

USER'S GUIDE

ITI8000 Series CompactPCI Multifunction Adapters

December 2001

Version 1.0

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Preface

This document is the user's guide for tru LSI Logic ITI8000 Series CompactPCI Multifunction Adapters User's Guide. It provides instructions for installing this multifunction adapter and describes the various Ultra2 SCSI, Ethernet, and Video functions associated with the ITI8000 adapters. It also provides installation instructions for the device drivers used in conjunction with the Solaris SPARC operating system.

Audience

This document assumes that you have some familiarity with microprocessors and related support devices. The people who benefit from this document are

- Engineers and managers who are evaluating and installing the CompactPCI multifunction adapter for possible use in a system
 - End-users who are installing the CompactPCI multifunction adapter into their systems
-

Organization

This document has the following chapters and appendixes:

- [Chapter 1, Installing the ITI8000 Series CompactPCI Adapters](#), describes these multifunction adapters and provides installation instructions for the board and its device drivers.
- [Chapter 2, Describing the ITI8241C-S Adapter](#), provides general information, illustrates the hardware components, and includes connector configuration details.
- [Chapter 3, Configuring SCSI Devices](#), discusses issues relating to SCSI devices such as terminating the SCSI bus, setting SCSI IDS,

connecting internal and external SCSI devices, and cabling requirements.

- [Chapter 4, **Configuring the Network Interface**](#), discusses how to configure the Ethernet driver and host files along with details about customizing your installation.
- [Appendix A, **Glossary**](#), lists terms used throughout this guide.

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Chapter 1

Installing the ITI8000 Series CompactPCI Adapters

This chapter provides installation instructions for the LSI Logic ITI8000 Series CompactPCI® multifunction adapters and the associated device drivers. It includes these topics:

- [Section 1.1, “General Description,” page 1-1](#)
 - [Section 1.2, “Installing the ITI8000 Series Adapter,” page 1-4](#)
 - [Section 1.3, “Device Drivers for CompactPCI Adapters,” page 1-5](#)
 - [Section 1.4, “Installing the Ultra2 SCSI Drivers,” page 1-6](#)
 - [Section 1.5, “Using the Network Installation Procedure,” page 1-8](#)
-

1.1 General Description

ITI8000 adapters combine Low Voltage Differential (LVD) Ultra2 SCSI technology with multiport Fast Ethernet and Video. The ITI8000 adapters provide maximum integration of the most commonly required server functions, leaving the maximum number of free CompactPCI slots available for your application.

1.1.1 LSI Logic Adapters Supported

[Table 1.1](#) describes the five ITI8000 adapters. Different variations of these boards provide you with Fast Ethernet ports and/or Video ports, or SCSI ports.

Table 1.1 ITI8000 Series CompactPCI Multifunction Adapters

Host Adapter	Description
ITI8241C-S	CompactPCI Multifunction Adapter with: Two Ultra2 SCSI ports, Four Fast Ethernet Ports and one Video Port.
IT-8240C-S	CompactPCI Multifunction Adapter with: Two Ultra2 SCSI ports and Four Fast Ethernet Ports.
ITI8200C-S	CompactPCI Adapter with two Ultra2 SCSI ports.
ITI8040C-S	CompactPCI Adapter with four Fast Ethernet Ports.
ITI8001C-S	CompactPCI Adapter with one Video Port.

Table 1.2 lists the variations that are available for the adapters above. The variations can be combined when applicable. For more information about these available options, contact the LSI Logic technical support team at <http://www.lsillogic.com>.

Table 1.2 Available Options

Variation	Description
-S	Sun Solaris Support
-R	Rear I/O

Each ITI8000 adapter has a different connector configuration depending on which variation you have purchased. For all other variations of the ITI8000 adapters, simply skip those sections that do not apply to your adapter. This guide focuses on the ITI8241C-S adapter, which is a fully configured module.

1.1.2 Hardware and Software Requirements

The Solaris operating system on SPARC-based systems supports the LSI Logic ITI8000 adapters. [Table 1.3](#) lists the versions of the operating systems that support these adapters.

Table 1.3 Operating System Support

Operating System	Intel	SPARC
Sun Solaris Version 2.6	No	Yes
Sun Solaris Version 7.0	No	Yes
Sun Solaris Version 8.0	No	Yes
Windows NT, Windows 95, Windows 98	No	N/A
Linux	No	N/A

[Table 1.4](#) lists the hardware and software requirements for the Ethernet portion of the ITI8000 Series adapters.

Table 1.4 Requirements for the Ethernet Adapter

Requirements	Hardware /Software
Supported Systems	Sun SPARC or SPARC OEM systems
Supported Operating Environments	Solaris 2.6 and above
OpenBoot PROM (OBP)	Release 3.0 or later

LSI Logic provides software device drivers that take full advantage of the embedded RISC SCRIPTS multiport SCSI controller to minimize system overhead and maximize data throughput. Four integrated Fast Ethernet ports provide high performance network connectivity with full compatibility with the Sun Microsystems Solaris SPARC QFE driver. An integrated ATI Rage2C graphics engine provides high performance graphics capability without the need for an additional CompactPCI slot.

LSI Logic provides the highest performance and the maximum functionality with their ITI8000 adapters, while leaving the system integrator the most expandable system platform. Having CompactPCI

compliant hot swap available makes the ITI8000 Series adapters a must for your high availability CompactPCI application.

1.2 Installing the ITI8000 Series Adapter

Table 1.5 shows the system requirements needed to install your ITI8000 adapters.

Table 1.5 System Requirements

Resource	Requirement
Host Bus Slot	Sun Solaris system with available CompactPCI 6U slot
Operating system	Solaris 2.6 release or later
Network Boot Server	SPARC or Intel Solaris boot server ¹
Firmware	OpenBoot PROM Version 3.0 or greater

1. Only required if you are using the LSI Logic module to support your System disk.

To install all the ITI8000 adapters, follow these steps:

- Step 1. Turn off the power to your computer system and to all peripherals directly connected to the system (monitor, printer, external SCSI enclosures, etc.)
- Step 2. Unplug the system from the AC power line.
- Step 3. Use an antistatic strap or precautions to avoid static discharge to your computer system or the ITI8000 adapter.
- Step 4. Remove the cabinet cover on your computer. Refer to the system's documentation).
- Step 5. Locate a free CompactPCI expansion slot and remove the screws and metal cover for the selected slot.

Important: *Do not install the adapter in a CPU slot.*

- Step 6. Install the adapter in the selected slot.

The module should fit without forcing and should line up with the I/O bulkhead. Ensure that the adapter is fully seated in the slot.

- Step 7. Tighten the retaining screws.
- Step 8. Connect any SCSI devices to the SCSI connectors, if applicable, (see [Figure 2.1](#)) and follow the guidelines in [Chapter 3, "Configuring SCSI Devices."](#)
- Step 9. Plug your VGA monitor into the 15-Pin VGA port shown in [Figure 2.1](#) on [page 2-7](#).
- Step 10. Plug your network cables into the four network jacks, starting at the top (qfe0) port.

After installing the module in an appropriate PCI slot and making all the necessary internal and external connections to the module, power on the host system.

1.3 Device Drivers for CompactPCI Adapters

The ITI8000 adapters offer the highest possible performance on Solaris operating systems. The CompactPCI Ultra2 SCSI adapters have built-in Fcode that operates in the Sun Microsystems OpenBoot environment. This allows Ultra2 SCSI devices to be available to the OpenBoot (ok) prompt. The ITSPS and ITHPS Ultra2 SCSI device drivers are high performance drivers for Sun Microsystems Solaris SPARC-based platforms, including versions 2.6 and 7.0.

Beginning with the Solaris 2.6 hardware: 5/98 release, the Solaris qfe software driver for the ITI8241C-S adapter is bundled with the Solaris operating system.

Note: For information on how to obtain the latest patches and patch revisions, visit the SunSolve Web site at <http://sunsolve.sun.com>, SunService, or your local reseller.

The qfe Ethernet driver supports the Ethernet ports on the ITI8241C-S adapter.

The video section of the card is based on the ATI Rage2C, and uses the m64 driver. This driver is resident on the Solaris 2.6 and later software distribution media.

Important: LSI Logic highly recommends that you backup your system disk before installing any software. Failure to back up all files on your system may result in unrecoverable loss of data.

1.4 Installing the Ultra2 SCSI Drivers

The LSI Logic ITSPS and ITHPS Ultra2 SCSI device drivers are optimized for low CPU overhead and high I/O throughput, making use of the LSI Logic single interrupt scripts. The ITHPS driver supports the ITI8200 adapters that have the LSI53C896 controller. The ITSPS driver is for another LSI Logic Ultra2 SCSI controller and its associated host adapters.

The ITSPS and ITHPS device drivers are bundled together and included in your host adapter kit. This document refers to the installation of the ITHPS driver. When you install the ITHPS driver, the ITSPS driver is automatically installed as well. The ITSPS driver supports older LSI Logic Ultra2 SCSI controllers.

