

Sun™ GigabitEthernet FC-AL/P Combination Adapter Installation Guide



THE NETWORK IS THE COMPUTER™

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2. This device must accept any interference received, including interference that may cause undesired operation.

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

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2. This device must accept any interference received, including interference that may cause undesired operation.

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

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

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Compliance ID: Everest

Product Name: Sun GigabitEthernet FC-AL/P Combination Adapter (X2069A)

This product has been tested and complies with the following rules and requirements.

EMC

European Union—EC

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

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

Safety

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

EC Type Examination Certificates:

EN60950/IEC950 (1993)

Supplementary Information

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

/S/

Dennis P. Symanski
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Preface

The *Sun GigabitEthernet FC-AL/P Combination Adapter Installation Guide* provides installation instructions for the Sun™ GigabitEthernet FC-AL/P Combination adapter. This manual also describes how to configure the driver software.

These instructions are designed for experienced enterprise system administrators.

How This Book Is Organized

This document is organized into the following chapters and appendices.

Chapter 1 introduces and lists the features of the Sun GigabitEthernet FC-AL/P Combination adapter.

Chapter 2 provides instructions for installing the adapter into a system.

Chapter 3 explains how to edit the Ethernet interface host files.

Chapter 4 describes how to configure the GigabitEthernet device driver parameters.

Appendix A lists the adapter's specifications.

Appendix B defines the diagnostic programs used to test the adapter.

Using UNIX Commands

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

See one or more of the following for this information:

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

Typographic Conventions

TABLE P-1 Typographic Conventions

Typeface	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <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

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
PCI adapter installation	Your system installation or service manual
Storage device installation	Your storage device installation or service manual
GigabitEthernet driver configuration	<i>Platform Notes: The Sun GigabitEthernet Device Driver</i>
Dynamic reconfiguration installation	Your system installation or service manual
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 an overview of the adapter, including a list of features and the supported systems. The chapter contains the following sections:

- “Product Features” on page 1
- “Hardware and Software Requirements” on page 3
- “Known Incompatibilities” on page 3

Product Features

The Sun GigabitEthernet FC-AL/P Combination adapter incorporates the Sun GigabitEthernet technology that transfers data at a rate of one gigabit per second—10 times the rate of a SunFastEthernet™ adapter. The adapter also contains a Fibre Channel-Arbitrated Loop (FC-AL) connector, which offers high bandwidth, increased distance, and additional connectivity from host to peripherals.

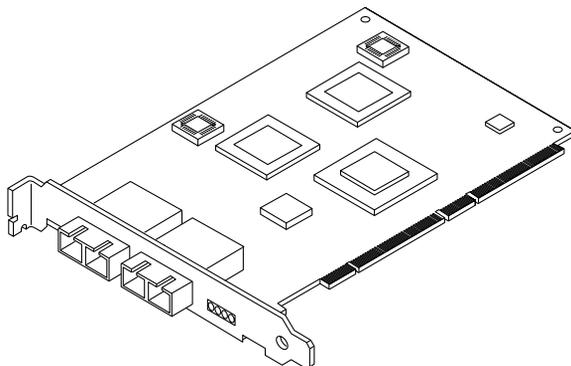


FIGURE 1-1 Sun GigabitEthernet FC-AL/P Combination Adapter

PCI Adapter

- Duplex SC fiber connectors (850 nm, SX)
- 33/66-MHz, 32- or 64-bit bus master
- Universal dual voltage signaling (3.3V and 5V)
- PCI Local Bus Rev 2.1 compliant (6.8-inch x 4.2-inch short card)

GigabitEthernet

The Sun GigabitEthernet FC-AL/P Combination 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:

- Logical Link Control (IEEE 802.2)
- Simple Network Management Protocol (SNMP) (limited Management Information Base (MIB))
- Ethernet (IEEE 802.3)
- Media Access Control (IEEE 802.3u)
- Flow control (IEEE 802.3x)
- Fully compliant with IEEE 802.3z
- Single 1000BASE-SX (GbE) port
- Full- and half-duplex GigabitEthernet interface
- Standard Ethernet frame size (1518 bytes)
- Dual DMA channels
- Reduced interrupt load on system
- Hardware assists in generating TCP checksum
- Supports full flow control

FC-AL

- ANSI X3T11 standards compliant
- Supports FC-AL private loop disk attach peripherals
- 64-bit/66-MHz PCI support
- No more than one PCI bus interrupt per SCSI I/O operation

Diagnostic Support

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

Hardware and Software Requirements

Before using the Sun GigabitEthernet FC-AL/P Combination adapter, make sure your system meets the following hardware and software requirements listed in TABLE 1-1. Check the `sun.com` website for up-to-date requirements.

TABLE 1-1 Supported Software and Hardware

Hardware and Software	Requirements
Sun systems	Sun Ultra™ 10, 30, 60, or 80 Sun Enterprise™ 250, or 450
FC-AL storage products	Sun StorEdge™ A5x00 product family Sun StorEdge L11000 Tape Library
Solaris operating environment	Solaris 7 11/99, and future supported releases
OpenBoot PROM	Revision 3.14 or above

Note – The adapter will not fit into PCI slots #9 or #10 of the Sun Enterprise 450 system, or slot #4 of the Ultra 80 system, because it requires a long connector socket.

Note – The Sun Ultra 10 system contains only 32-bit, 33-MHz PCI slots. Therefore, the adapter will provide lower performance levels in an Ultra 10 system compared to systems with 64-bit, 66-MHz PCI slots. When installed in an Ultra 10 system, the adapter should be used for connectivity purposes only.

Known Incompatibilities

You may experience interoperability issues when using the adapter with the SunSwitch™ switch, Alteon ACE 110 Switch, or other pre- or non-IEEE 802.3z standard compliant network equipment. If you experience difficulties, set auto-negotiation to `off` and try to manually configure the interface through the command line.

