driver Operating Statistics” on page 39

GigaSwift Ethernet Device Driver Parameters

The `ce` device driver controls the GigaSwift Ethernet devices. The `ce` driver is attached to the UNIX `pci` name property `pci108e,abba` for the Sun GigaSwift Ethernet adapter (108e is the vendor ID and abba is the PCI device ID).

You can manually configure the `ce` device driver parameters to customize each Sun GigaSwift Ethernet adapter device in your system. This section provides an overview of the capabilities of the GigaSwift Ethernet device used in the adapter, lists the available `ce` device driver parameters, and describes how to configure these parameters.

The Sun GigaSwift Ethernet UTP PCI adapter is capable of all the operating speeds and modes listed in “Setting the Autonegotiation Mode” on page 36. The `ce` device performs autonegotiation with the remote end of the link (link partner) to select a common mode of operation. The `ce` device also supports a forced mode of operation.

Driver Parameter Values and Definitions

TABLE 4-1 describes the parameters and settings for the `ce` device driver.

TABLE 4-1 `ce` Driver Parameter, Status, and Descriptions

Parameter	Status	Description
<code>instance</code>	Read and write	Device instance
<code>adv_autoneg_cap</code>	Read and write	Operational mode parameter
<code>adv_1000fdx_cap</code>	Read and write	Operational mode parameter
<code>adv_1000hdx_cap</code>	Read and write	Operational mode parameter
<code>adv_100T4_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>adv_asmpause_cap</code>	Read and write	Flow control parameter
<code>adv_pause_cap</code>	Read and write	Flow control parameter
<code>link_master</code>	Read and write	1Gb forced mode parameter
<code>use_int_xcvr</code>	Read and write	
<code>enable_ipg0</code>	Read and write	Enable additional delay before transmitting a packet
<code>ipg0</code>	Read and write	Additional delay before transmitting a packet
<code>ipg1</code>	Read and write	Interpacket Gap parameter
<code>ipg2</code>	Read and write	Interpacket Gap parameter
<code>rx_intr_pkts</code>	Read and write	Receive interrupt blanking values
<code>rx_intr_time</code>	Read and write	Receive interrupt blanking values
<code>red_dv4to6k</code>	Read and write	Random early detection and packet drop vectors
<code>red_dv6to8k</code>	Read and write	Random early detection and packet drop vectors
<code>red_dv8to10k</code>	Read and write	Random early detection and packet drop vectors
<code>red_dv10to12k</code>	Read and write	Random early detection and packet drop vectors
<code>tx_dma_weight</code>	Read and write	PCI Interface parameter
<code>rx_dma_weight</code>	Read and write	PCI Interface parameter
<code>infinet_burst</code>	Read and write	PCI Interface parameter
<code>disable_64bit</code>	Read and write	PCI Interface parameter

Operational Mode Parameters

The following parameters determine the transmit and receive speed and duplex. TABLE 4-2 describes the operational mode parameters and their default values.

TABLE 4-2 Operational Mode Parameters

Parameter	Description
adv_autoneg_cap	Local interface capability advertised by the hardware 0 = Forced mode 1 = Autonegotiation (default)
adv_1000fdx_cap	Local interface capability advertised by the hardware 0 = Not 1000 Mbit/sec full-duplex capable 1 = 1000 Mbit/sec full-duplex capable (default)
adv_1000hdx_cap	Local interface capability advertised by the hardware 0 = Not 1000 Mbit/sec half-duplex capable 1 = 1000 Mbit/sec half-duplex capable (default)
adv_100fdx_cap	Local interface capability advertised by the hardware 0 = Not 100 Mbit/sec full-duplex capable 1 = 100 Mbit/sec full-duplex capable (default)
adv_100hdx_cap	Local interface capability advertised by the hardware 0 = Not 100 Mbit/sec half-duplex capable 1 = 100 Mbit/sec half-duplex capable (default)
adv_10fdx_cap	Local interface capability advertised by the hardware 0 = Not 10 Mbit/sec full-duplex capable 1 = 10 Mbit/sec full-duplex capable (default)
adv_10hdx_cap	Local interface capability advertised by the hardware 0 = Not 10 Mbit/sec half-duplex capable 1 = 10 Mbit/sec half-duplex capable (default)

Note – If a parameter's initial setting is 0, it cannot be changed. If you try to change it, it will revert back to 0.

If all these parameters are set to 1, autonegotiation will use the highest speed possible. If all these parameters are set to 0, you will receive the following error message:

```
NOTICE: Last setting will leave cel with no link capabilities.  
WARNING: cel: Restoring previous setting.
```

Flow Control Parameters

The `ce` device is capable of sourcing (transmitting) and terminating (receiving) pause frames conforming to the IEEE 802.3x Frame Based Link Level Flow Control Protocol. In response to received flow control frames, the `ce` device can slow down its transmit rate. On the other hand, the `ce` device is capable of sourcing flow control frames, requesting the link partner to slow down, provided that the link partner supports this feature. By default, the driver advertises both transmit and receive pause capability during autonegotiation.

TABLE 4-3 provides flow control keywords and describes their function.