1.4.1 Features

The ITHPS device driver supports these features:

- Synchronous negotiation (including Fast SCSI/Ultra SCSI/Ultra2 SCSI)
- Multiple host adapters
- Disconnect/Reselect
- Multiple and noncontiguous Logical Unit Numbers (LUNs)
- Scatter/Gather
- Wide devices, and tagged command queuing
- Multiprocessors

1.4.2 Description

The LSI Logic ITHPS driver conforms to the Sun Microsystems SCSA specifications' for device drivers. The LSI Logic ITHPS device driver allows the Solaris operating system to interface with SCSI devices

connected to the LSI Logic Ultra2 SCSI controller with support for Low Voltage Differential (LVD) devices. This driver takes advantage of new hardware features in the LSI53C896 controllers to minimize CPU utilization, including a single interrupt per I/O.

As mentioned above, this driver allows connection of SCSI devices including disk drives, CD-ROMs, and tape drives for PCI-based machines. To support a new SCSI device, the Solaris architecture requires that the device complies to the SCSI standard.

Note: If you plan on using an LSI Logic adapter for your System Disk, you *must* use the Network install procedure in order to load the device driver during installation.

1.4.3 Floppy Disk Install

To install the LSI Logic ITHPS driver to an existing Solaris system, you must be logged into the root directory on your Solaris system. If you received the ITHPS driver on a floppy diskette, follow these steps:

Step 1. Place the diskette in the floppy drive.

Step 2. Type at the command prompt:

```
volcheck
```

This command ensures that the system can see the floppy.

Step 3. Change the directory to the root directory of the floppy. For example:

```
cd /floppy/floppy0
```

Step 4. Start the installation by invoking the `pkgadd` command as:

```
pkgadd -d.
```

The ITHPS device driver is now installed.

Step 5. Reboot the machine to reconfigure the system and to recognize the new devices.

1.4.4 Distribution File Install

If you received the ITHPS driver in an `itis_install.tar.Z` file, follow these steps:

Step 1. Uncompress and untar the `itis_install.tar.Z` file by typing at the command prompt:

```
uncompress itis_install.tar.Z
tar -xvf itis_install.tar
cd install
```

This will create a directory named `install`.

Step 2. Start the installation by invoking the `pkgadd` command as:

```
pkgadd -d
```

The ITHPS device driver is now installed.

Step 3. Reboot the machine to reconfigure the system and to recognize the new devices.

Note: If you change the disk drive configuration of your machine, it may be necessary to issue the command:

```
touch /reconfigure
```

and then reboot the system in order for the system to detect and correctly install your new disks.

1.5 Using the Network Installation Procedure

If you are using your ITI8000 adapters to support your Solaris SPARC system disk, you must install the Solaris operating system using a network install. This section describes a complete installation of Solaris to a client system using the ITI8000 CompactPCI Ultra2 SCSI adapters for the system disk. The method described in this section allows you to install the LSI Logic ITHPS driver onto a network boot kit, which makes it available during the Solaris SPARC installation script.

If you are simply installing an ITI8000 adapter as an additional storage adapter in an existing system, use the driver installation procedure described in [Section 1.4, "Installing the Ultra2 SCSI Drivers," page 1-6](#).

1.5.1 Setting up a Boot/Install Server

Refer to the “Preparing to Install Solaris Software Over the Network” section of the Solaris Advanced Installation Guide, available at <http://docs.sun.com>

To set up a boot/install server, follow these steps:

- Step 1. Insert the Solaris distribution CD-ROM into the boot/install server's CD-ROM drive.
- Step 2. Change the directory to the Tools area on the distribution CD-ROM by typing:

```
cd /cdrom/cdrom0/Solaris_2.6/Tools
```

- Step 3. Execute the `setup_install_server` script to copy the boot and installation files to your boot/install server. Type at the command prompt:

```
./setup_install_server /export/home/install
```

1.5.2 Installing the ITHPS Driver

After you have set up your network boot/install server, you can install the ITHPS driver on the boot/install server. To install the device driver, follow these steps:

- Step 1. Place the driver diskette in the floppy drive.
- Step 2. Execute the `volcheck` command by typing at the command prompt:

```
volcheck
```

This command ensures that the system can see the floppy.

- Step 3. Change the directory to the root of the floppy by typing at the command prompt:

```
cd /floppy/floppy0
```

- Step 4. Execute the `install.sh` shell script to add the ITHPS driver to the boot installation area:

```
./install.sh -n /export/home/install/Solaris_2.6
```

Note: For Solaris 2.7 boot files, the directory would be
`/export/home/install/Solaris_2.7.`

The message “major number maximum based on server,
not client” can safely be ignored.

When you execute the `install.sh` script in this way, you copy and install the Ultra2 SCSI device driver into the `Tools/Boot/` area of the boot files. This allows ITI8000 adapters to be booted for installation through the bootserver.

1.5.3 Adding Clients to your Boot/Install Server

For each machine that boots into the boot/install server, you must add a client entry on the boot/install server. To add clients, follow these steps:

Step 1. Change the directory to the boot/install kit by typing at the command prompt:

```
cd /export/home/install/Solaris_2.6/Tools
```

Step 2. Execute the `add_install_client` script to add the client machine by typing at the command prompt:

```
./add_install_client -i ipaddr  
-e ethernetid client_name platform_group
```

Where:

`ipaddr` is the tcp/ip address of the client

`ethernetid` is the ethernet hardware (mac) address of the client

`client_name` is the client's system name

`platform_group` is the client's vendor defined hardware group

For example, the result could be:

```
./add_install_client -i 192.168.103.124  
-e 00:08:26:02:25:34 sunsys sun4u
```

Note: You can obtain the `platform_group` from a machine of the same type as the target client using the `uname -m` command.

1.5.4 Booting the Client using the ITHPS driver

Follow these steps to install the Solaris operating system on the client target machine by using the boot/install server:

Step 1. Boot the network install kit by typing at the `ok` prompt:

```
ok boot net -v
```

Important: It is important to choose "Manual Reboot" rather than "AutoReboot" during the Solaris installation on the target machine. If you choose "AutoReboot", you will not have the opportunity to complete the installation of the Ultra2 SCSI driver and your system will fail to boot.

Step 2. Follow the prompts to complete the Solaris installation.

Step 3. Proceed to a console window and run the following script:

```
/sbin/itisinstant
```

This script copies and installs the driver from the boot server to the newly created Solaris installation. After this script has been run, the Ultra2 SCSI device driver installation is complete.

Step 4. Reboot your system.

Notes: The message "major number maximum based on server, not client" can safely be ignored.

Your Sun machine will prompt you to allow power saving automatic shutdown. You must answer No to this question if you are using the LSI Logic CompactPCI adapter to support your boot disk.

If you change the disk drive configuration of your machine, issue the command:

```
touch /reconfigure
```

and then reboot the system in order for the system to detect and correctly install your new disks.

1.6 Troubleshooting

The following are some potential error messages that may be preceded by a warning message displayed by the operating system. In the message descriptions below, the ITHPS<n> signifies that <n> can be replaced by some number assigned to it by the operating system. That value helps to identify the SCSI bus that is reporting the error.

- ITHPS<n> This hardware not supported by this driver**
The ITHPS driver has been told to control a 53C896 hardware, which is made by a manufacturer other than LSI Logic. This adapter requires a special driver provided by that manufacturer. Please contact the manufacturer for assistance.
- ITHPS<n> Failed to map device registers**
The ITHPS driver was unable to access the hardware registers necessary for operation. The operating system did not properly configure the PCI device.
- ITHPS<n> Hardware not properly enabled by system, cmd = 0xnxxx**
The system has not properly enabled the configuration resources that the ITHPS driver needs in order to use this hardware. The cmd = 0xnxxx value needs to be reported to technical support.
- ITHPS<n> Ignored invalid scsi-initiator-id value = x**
The `ithps.conf` file has an invalid scsi-initiator-id value as displayed in the error message. The allowable values are in the range 0 through 15.
- ITHPS<n> Could not allocate memory to read configuration data.**
The ITHPS driver was unable to allocate memory required to process the configuration data. This means that the configuration was not properly determined. To fix this, you need to manually configure the driver using the `ithps.conf` file.
- ITHPS<n> Unable to make reset notification callbacks**
The ITHPS driver was unable to notify the target device driver of a SCSI bus reset. The target driver may start to malfunction because of this.

- ITHPS<n> ddi_dma_numwin() failed**
- ITHPS<n> ddi_dma_getwin() failed**
- ITHPS<n> ddi_dma_alloc_handle: xxh unknown/impossible**
- ITHPS<n> ddi_dma_buf_bind_handle: DDI_DMA_INUSE impossible**
- ITHPS<n> ddi_dma_buf_bind_handle: xxh unknown/impossible**
- ITHPS<n> ddi_dma_unbind_handle: failed**
The operating system failed to respond to the named routine in a known manner. This is a fatal error that is not recoverable. Please report this error to technical support.
- ITHPS<n> No KeyROM found. Hardware contains no valid license**
The adapter is not a valid LSI Logic adapter licensed for use with the Solaris operating system.
- ITHPS<n> Device in a slave-only slot and is unusable**
- ITHPS<n> Hi-level interrupts not supported**
The adapter is in a slot that cannot be used with this driver. Please try moving the adapter to a different PCI slot.
- ITHPS<n> Failed to attach. This adapter will not be installed**
Because one of the previous two errors occurred, this adapter could not be attached to the I/O subsystem and is not accessible. See the previous error message and solve that problem.
- ITHPS<n> Unable to obtain soft state structure**
The ITHPS driver was unable to initialize a required data structure and therefore did not load. Please call technical support.
- ITHPS<n> Failed to attach interrupt handler**
The ITHPS driver was unable to initialize the interrupt handler as required. Please call technical support.