See “Known Incompatibilities With Noncompliant Network Equipment” on page 7 for more information.

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 contains the following sections:

- “Preparing for the Installation” on page 5
- “Installing the Adapter Into the System” on page 10

Preparing for the Installation

Before installing the adapter, prepare for the installation by assembling the appropriate tools, verifying the system software, and setting the appropriate hardware parameters.

Tools and Equipment Needed

You may need to order fiber-optic cables. You can order cables from Sun in the following lengths:

- 2-meter, part number X973A
- 15-meter, part number X978A

You will also need:

- A Number 2 Phillips screwdriver
- An antistatic wrist strap

▼ To Verify the Software Environment

1. Determine which version of the Solaris operating environment your system is running.

View the contents of the `/etc/release` file and make sure your system has at least the Solaris 7 11/99 operating environment installed.

2. Verify that your system has the Sun GigabitEthernet packages installed.

Use the `pkginfo` command to list all of the software packages installed on your system. The table below lists the required GigabitEthernet software packages.

TABLE 2-1 Required Software Packages

Software Package	Description
SUNWged	Sun GigabitEthernet driver
SUNWgedm	Sun GigabitEthernet man pages
SUNWgedu	Sun GigabitEthernet headers

Refer to the *Solaris Sun Hardware Platform Guide* for instructions on installing required packages from the Solaris Supplement CD. The software package names may change in future Solaris releases.

3. Install the required software patches, if any.

Go to the <http://sunsolve.sun.com> website and search the patch database for any required patches.

Known Incompatibilities With Noncompliant Network Equipment

You may experience interoperability issues when using the 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 manually configure the interface.

▼ 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 (`cfg`). Refer to your switch documentation for instructions on how to access and use the `cfg` 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, you will see the Main menu prompt (Main#).

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 GigabitEthernet 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 GigabitEthernet (`ge`) device.

- 1. Set the following GigabitEthernet driver parameters to values according to the documentation that shipped with your switch:** `adv_1000fdx_cap`, `adv_1000hdx_cap`, `adv_pauseTX` **and** `adv_pauseRX`.
- 2. Set the `adv_1000autoneg_cap` parameter to 0.**

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

Verifying the Sun StorEdge A5000 Array Firmware

If you are planning to connect the Sun GigabitEthernet FC-AL/P Combination adapter to a Sun StorEdge A5000 array, ensure that the firmware level of the interface board is at least 1.09.

- Use the Sun StorEdge A5000 array front panel module (FPM) to check the interface board firmware level.

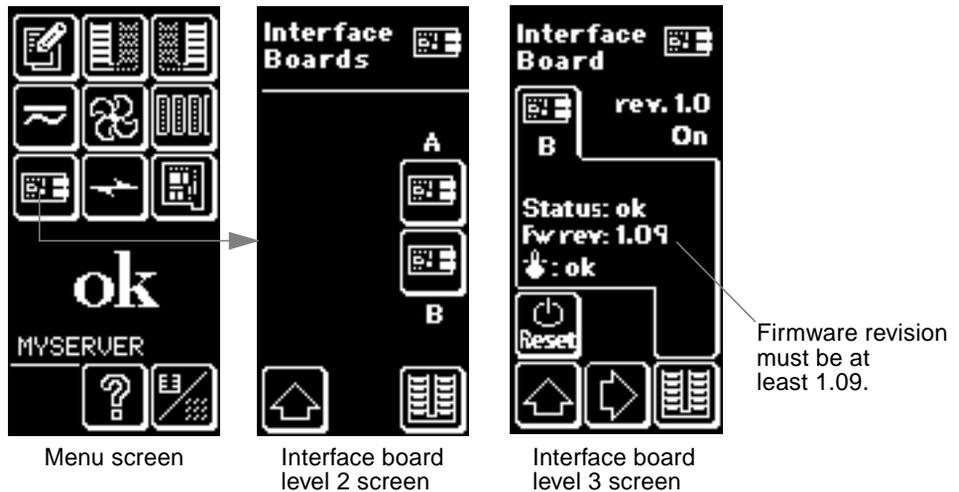


FIGURE 2-1 Checking the StorEdge A5000 Array Interface Board Firmware Level

If the StorEdge A5000 array firmware level is less than 1.09, you must upgrade the firmware using an SBus-based host system before you can connect the array to the Sun GigabitEthernet FC-AL/P Combination adapter. Visit the sunsolve.sun.com website to download the latest firmware patch.

Installing the Adapter Into the System

Note – If your system supports dynamic reconfiguration (DR), refer to your system documentation for installation instructions.

▼ 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 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.**

Note – The Ultra 10 system contains 32-bit, 33-MHz PCI slots that are shorter in length than the adapter's 64-bit, 66-MHz PCI connector. Because of this size difference, the adapter's connector will extend beyond the Ultra 10 PCI slot.

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. Remove the dust covers from the adapter’s fiber-optic connectors.

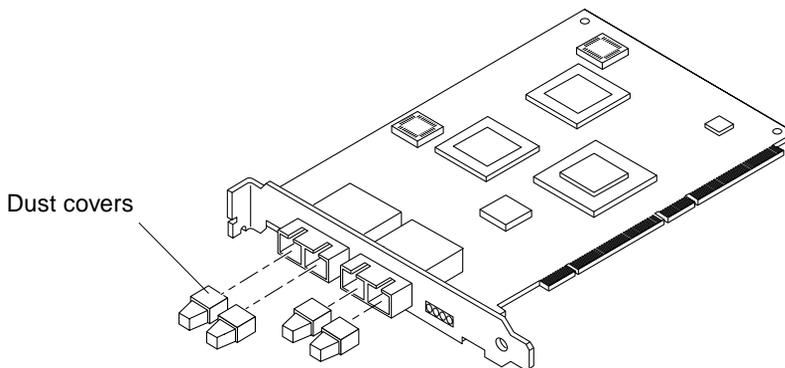


FIGURE 2-2 Removing the Dust Covers

12. Connect a fiber-optic cable to the FC-AL connector (FIGURE 2-3) and to a device such as a disk array or a hub.

Refer to the documentation that came with the peripheral device for specific instructions.

