sgi®

SGI® 10-Gigabit Ethernet Adapter II
User's Guide

FCC WARNING

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

ATTENTION

This product requires the use of external shielded cables in order to maintain compliance pursuant to Part 15 of the FCC Rules.

VDE 0871/6.78

This equipment has been tested to and is in compliance with the Level A limits per VDE 0871.

EUROPEAN UNION STATEMENT

This device complies with the European Directives listed on the "Declaration of Conformity" which is included with each product. The CE mark insignia displayed on the device is an indication of conformity to the aforementioned European requirements.

International Special Committee on Radio Interference (CISPR)

This equipment has been tested to and is in compliance with the Class A limits per CISPR publication 22.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications.

Attention

Cet appareil numérique n'émet pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A préscrites dans le Règlement sur les interferences radioélectriques etabli par le Ministère des Communications du Canada.

Japanese Compliance Statement

　この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Compliance Statement in Chinese

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策．

Record of Revision

Version	Description
001	May 2008 Initial release.

Contents

Figures

Tables

About This Book

This guide describes the two versions of the SGI 10-Gigabit Ethernet Adapter II, shows you how to connect the adapter to an Ethernet network, and explains how to operate the adapter.

You can use the adapter to replace the built-in Ethernet network adapter in your system or use it in addition to your current adapter.

This guide is written for users of the SGI 10-Gigabit Ethernet Adapter II. It is assumed that you have general knowledge of Ethernet networks and the system in which the adapter is installed.

Important Information

Warning: **Never look into the end of a fiber optic cable to confirm that light is being emitted (or for any other reason). Most fiber optic laser wavelengths (1300 nm and 1550 nm) are invisible to the eye and cause permanent eye damage. Shorter wavelength lasers (for example, 780 nm) are visible and can cause significant eye damage. Use only an optical power meter to verify light output.**

Warning: **Never look into the end of a fiber optic cable on a powered device with any type of magnifying device, such as a microscope, eye loupe, or magnifying glass. Such activity causes cause a permanent burn on the retina of the eye. Optical signal cannot be determined by looking into the fiber end.**

Chapter Descriptions

This guide contains the following chapters:

- Chapter 1, "Features and Capabilities," summarizes the adapter features, lists the protocols and interfaces with which the adapter is compatible, and gives adapter configuration limits for various systems.

- Chapter 2, "Connecting the Adapter to a Network," shows you how to connect the adapter to your network.

- Chapter 3, "Operating the Adapter," describes how to verify installation of the adapter and software, how to reset the adapter, how to set parameters to improve performance, and how to set configuration parameters.

- Chapter 4, "Performance Tuning,"describes performance tuning for the adapter.

A glossary and an index complete this guide.

Related Publications

This guide is part of a document set that fully supports the installation, operation, and service of the SGI 10-Gigabit Ethernet Adapter II. For more information about installing and servicing the adapter, see the user's guide for the system in which the board is installed.

SGI Altix Hardware Documentation

The following is a list of hardware documentation available from SGI that describes SGI Altix systems.

- *SGI Altix 450 System User's Guide*
  Provides an overview of the Altix 450 system components, and it describes how to set up and operate this system

- *SGI Altix 4700 User's Guide*
  This guide provides an overview of the architecture and descriptions of the major components that compose the SGI Altix 4700 family of servers. It also provides the standard procedures for powering on and powering off the system, basic troubleshooting information, and important safety and regulatory specifications.

- *SGI Altix ICE 8200 Series System Hardware User's Guide*
  Describes the features of the SGI Alitx ICE 8200 series systems as well as troubleshooting, upgrading, and repairing.
  Describes the features of the Altix ICE 8200 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE210 System User's Guide*
  Describes the features of the Altix XE210 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE240 System User's Guide*
  Describes the features of the Altix XE240 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE250 System User's Guide*
  Describes the features of the Altix XE250 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE310 System User's Guide*
  Describes the features of the Altix XE310 server system as well as troubleshooting, upgrading, and repairing.

- *SGI Altix XE320 System User's Guide*
  Describes the features of the Altix XE320 server system as well as troubleshooting, upgrading, and repairing.

You can obtain SGI documentation, release notes, or man pages in the following ways:

- See the SGI Technical Publications Library at http://docs.sgi.com. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.