- ITHPS<n> The adapter is malfunctioning**
- ITHPS<n> The adapter is malfunctioning or is of an unknown type**
The ITHPS driver is not able to communicate with the hardware. You may need to update your driver or your hardware.
- ITHPS<n> Failed to create minor node required for DMI interface**
The ITHPS driver was unable to create an entry point for the DMI device driver. If you are not using the DMI device driver then you may safely ignore this message.
- ITHPS<n> Could not attach to the SCSI subsystem**
The ITHPS driver was unable to communicate with the SCSI device driver that is part of the operating system. You may need to update your driver.
- ITHPS<n> Failed to allocate memory**
The ITHPS driver was unable to allocate the memory needed during initialization. You may have run out of available memory.
- ITHPS<n> Unbind failed!**
The ITHPS driver had a problem when attempting to unload itself. This is a fatal error.

Chapter 2

Describing the ITI8241C-S Adapter

This chapter describes the ITI8241C-S adapter, which is a fully configured module. This adapter is plug and play compatible with Sun Solaris SPARC systems. It includes these topics:

- [Section 2.1, “General Description,” page 2-1](#)
 - [Section 2.2, “Using the Handle Connections,” page 2-6](#)
 - [Section 2.3, “Describing the Connectors,” page 2-8](#)
 - [Section 2.4, “Configuring the ITI8241C-S Module,” page 2-12](#)
 - [Section 2.5, “Configuring with Rear I/O Exits,” page 2-14](#)
 - [Section 2.6, “Connecting the Rear I/O Backplane,” page 2-17](#)
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2.1 General Description

The ITI8241C-S adapter includes two Ultra2 SCSI ports, four Fast Ethernet Ports, and one Video Port. The four fully buffered twisted-pair Ethernet ports (RJ-45) provide four 10BASE-T/100BASE-TX channels on one CompactPCI adapter.

2.1.1 Features

The ITI8241C-S adapter supports these features:

- Provides two Ultra2 SCSI ports
 - Capable of running LVD at up to 80 Mbytes/s
 - Capable of running Single-Ended (SE) at up to 40 Mbytes/s.
- Complies with the ANSI/IEEE Std. 802.3 CSMA/CD physical layer specification

- Provides four switchable 10BASE-T/100BASE-TX Ethernet channels with autonegotiation and conforms to the IEEE 802.3 Ethernet standard
- Allows up to 100 meters of twisted-pair without the use of repeaters
- Provides four independent Ethernet channels that can run at either 10 Mbits/s or 100 Mbits/s
- Operates at half duplex or full duplex
- Provides multiple 48-bit IEEE 802.3 style Media Access Control (MAC) identifiers, one for each Ethernet channel
- Includes LED indicators that provide link integrity for each Ethernet channel
- Provides SCSI LEDs for LVD, Termination, and Activity
- Provides one Video port

2.1.2 Supporting the QFE Interface

The ITI8241C-S adapter supports autonegotiation for the Ethernet interface. The autonegotiation protocol, as specified in the 100BASE-TX standard, automatically selects the operation mode (half-duplex or full-duplex) and speed (10 Mbits/s or 100 Mbits/s) based on the network the adapter is on.

The link speed and modes supported by the ITI8241C-S adapter are listed below in order of decreasing priority:

- 100 Mbits/s, full-duplex
- 100 Mbits/s, half-duplex
- 10 Mbits/s, full-duplex
- 10 Mbits/s, half-duplex

When you boot your system, an ITI8000 adapter advertises these capabilities to the Link Partner (a hub, switch, or another Network Interface Card (NIC) in a host system) at the other end of the link. If the Link Partner also supports autonegotiation, it will advertise its capabilities over the link. The common highest priority mode that both sides support is selected automatically for the link operation.

If you connect an ITI8000 adapter to a remote system or to an interface that is capable of autonegotiation, your system automatically selects the speed and duplex mode.

If you connect an LSI Logic CompactPCI adapter to a Link Partner in which autonegotiation protocol is not operational, you can configure the device to not use this protocol. This forces the driver to set up the link in the mode and speed of your choice.

For more information, refer to the *AnswerBook2 Platform Notes* about the Sun Quad Fast Ethernet Device Driver document for mode information on the QFE driver and autonegotiation.

2.1.3 Verifying the Installation

After you have installed the ITI8241C-S adapter, but before you boot the system, perform the following tasks to verify the installation:

Step 1. Power on the system.

The system displays a banner.

Step 2. Press the Stop-A keys to interrupt the boot process and to get to the `ok` prompt.

Step 3. Use the `show-devs` command to list the system devices.

You should see lines in the list of devices, similar to the example below. Ports that are identified as `/pci@1f,2000/pci@2/IntraServer,qfe@0,1` are the LSI Logic Fast Ethernet ports on the ITI8241C-S adapter. Depending on your system's configuration, various results appear when using this command. The information below is an example only.

```
ok show-devs
...
/pci@1f,2000/pci@2/IntraServer,qfe@0,1
/pci@1f,2000/pci@2/IntraServer,qfe@1,1
/pci@1f,2000/pci@2/IntraServer,qfe@2,1
/pci@1f,2000/pci@2/IntraServer,qfe@3,1
...
```

Note: If you do not see the devices listed, check to see that the adapter is firmly seated in the PCI slot. Remove and reinstall the adapter if necessary.

2.1.4 Performing Diagnostic Testing

The system adds the FCode self-test to the device tree during the probing phase of the OpenBoot PROM startup sequence. 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 the diagnostics, appropriate messages will appear. Refer to the *OpenBoot 3.x Command Reference Manual* for more information on the `test` and `test-all` commands.

The self-test exercises most functionality of the adapter after it has been connected to a network. The self-test looks for these conditions:

- Isolates faulty devices
- Checks that no hardware fault exists
- Checks connectivity during adapter card installation
- Verifies that all components are functional

To help identify problems when the system containing the LSI Logic ITI8241C-S adapter does not boot, follow these steps:

Step 1. Type at the `ok` prompt:

```
ok setenv diag-switch? true
ok test <device-path>
```

Where *<device-path>* is the path to an Ethernet device as displayed by the `show-devs` command, for example:

```
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@1,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@2,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@3,1)
```

The system will display messages similar to these:

```
Hme register test --- succeeded.
Internal loopback test -- succeeded.
```



```
Transceiver check -- Using Onboard Transceiver - Link Up.  
passed  
ok
```

Ensure the following tests are run during the execution of the test command:

- qfe register
- MAC Internal Loopback
- 100 Mbit PHY Loopback
- 100 Mbit TP Loopback
- 10 Mbit XCVR Loopback

Important: To test other channels of the adapter, you must execute the test command separately on each channel.

Step 2. Type this command at the `ok` prompt after you have completed the testing:

```
ok setenv diag-switch? False
```

This command turns off diagnostic mode. If `diag-switch?` is left as true, the time for the system to initialize will increase.

2.1.5 Monitoring Network Activity

To verify that the system recognizes the Ethernet connection, make sure that you are connected to an active network. To monitor network activity of incoming network packets, follow these steps:

Step 1. Type at the `ok` prompt (include quotation marks and spaces):

```
ok setenv diag-switch? true  
ok apply watch-net <full path name of the qfe  
interface>
```

The system will display messages similar to these:

```
Internal loopback test -- succeeded.  
Transceiver check -- passed  
Looking for Ethernet Packets.  
'.' is a Good Packet. 'X' is a Bad Packet.
```

Step 2. Press any key to stop.

```

.....
.....
.....
.....
.....
.....
.....
ok

```

Note: Where *<device-path>* is the path to an Ethernet device as displayed by the `show-devs` command, for example:

```

/pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@1,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@2,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@3,1

```

Step 3. Type this command at the `ok` prompt after testing has completed:

```
ok setenv diag-switch? False
```

This command turns off diagnostic mode. If `diag-switch?` is left as true, the time for the system to initialize will increase.

Step 4. Reboot the system after examining the network activity.

2.2 Using the Handle Connections

The ITI8241C-S adapter includes an external SCSI connector for each Ultra2 SCSI port, which is accessible through the front bulkhead handle.

The design of this board provides four Ethernet connectors on the adapter handle. These connectors are known to the Solaris system as `qfe0` – `qfe3`. They are numbered from the top of the handle to the middle, where the port closest to the top (or end) of the handle is `qfe0`. See [Figure 2.3](#) for location of these Ethernet ports.