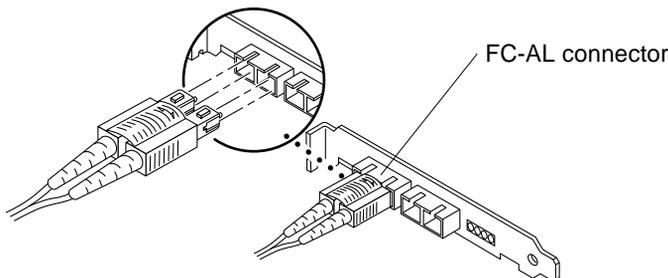


FIGURE 2-3 Connecting a Cable to the FC-AL Connector

13. **Connect a fibre optic cable (850nm, SC) to the GigabitEthernet connector (FIGURE 2-4) and to a fibre optic Ethernet network.**

Refer to the documentation that came with your GigabitEthernet network device for specific instructions.

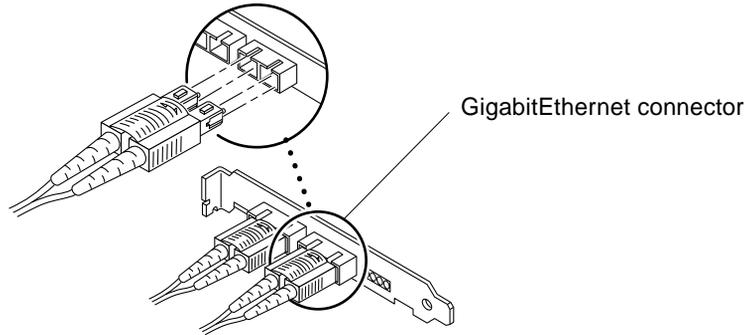


FIGURE 2-4 Connecting a Cable to the GigabitEthernet Connector

▼ To Verify the Installation

After you have installed the Sun GigabitEthernet FC-AL/P Combination 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 more information about OpenBoot PROM commands.

1. **Power on the peripherals connected to your system.**
2. **Power on the system, and when the banner appears, press the Stop-A keys to interrupt the boot process and display the `ok` prompt.**

3. List the network devices on your system.

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 GigabitEthernet FC-AL/P Combination adapter and the `network@1,1` is the onboard Ethernet device.

```
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: a
/pci@1f,2000/pci@1/network@4 has been selected.
Type ^Y ( Control-Y ) to insert it in the command line.
e.g. ok nvalias mydev ^Y
      for creating devalias mydev for
      /pci@1f,2000/pci@1/network@4
```

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

4. View the network device that you installed.

Using the previous example, type:

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

5. Use the `.properties` command to verify the installation by viewing the list of network device properties.

It may be difficult to tell if the devices on your network are GigabitEthernet devices or other network interface cards. The `.properties` command will display specific information about the adapter.

To make sure that the device you just installed is a Sun GigabitEthernet FC-AL/P Combination adapter, view the `.properties` output and verify that the `board-model` property is 501-5426.

```
ok .properties
assigned-addresses      82812010 00000000 00200000 00000000 00009060
local-mac-address       08 00 20 8e 00 dc
shared-pins             serdes
board-rev               00 00 00 06
board-model             501-5426
model                   SUNW,pci-gem
has-fcode
version                 1.2
device_type             network
address-bits            00 00 00 30
max-frame-size          00 00 40 00
reg                     00812000 00000000 00000000 00000000 00000000
                        02812010 00000000 00000000 00000000 00009060
gem-rev                 00 00 00 01
compatible              70 63 69 31 30 38 65 2c 32 62 61 64 00 70 63 69
name                    network
fcode-rom-offset        00000000
66mhz-capable
fast-back-to-back
devsel-speed            00000002
class-code              00020000
interrupts              00000001
max-latency             00000040
min-grant                00000040
subsystem-id            00000001
revision-id             00000001
device-id               00002bad
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 16 for more information.

6. Make sure that the adapter recognizes the peripheral devices.

Use the `show-devs` command to locate the host adapter directory and the `show-children` command to display the FC-AL devices connected to your adapter.

```
ok show-devs
/SUNW,UltraSPARC-II@0,0
/counter-timer@1f,1c00
/pci@1f,2000
/pci@1f,4000
/virtual-memory
/memory@0,60000000
/aliases
/options
/openprom
/chosen
/packages
/pci@1f,2000/pci@1
/pci@1f,2000/pci@1/SUNW,ifp@5
/pci@1f,2000/pci@1/network@4
/pci@1f,2000/pci@1/SUNW,ifp@5/ses
/pci@1f,2000/pci@1/SUNW,ifp@5/ssd
. . .
ok select /pci@1f,2000/pci@1/SUNW,ifp@5
ok show-children
LiD  HA  --- Port WWN  ---  --- Disk description  ---
1d  1d  5080020000007c22  SUN  SENA  1.05P|
10  10  21000020370710ac  SEAGATE  ST19171FCSUN9.0G10789735C05778
11  11  2100002037076b25  SEAGATE  ST19171FCSUN9.0G10789735H45113
12  12  2100002037072a4f  SEAGATE  ST19171FCSUN9.0G10789735D25090
13  13  21000020370729fe  SEAGATE  ST19171FCSUN9.0G10789735C59513
14  14  21000020370751a1  SEAGATE  ST19171FCSUN9.0G10789735E83001
15  15  2100002037075299  SEAGATE  ST19171FCSUN9.0G10789735E83803
16  16  2100002037075302  SEAGATE  ST19171FCSUN9.0G10789735E83720
. . .
```

In the example, `/pci@1f,2000/pci@1/SUNW,ifp@5` is the Sun GigabitEthernet FC-AL/P Combination adapter in an Ultra 30 system and the disks shown by using the `show-children` command are in a Sun StorEdge A5000 array (SENA).

Setting the `local-mac-address` Property

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

The network interface of the Sun GigabitEthernet FC-AL/P Combination adapter has been assigned a unique Media Access Control (MAC) address, which 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 GigabitEthernet FC-AL/P Combination adapter, set the NVRAM configuration variable `local-mac-address?` to `true`.

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

Rebooting the System

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