TABLE 4-3 Read-Write Flow Control Keyword Descriptions

Keyword	Description
<code>adv_asmpause_cap</code>	The adapter supports asymmetric pause, which means it can pause only in one direction. 0=Off (default) 1=On
<code>adv_pause_cap</code>	This parameter has two meanings depending on the value of <code>adv_asmpause_cap</code> . (Default=0) If <code>adv_asmpause_cap</code> = 1 while <code>adv_pause_cap</code> = 1 pauses are received. If <code>adv_asmpause_cap</code> = 1 while <code>adv_pause_cap</code> = 0 pauses are transmitted. If <code>adv_asmpause_cap</code> = 0 while <code>adv_pause_cap</code> = 1 pauses are sent and received. If <code>adv_asmpause_cap</code> = 0 then <code>adv_pause_cap</code> determines whether Pause capability is on or off.

Gigabit Forced Mode Parameter

In 10/100 mode it was possible to disable auto-negotiation and force the link to the speed you required. With Gigabit copper interfaces this feature is also available but may require you to decide whether your side of the connection is a master or a slave. The `link_master` parameter will facilitate that. Usually switches will be enabled as master therefore this parameter can remain unchanged, since slave operation is the default. If this is not the case Then `link_master` can be used to enable `ce` as a master.

TABLE 4-4 Forced Mode Parameter

Parameter	Description
<code>link_master</code>	When set to 1 this enables master operation, assuming the link partner is a slave. When set to 0 this enables slave operation, assuming the link partner is a slave. (default)

Interpacket Gap Parameters

The `ce` device supports a programmable mode called `enable_ipg0`.

When a driver receives a packet with `enable_ipg0` set (the default), it adds an additional time delay before transmitting the packet. This delay, set by the `ipg0` parameter, is in addition to the delay set by the `ipg1` and `ipg2` parameters. The additional `ipg0` delay helps to reduce collisions.

If `enable_ipg0` is disabled, the value of `ipg0` is ignored and no additional delay is set. Only the delays set by `ipg1` and `ipg2` will be used. Disable `enable_ipg0` if other systems keep sending a large number of back-to-back packets. Systems that have `enable_ipg0` set might not have enough time on the network.

You can add the additional delay by setting the `ipg0` parameter from 0 to 255, which is the media byte time delay.

TABLE 4-5 defines the `enable_ipg0` and `ipg0` parameters.

TABLE 4-5 Parameters Defining `enable_ipg0` and `ipg0`

Parameter	Values	Description
<code>enable_ipg0</code>	0	<code>enable_ipg0</code> reset
	1	<code>enable_ipg0</code> set (Default=8)
<code>ipg0</code>	0 to 255	The additional time delay (or gap) before transmitting a packet (after receiving the packet) (Default=8)

The `ce` device supports the programmable Interpacket Gap (IPG) parameters `ipg1` and `ipg2`. The total IPG is the sum of `ipg1` and `ipg2`. The total IPG is 0.096 microseconds for the link speed of 1000 Mbps.

TABLE 4-6 lists the default values and allowable values for the IPG parameters.

TABLE 4-6 Read-Write Interpacket Gap Parameter Values and Descriptions

Parameter	Values (Byte-time)	Description
<code>ipg1</code>	0 to 255	Interpacket gap 1 (Default = 8)
<code>ipg2</code>	0 to 255	Interpacket gap 2 (Default = 4)

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 1000 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.

Interrupt Parameters

TABLE 4-7 describes the receive interrupt blanking values.

TABLE 4-7 RX Blanking Register for Alias Read

Field Name	Values	Description
rx_intr_pkts	0 to 511	Interrupt after this number of packets have arrived since the last packet was serviced. A value of zero indicates no packet blanking. (Default=3)
rx_intr_time	0 to 524287	Interrupt after 4.5 US ticks have elapsed since the last packet was serviced. A value of zero indicates no time blanking. (Default=1250)

Random Early Drop Parameters

TABLE 4-8 describes the RX random early detection 8-bit vectors, which allows you to enable random early drop (RED) thresholds. When received packets reach the RED range packets are dropped according to the preset probability. The probability should increase when the fifo level increases. Control packets are never dropped and are not counted in the statistics.

TABLE 4-8 RX Random Early Detecting 8-Bit Vectors

Field Name	Values	Description
red_dv4to6k	0 to 255	Random early detection and packet drop vectors for when fifo threshold is greater than 4096 bytes and less than 6,144 bytes. Probability of drop can be programmed on a 12.5 percent granularity. For example, if bit 0 is set the first packet out of every eight will be dropped in this region. (Default=0)

TABLE 4-8 RX Random Early Detecting 8-Bit Vectors

Field Name	Values	Description
red_dv6to8k	0 to 255	Random early detection and packet drop vectors for when fifo threshold is greater than 6,144 bytes and less than 8,192 bytes. Probability of drop can be programmed on a 12.5 percent granularity. For example, if bit 8 is set the first packet out of every eight will be dropped in this region. (Default=0)
red_dv8to10k	0 to 255	Random early detection and packet drop vectors for when fifo threshold is greater than 8,192 bytes and less than 10,240 bytes. Probability of drop can be programmed on a 12.5 percent granularity. For example, if bit 16 is set the first packet out of every eight will be dropped in this region. (Default=0)
red_dv10to12k	0 to 255	Random early detection and packet drop vectors for when fifo threshold is greater than 10,240 bytes and less than 12,288 bytes. Probability of drop can be programmed on a 12.5 percent granularity. For example, if bit 24 is set the first packet out of every eight will be dropped in this region. (Default=0)

PCI Bus Interface Parameters

These parameters allow you to modify PCI interface features to gain better PCI interperformance for a given application.