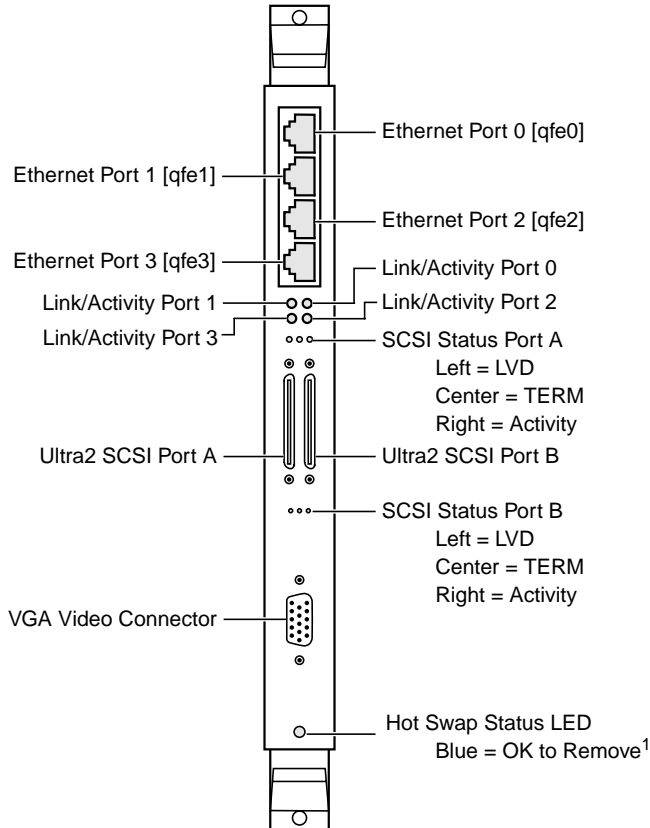
Note: The system names your ports with the next four available `qfe` numbers if there are existing `qfe` ports in your system.

The module handle contains a 15-pin “D” standard VGA connector. Plug the VGA monitor into this connector, and plug the system keyboard and mouse to the CPU keyboard and mouse port. The Solaris operating

system automatically recognizes the ATI video subsystem under the m64 driver.

To connect your external devices to the ITI8241C-S adapter, use the diagram shown in [Figure 2.1](#) as a guide.

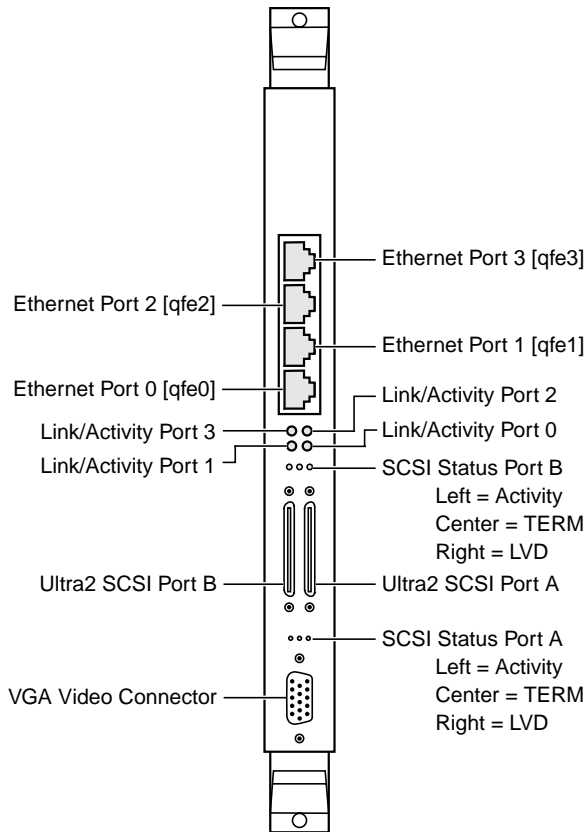
Figure 2.1 ITI8241C-S I/O Connector Configuration



1. Contact your Software Vendor for details. Some operating systems do not support Hot Swap.

To connect your external devices to the ITI8241C-R rear I/O module, use the diagram shown in [Figure 2.2](#) as a guide.

Figure 2.2 ITI8241C-R Rear I/O Connector Configuration



2.3 Describing the Connectors

This section provides the connector pinouts for the Ethernet and video portion of the ITI8241C-S adapter. For information about SCSI connectors, refer to [Section 3.4, “Connecting Internal and External Devices,”](#) page 3-8.

2.3.1 Ethernet

[Figure 2.3](#) illustrates the 8-pin RJ-45 connector for 10/100 Mb/s Ethernet.

Figure 2.3 8-Pin RJ-45 Connector (Front)

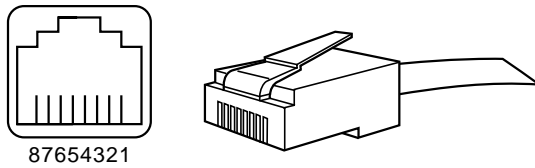


Table 2.1 shows the connection pin assignments.

Table 2.1 8-Pin Connector Pin Assignments

Pin Number	Signal Name
1	Transmit + TX (+)
2	Transmit – TX (-)
3	Receive + RX (+)
4	No Connection NC
5	No Connection NC
6	Receive – RX (-)
7	No Connection NC
8	No Connection NC

Table 2.2 lists the pin connections from the ITI8241C-S adapter to a network hub.

Table 2.2 Adapter to Network Hub Wiring

Straight Through				
Adapter Pin			Hub Pin	
TX (+)	1	↔	1	RX (+)
TX (-)	2	↔	2	RX (-)
RX (+)	3	↔	3	TX (+)
	4		4	
	5		5	
RX (-)	6	↔	6	TX (-)
	7		7	
	8		8	

Table 2.3 shows a point to point connection from the ITI8241C-S adapter to another network adapter.

Table 2.3 Adapter to Adapter (Point to Point) Wiring

Crossover				
Adapter 1 Pin			Adapter 2 Pin	
TX (+)	1	↔	3	RX (+)
TX (-)	2	↔	6	RX (-)
RX (+)	3	↔	1	TX (+)
	4		4	
	5		5	
RX (-)	6	↔	2	TX (-)
	7		7	
	8		8	

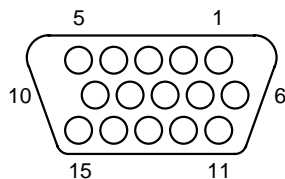
In order for your network to operate properly, you must use a category of network cabling that is appropriate for the data rate of the port. For 10 Mbits/s operation, you must use a Category 3 or Category 5 cable. For 100 Mbits/s or 100 Mbits/s Full Duplex operation, you must use a Category 5 cable.

The maximum cable segment length supported at 100 Mbits/s speed, on Category 5 cable, is 100 meters. Any single cable segment (adapter to adapter or adapter to network hub) must be within the 100 meters length requirement.

2.3.2 Video

The VGA interface on the ITI8241C-S adapter uses the industry standard 15-pin “D” connector as shown in [Figure 2.4](#).

Figure 2.4 Video Connector



[Table 2.4](#) lists the Video connector pinouts.

Table 2.4 Video Connector Pinout

Connection	Signal	Connection	Signal
1	Red	9	+5 V
2	Green	10	Sync Ground
3	Blue	11	Ground
4	Ground	12	Bidirectional data
5	DDC Ground	13	Horiz. Sync.
6	Red Ground	14	Vert. Sync.
7	Green Ground	15	Data timing
8	Blue Ground	–	–

2.4 Configuring the ITI8241C-S Module

To locate the major components and option jumpers on the ITI8241C-S adapter, refer to [Figure 2.5](#) as a guide.