```
ok boot -r
```

Configuring the Network Host Files

This chapter describes how to configure the system host files to use the Sun GigabitEthernet driver software.

This chapter contains the following sections:

- “Displaying the System Configuration Information” on page 17
- “Configuring the Network Host Files” on page 19
- “Setting up a Diskless Client System on a GigabitEthernet Network” on page 20
- “Installing the Solaris Operating Environment Over a GigabitEthernet Network” on page 22

Displaying the System Configuration Information

Before editing the system host files, you may first want to view the output of the `prtdiag` command. The `prtdiag` command displays the diagnostic and system configuration information of the system. Using this command, you can display the location of the installed PCI adapters.

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

▼ To Display the System Configuration Information

- Use the `prtdiag -v` command to list the configuration of the host system.

In the example below, a Sun GigabitEthernet FC-AL/P Combination adapter (network-pci108e,2bad) is installed in the 66-MHz PCI slot of an Ultra 30 system.

TABLE 3-1 `prtdiag -v` Command Output

```
# /usr/platform/sun4u/sbin/prtdiag -v
System Configuration: Sun Microsystems sun4u Sun Ultra 30 UPA/PCI
(UltraSPARC-II 296MHz)
System clock frequency: 99 MHz
Memory size: 128 Megabytes

===== CPUs =====

Brd  CPU  Module  Run  Ecache  CPU  CPU
----  ---  -
0    0    0       296  2.0    US-II  1.1

===== IO Cards =====

Brd  Bus  Freq  Slot  Name  Model
----  ---  ---  -
0    PCI  33    1    network-SUNW,hme
0    PCI  33    3    scsi-glm/disk (block)  Symbios,53C875
0    PCI  66    4    network-pci108e,2bad  SUNW,pci-gem
0    PCI  66    5    SUNW,ifp-pci1077,2100.4/ssd (blo+

No failures found in System
=====

===== HW Revisions =====

ASIC Revisions:
-----
PCI: pci Rev 4
PCI: pci Rev 4
Cheerio: ebus Rev 1

System PROM revisions:
-----
OBP 3.11.2 1998/04/20 15:37  POST 1.1.1 1997/03/04 13:59
```

Configuring the Network Host Files

After installing the GigabitEthernet driver software and the adapter, you must create a `hostname.genumber` 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.

▼ To Configure the Network Host Files

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

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

In the example above, the device instance is from the Sun GigabitEthernet FC-AL/P Combination adapter. For clarity, the instance number is in bold italics.

2. **Set up each `hostname.genumber` file to correspond with each `ge` device in the `path_to_inst` file.**

To use the adapter's `ge` interface in the above example, you would need to create an `/etc/hostname.ge0` file, where `0` is the instance number of the `ge` interface. If the instance number were `2`, the file name would be `/etc/hostname.ge2`.

- Do not create an `/etc/hostname.genumber` file for a Sun GigabitEthernet FC-AL/P Combination adapter interface you plan to leave unused.
- The `/etc/hostname.genumber` file must contain the host name for the appropriate `ge` interface.
- The host name should have an IP address and should be entered in the `/etc/hosts` file.
- The host name should be different from any other host name of any other interface; for example `/etc/hostname.ge0` and `/etc/hostname.hme1` cannot share the same host name.

The following example shows the `/etc/hostname.genumber` file required for a system called `cartman` that has a Sun GigabitEthernet FC-AL/P Combination adapter (`cartman-11`).

```
# cat /etc/hostname.hme0
cartman
# cat /etc/hostname.ge0
cartman-11
```

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

For example:

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

4. Shut down your system and perform a reconfiguration boot using the `boot -rv` OpenBoot PROM command.

For example:

```
# shutdown -i0 -g10 -y
. . .
(shutdown command messages omitted)
. . .
ok boot -rv
```

Setting up a Diskless Client System on a GigabitEthernet Network

Before you can boot and operate a diskless client system across a GigabitEthernet network, you must first install the GigabitEthernet software packages into the root directory of the diskless client. You can find the GigabitEthernet software packages on the Solaris Supplement CD.

Note – 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 GigabitEthernet 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:

```
# /export/root/client_name
```

2. Insert the Solaris Supplement 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 the *Solaris Supplement Sun Hardware Platform Guide* for mounting instructions.

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

You will need to install the `SUNWged`, `SUNWgedm`, and the `SUNWgedu` software packages to the client's root directory.