- For the latest information about software and documentation for your SGI ProPack software release, see the release notes that are in a file named README.TXT that is available in /docs directory on the SGI ProPack 5 for Linux CD.

- You can also view man pages by typing `man` *<title>* on a command line.

For example, to display the man page for the `apropos` command, type the following on a command line:

man apropos

Important system configuration files and commands are documented on man pages. References in the documentation to these pages include the name of the command and the section number in which the command is found. For example, "apropos(1)" refers to the `apropos` command and indicates that it is found in section 1 of Linux man pages.

For additional information about displaying reference pages using the `man` command, see man(1).

Conventions

The following conventions are used throughout this document:

Convention	Meaning
Command	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
variable	The italic typeface denotes variable entries and words or concepts being defined. Italic typeface also is used for book titles.
user input	This bold, fixed-space font denotes literal items that the user enters in interactive sessions. Output is shown in nonbold, fixed-space font.
[ ]	Brackets enclose optional portions of a command or directive line.
...	Ellipses indicate that a preceding element can be repeated.
man page(*x*)	Man page section identifiers appear in parentheses after man page names.
GUI element	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists.

Product Support

SGI provides a comprehensive product support and maintenance program for its products:

- If you are in North America, contact the Technical Assistance Center at +1 800 800 4SGI or contact your authorized service provider.

- If you are outside North America, contact the SGI subsidiary or authorized distributor in your country.

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, contact SGI. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

You can contact SGI in any of the following ways:

- Send e-mail to the following address:

  techpubs@sgi.com

- Use the Feedback option on the Technical Publications Library Web page:

  http://docs.sgi.com

- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.

- Send mail to the following address:

  Technical Publications
  SGI
  1140 East Arques Avenue
  Sunnyvale, CA 94085-4602

SGI values your comments and will respond to them promptly.

Features and Capabilities

Gigabit Ethernet is technology that allows computer systems to communicate at speeds up to 10 gigabits per second (Gbps). This chapter includes the following sections:

- "Hardware Platforms" on page 1
- "Adapter Features" on page 2
- "Cabling" on page 4
- "Configuration Limits" on page 6

Hardware Platforms

The SGI 10-Gigabit Ethernet Adapter II is supported in the following systems:

- SGI Altix XE210
- SGI Altix XE240
- SGI Altix XE250
- SGI Altix XE310
- SGI Altix XE320
- SGI Altix ICE 8200
- SGI Altix 450
- SGI Altix 4700

Note: Not every Altix system can immediately accept a PCI Express card without optional hardware to support it. For example, an Altix XE210 system needs a specific PCIe riser to use a PCI Express card. In the case of an SGI Altix 450 and 4700 system, you must have an optional PCIe blade installed to use a PCI Express card in the system. Consult your SGI system hardware manual for exact requirements.

Adapter Features

The product features/specifications for the adapter are from the product specification for the 10GbE Storage Accelerator from Chelsio Communications, Inc. See the following webpage:

http://www.chelsio.com

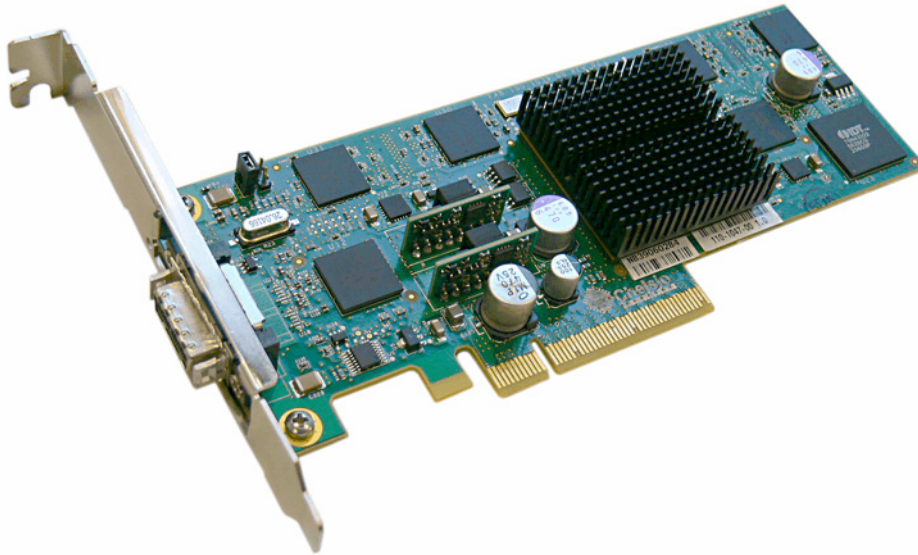Figure 1-1 shows the SGI 10-Gigabit Ethernet Adapter II.