Figure 2.5 ITI8241C-S Configuration Jumper and Header Location

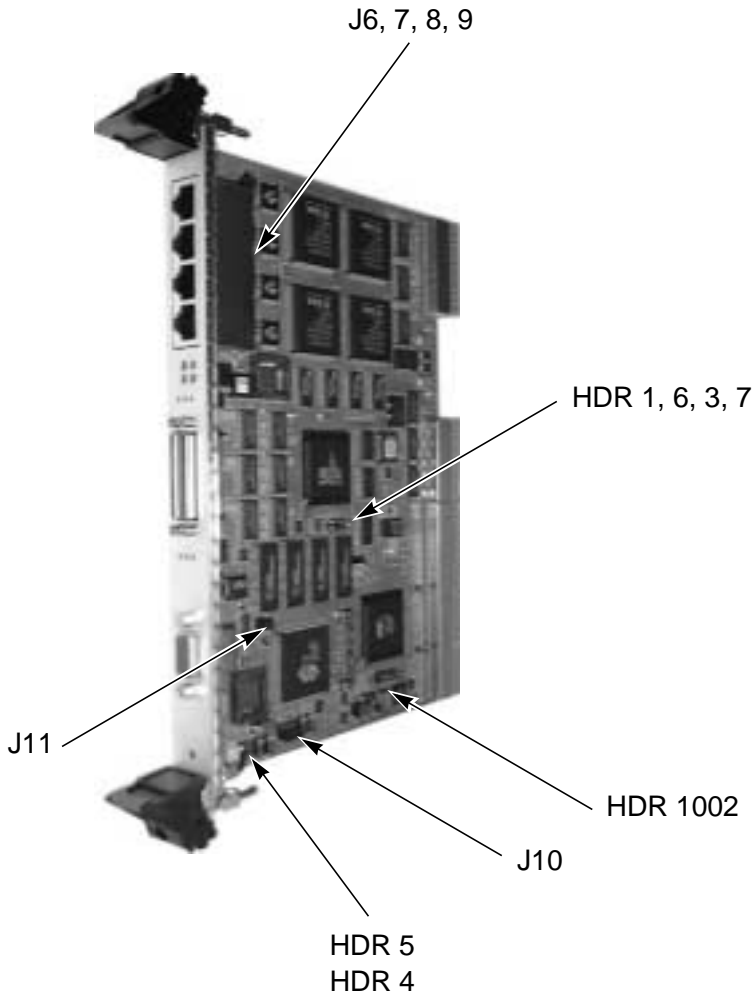


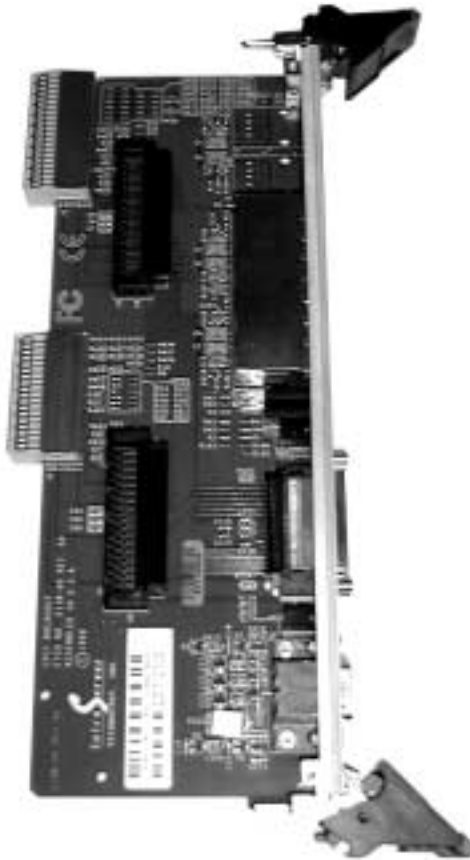
Table 2.5 provides the functions of the various headers and jumpers.

Table 2.5 Configuration Headers and Jumpers

Header Number	Function
HDR 1	Bus A Internal Termination Invert
HDR 3	Bus B Internal Termination Invert
HDR 4	Video Disable
HDR 5	Video Interrupt Disable
HDR 6	Bus A External Termination Invert
HDR 7	Bus B External Termination Invert
HDR 1002	Hot Swap Register Disable
J6	Ethernet Port 0 Front/Rear Select
J7	Ethernet Port 1 Front/Rear Select
J8	Ethernet Port 2 Front/Rear Select
J9	Ethernet Port 3 Front/Rear Select
J11	Video Front/Rear
J10	Video Front/Rear

Figure 2.6 illustrates the ITI8241C-R Rear I/O Transition Module.

Figure 2.6 LSI Logic ITI8241C-R Rear I/O Transition Module



2.5 Configuring with Rear I/O Exits

This section describes how to configure your ITI8241C-S adapter to exit from the rear of the board.

2.5.1 SCSI

The ITI8241C-S SCSI ports on the front and rear are all active at the same time. The ITI8241C-R variant of the module allows SCSI to exit from the rear of the system enclosure by connecting to J3 and J5 connectors of the ITI8241C-R module.

If the front ports are used alone, or the rear ports are used alone, then the module terminates the SCSI bus. If the rear and front SCSI port on either the A or B SCSI channel are used together, the module automatically disables the onboard terminators for that port.

No manual configuration of the SCSI termination is required. The state of the on-board termination can be monitored on the TERM LED on the module handle.

2.5.2 Ethernet

To configure the ITI8241C-S Ethernet port to exit the rear of the system cabinet through the ITI8241C-R rear I/O module, follow these steps:

- Step 1. Locate J6, J7, J8, and J9. (See [Figure 2.7](#) for jumper locations)
- Step 2. Move the jumpers for each port to the Front "F" or Rear "R" position.

Each port can be configured for front I/O ([Figure 2.7](#)) or rear I/O ([Figure 2.8](#)).

Figure 2.7 Ethernet Port Configured for Front I/O

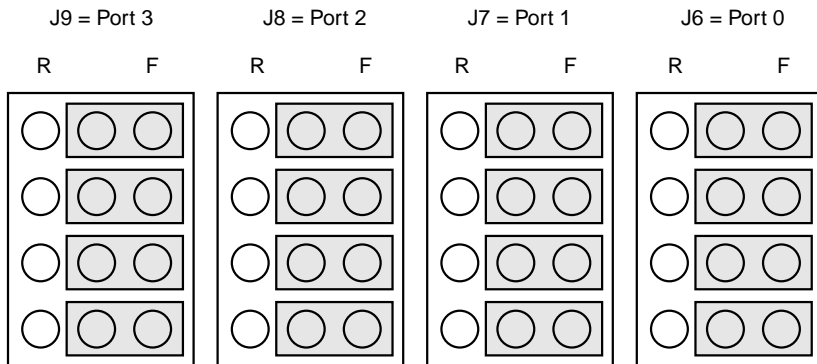
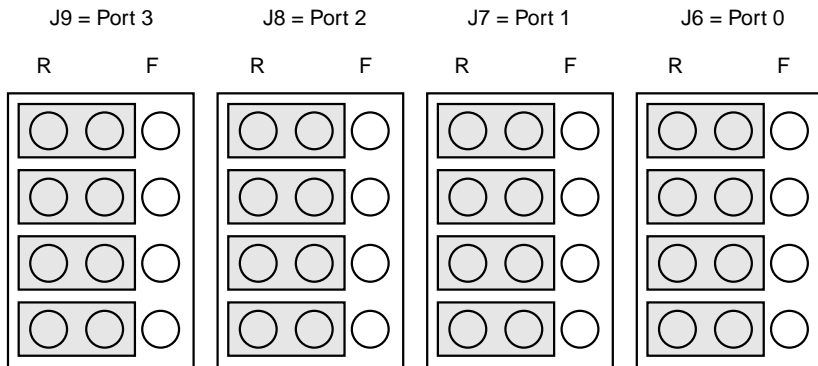


Figure 2.8 Ethernet Port Configured for Rear I/O



2.5.3 Video

To configure the ITI8241C-S video port to exit the rear of the system cabinet through the ITI8241C-R rear I/O module, follow these steps:

- Step 1. Locate J10 and J11. (See [Figure 2.9](#) for jumper locations)
- Step 2. Move each of the jumpers on J10 and J11 from the “F” position ([Figure 2.9](#)) to the “R” position ([Figure 2.10](#)).

Figure 2.9 Video Port Configured for Front I/O

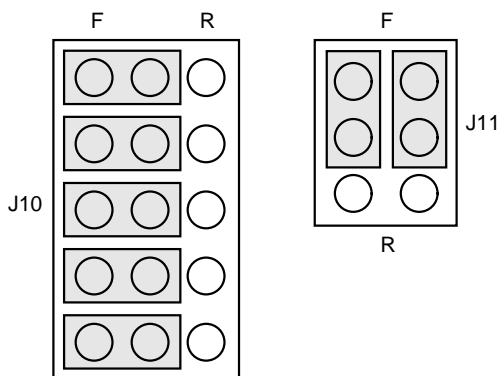
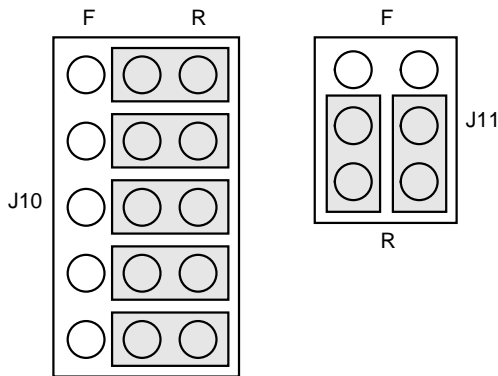


Figure 2.10 Video Port Configured for Rear I/O

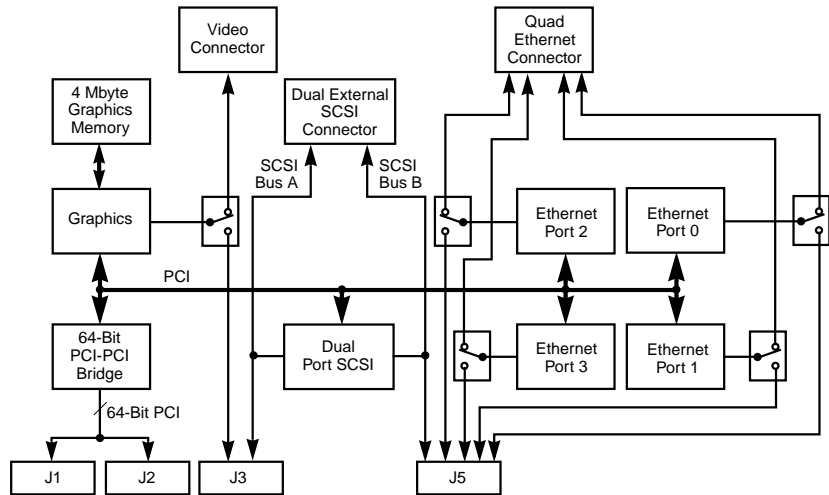


This configuration activates the video connector on the ITI8241C-R Rear I/O module and de-activates the front video connector on the ITI8241C-R module.

2.6 Connecting the Rear I/O Backplane

All I/O is accessible through the rear connectors of the module on J3 and J5 connectors. [Figure 2.11](#) illustrates the block diagram for this adapter.