```
# cd /cdrom/cdrom0/Product
# pkgadd -R /export/root/client_name -d . SUNWged SUNWgedm SUNWgedu
# cd /
```

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

4. Eject the Solaris Supplement CD from the CD-ROM drive.

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

You will need to create an `/export/root/client_name/etc/hostname.genumber` file for the GigabitEthernet interface. See “Configuring the Network Host Files” on page 19 for instructions.

6. Edit the `hosts` file 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 GigabitEthernet interface. See “Configuring the Network Host Files” on page 19 for instructions.

Installing the Solaris Operating Environment Over a GigabitEthernet 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 GigabitEthernet adapter, you must first add the GigabitEthernet software packages to the install server. These software packages can be found on Solaris Supplement CD.

Note – Refer to the *Solaris Advanced Installation Guide* for more information about installing the Solaris operating environment over the network. Also, refer to the *Solaris Sun Hardware Platform Guide* for information about software included on the Solaris Supplement CD.

▼ To Install the Solaris Environment Over a GigabitEthernet 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 bootype=: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 Solaris Supplement CD in 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 the *Solaris Supplement Sun Hardware Platform Guide* for mounting instructions.

4. On the install server, install the GigabitEthernet software to the client's root directory.

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

```
# cd /cdrom/cdrom0/Product
# ls SUNWge*
SUNWged  SUNWgedm  SUNWgedu
# pkgadd -R root_directory/Solaris_2.7/Tools/Boot -d . SUNWged SUNWgedm SUNWgedu
# cd /
```

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

5. Eject the Solaris Supplement CD from the CD-ROM drive.

Note – You will perform the next steps on the client system.

6. If the client system is not already displaying the OpenBoot (ok) prompt, shut down and halt the client system.

Use the `shutdown(1M)` 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 GigabitEthernet device.

The `show-nets` command lists the system devices. You should see the full path name of the network device, similar to the Ultra 30 example below. In this example, the `network@4` device is the Sun GigabitEthernet FC-AL/P Combination 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 GigabitEthernet 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, you will need to install the GigabitEthernet software on the client system.

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

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

```
# pkginfo | grep SUNWge
system SUNWged   Sun Gigabit Ethernet Adapter Driver
system SUNWgedm  Sun Gigabit Ethernet Adapter Driver Man Pages
system SUNWgedu  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 the *Solaris Sun Hardware Platform Guide* for instructions on installing the required software packages from the Solaris Supplement CD.

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

Although the Solaris software installation creates the client's `hostname.gnumber` and `hosts` files, you may need to edit these files to match your specific networking environment. See "Configuring the Network Host Files" on page 19 for more information about editing these files.

Configuring the GigabitEthernet Device Driver Parameters

This chapter describes how to configure the network driver parameters used by the Sun GigabitEthernet FC-AL/P Combination adapter. This appendix contains the following sections:

- “GigabitEthernet Device Driver Parameters” on page 27
- “Setting ge Driver Parameters” on page 34
 - “Setting Parameters Using the ndd Utility” on page 34
 - “Setting Parameters Using the ge.conf File” on page 37

GigabitEthernet Device Driver Parameters

The `ge` device driver controls the GigabitEthernet devices. The GigabitEthernet device is identified as a `SUNW,pci-gem` node. The `ge` driver is attached to the device with the compatible property `pci108e,2bad` for the Sun GigabitEthernet FC-AL/P Combination adapter (108e is the adapter vendor ID and 2bad is the device ID).

You can manually configure the `ge` device driver parameters to customize each Sun GigabitEthernet FC-AL/P Combination adapter device in your system. This section provides an overview of the capabilities of the GigabitEthernet ASIC used in the adapter, lists the available `ge` device driver parameters, and describes how you can configure these parameters.

Note – Refer to the *Platform Notes: Sun GigabitEthernet Adapter* manual for current driver parameter settings and descriptions. This manual is shipped with the Solaris operating environment and can be viewed on the `docs.sun.com` website.

GigabitEthernet MAC

The GigabitEthernet MAC (GEM) provides 1000BASE-SX networking interfaces. The driver automatically sets the link speed to 1000 Mbps and conforms to the IEEE 802.3z Ethernet standard. The GEM PCI ASIC provides the PCI interface, Media Access Control (MAC) functions, and Physical Code Sublayer (PCS) functions. The External SERDES, which connects the 1000BASE-SX Compliant SC connector to the ASIC, provides the physical layer functions.

The GEM MAC and PCS are capable of all the operating speeds and modes listed in the section, “Setting the Autonegotiation Mode” on page 37. The PCS performs autonegotiation with the remote end of the link (link partner) to select a common mode of operation.

The PCS also supports a forced mode of operation. You can select the speed and mode by creating a `ge.conf` file.

Driver Parameter Values and Definitions

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

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

Parameter	Status	Description
<code>link_status</code>	Read only	Defines the current status
<code>link_speed</code>	Read only	Defines the current status
<code>link_mode</code>	Read only	Defines the current status
<code>ipg1</code>	Read and write	Interpacket Gap parameter
<code>ipg2</code>	Read and write	Interpacket Gap parameter
<code>instance</code>	Read and write	Device instance
<code>lance_mode</code>	Read and write	Enable additional delay before transmitting a packet
<code>ipg0</code>	Read and write	Additional delay before transmitting a packet
<code>adv_1000autoneg_cap</code>	Read and write	Operational mode parameter

TABLE 4-1 ge Driver Parameter, Status, and Descriptions (Continued)

Parameter	Status	Description
adv_1000fdx_cap	Read and write	Operational mode parameter
adv_1000hdx_cap	Read and write	Operational mode parameter
adv_pauseTX	Read and write	Operational mode parameter
adv_pauseRX	Read and write	Operational mode parameter
1000autoneg_cap	Read only	PCS autonegotiation capability
1000fdx_cap	Read only	PCS full duplex capability
1000hdx_cap	Read only	PCS half duplex capability
asm_dir_cap	Read only	PCS ASM_DIR capability
pause_cap	Read only	PCS Symmetric PAUSE capability
lp_1000autoneg_cap	Read only	Link partner autonegotiation capability
lp_1000fdx_cap	Read only	Link partner capability
lp_1000hdx_cap	Read only	Link partner capability
lp_asm_dir_cap	Read only	Link partner capability
lp_pause_cap	Read only	Link partner capability

Defining the Current Status

The read-only parameters described in TABLE 4-2 explain the operational mode of the interface. These parameters define the current status.