Figure 1-1   SGI 10-Gigabit Ethernet Adapter II

There are two versions of the SGI 10-Gigabit Ethernet Adapter II, as described in Table 1-1.

Table 1-1   Two Versions of the SGI 10-Gigabit Ethernet Adapter II

Part Number	Marketing Code	Description
030-2313-001	PCIE-10G-C-RDMA	The CX4 version of the adapter
030-2314-001	PCIE-10G-OR-RDMA	Standard version

Table 1-2 lists the product features of the adapter.

Table 1-2   Adapter Features

Feature	Description/Specifications
Host Interface	+ PCI Express 1.1 x8, x4, x2, x1 + MSI-X, MSI and support for legacy pin interrupts
Network Interfaces	+ 10GBASE-SR short-reach optics (850nm) + 10GBASE-CX short-reach copper
Ethernet	+ IEEE 802.3ae (10GbE) + IEEE 802.1p Priority and 802.1Q VLAN tagging + IEEE 802.3x flow control + IEEE 802.3ad load-balancing and failover + Ether II and 802.3 encapsulated frames + Multiple MAC addresses per interface + Jumbo Frames up to 9.6Kbytes
Stateless Offloads	+ TCP checksum offload for IPv4 & IPv6 + TCP segmentation offload (TSO) for IPv4 & IPv6 + Large send offload (LSO) for IPv4 & IPv6 + Large receive offload (LRO) for IPv4 & IPv6 + UDP checksum offload for IPv4 & IPv6 + Receive-side scaling and packet steering + Line-rate packet filtering and attack protection
Integrated Traffic Manager	+ Multiple Tx & Rx queues with QoS +Two separate channels for simultaneous low latency & high bandwidth + Per-connection and per-class rate control + Packet loss avoidance
Virtualization and Firewall	Rule-based packet steering and filtering capability

Table 1-2   Adapter Features **(continued)**

Feature	Description/Specifications
High Performance RDMA	+ Ultra-Low latency, line rate bandwidth + IETF RDDP and RDMAC iWARP compliance + APIs: RNIC-PI, kDAPL and OpenFabrics 1.2
Physical and Environmental	+ Dimensions without bracket: 6.6 in. x 2.5 in. or 16.8 cm x 6.4 cm + Operating Temp: 0 to 40ºC or 32 to 104ºF + Operating Humidity: 5 to 95% + Typical power consumption: 17W

Cabling

The cabling for the adapter is described in the following sections:

- "Fiber-Optic Cables" on page 4
- "Copper Cables" on page 6

Note: Cabling is not automatically bundled with the adapter.

Fiber-Optic Cables

Table 1-3 lists the SGI LC-to-LC fiber-optic cables for the PCIE-10G-OR-RDMA version of the adapter.

Table 1-3   LC-to-LC Optical Cables

Marketing Code	Length
X-F44-OPT-2M	2 meters
X-F44-OPT-3M	3 meters
X-F44-OPT-5M	5 meters
X-F44-OPT-10M	10 meters
X-F44-OPT-20M	20 meters

Table 1-3   LC-to-LC Optical Cables **(continued)**

Marketing Code	Length
X-F44-OPT-30M	30 meters
X-F44-OPT-50M	50 meter
X-F44-OPT-100M	100 meters
X-F44-OPT-300M	300 meters

Table 1-4 lists the SGI 4X InfiniBand fiber-optic cables for the PCIE-10G-C-RDMA version of the adapter.