Figure 2.11 ITI8241C-S Multifunction Adapter



The J3 connector brings the video and SCSI Channel A to the backplane and brings the J5 connector brings SCSI Channel B and the four Ethernet channels to the backplane. The optional rear I/O module ITI8241C-R uses J3 and J5 to bring SCSI, Ethernet, and video to the rear of the system enclosure.

Tables 2.6 and 2.7 provide the backplane connector pinouts for the J3 and J5 connectors.

Table 2.6 Backplane Connector J3 Pinout

ITI8241C-S CompactPCI Connector J3 ¹					
	Connector Row				
Pin	A	B	C	D	E
19	GND²	B_RED	GND	B_BHSYNC	B_MONID1
18	GND	B_GREEN	GND	B_MONID2	B_VSYNC
17	GND	B_BLUE	GND	GND	GND
16	GND	GND	GND	GND	GND
15	A_TERMPOWER	A_TERMPOWER	GND	A_TERMPOWER	A_TERMPOWER
14	A_DIFFSENS	+5V	GND	LVDA_SD13-	LVDA_SD13+
13	LVDA_SD0-	LVDA_SD0+	GND	LVDA_SD12-	LVDA_SD12+
12	LVDA_SD1-	LVDA_SD1+	INT_LVDA_1	LVDA_SD14-	LVDA_SD14+
11	LVDA_SD4-	LVDA_SD4+	GND	LVDA_SDP1-	LVDA_SDP1+
10	LVDA_SD3-	LVDA_SD3+	GND	LVDA_SD15-	LVDA_SD15+
9	LVDA_SD6-	LVDA_SD6+	BA_ACTIVE_LED	LVDA_SD2-	LVDA_SD2+
8	LVDA_SD7-	LVDA_SD7+	GND	LVDA_SD5-	LVDA_SD5+
7	LVDA_SATN-	LVDA_SATN+	GND	LVDA_SDP0-	LVDA_SDP0+
6	LVDA_SBSY-	LVDA_SBSY+	BA_TERM_LED	LVDA_SRST-	LVDA_SRST+
5	LVDA_SACK-	LVDA_SACK+	GND	LVDA_SMSG-	LVDA_SMSG+
4	LVDA_SC_D-	LVDA_SC_D+	GND	LVDA_SSEL-	LVDA_SSEL+
3	LVDA_SI_O-	LVDA_SI_O+	B_LVDA_LED	LVDA_SREQ-	LVDA_SREQ+
2	LVDA_SD9-	LVDA_SD9+	GND	LVDA_SD8-	LVDA_SD8+
1	LVDA_SD10-	LVDA_SD10+	GND	LVDA_SD11-	LVDA_SD11+

1. Connector row F all grounds.
2. Bold text indicates reserved pin on F module variation.

Table 2.7 Backplane Connector J5 Pinout

IT18241C-S Compact PCI Connector J5 ¹					
Connector Row					
Pin	A	B	C	D	E
22	BPORT0_RX+²	BPORT0_RX-	GND	BPORT0_TX-	BPORT0_TX+
21	GND	GND	BPORT0_LED	GND	GND
20	BPORT1_RX+	BPORT1_RX-	GND	BPORT1_TX-	BPORT1_TX+
19	GND	GND	BPORT1_LED	GND	GND
18	BPORT2_RX+	BPORT2_RX-	GND	BPORT2_TX-	BPORT2_TX+
17	GND	GND	BPORT2_LED	GND	GND
16	BPORT3_RX+	BPORT3_RX-	GND	BPORT3_TX-	BPORT3_TX+
15	B_TERMPPWR	B_TERMPPWR	BPORT3_LED	B_TERMPPWR	B_TERMPPWR
14	B_DIFFSENS	+5V	GND	LVDB_SD13-	LVDB_SD13+
13	LVDB_SD0-	LVDB_SD0+	GND	LVDB_SD12-	LVDB_SD12+
12	LVDB_SD1-	LVDB_SD1+	INT_LVDB_1	LVDB_SD14-	LVDB_SD14+
11	LVDB_SD4-	LVDB_SD4+	GND	LVDB_SDP1-	LVDB_SDP1+
10	LVDB_SD3-	LVDB_SD3+	GND	LVDB_SD15-	LVDB_SD15+
9	LVDB_SD6-	LVDB_SD6+	BB_ACTIVE_LED	LVDB_SD2-	LVDB_SD2+
8	LVDB_SD7-	LVDB_SD7+	GND	LVDB_SD5-	LVDB_SD5+
7	LVDB_SATN-	LVDB_SATN+	GND	LVDB_SDP0-	LVDB_SDP0+
6	LVDB_SBSY-	LVDB_SBSY+	BB_TERM_LED	LVDB_SRST-	LVDB_SRST+
5	LVDB_SACK-	LVDB_SACK+	GND	LVDB_SMSG-	LVDB_SMSG+
4	LVDB_SC_D-	LVDB_SC_D+	GND	LVDB_SSEL-	LVDB_SSEL+
3	LVDB_SI_O-	LVDB_SI_O+	B_LVDB_LED	LVDB_SREQ-	LVDB_SREQ+
2	LVDB_SD9-	LVDB_SD9+	GND	LVDB_SD8-	LVDB_SD8+
1	LVDB_SD10-	LVDB_SD10+	GND	LVDB_SD11-	LVDB_SD11+

1. Connector row F all grounds.
2. Bold text indicates reserved pin on F module variation.

Chapter 3

Configuring SCSI Devices

This chapter provides information about configuring SCSI devices with specific reference to the ITI8200 Series CompactPCI adapters. It includes these topics:

- [Section 3.1, “General Description,” page 3-1](#)
 - [Section 3.2, “Terminating the SCSI Bus,” page 3-5](#)
 - [Section 3.3, “Setting SCSI IDs,” page 3-7](#)
 - [Section 3.4, “Connecting Internal and External Devices,” page 3-8](#)
 - [Section 3.5, “Cabling SCSI Devices,” page 3-10](#)
-

3.1 General Description

Correct installation of your adapter requires that you first understand the basic rules of the SCSI bus and correctly configure the termination. The configuration is based on the position of the LSI Logic CompactPCI adapter on the bus. In order for a SCSI bus to operate, it must be electrically terminated at both ends.

Each of the two Ultra2 SCSI ports are capable of running LVD at up to 80 Mbytes/s or Single-Ended (SE) at up to 40 Mbytes/s. If you place an SE device on an LVD bus, the bus will run in SE mode. As a result, this configuration reduces the overall bandwidth of the bus to 40 Mbytes/s.

The terminators for Low Voltage Differential (LVD) and Single-Ended (SE) on the ITI8200 Series CompactPCI adapters are fully automatic. Under normal circumstances, no manual intervention for correct operation is necessary.

3.1.1 Verifying Correct Installation

Use this procedure to verify the installation of your ITI8200 Series Ultra2 SCSI adapter(s) before booting your system:

Step 1. Power on the system.

The system displays a banner.

Step 2. Press the Stop-A keys to interrupt the boot process.

Step 3. Stop at the `ok` prompt.

Step 4. Type the `show-devs` command at the `ok` prompt to list the system devices.

```
ok show devs
```

The system displays information similar to this:

```
/SUNW,UltraSPARC-IIi@0,0
/pci@1f,0
/virtual-memory
/memory@0,0
/packages
/pci@1f,0/pci@1
/pci@1f,0/pci@1,1
/pci@1f,0/pci@1/pci@1
/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0,1
/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0
/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0,1/tape
/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0,1/disk
/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0/tape
/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0/disk
/pci@1f,0/pci@1,1/network@3,1
/pci@1f,0/pci@1,1/scsi@2
/pci@1f,0/pci@1,1/network@1,1
/pci@1f,0/pci@1,1/ebus@1
ok
```

`/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0` identifies the FIRST SCSI interface on the ITI-8000 CompactPCI Series adapter.

`/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0,1` identifies the SECOND SCSI interface on the ITI-8000 CompactPCI Series adapter.

Note 1: The output above represents an example. The output of the `show-devs` command varies depending on your system and configuration. Use the corresponding entries on your system, not the ones given here.

Note 2: If these devices are not listed, check that the adapter is correctly installed and reseal the adapter.

3.1.2 Identifying the SCSI Disks

The `probe-scsi-all` command identifies the SCSI devices on your LSI Logic adapter. To identify your SCSI disks, type at the `ok` prompt:

```
ok probe-scsi-all
```

The system displays information similar to this:

```
/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0,1
Target 0
  Unit 0   Disk      SEAGATE ST39102LC      0004
Target 1
  Unit 0   Disk      SEAGATE ST39102LC      0004

/pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0
Target 0
  Unit 0   Disk      IBM      DDRS-34560D      DC1B
Target 1
  Unit 0   Disk      IBM      DDRS-34560D      DC1B
```

If your system does not identify the SCSI disks on ITI8000 adapter, check the following:

- Does each disk have a unique SCSI ID?
- Does each disk have a SCSI ID that does not conflict with the SCSI ID of the ITI8000 adapter (Default id = 7)?
- Is the bus correctly terminated? The TI8000 adapter automatically terminates at the host end of the bus. You must have an SE/LVD terminator at the end of the SCSI chain.