TABLE 4-2 Read-Only Parameters Defining the Current Status

Parameter	Description
link_status	Current link status 0 = Link down 1 = Link up
link_speed	Valid only if the link is up 0 = Link is not up 1 = 1000 Mbps
link_mode	Valid only if the link is up 0 = Half duplex 1 = Full duplex

Flow Control Parameters

The GEM ASIC 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 GEM can slow down its transmit rate. On the other hand, GEM 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 Receive PAUSE capability, during autonegotiation.

TABLE 4-3 Read-Write Flow Control Parameters Values and Descriptions

Parameter	Values (on/off)	Description
adv_pauseTX	0, 1	Transmit PAUSE Capable (default: not capable)
adv_pauseRX	0, 1	Receive Pause Capable (default: capable)

For normal operations, the driver doesn't need to source flow control frames. However, if the adapter is operating on a slow bus (for instance, a 33-MHz PCI bus slot), and there is a lot of frame reception activity, there could be a performance degradation due to Receive FIFO overflow. If the link partner is capable of terminating PAUSE flow control frames, the performance of the adapter could be improved by enabling `adv_pauseTX` and restarting autonegotiation.

Interpacket Gap Parameters

The GEM ASIC 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 4-4 lists the default values and allowable values for the IPG parameters.

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

Parameter	Values (Byte-time)	Description
<code>ipg1</code>	0, 255	<code>ipg1</code> = 8 (default at initialization)
<code>ipg2</code>	0, 255	<code>ipg2</code> = 4 (default at initialization)

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

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

The GEM ASIC supports a programmable mode called `lance_mode`. The `ipg0` parameter is associated with `lance_mode`.

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

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

You can add the additional delay by setting the `ipg0` parameter from 0 to 31, which is the media byte time delay.

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

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

Parameter	Values	Description
<code>lance_mode</code>	0	<code>lance_mode</code> disabled
	1	<code>lance_mode</code> enabled (default)
<code>ipg0</code>	0 to 31	The additional time delay (or gap) before transmitting a packet (after receiving the packet)

Operational Mode Parameters

TABLE 4-6 describes the operational mode parameters and their default values.

TABLE 4-6 Operational Mode Parameters

Parameter	Description
adv_1000autoneg_cap	Local PCS capability advertised by the hardware 0 = Forced mode 1 = Autonegotiation (default)
adv_1000fdx_cap	Local PCS 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 PCS capability advertised by the hardware 0 = Not 1000 Mbit/sec half-duplex capable 1 = 1000 Mbit/sec half-duplex capable (default)
adv_pauseTX	Local PCS capability advertised by the hardware 0 = Not Pause TX capable (default) 1 = Pause TX capable
adv_pauseRX	Local PCS capability advertised by the hardware 0 = Not Pause RX capable 1 = Pause RX capable (default)

Reporting Local PCS Capabilities

TABLE 4-7 describes the read-only Physical Code Sublayer (PCS) capabilities. These parameters define the capabilities of the hardware. The GEM PCS supports all of the following capabilities.

TABLE 4-7 Read-Only PCS Capabilities

Parameter	Description (Local PCS Capabilities)
1000autoneg_cap	0 = Not capable of autonegotiation 1 = Autonegotiation capable
1000fdx_cap	Local PCS full-duplex capability 0 = Not 1000 Mbit/sec full-duplex capable 1 = 1000 Mbit/sec full-duplex capable

TABLE 4-7 Read-Only PCS Capabilities (*Continued*)

Parameter	Description (Local PCS Capabilities)
1000hdx_cap	Local PCS half-duplex capability 0 = Not 1000 Mbit/sec half-duplex capable 1 = 1000 Mbit/sec half-duplex capable
asm_dir_cap	Local PCS flow control capability 0 = Not asymmetric pause capable 1 = Asymmetric pause (from the local device) capable
pause_cap	Local PCS flow control capability 0 = Not Ssymmetric pause capable 1 = Symmetric pause capable

Reporting the Link Partner Capabilities

TABLE 4-8 describes the read-only link partner capabilities.

TABLE 4-8 Read-Only Link Partner Capabilities

Parameter	Description
lp_1000autoneg_cap	0 = No autonegotiation 1 = Autonegotiation
lp_1000fdx_cap	0 = No 1000 Mbit/sec full-duplex transmission 1 = 1000 Mbit/sec full-duplex
lp_1000hdx_cap	0 = No 1000 Mbit/sec half-duplex transmission 1 = 1000 Mbit/sec half-duplex
lp_asm_dir_cap	0 = Not asymmetric pause capable 1 = Asymmetric pause towards link partner capability
lp_pause_cap	0 = Not symmetric pause capable 1 = Symmetric pause capable

If the link partner is *not* capable of autonegotiation (when lp_1000autoneg_cap is 0), the remaining information described in TABLE 4-8 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 get the link partner capabilities.

Setting `ge` Driver Parameters

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

- Using the `ndd` utility
- Using the `ge.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/ge.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 `ge` driver and the `ndd` utility to modify (with the `-set` option) or display (without the `-set` option) the parameters for each `ge` device.

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

Before you use the `ndd` utility to get or set a parameter for a `ge` 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 ge /etc/path_to_inst
"/pci@1f,2000/pci@1/network@4" 2 "ge"
"/pci@1f,2000/pci@1/network@4" 1 "ge"
"/pci@1f,2000/pci@1/network@4" 0 "ge"
```

In the example above, the three GigabitEthernet instances are from the installed adapters. The instance numbers are in bold italics.

2. Use the instance number to select the device.