Table 1-4   SGI 4X Infiniband Optical Cables

Marketing Code	Length
IB-CABLE-01M-OPT	1 meter
IB-CABLE-03M-OPT	3 meters
IB-CABLE-05M-OPT	5 meters
IB-CABLE-07M-OPT	7 meters
IB-CABLE-10M-OPT	10 meters
IB-CABLE-15M-OPT	15 meters
IB-CABLE-20M-OPT	20 meters
IB-CABLE-30M-OPT	30 meters
IB-CABLE-50M-OPT	50 meters
IB-CABLE-100M-OPT	100 meters

Copper Cables

Table 1-5 lists the SGI CX4 copper cables for the PCIE-10G-C-RDMA version of the adapter.

Table 1-5   SGI CX4 Copper Cables

Marketing Code	Length
IB-CABLE-01M-Z	1 meter
IB-CABLE-02M-Z	2 meters
IB-CABLE-03M-Z	3 meters
IB-CABLE-04M-Z	4 meters
IB-CABLE-05M-Z	5 meters
IB-CABLE-06M-Z	6 meters
IB-CABLE-07M-Z	7 meters
IB-CABLE-06M-Z	1 meters
IB-CABLE-10M-Z	10 meters

Configuration Limits

Table 1-6 summarizes the configuration limits for the adapter .

Table 1-6   Configuration Limits

System	Maximum Per Bus	Maximum Number of Adapters
Altix XE210	1	1
Altix XE240	1	2 with a PCI-x riser, 4 with a PCI-E riser
Altix XE250	4	4

Table 1-6   Configuration Limits **(continued)**

System	Maximum Per Bus	Maximum Number of Adapters
Altix XE310	1	1
Altix XE320	1	1
Altix 450	1	16
Altix ICE 8200	1	4
Altix 4700	1	16

Note: You may see a performance degradation if you configure two adapters to the same 12E or 14E blade on Altix 450 or Altix 4700 servers.

Connecting the Adapter to a Network

This chapter describes installing the SGI 10-Gigabit Ethernet Adapter II and connecting it to a network:

- "Installing the Adapter" on page 9
- "Special Installation Instructions for Altix XE320 Servers" on page 9
- "Driver Specification Needed for SGI Altix 450 and SGI Altix 4700 Platforms" on page 10
- "Connecting to a Network" on page 10

Installing the Adapter

With the exceptions of the Altix 4700 and Altix XE320, refer to the instructions for installing a PCI-E card in the user's or owner's guide that came with your system. For the Altix 4700, an SGI certified service provider must install your adapter. For the Altix XE320, see the next section "Special Installation Instructions for Altix XE320 Servers".

Special Installation Instructions for Altix XE320 Servers

For the external connector and bracket of the adapter, some configurations may require special adaptation to successfully mount the card to the XE320 PCIe slot. The following are three additional procedures, presented in simplest-to-most-complex order, that might be necessary for card insertion.

Procedure 1 (Simplest)

Remove one or two adjacent DIMMs to ease the insertion of the card into the slot.

Procedure 2

1. Remove one or two adjacent DIMMs.

2. Remove the chassis-mounted bracket latch of the adapter.

   The bracket latch is the small assembly attached at the top of the slot with two screws.

Procedure 3 (Most Complex)

Note: This procedure is required for the PCIE-10G-C-RDMA version (part number 030-2313-001) of the adapter.

---

1. Remove one or two adjacent DIMMs.

2. Remove the short PCIe riser assembly from the chassis (one screw).

3. Position the card on the chassis sheet metal slot so that the lower bracket lip will be inserted into its chassis lock.

4. Position the riser to couple with the adapter.

5. Position the entire assembly to couple with the motherboard.

Driver Specification Needed for SGI Altix 450 and SGI Altix 4700 Platforms

On SGI Altix 450 and SGI Altix 4700 platforms, you must ensure that the file `/etc/modprobe.conf.local` contains an entry like the following:

```
options cxgb3 msi=0
```

Connecting to a Network

This section describes how you connect the adapter to a network in the following sections:

- "Connecting with a Fiber-Optic Cable" on page 11
- "Connecting with a Copper Cable" on page 12

Connecting with a Fiber-Optic Cable

To connect your adapter to a network with a fiber-optic cable, do the following:

1. Remove the protective end caps and **save them**.

Caution: 10-Gigabit optics are sensitive. If you plan to leave them disconnected for any significant length of time, you must replace the end caps. The optics on the adapter cannot be cleaned.