To identify your ITI8000 adapters, follow these steps:

Step 1. Select the adapter entry by typing at the `ok` prompt:

```
cd /pci@1f,0/pci@1/pci@1/IntraServer,Ultra2-scsi@0,1
```

Step 2. Type `.properties` to show the adapter properties:

```
ok .properties
```

The system displays information similar to this:

```
assigned-addresses 81036810 00000000 00001000 00000000 00000100
82036814
                    00000000 00100000 00000000 00000400 8203681c
00000000 00102000
                    00000000 00002000 82036830 00000000 00140000
00000000 00040000
compatible         ithps
version#           1.0.0
model              IntraServer,ITI82xx
wide device_type   scsi-2
clock-frequency    02faf080
reg                00036800 00000000 00000000 00000000 00000000
                    01036810 00000000 00000000 00000000 00000100
                    02036814 00000000 00000000 00000000 00000400
                    0203681c 00000000 00000000 00000000 00002000
                    02036830 00000000 00000000 00000000 00040000
arc-identifier     NCRC810
name               IntraServer,Ultra2-scsi
fcode-rom-offset  0000d000
devsel-speed       00000001
class-code         00010000
interrupts         00000001
max-latency        00000040
min-grant          00000011
revision-id        00000005
device-id          0000000b
vendor-id          00001000
```

3.2 Terminating the SCSI Bus

Some basic SCSI principles must be applied to correctly configure the SCSI bus on your system. Most difficulties with the SCSI bus can be traced to improper termination and cabling.

To configure termination on each device on the SCSI bus, follow these requirements:

- Enable termination on devices at the *ends* of the bus
- Disable termination on devices not at the *end* of the bus
- Use LVD/SE termination on the Ultra2 SCSI buses.
- Use active termination for Ultra Wide SCSI.

The SCSI bus must be terminated at both ends, and *only* at the ends.

3.2.1 Automatic SCSI Termination

All of the ITI8000 SCSI adapters employ automatic termination. Under normal circumstances, no operator action is required to correctly terminate the SCSI bus if you observe the following rules:

- Only terminate each SCSI bus at the ends. If an ITI8000 adapter is at the end of the SCSI bus, the termination is set Automatically Enabled, which means the TERM light turns on to indicate the module is terminating the bus.
- If the LVD/SE bus on an ITI8000 adapter is located on a bus containing LVD devices, it is automatically set to LVD signal levels. The LVD light illuminates to indicate the bus is running in Ultra2 SCSI LVD (80 Mbytes/s) mode.
- If the LVD/SE bus on an ITI8000 adapter senses *any* Single-Ended (SE only) devices on the bus, it is automatically set to SE signal levels and run in Ultra SCSI (40 Mbytes/s) mode.

Important: If you place SE devices on the LVD bus on a ITI8000 adapter, this forces the LVD bus to run in Ultra SCSI mode.

QUICK CHECK: If the LVD LED is on, the bus is capable of Ultra2 SCSI (80 Mbytes/s) performance. If the LED is off, the bus is capable of 40 Mbytes/s performance.

As a rule, SE devices and LVD devices should *not* be mixed on a bus. If all SE devices are kept on one SE bus, the LVD bus will run at Ultra2 SCSI speeds, while the SE devices will run at their maximum Ultra SCSI speeds.

If a “Y” cable is used on the FRONT external connector, placing the ITI8000 Series adapter in the middle of the LVD SCSI bus, you must install a jumper on HDR1 if the “Y” cable is on bus A and on HDR3 if the “Y” cable is on bus B. These jumpers are the invert termination headers. This forces the module to *not* terminate the bus. This situation could arise in a SCSI cluster.

Note: LSI Logic recommends that you do not use a “Y” cable out the front of the module. This causes a violation of the SCSI specification, which could degrade the bus performance or make it inoperable.

If a “Y” cable is used on the REAR external connector, placing the ITI8000 Series adapter in the middle of the LVD SCSI bus, you must install a jumper on HDR6 if the “Y” cable is on bus A and on HDR7 if the “Y” cable is on bus B. These jumpers are the invert termination headers. This forces the module to *not* terminate the bus. This situation could arise in a SCSI cluster.

If both the internal connector and the external connector of bus A are used on the Rear Transition module, then you must install a jumper on HDR6. If both the internal connector and the external connector of bus B are used on the Rear Transition module, then you must install a jumper on HDR7.

Note: LSI Logic recommends that you do not use a “Y” cable out the REAR of the module or use both the internal and external connector on the same bus on the Rear Transition module. This will cause a violation of the SCSI specification, which could degrade the bus performance or make it inoperable.

If you want to have the module in the middle of the SCSI bus, LSI Logic recommends that you use the external connector (of the desired bus) on

the front of the module and one of the connectors (for the same bus) on the Rear Transition Module. This does not degrade the SCSI bus performance.

QUICK CHECK: If the TERM LED is on, the ITI8000 Series adapter is terminating the bus. If you are using the “Y” configuration as described above, the termination LED must be set to off.

LVD technology is not compatible with the older High Voltage Differential (HVD) SCSI standard. If an HVD device is placed on the Ultra2 SCSI LVD bus, the ITI8000 Series adapter will turn off the port. The system indicates this error by flashing the LVD LED Status Indicator. Do not use HVD terminators on your LVD bus.

QUICK CHECK: If the LVD LED is flashing, an HVD device has been sensed on the LVD bus. As a result, this bus is automatically disabled. To correct this problem, remove the HVD device.

3.3 Setting SCSI IDs

Each device and host adapter on the SCSI bus must have a unique SCSI ID. LSI Logic recommends that the host adapter be left at its default SCSI ID of 7. If you must change the host adapter ID, use the `OBP setenv` command to change the `scsi-initiator-id` from 7 to the desired value. You must change the SCSI ID of one or more of the adapters in a SCSI Clustered system because more than one ITI8000 adapter exists on the same SCSI bus.

On a 16-bit SCSI bus, each device must have a unique SCSI ID from 0–15. All LSI Logic CompactPCI adapters default to SCSI ID 7. All other devices on the bus should be given IDs from 0–6 or 8–15. Refer to the target devices’ documentation about setting the targets’ SCSI ID.

Note: Not all operating systems currently support SCSI IDs above 7. Refer to your specific operating system for more details.

3.4 Connecting Internal and External Devices

This section provides information about making internal and external SCSI bus connections.

3.4.1 Internal SCSI Device Connections

To connect internal SCSI devices to the ITI8241C-R rear I/O adapter, use a multiconductor 68-position ribbon cable for 16-bit devices. There is one 68-position connector for each of the two SCSI buses. SCSI bus A is wired to J7 and SCSI bus B is wired to J8.

All Ultra2 SCSI LVD/SE connectors can run LVD SCSI at 80 Mbytes/s. To maximize the performance of the card, use all LVD capable devices. If you connect a non-LVD device to the LVD bus, the device runs in SE mode. This reduces the maximum performance of the port to 40 Mbytes/s.

If the SCSI bus is not in LVD mode (LVD LED is off), the SCSI bus length must be kept to the Ultra2 SCSI SE length of 1.5 meters.

Note: If the LVD LED is not illuminated, the LVD bus is not running in LVD mode. This is a quick check to indicate if a non-Ultra2 SCSI LVD device is on the LVD segment of the card.

3.4.1.1 Attaching Ultra2 SCSI LVD Devices

You can use a differential internal cable (50-401030) to attach internal LVD disks to the ITI8241C-R Rear I/O module. The LVD cable must be plugged into one of the LVD/SE connectors on the rear I/O adapter (J7 or J8). You must connect all internal LVD devices to this cable.

To configure internal devices on the LVD/SE bus, follow these steps:

Step 1. Set the device to a unique SCSI ID (0–6 or 8–15).

The host adapter default is SCSI ID 7.

Step 2. Plug the unterminated end of the SCSI cable into the LSI Logic CompactPCI adapter, making sure pin 1 (usually marked on the cable with a red stripe), corresponds to pin 1 on the connector.

- Step 3. Plug one connector on the ribbon cable to each of the devices on the bus.
- Step 4. Plug a 4-pin power connector into the power connector of each SCSI device.
- Step 5. The end of the LVD differential cable has a built-in LVD terminator that terminates the end of the internal LVD bus segment. The adapter terminates the other end of the bus automatically.

3.4.1.2 Attaching SE Devices

You can use the LSI Logic internal cable (50-401030) to attach internal SE disks to the ITI8241C-R rear I/O module. Note that placing any non-LVD drives on a bus causes the entire bus to run in SE mode, and reduces the maximum I/O throughput from 80 Mbytes/s to 40 Mbytes/s. If you must use SE drives on your system, place them all on the same bus, if possible.

To configure SE internal devices on the ITI8241C-R adapter, follow these steps:

- Step 1. Disable termination on all SE devices, and use a cable (50-401030) that is capable of SE/LVD termination. This ensures the SCSI bus is only terminated at the end and that a high quality terminator is being used.
- Step 2. Set the device to a unique SCSI ID (0–6 or 8–15).
The host adapter default is SCSI ID 7.
- Step 3. Plug the end of the SCSI cable into the J7 or J8 connector on the ITI8241C-R adapter, making sure pin 1 (usually marked on the cable with a red stripe), corresponds to pin 1 on the connector.
- Step 4. Plug one connector on the ribbon cable to each of the devices on the SE bus
- Step 5. Plug a 4-pin power connector into the power connector of each SCSI device

Caution: If you are using J7 or J8, you must *not* also attach a cable to the corresponding external SCSI bus on the rear I/O module. If you attempt to use J7 and disks on the “A”

external rear I/O connector, or use disks on J8 and disks on the “B” external rear I/O connector, this will result in unpredictable behavior.