TABLE 4-9 PCI Bus Interface Parameters

Parameter	Description
tx_dma_weight	Determine the multiplication factor for granting credit to the TX side during a weighted round robin arbitration. Values are 0 to 3. (Default=0) Zero means no extra weighting. The other values are power of 2 extra weighting, on that traffic. For example of tx_dma_weight = 0 and rx_dma_weight = 3 then as long as RX traffic is continuously arriving its priority will be 8 times greater than TX to access the PCI

TABLE 4-9 PCI Bus Interface Parameters

Parameter	Description
<code>rx_dma_weight</code>	Determine the multiplication factor for granting credit to the RX side during a weighted round robin arbitration. Values are 0 to 3. (Default=0)
<code>infinite_burst</code>	allows the infinite burst capability to be utilized. When this is in effect and the system supports infinite burst. The adapter will not free the bus until complete packets are transferred across the bus. Values are 0 or 1. (Default=0)
<code>disable_64bit</code>	Switches off 64 bit capability of the adapter. In some cases, it is useful to switch off this feature. Values are 0 or 1. (Default=0, which enables 64 bit capability)

Setting `ce` Driver Parameters

You can set the `ce` device driver parameters in two ways:

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

If you use the `ndd` utility, the parameters are valid only until you reboot the system. This method is good for testing parameter settings.

To set parameters so they remain in effect after you reboot the system, create a `/kernel/drv/ce.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 `ce` driver and the `ndd` utility to modify (with the `-set` option) or display (without the `-set` option) the parameters for each `ce` device.

▼ To Specify Device Instances for the `ndd` Utility

Before you use the `ndd` utility to get or set a parameter for a `ce` device, you must specify the device instance for the utility.

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

```
# grep ce /etc/path_to_inst
"/pci@1f,2000/pci@1/network@0"  2 "ce"
"/pci@1f,2000/pci@2/network@0"  1 "ce"
"/pci@1f,2000/pci@4/network@0"  0 "ce"
```

In the example above, the three GigaSwift Ethernet instances are from the installed adapters. The instance numbers are in bold italics for clarity.

2. Use the instance number to select the device.

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

The device remains selected until you change the selection.

Noninteractive and Interactive Modes

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

- Noninteractive
- Interactive

In noninteractive 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 Noninteractive Mode

This section describes how to modify and display parameter values.

- **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/ce` driver instance, and assigns it to the parameter:

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

When you change any `adv` parameter, a message similar to the following appears:

```
xcvr addr:0x00 - link up 1000 Mbps half duplex
```

- **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/ce parameter
```

Using the `ndd` Utility in Interactive Mode

- **To modify a parameter value in interactive mode, specify `ndd /dev/ce`, as shown below.**

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

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

After typing the parameter name, the `ndd` utility prompts you for the parameter value (see TABLE 4-1 through TABLE 4-11).

- To list all the parameters supported by the `ce` driver, type `ndd /dev/ce`.
(See TABLE 4-1 through TABLE 4-11 for parameter descriptions.)

```
# ndd /dev/ce
name to get/set ? ?
?                               (read only)
instance                        (read and write)
adv_autoneg_cap                 (read and write)
adv_1000fdx_cap                 (read and write)
adv_1000hdx_cap                 (read and write)
adv_100T4_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)
adv_asmpause_cap                (read and write)
adv_pause_cap                   (read and write)
link_master                     (read and write)
use_int_xcvr                    (read and write)
enable_ipg0                     (read and write)
ipg0                            (read and write)
ipg1                            (read and write)
ipg2                            (read and write)
rx_intr_pkts                    (read and write)
rx_intr_time                    (read and write)
red_dv4to6k                     (read and write)
red_dv6to8k                     (read and write)
red_dv8to10k                    (read and write)
red_dv10to12k                   (read and write)
tx_dma_weight                   (read and write)
rx_dma_weight                   (read and write)
infinite_burst                  (read and write)
disable_64bit                   (read and write)
name to get/set ?
#
```

Setting the Autonegotiation Mode

By default, autonegotiation is set to `on`. This means that the adapter communicates with its link partner to determine a compatible network speed, duplex mode, and flow control capability.

▼ To Disable Autonegotiation Mode

If your network equipment does not support autonegotiation, or if you want to specify your network speed, you can set autonegotiation to `off` on the `ce` device.

1. **Set the following driver parameters to the values that are described in the documentation that shipped with your link partner (for example, a switch):**

- `adv_1000fdx_cap`
- `adv_1000hdx_cap`
- `adv_100fdx_cap`
- `adv_100hdx_cap`
- `adv_10fdx_cap`
- `adv_10hdx_cap`
- `adv_asmpause_cap`
- `adv_pause_cap`

See TABLE 4-2 for the descriptions and possible values of these parameters.

2. **Set the `adv_autoneg_cap` parameter to 0.**

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

When you change any `ndd` link parameter, a message similar to the following appears:

```
xcvr addr:0x00 - link up 1000 Mbps half duplex
```

Setting Parameters Using the `ce.conf` File

You can also specify the driver parameter properties on a per-device basis by creating a `ce.conf` file in the `/kernel/drv` directory. Use a `ce.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 26.

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

▼ To Set Driver Parameters Using a `ce.conf` File

1. Obtain the hardware path names for the `ce` devices in the device tree.

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

```
# grep ce /etc/path_to_inst
"/pci108e;abba;/pci@4,4000/network@0"  2 "ce"
"/pci108e;abba;/pci@6,2000/network@0"  1 "ce"
"/pci108e;abba;/pci@4,2000/network@0"  0 "ce"
```

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

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

In the first line of the previous example:

- Name = `pci108e,abba`
- Parent name = `/pci@4,4000`
- Unit-address = 4

In the second line in the previous example:

- Name = `pci108e,abba`
- Parent name = `/pci@6,2000`
- Unit-address = 4

In the third line in the previous example:

- Name = `pci108e,abba`
- Parent name = `/pci@4,2000`
- Unit-address = 4

2. Set the parameters for the above devices in the `/kernel/drv/ce.conf` file.

In the following example, the `adv_autoneg_cap` and `adv_1000fdx_cap` parameters are set for all Sun GigaSwift Ethernet devices. (See the `driver.conf(4)` man page for more information.)

```
adv_autoneg_cap=0 adv_1000fdx_cap=0
```

In the following example, the `adv_autoneg_cap` and `adv_1000fdx_cap` parameters are set for a single instance of the Sun GigaSwift Ethernet device.

```
name=pci108e,abba parent=pci@4,4000 unit address+4 adv_autoneg_cap=0  
adv_1000fdx_cap=0;
```

3. Save the `ce.conf` file.
4. Save and close all files and programs, and exit the windowing system.
5. Shut down and reboot the system.

GigaSwift Ethernet Driver Operating Statistics

These statistics are part of the statistics presented by the `netstat -k` command.

TABLE 4-10 describes the read-only Media Independent Interface (MII) capabilities. These parameters define the capabilities of the hardware. The Gigabit Media Independent Interface (GMII) supports all of the following capabilities.

TABLE 4-10 Read-Only `ce` Device Capabilities

Parameter	Description (Local interface Capabilities)
<code>cap_autoneg</code>	0 = Not capable of autonegotiation 1 = Autonegotiation capable
<code>cap_1000fdx</code>	Local interface full-duplex capability 0 = Not 1000 Mbit/sec full-duplex capable 1 = 1000 Mbit/sec full-duplex capable
<code>cap_1000hdx</code>	Local interface half-duplex capability 0 = Not 1000 Mbit/sec half-duplex capable 1 = 1000 Mbit/sec half-duplex capable

TABLE 4-10 Read-Only ce Device Capabilities (*Continued*)

Parameter	Description (Local interface Capabilities)
cap_100fdx	Local interface full-duplex capability 0 = Not 100 Mbit/sec full-duplex capable 1 = 100 Mbit/sec full-duplex capable
cap_100hdx	Local interface half-duplex capability 0 = Not 100 Mbit/sec half-duplex capable 1 = 100 Mbit/sec half-duplex capable
cap_10fdx	Local interface full-duplex capability 0 = Not 10 Mbit/sec full-duplex capable 1 = 10 Mbit/sec full-duplex capable
cap_10hdx	Local interface half-duplex capability 0 = Not 10 Mbit/sec half-duplex capable 1 = 10 Mbit/sec half-duplex capable
cap_asm_pause	Local interface flow control capability 0 = Not asymmetric pause capable 1 = Asymmetric pause (from the local device) capable
cap_pause	Local interface flow control capability 0 = Not Symmetric pause capable 1 = Symmetric pause capable

Reporting the Link Partner Capabilities

TABLE 4-11 describes the read-only link partner capabilities.

TABLE 4-11 Read-Only Link Partner Capabilities

Parameter	Description
lp_cap_autoneg	0 = No autonegotiation 1 = Autonegotiation
lp_cap_1000fdx	0 = No 1000 Mbit/sec full-duplex transmission 1 = 1000 Mbit/sec full-duplex
lp_cap_1000hdx	0 = No 1000 Mbit/sec half-duplex transmission 1 = 1000 Mbit/sec half-duplex
lp_cap_100fdx	0 = No 100 Mbit/sec full-duplex transmission 1 = 100 Mbit/sec full-duplex
lp_cap_100hdx	0 = No 100 Mbit/sec half-duplex transmission 1 = 1000 Mbit/sec half-duplex
lp_cap_10fdx	0 = No 10 Mbit/sec full-duplex transmission 1 = 10 Mbit/sec full-duplex

TABLE 4-11 Read-Only Link Partner Capabilities (*Continued*)

Parameter	Description
lp_cap_10hdx	0 = No 10 Mbit/sec half-duplex transmission 1 = 10 Mbit/sec half-duplex
lp_cap_asm_pause	0 = Not asymmetric pause capable 1 = Asymmetric pause towards link partner capability
lp_cap_pause	0 = Not symmetric pause capable 1 = Symmetric pause capable

If the link partner is *not* capable of autonegotiation (when lp_autoneg_cap is 0), the remaining information described in TABLE 4-11 is not relevant and the parameter value = 0.

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

TABLE 4-12 describes the netstat -k transmit and receive parameters:

TABLE 4-12 Transmit and Receive Parameters

Parameter	Description
xcvr_inits	Number of Physical layer re-initializations every time you change link parameters using NDD this increments.
rev_id	Revision ID of the GigaSwift Ethernet device useful for recognition of device being used in the field.
xcvr_addr	GMII/MII Physical layer device address for management interface.
xcvr_id	GMII/MII Physical layer device Identification Decimal copy of MII registers 2 and 3.
lb_mode	Copy of the Loopback mode the device is in, if any.
qos_mode	When zero, the TX queues operate in a simple round robin queueing scheme, based on TCP/UDP destination port number. If set the TX queues operate in a scheme designed to provide VLAN priorities.
tx_starts	Number of times that the driver attempted to transmit a packet.
tx_dma_bind_fail	Number of times a page table entry was not available to allow the driver to map the kernel memory to device accessible memory for transmission.
tx_queue0	Number of packets queued for transmission on the first hardware transmit queue.

TABLE 4-12 Transmit and Receive Parameters

Parameter	Description
tx_queue1	Number of packets queued for transmission on the second hardware transmit queue.
tx_queue2	Number of packets queued for Transmission on the third hardware transmit queue.
tx_queue3	Number of packets queued for Transmission on the fourth hardware transmit queue.
tx_max_pend	Maximum number of transmits pending on any of the four queues.
rx_hdr_pkts	Number of packets received that were less than 256 bytes.
rx_mtu_pkts	Number of packets received that were greater than 256 bytes and less than 1514 bytes.
rx_split_pkts	Number of packets that were split across two pages.
rx_no_comp_wb	Number of times the hardware cannot post completion entries for received data.
rx_no_buf	Number of times the hardware cannot receive data because there is no more receive buffer space.
rx_new_pages	Number of pages that got replaced during reception.
rx_new_hdr_pgs	Number of pages that were filled with packets less than 256 bytes that got replaced during reception.
rx_new_mtu_pgs	Number of pages that were filled with packets greater than 256 bytes and less than 1514 that got replaced during reception.
rx_new_nxt_pgs	Number of pages that contained packets that were split across pages that got replaced during reception.
rx_hdr_drops	Number of times a whole page of packets less than 256 bytes was dropped because the driver was unable to map a new one to replace it.
rx_mtu_drops	Number of times a whole page of packets greater than 256 bytes and less than 1514 was dropped because the driver was unable to map a new one to replace it.
rx_nxt_drops	Number of times a page with a split packet was dropped because the driver was unable to map a new one to replace it.
rx_rel_flow	Number of times the driver was told to release a flow.

▼ To Check Link Partner Settings

- As superuser, type the `netstat -k` command:

```
# netstat -k ce0
ce0:
ipackets 0 ipackets64 0 ierrors 0 opackets 0 opackets64 0
oerrors 0 collisions 0 rbytes 0 rbytes64 0 obytes 0 obytes64 0
multircv 0 multixmt 0 brdcstrcv 0 brdcstxmt 0 norcvbuf 0
noxmtbuf 0 first_collision 0 excessive_collisions 0 late_collisions 0
peak_attempts 0 length_err 0 alignment_err 0 crc_err 0 code_violations 0
ifspeed 0 rev_id 1 xcvr_inits 1 xcvr_inuse 3 xcvr_addr 0
xcvr_id 0 cap_autoneg 1 cap_1000fdx 1 cap_1000hdx 0 cap_100T4 0
cap_100fdx 0 cap_100hdx 0 cap_10fdx 0 cap_10hdx 0 cap_asmpause 0
cap_pause 1 lp_cap_autoneg 0 lp_cap_1000fdx 0 lp_cap_1000hdx 0
lp_cap_100T4 0 lp_cap_100fdx 0 lp_cap_100hdx 0 lp_cap_10fdx 0
lp_cap_10hdx 0 lp_cap_asmpause 0 lp_cap_pause 0 link_T4 0
link_speed 0 link_duplex 0 link_asmpause 0 link_pause 0
link_up 0 lb_mode 0 qos_mode 0 tx_inits 0 tx_starts 0 tx_nocanput 0
tx_msgdup_fail 0 tx_allocb_fail 0 tx_no_desc 0 tx_dma_bind_fail 0
tx_uflo 0 tx_queue0 0 tx_queue1 0 tx_queue2 0 tx_queue3 0
tx_max_pend 0 rx_inits 0 rx_hdr_pkts 0 rx_mtu_pkts 0 rx_split_pkts 0
rx_no_buf 0 rx_no_comp_wb 0 rx_ov_flow 0 rx_len_mm 0 rx_bad_descs 0
rx_nocanput 0 rx_msgdup_fail 0 rx_allocb_fail 0 rx_new_pages 0
rx_new_hdr_pgs 0 rx_new_mtu_pgs 0 rx_new_nxt_pgs 0 rx_hdr_drops 0
rx_mtu_drops 0 rx_nxt_drops 0 rx_rel_flow 0 rx_pkts_dropped 0
pci_err 0 pci_rta_err 0 pci_rma_err 0 pci_parity_err 0 pci_bad_ack_err 0
pci_drto_err 0 ipackets_cpu00 0 ipackets_cpu01 0 ipackets_cpu02 0
ipackets_cpu03 0
```


Configuring VLANs

This chapter explains VLANs in detail and provides configuration instructions and examples.

- **VLANs:** Virtual Local Area Networks (VLANs) are commonly used to split up groups of network users into manageable broadcast domains, to create logical segmentation of workgroups, and to enforce security policies among each logical segment. With multiple VLANs on an adapter, a server with a single adapter can have a logical presence on multiple IP subnets. By default, 512 VLANs can be defined for each VLAN-aware adapter on your server. However, this number can be increased by changing the system parameters. VLANs are currently supported for gigabit mode only.

If your network does not require multiple VLANs, you can use the default configuration, in which case no further configuration is necessary.

Note – If you did not install the VLAN packages when you installed the driver, you must unconfigure all ce networking interfaces and unload the driver before you can configure VLAN.

An Overview of VLANs

VLANs allow you to split your physical LAN into logical subparts, providing an essential tool for increasing the efficiency and flexibility of your network.

VLANs are commonly used to separate groups of network users into manageable broadcast domains, to create logical segmentation of workgroups, and to enforce security policies among each logical segment. Each defined VLAN behaves as its own separate network, with its traffic and broadcasts isolated from the others, increasing the bandwidth efficiency within each logical group.

Although VLANs are commonly used to create individual broadcast domains and/or separate IP subnets, it is sometimes useful for a server to have a presence on more than one VLAN simultaneously. Several Sun products support multiple VLANs on a per port or per interface basis, allowing very flexible network configurations.

FIGURE 5-1 shows an example network that uses VLANs

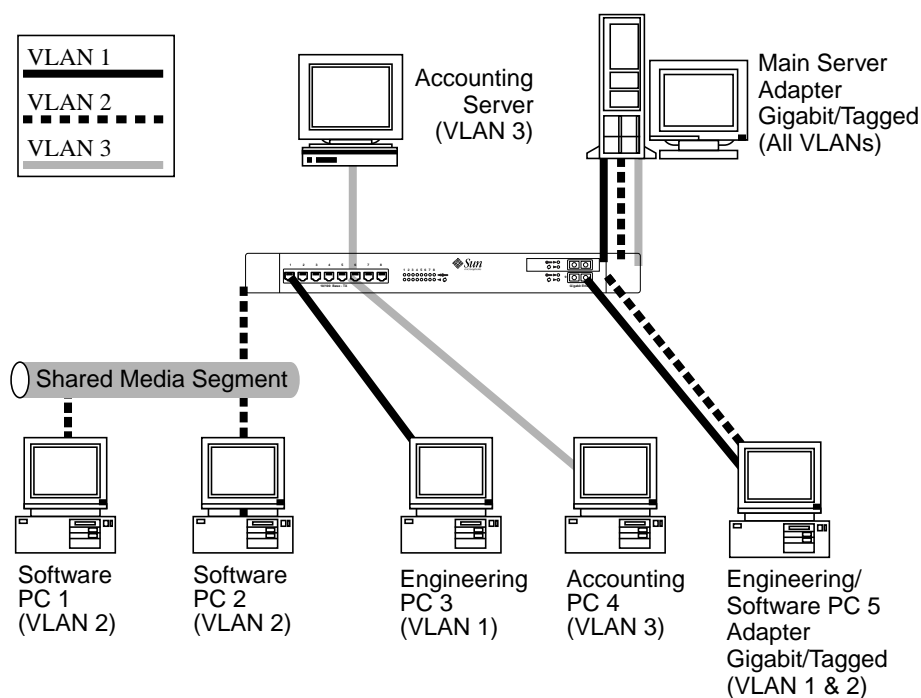


FIGURE 5-1 Example of Servers Supporting Multiple VLANs with Tagging Adapters

The example network has the following features:

- The physical LAN network consists of a switch, two servers, and five clients.
- The LAN is logically organized into three different VLANs, each representing a different IP subnet.
- VLAN 1 is an IP subnet consisting of the Main Server, Client 3, and Client 5. This represents an engineering group.