---

2. Insert the LC connector on one end of the fiber-optic cable into the adapter, as shown in Figure 2-1. Ensure that the connector is inserted completely into the jack.

3. Insert the connector on the other end of the fiber-optic cable into the connector on the Ethernet switch or on another computer system (as appropriate).

Note: If your network connects to an Ethernet switch, consult the operating manual for the switch to ensure that the switch port is enabled and configured correctly.
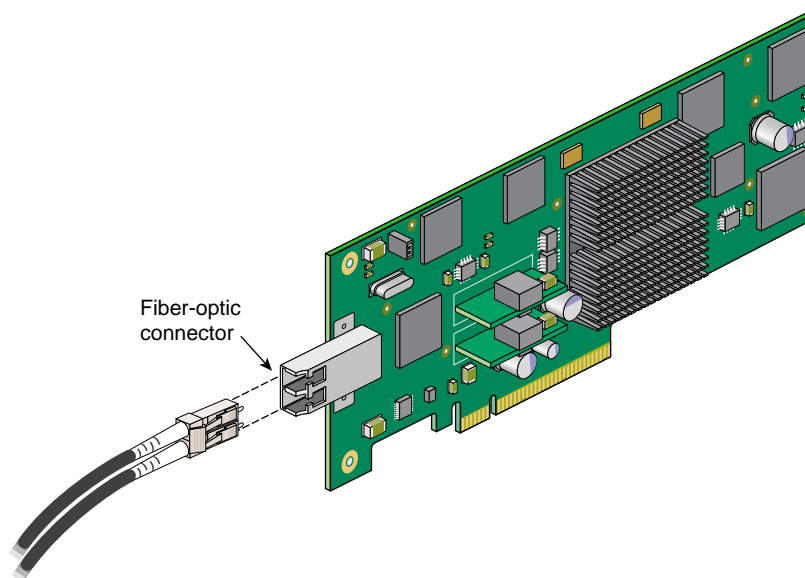

Fiber-optic
connector

Figure 2-1   Connecting the Fiber-Optic Cable

Connecting with a Copper Cable

To connect your adapter to a network with a copper cable, do the following:

1. Insert the connector on one end of the copper cable into the adapter, as shown in Figure 2-2. Ensure that the connector is inserted completely into the jack.

2. Insert the connector on the other end of the copper cable into the connector on the Ethernet switch or on another computer system (as appropriate).

Note: If your network connects to an Ethernet switch, consult the operating manual for the switch to ensure that the switch port is enabled and configured correctly.
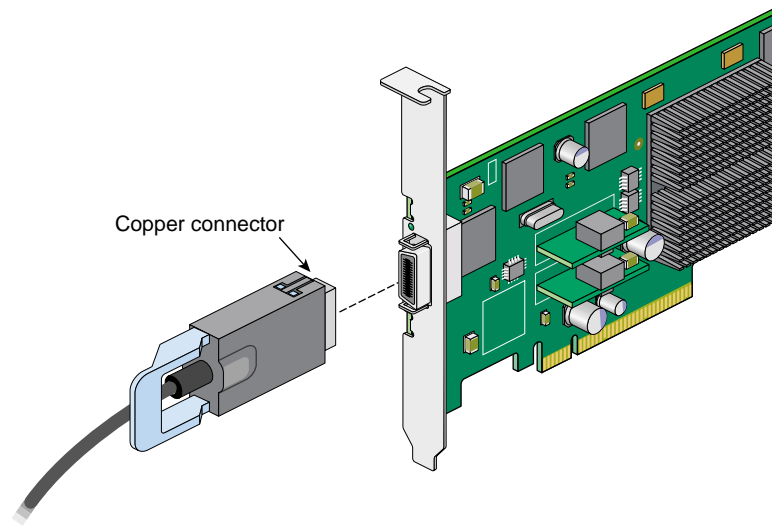
Copper connector

Figure 2-2   Connecting the Copper Cable

Operating the Adapter

This chapter describes several operational tasks as well as troubleshooting.

Verifying Functionality

This section describes the following:

Using LEDs to Determine Adapter Functionality

The adapter has a single light-emitting diode (LED) display that indicates if the adapter is configured correctly and connected to an active Ethernet. Table 3-1 describes the LED.