```
# ndd -set /dev/ge 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 to 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/ge` driver instance, and assigns it to the parameter:

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

- **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/ge parameter
```

Using the `ndd` Utility in Interactive Mode

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

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

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

After entering the parameter name, the `ndd` utility prompts you for the parameter value (see TABLE 4-1 through TABLE 4-8).

- To list all the parameters supported by the `ge` driver, type `ndd /dev/ge \?`. (See TABLE 4-1 through TABLE 4-8 for parameter descriptions.)

```
# ndd /dev/ge \?
?                (read only)
link_status      (read only)
link_speed       (read only)
link_mode        (read only)
ipg1             (read and write)
ipg2             (read and write)
instance         (read and write)
lance_mode       (read and write)
ipg0             (read and write)
adv_1000autoneg_cap (read and write)
adv_1000fdx_cap  (read and write)
adv_1000hdx_cap  (read and write)
adv_pauseTX     (read and write)
adv_pauseRX     (read and write)
1000autoneg_cap (read only)
1000fdx_cap     (read only)
1000hdx_cap     (read only)
asm_dir_cap     (read only)
pause_cap       (read only)
lp_1000autoneg_cap (read only)
lp_1000fdx_cap  (read only)
lp_1000hdx_cap  (read only)
lp_asm_dir_cap  (read only)
lp_pause_cap    (read only)
#
```

Setting the Autonegotiation Mode

By default, autonegotiation is set to `on`. This means that the adapter will communicate 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 `ge` 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_pauseTX`
- `adv_pauseRX`

See TABLE 4-6 for the descriptions and possible values of these variables.

2. Set the `adv_1000autoneg_cap` parameter to 0.

```
# ndd -set /dev/ge adv_1000autoneg_cap 0
```

Setting Parameters Using the `ge.conf` File

You can also specify the driver parameter properties on a per-device basis by creating a `ge.conf` file in the `/kernel/drv` directory. Use a `ge.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 28.

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

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

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

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

```
# grep ge /etc/path_to_inst
"/pci@4,4000/network@4" 2 "ge"
"/pci@6,2000/network@4" 1 "ge"
"/pci@4,2000/network@4" 0 "ge"
```

- 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.
 - 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 `ge.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,2bad`
- Parent = `/pci@4,4000`
- Unit-address = 4

In the second line in the previous example:

- Name = `pci108e,2bad`
- Parent = `/pci@6,2000`
- Unit-address = 4

In the third line in the previous example:

- Name = `pci108e,2bad`
- Parent = `/pci@4,2000`
- Unit-address = 4

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

In the example below, the `ipg1` and the `ipg2` parameters are set for the three GigabitEthernet devices.