- VLAN 2 includes the Main Server, Clients 1 and 2 via shared media segment, and Client 5. This is a software development group.
- VLAN 3 includes the Main Server, the Accounting Server and Client 4. This is an accounting group.

- The Main Server is a high-use server that needs to be accessed from all VLANs and IP subnets. The server has a Sun GigabitEthernet adapter installed. All three IP subnets are accessed via the single physical adapter interface. The server is attached to one of the SunSwitch's Gigabit Ethernet ports, which is configured for VLANs 1, 2, and 3. Both the adapter and the connected SunSwitch port have tagging turned on. Because of the tagging VLAN capabilities of both devices, the server is able to communicate on all three IP subnets in this network, but continues to maintain broadcast separation between all of them.
- The Accounting Server is available to VLAN 3 only. It is isolated from all traffic on VLANs 1 and 2. The switch port connected to the server has tagging turned off.
- Clients 1 and 2 are attached to a shared media hub that is then connected to the switch. They belong to VLAN 2 only, and are logically in the same IP subnet as the Main Server and Client 5. The switch port connected to this segment has tagging turned off.
- Client 3 is a member of VLAN 1, and can communicate only with the Main Server and Client 5. Tagging is not enabled on Client 3's switch port.
- Client 4 is a member of VLAN 3, and can communicate only with the servers. Tagging is not enabled on Client 4's switch port.
- Client 5 is a member of both VLANs 1 and 2, and has a Sun GigabitEthernet adapter installed. It is connected to switch port 10. Both the adapter and the switch port are configured for VLANs 1 and 2 and have tagging enabled.

VLAN tagging is only required to be enabled on switch ports that create trunk links to other VLAN-aware Ethernet switches, or on ports connected to tag-capable end-stations, such as servers or workstations with VLAN-aware adapters.

Configuring VLANs

VLANs can be created according to various criteria, but each VLAN must be assigned a VLAN tag or VLAN ID (VID). The VID is a 12-bit identifier between 1 and 4094 that identifies a unique VLAN. For each network interface (ce0, ce1, ce2 and so on), 512 possible VLANs can be created. Because IP subnets are commonly used, it's best to use IP subnets when setting up a VLAN network interface. This means that each VID assigned to a VLAN interface of a physical network interface will belong to different subnets.

Tagging an Ethernet frame requires the addition of a tag header to the frame. The header is inserted immediately following the Destination MAC address and the Source MAC address. The tag header consists of two bytes of Ethernet Tag Protocol Identifier (TPID, 0x8100) and two bytes of Tag Control Information (TCI). FIGURE 5-2 shows the Ethernet Tag Header format.

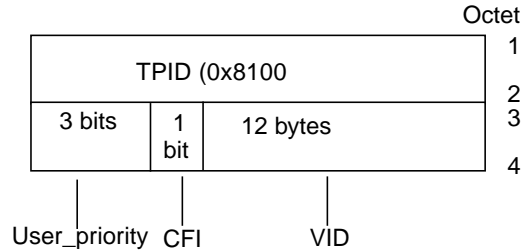


FIGURE 5-2 Ethernet Tag Header Format

By default, a single VLAN is configured for every port, which groups all ports into the same broadcast domain, just as if there were no VLANs at all, VLAN tagging for the switch port turned off.

▼ To Configure Static VLANs

1. **Create one `hostname6.cenum` file for each VLAN which will be configured for each adapter on the server, using the following naming format that includes both the VID and the physical point of attachment (PPA):**

VLAN logical PPA = <1000 * VID> + <Device PPA>
`ce123000` = 1000*123 + ce

This format limits the maximum number of PPAs (instances) you can configure to 1000 in the `/etc/path_to_inst` file.

For example, on a server with the Sun GigabitEthernet/P 3.0 adapter having an instance of 0, that belongs to a member of two VLANs, with VID 123 and 224, you would use `ce123000` and `ce224000`, respectively, as the two VLAN PPAs.

2. Use the `ifconfig(1M)` to configure a VLAN virtual device, for example:

```
# ifconfig ce123000 plumb up
# ifconfig ce224000 plumb up
```

The output of `ifconfig -a` on a system having VLAN devices `ce123000` and `ce224000`:

```
# ifconfig -a
lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232 index 1
    inet 127.0.0.1 netmask ff000000
hme0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 2
    inet 129.144.131.91 netmask ffffffff broadcast 129.144.131.255
    ether 8:0:20:a4:4f:b8
ce123000: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 3
    inet 199.199.123.3 netmask ffffffff broadcast 199.199.123.255
    ether 8:0:20:a4:4f:b8
ce124000: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500 index 4
    inet 199.199.124.3 netmask ffffffff broadcast 199.199.124.255
    ether 8:0:20:a4:4f:b8
```

3. On the switch, set VLAN tagging and set VLAN ports to coincide with the VLANs you've set up on the server. Using the examples in Step 2, you would set up VLAN ports 123 and 224 on the switch.

Refer to the documentation that came with your switch for specific instructions for setting VLAN tagging and ports.

Specifications

This appendix lists the specifications for the Sun GigaSwift Ethernet adapter. It contains the following sections:

- “Connectors” on page 51
- “Performance Specifications” on page 52
- “Physical Characteristics” on page 52
- “Power Requirements” on page 52

Connectors

FIGURE A-1 shows the connector for the Sun GigaSwift Ethernet UTP adapter.

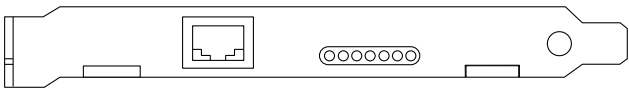


FIGURE A-1 Sun GigaSwift Ethernet UTP Adapter Connector

Table A-2 lists the characteristics of the Cat-5 Connector used by the Sun GigaSwift Ethernet UTP adapter.

TABLE A-1 Cat-5 Connector Link Characteristics

Description	
Operating range	Up 100 meters

Performance Specifications

TABLE A-2 Performance Specifications

Feature	Specification
PCI clock	33/66 MHz max
PCI data burst transfer rate	up to 64-byte bursts
PCI data/address width	32/64 -bit
PCI modes	Master/slave
1 GBit/s, 850 nm	1000 Mbps (full duplex)

Physical Characteristics

TABLE A-3 Physical Characteristics

Dimension	Measurement
Length	6.8 inches
Width	4.2 inches

Power Requirements

TABLE A-4 Power Requirements

Specification	Measurement
Maximum power consumption	14 watts
Voltage	3.3V and 5V

Diagnostic Software and Troubleshooting Issues

This appendix provides an overview of the SunVTS diagnostic application and instructions for testing the adapter using the onboard FCode self-test. There is also a section outlining some common troubleshooting issues. This appendix contains the following sections:

- “SunVTS Diagnostic Software” on page 53
- “Using the OpenBoot PROM FCode Self-Test” on page 54
- “Troubleshooting Issues” on page 56

SunVTS Diagnostic Software

The SunVTS software executes multiple diagnostic hardware tests from a single user interface and is used to verify the configuration and functionality of most hardware controllers and devices. The SunVTS software operates primarily from a graphical user interface, enabling test parameters to be set quickly and easily while a diagnostic test operation is being performed.

The `nettest` diagnostic checks all the networking interfaces on a system, including the Sun GigaSwift Ethernet adapter. Refer to the *SunVTS User's Guide* for more information on how to run the `nettest` diagnostic test.

Note – To use the `nettest` diagnostic, you must have the SunVTS software installed on your system. Refer to the *Solaris Sun Hardware Platform Guide*, which was shipped with the *Solaris Supplement* CD, for instructions on how to install the SunVTS software.

Using the OpenBoot PROM FCode Self-Test

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

You can invoke the FCode self-test 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.

The FCode self-test exercises most functionality sub-section by sub-section and ensures the following:

- Connectivity during adapter card installation
- Verification that all components required for a system boot are functional

▼ Running the Ethernet FCode Self-Test 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 might 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 shutdown procedures described in the *Solaris Handbook for Sun Peripherals*.

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

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

3. Reset the system.