Table 3-1   Adapter LED

Label	Color	Meaning
LINK/ACT	Green	Link established
	Yellow	Link active
	Red	Power-on indicator (ON by default during power-on but OFF after the driver is loaded.)

Verifying That the Adapter Driver Is Loaded

The adapter driver should be automatically loaded at boot time. To verify, check for the presence of the cxgb3 driver:

```
lsmod | grep cxgb3
```

You can load the driver manually as follows:

```
modprobe cxgb3
```

Enabling the Adapter

To enable the adapter, enter the following as root:

ifconfig *IPaddress* **netmask** *mask* **broadcast** *address* **mtu 1500|9000**

For example:

ifconfig eth2 10.0.0.1 netmask 0xffffff00 broadcast 10.0.0.255 mtu 9000

For other systems to see the new address, you must enter new addresses in host files, DNS, or NIS as required for your system. For details, see the network documentation for your operating system.

Verifying That the Adapter Is Properly Configured and Enabled

Use the installation tool that comes with your operating system to install and configure the adapter.

You can use the `ifconfig -a` command to verify the configuration information, as follows:

```
systemA:~ # ifconfig -a
eth2      Link encap:Ethernet  HWaddr 00:60:DD:47:81:24
          inet addr:10.0.0.1 Bcast:10.0.0.255 Mask:255.255.255.0
          inet6 addr: fe80::260:ddff:fe47:8124/64 Scope:Link
          UP BROADCAST MULTICAST  MTU:9000  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)
          Base address:0x3020 Memory:b9160000-b9180000
```

For more information on `ifconfig`, see the `ifconfig(8)` man page.

Resetting the Adapter

In the unlikely event that you need to reset the adapter, enter the following:

ifconfig <*interface*> down
ifconfig <*interface*> up

where `interface` is name of the interface. This is usually a driver name followed by a unit number, for example, `ifconfig eth0 down`, for the first Ethernet interface.

For more information on `ifconfig`, see the `ifconfig(8)` man page.

Changing the Configuration

Configuration changes for Ethernet devices drivers are made by means of the `ethtool`(8) command. The `ethtool` command works with all Linux Ethernet drivers.

In general, each feature has a `query` and a `modify` variant. If you are wondering whether the current driver and `ethtool` support a specific feature, attempt to run the `query` option first, an example is, as follows:

```
# ethtool -a eth0
Pause parameters for eth0:
Autonegotiate:  on
RX:             on
TX:             on
```

This shows the current settings of the `pause` (or flow control) parameters. You can then change these parameters with the `ethtool -A` option.

As with any system configuration changes, make sure to have a back out strategy, read the most recent documentation for potential changes and pitfalls, and consult with a relevant Linux archives for examples of common usage.

Troubleshooting

The following standard Linux commands are useful with any Ethernet device:

- `ethtool`(8)
- `ifconfig`(8)
- `ip`(8)

For more information, see the man page associated with each tool.

Performance Tuning

The Network Interface Card (NIC) driver for the SGI 10-Gigabit Ethernet Adapter II allows performance tuning in the following three major areas:

- "Load Balancing the Receive Activity Among CPUs" on page 20

- "Latency/Throughput Tuning" on page 20

- "NIC Acceleration Features" on page 21

- "Software (SW) Stack Tuning" on page 21

- "Further Tuning with a Sample Script" on page 22

Note: Many of the tuning techniques described in this chapter require the `cxgbtool` (8), which can be obtained directly from Chelsio Communications, Inc. See the following website:

http://www.service/chelsio.com/

Load Balancing the Receive Activity Among CPUs

The adapter can be configured to use a maximum of eight receive queues. The adapter will be spread across all configured Rx queues.

Multiple Rx queues are available when the driver is loaded in MSI-X mode (default mode). In this mode, once the driver is loaded, the number of queues must be specified before the port is configured.

The interface cxgbtool(8) provides this capability:

cxgbtool *intf* **qsets 8**

Each queue must then be associated with a CPU through interrupt affinity. This sample shell script allows this operation:

```
irqs=($(cat /proc/interrupts | grep <intf> | \
    grep queue | awk `{ split($0,a,":"); print a[1] }'))

cpumask=1
for (( c=0; c < ${#irqs[@]}; c++ ));
    do
        echo $cpumask > /proc/irq/${irqs[$c]}/smp_affinity
        cpumask=`expr $cpumask \* 2`
    done
```

Once the port is configured, receive traffic will be balanced between the CPUs associated with a queue.