```
name="pci108e,2bad" parent="/pci@4,4000" unit-address="4" ipg1=20 ipg2=10;  
name="pci108e,2bad" parent="/pci@6,2000" unit-address="4" ipg1=20 ipg2=10;  
name="pci108e,2bad" parent="/pci@4,2000" unit-address="4" ipg1=20 ipg2=10;
```

3. Save the `ge.conf` file.

4. Save and close all files and programs, and exit the windowing system.

5. Shut down and reboot the system.

Specifications

This appendix displays the connectors and lists the following specifications for the Sun GigabitEthernet FC-AL/P Combination adapter:

- “Sun GigabitEthernet FC-AL/P Combination Adapter Connectors” on page 41
- “Fibre Channel Interface Specifications” on page 42
- “Performance Specifications” on page 42
- “Power Requirements” on page 43
- “Physical Dimensions” on page 43
- “PCI Edge Connector Pin Definitions” on page 44

Sun GigabitEthernet FC-AL/P Combination Adapter Connectors

FIGURE A-1 displays the FC-AL and GigabitEthernet connectors of the adapter.

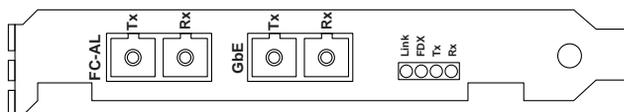


FIGURE A-1 Sun GigabitEthernet FC-AL/P Combination Adapter Backplate

Fibre Channel Interface Specifications

TABLE A-1 Fibre Channel Interface Specifications

Specification	Value
ANSI standards	Fibre Channel FC-PH X3.230-1995 SCSI Fibre Channel Protocol X3.269-1996 100 Mbytes/sec (1 Gbits/sec) Shortwave laser
Fiber cable type	50 or 62.5 micrometer multimode
Maximum cable length	500 meters

Performance Specifications

TABLE A-2 Performance Specifications

Feature	Specification
PCI clock	66 MHz max.
PCI data burst transfer rate	528 Mbytes/sec burst rate
FC-AL transfer rate payload	100 Mbytes/sec
DMA transfer size 32-bit	4 Gbytes max.
PCI data/address lines	AD63-0
PCI modes	Master/slave
Capacitance per PCI signal line	10 pF, except for CLK between 5 to 12 pF and IDSEL 8pF
FC-AL Interface	1 Gbit optical (1.0625 Gbits/sec)
1 Gbit/sec, 850 nm	1000 Mbps

Power Requirements

TABLE A-3 Power Requirements

Specification	Measurement
Power requirements	
5V 5%	3A
Ripple	100 mV
Maximum power consumption	10 watts
Voltage	3.3V and 5V

Physical Dimensions

TABLE A-4 Physical Dimensions

Height	Width	Depth	Weight
0.6 inches	4.2 inches	6.875 inches	5.2 oz
15 mm	106.68 mm	174.63 mm	147.4g

PCI Edge Connector Pin Definitions

TABLE A-5 PCI Edge Connector Pin Definitions (Top)

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	-12V	25	+3.3V	49	MGGEN	73	Ground
2	TCK	26	C/BE[3]#	50	KEYWAY	74	AD[55]
3	GND	27	AD23	51	KEYWAY	75	AD[53]
4	TDO	28	GND	52	AD08	76	Ground
5	+5V	29	AD21	53	AD07	77	AD[51]
6	+5V	30	AD19	54	+3.3V	78	AD[49]
7	INTB#	31	+3.3V	55	AD05	79	VIO
8	INTD#	32	AD17	56	AD03	80	AD[45]
9	PRSNT1#	33	C/BE[2]#	57	GND	81	AD[47]
10	RESERVED	34	GND	58	AD01	82	Ground
11	GND (PRSNT2)#	35	IRDY#	59	VIO	83	AD[43]
12	KEYWAY	36	+3.3V	60	ACK64#	84	AD[41]
13	KEYWAY	37	DEVSEL#	61	+5V	85	Ground
14	RESERVED	38	GND	62	+5V	86	AD[39]
15	GND	39	LOCK#	63	Reserved	87	AD[37]
16	CLK	40	PERR#	64	Ground	88	VIO
17	GND	41	+3.3V	65	C/BE[6]#	89	AD[35]
18	REQ#	42	SERR#	66	C/BE[4]#	90	AD[33]
19	VIO	43	+3.3V	67	Ground	91	Ground
20	AD31	44	C/BE[1]#	68	AD[63]	92	Reserved
21	AD29	45	AD14	69	AD[61]	93	Reserved
22	GND	46	GND	70	VIO	94	Ground
23	AD27	47	AD12	71	AD[59]		
24	AD25	48	AD10	72	AD[57]		

TABLE A-6 PCI Edge Connector Pin Definitions (Bottom)

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	TRST#	25	AD24	49	AD09	73	AD[56]
2	+12V	26	IDSEL	50	KEYWAY	74	AD[54]
3	TMS	27	+3.3V	51	KEYWAY	75	VIO
4	TDI	28	AD22	52	C/BE[0]#	76	AD[52]
5	+5V	29	AD20	53	+3.3V	77	AD[50]
6	INTA#	30	GND	54	AD06	78	Ground
7	INTC#	31	AD18	55	AD04	79	AD[48]
8	+5V	32	AD16	56	GND	80	AD[46]
9	RESERVED	33	+3.3V	57	AD02	81	Ground
10	VIO	34	FRAME#	58	AD00	82	AD[44]
11	RESERVED	35	GND	59	VIO	83	AD[42]
12	KEYWAY	36	TRDY#	60	REQ64#	84	VIO
13	KEYWAY	37	GND	61	+5V	85	AD[40]
14	RESERVED	38	STOP#	62	+5V	86	AD[38]
15	RST#	39	+3.3V	63	Ground	87	Ground
16	VIO	40	SDONE	64	C/BE[7]#	88	AD[36]
17	GNT#	41	SBO#	65	C/BE[5]#	89	AD[34]
18	GND	42	GND	66	VIO	90	Ground
19	RESERVED	43	PAR	67	PAR64	91	AD[32]
20	AD30	44	AD15	68	AD[62]	92	Reserved
21	+3.3V	45	+3.3V	69	Ground	93	Ground
22	AD28	46	AD13	70	AD[60]	94	Reserved
23	AD26	47	AD11	71	AD[58]		
24	GND	48	GND	72	Ground		

Using the SunVTS Diagnostic Software

This appendix contains an overview of the SunVTS diagnostic application and instructions for testing the adapter using the onboard FCode selftest.

This appendix contains the following sections:

- “SunVTS Diagnostic Software” on page 48
- “Using the OpenBoot PROM FCode Self-Test” on page 49

SunVTS Diagnostic Software

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

The following SunVTS tests can be used to test the Sun GigabitEthernet FC-AL/P Combination adapter:

TABLE 4-9 SunVTS Tests

SunVTS Test	Description
nettest	Checks all the networking interfaces on a system, including the Sun GigabitEthernet FC-AL/P Combination adapter.
gemtest	Provides functional test coverage of the Sun GigabitEthernet adapters, including the Sun GigabitEthernet FC-AL/P Combination adapter. The <code>gemtest</code> provides better fault isolation as compared to <code>nettest</code> .
disktest	Verifies the functionality of hard disk drives.

Note – Do *not* run `nettest` and `gemtest` at the same time.

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

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

TABLE B-1 SunVTS Documentation

Title	Description
<i>SunVTS User's Guide</i>	Describes the SunVTS environment
<i>SunVTS Test Reference Manual</i>	Describes each SunVTS test; provides various test options and command-line arguments
<i>SunVTS Quick Reference</i>	Provides an overview of the user interface

Using the OpenBoot PROM FCode Self-Test

The following tests are available to help identify problems with the Sun GigabitEthernet FC-AL/P Combination 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 subsection by subsection and ensures the following:

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

▼ To Run 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 may cause the system to hang.

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

1. Shut down the system.

Use the standard shutdown procedures described in *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 Sun GigabitEthernet/P 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
```

5. Type the following to run the selftest using the `test` command.

```
ok test device path
```

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

- SERDES internal loopback test
- Link up/down test

If the test passes, you will see these messages.

```
ok test /pci@1f,2000/pci@1/network@4
Internal loopback test -- succeeded.
Link is -- up
```

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

```
ok test /pci@1f,2000/pci@1/network@4
Internal loopback test -- succeeded.
Link is -- down
```

6. After testing the adapter, type the following to return the OpenBoot PROM to standard operating mode.

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

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

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

8. Reset and reboot the system.

```
ok reset-all
```


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