```
ok reset-all
```

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

You should see a list of devices, similar to the example below, specific to the adapter:

```
ok show-nets
a) /pci@1f,0/pci@1/network@4
b) /pci@1f,0/pci@1,1/network@1,1
q) NO SELECTION
Enter Selection, q to quit:
```

5. Type the following to run the self-test using the `test` command:

```
ok test device path
```

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

- `ce register test`
- `serdes internal loopback test`
- `link up/down test`

If the test passes, you see these messages:

```
ok test /pci@1f,0/pci@1/network@4
ce register test --- succeeded.
Internal loopback test -- succeeded.
Link is -- up
```

If the card is not connected to a network, you see the following messages:

```
ok test /pci@1f,0/pci@1/network@4
ce register test --- succeeded.
Internal loopback test -- succeeded.
Link is -- down
ok
```

6. For more robust test results, set the `diag-switch?` to `true` and reissue the tests as shown in Step 5 above.

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

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.

Troubleshooting Issues

Known Incompatibilities with Pre-IEEE 802.3z Network Switches

You might experience interoperability issues when using the Sun GigaSwift Ethernet adapter with the SunSwitch switch, the Alteon ACE 110 switch, or other pre- or non-IEEE 802.3z standard compliant network equipment. If you experience difficulties with noncompliant equipment, set the adapter and switch autonegotiation properties to `off` and try to configure the interface manually.

▼ To Set Autonegotiation to `off` for a SunSwitch or an Alteon ACE 110 Switch

You can set autonegotiation to `off` for SunSwitch and Alteon ACE 110 switches using those switches' configuration program (`cgf`). Refer to your switch documentation for instructions on how to access and use the `cgf` program.

The following procedure describes how to turn autonegotiation off for one SunSwitch port.

1. Establish a connection to the switch using either a serial connection or a Telnet connection.

Refer to the *SunSwitch 1.1 Installation and Configuration Guide* (805-3743-10) for more information. After connecting to the switch, the Main menu prompt (Main#) is displayed.

2. At the Main# prompt, type `cfg` to display the Configuration menu and prompt (Configuration#).

```
>> Main# cfg
[Configuration Menu]
    sys  - System-wide parameter menu
    port - Port configuration menu
    ip   - IP addressing menu
    vlan - VLAN configuration menu
    stp  - Spanning Tree menu
    snmp - SNMP menu
    setup - Step by step configuration set up
    dump - Dump current configuration to script file

>> Configuration#
```

3. Type the following to disable autonegotiation on a GigaSwift Ethernet port.
Replace *portnumber* with the Ethernet port used by the adapter.

```
>> Configuration# /port portnumber/auto off
```

4. Type the following to apply and save your changes.

```
>> Configuration# apply
>> Configuration# save
```

Refer to the switch documentation for further configuration instructions.

▼ To Set Autonegotiation to `off` for Other Noncompliant Network Equipment

If your network equipment does not support autonegotiation, you can set autonegotiation to `off` on the GigaSwift Ethernet (ce) device.

1. Set the following GigaSwift Ethernet driver parameters to values according to the documentation that shipped with your switch:

- `adv_1000fdx_cap`
- `adv_1000hdx_cap`
- `adv_pauseTX`
- `adv_pauseRX`.

2. Set the `adv_autoneg_cap` parameter to 0.

Note – See Chapter 4 for the default values of these parameters and for instructions on how to set these parameters.

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