Latency/Throughput Tuning

The adapter is tuned by default for good latency with the interrupt holdoff timer set to 5 usecs. The setting can result in high interrupt load. If latency is not the primary target, you might want to increase it.

Currently, ethtool(8) is not well suited to deal with hardware that supports multiple receive queues. Interface cxgbtool(8) provides the facility to control the interrupt holdoff timer on a per-receive-queue basis.

The following entry dumps the current settings:

cxgbtool *intf* **qset**

The following entry updates the holdoff timer value for queue X to Y usecs:

cxgbtool *intf* **qset** *X* **lat** *Y*

NIC Acceleration Features

The adapter supports all widespread acceleration features:

• Checksum offload

• TCP segmentation offload (TSO)

• Large receive offload (LRO)

Checksum offload and TSO are controlled through ethtool(8).

Currently, ethtool(8) is not well suited to deal with hardware that supports multiple receive queues. The interface cxgbtool(8) provides the facility to control LRO on a per-recieve-queue basis. The following entry dumps the current settings:

cxgbtool *intf* **qset**

The following entry disables/enables the LRO capability for queue X:

cxgbtool *intf* **qset** *X* **lro** [**0**|**1**]

Software (SW) Stack Tuning

The SW stack can be tuned to improve TCP performance as follows:

```
Set net.core.wmem_max="16777216"
Set net.core.rmem_max="16777216"
Set net.ipv4.tcp_timestamps="0"
Set net.ipv4.tcp_rmem="4096 262144 16777216"
Set net.ipv4.tcp_wmem="4096 262144 16777216"
Set net.core.optmem_max="524288"
Set net.core.netdev_max_backlog="200000"
```

Further Tuning with a Sample Script

Chelsio Communications, Inc. provides a sample script, `perftune.sh.txt`, to use for further tuning. You can access the script by contacting Chelsio Communications, Inc.

Glossary

acknowledge (Ack) packet

The Ack packet informs the PE that initiated a message that the destination PE accepted the message.

autonegotiation

The process by which two computers (or a computer and a switch) connected by Gigabit Ethernet determine the speed and other parameters with which they will communicate.

CD-ROM (CD)

A flat metallic disk that contains information that you can view and copy onto your own hard disk; you cannot change or add to the disk. CD-ROM is an abbreviation for compact disc read-only memory.

Ethernet

A communication network used to connect computers.

gigabit

A communication rate of 2^{30} bits per second.

host

Any system connected to the network.

hostname

The name that uniquely identifies each host (system) on the network.

IP address

A number that uniquely identifies each host (system) on a TCP/IP network.

LED

Light-emitting diode, a light on a piece of hardware that indicates status or error conditions.

MAC

Medium access control, also called the physical layer.

MAC address

The physical address of the Gigabit Ethernet board, which is distinct from the IP address.

MTU

Maximum Transmission Unit is a configuration parameter that controls the size of the Ethernet frames that the Gigabit Ethernet board can transmit and receive.

man (manual) page

An online document that describes how to use a particular Linux command. Also called reference page.

NIS

Network Information Service, a distributed database mechanism for user accounts, host names, mail aliases, and so on.

PCI Express

Peripheral Component Interconnect Express (also referred to as PCIe) is a high-performance I/O interconnect. PCI Express is a third-generation I/O architecture where traditional PCI attributes are maintained, but the parallel PCI bus interconnect is replaced by a highly scalable serial interface.

reference page

See man (manual) page.

TCP/IP

A standard networking protocol that is included in the Linux software.

Index

LC connector, 11
LEDs
   troubleshooting, 16
load balancing, receive queues, 20
LRO, large receive offload, 21

O

optical cables, 4, 5, 11

P

PCI Express, 1, 3, 24
PCIe, 1, 3, 24
performance tuning, 19
perftune.sh.txt script, 22
product support, xvii

S

software stack tuning, 21

T

TCP segmentation offload (TSO), 21
technical support, xvii
throughput tuning, 20
troubleshooting, 10, 16, 18
TSO, TCP segmentation offload, 21