3.4.2 External SCSI Device Connections

LSI Logic provides optional cables for all external devices. You must know the type of connector that you require on each end of the cable, and the length of cable required.

To connect external SCSI devices, follow these steps:

Step 1. Enable termination on the end device only (last device on the cable).

Step 2. Set each device to have a unique SCSI ID.

All ITI8200 adapters automatically enable or disable SCSI termination by sensing the cable configuration. [Table 3.1](#) provides a cable guide to help you determine the correct cable for your applications.

Note: If you are using external devices, the end of the external cable *must* be correctly terminated with an LVD Ultra2 SCSI terminator.

3.4.3 Using the Activity LED

The ITI8000 adapters have a built-in activity LED, which indicates when the SCSI bus is busy. The LED flashes to indicate activity on the bus.

3.5 Cabling SCSI Devices

All LSI Logic CompactPCI SCSI adapters support up to 15 devices per SCSI channel. Devices can be connected internally, externally, or a combination of internally and externally. For Ultra2 SCSI running in LVD mode, the cable must be kept within 12 meters for multidrop connections or 25 meters point to point. For Ultra2 SCSI in SE mode, LSI Logic recommends that the total bus (cable + module etc) length be kept to 1.5 meters.

LSI Logic recommends that you select a high quality SCSI cable for all device connections, due to the importance of optimal signal integrity.

Also, this ensures compliance with regulatory agency approval for system emissions. You can trace most problems encountered during the initial installation of a SCSI system to improper or low quality cabling and termination. LSI Logic carries a complete line of high quality SCSI cables, which you can order to meet the requirements of your configuration.

Note: In order to ensure optimal signal integrity in the Ultra2 SCSI LVD environment, a differential pair (twisted pair) cable must be used on all LVD segments of the bus.

3.5.1 LVD/SE SCSI Cable Selection Guide

Table 3.1 describes the available cables for use with the ITI8200 Series CompactPCI adapters.

Table 3.1 SCSI Cable Selection Guide

Cable Description	BUS	Length Meters	Adapter Connector	Device Connector	Part Number
Internal 68-pin ribbon, LVD differential high density, 5 position (1 adapter & 4 devices) with built in LVD/SE Terminator	16-bit LVD/SE internal	1.0	68-pin high density	68-pin high density	50-401030
External 68-pin high density to 68-pin micro	16-bit LVD external	1.0	68-pin high density micro	68-pin high density male, right angle	50-500175
External Adapter Cable, 68-pin micro to 68 position high density receptacle.	16-bit LVD external	0.2	68-pin micro	68-pin high density receptacle	50-500170

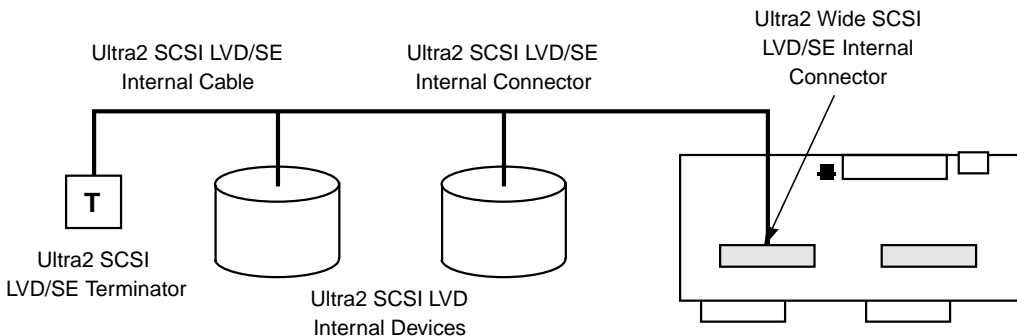
The ITI8200 Series adapter greatly increases the configuration flexibility for SCSI while it allows increased performance two to four times over previous generation products. LVD technology allows multidrop cables up to 12 meters, while operating at 80 Mbytes/s. You *must* provide LVD termination to the end of the bus. To maximize the performance of the ITI8000 Series adapter, follow these general rules:

- You must *only* connect Ultra2 SCSI LVD devices to the Ultra2 SCSI LVD connectors.
- If you must connect Ultra SCSI SE devices to the adapter, put them all on one bus. SE devices cause the bus to run at Ultra SCSI speeds and limit the bus performance to 40 Mbytes/s.
- The maximum cable length, end to end, of the LVD bus must be 12 meters or less for multidrop connections.
- The maximum cable length, end to end, of any bus running in SE mode must be 1.5 meters or less.

3.5.2 Cabling Internal Devices

You must use the LSI Logic LVD differential cable and the LVD/SE 68-pin connector to connect all your internal LVD peripherals. The cable has a built-in terminator at the drive end. The ITI8000 Series adapter terminates the controller end. [Figure 3.1](#) illustrates how to connect internal devices.

Figure 3.1 Internal Ultra2 SCSI LVD Devices Using ITI8241C-R Rear I/O



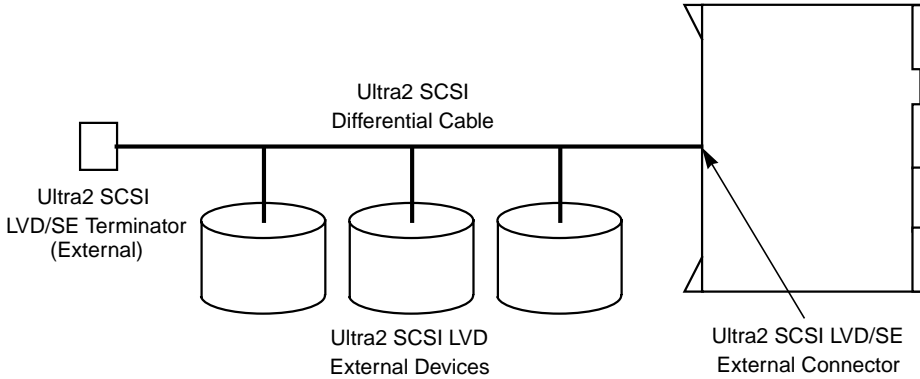
This example shows correct cabling of internal LVD devices to SCSI bus channel B of the ITI8241C-R Rear I/O module.

Note: In this configuration, external drives connected to the SCSI bus channel B rear I/O connector are not supported.

3.5.3 Cabling External Devices

You must use a high quality differential cable for all your external LVD/SE connections. You must provide LVD termination at the end of the external bus. [Figure 3.2](#) illustrates how to connect external devices.

Figure 3.2 External Ultra2 SCSI LVD Devices



Chapter 4

Configuring the Network Interface

This chapter provides information about optimizing performance with the Ethernet (network) interface on your ITI8241C-S adapter. It includes these topics:

- [Section 4.1, “Configuring Driver Parameters,” page 4-1](#)
 - [Section 4.2, “Configuring Host Files,” page 4-2](#)
 - [Section 4.3, “Booting from the Network Using Solaris,” page 4-3](#)
 - [Section 4.4, “Customizing the Installation,” page 4-3](#)
-

4.1 Configuring Driver Parameters

The qfe device driver controls the ITI8241C-S Quad Fast Ethernet device. The device driver automatically selects the link speed using the autonegotiation protocol with the link partner.

You can manually configure the qfe device driver parameters to customize each qfe device in your system in three ways:

- Configure the qfe driver parameters generally for all qfe devices in the system by entering the parameter variables in the `/etc/system` file.
- Set a parameter on a per-device basis by creating the `qfe.conf` file in the `/kernel/drv` directory.
- Use the `ndd (1M)` utility to temporarily change a parameter. This change is lost when you reboot the system.

Refer to the *Platform Notes: The Sun Quad Fast Ethernet Device Driver* document for more information on configuring driver parameters. This document is also available on the Solaris AnswerBook.

4.2 Configuring Host Files

After you install the ITI8241C-S adapter, you must create a `hostname.qfe<num>` file for each Ethernet interface. You must also assign an IP address and a host name for each Ethernet interface in the `/etc/hosts` file.

To configure the host files, create an `/etc/hostname.qfe0` file. The number 0 after `.qfe` represents the first Ethernet port of the qfe device. Use channel `qfe1` for a second Ethernet port and so on.

To ensure correct configuration of the host files, follow these points:

- Do not create `/etc/hostname.qfe<num>` files for the qfe channels (if any) you do not plan to use. The `/etc/hostname.qfe<num>` file must contain the host name for the appropriate network interface.
- The host name should have an IP address and should be entered in the `/etc/hosts` file.
- The host name should be different from any host name of any other interface, for example: `/etc/hostname.qfe0` and `/etc/hostname.qfe1` cannot share the same host name.
- The following is an example of the `/etc/hostname.qfe<num>` files required for a machine called `intra`. This machine will be known as `intra-1` and `intra-2` on the networks, which are connected to the `qfe0` and `qfe1` Ethernet interfaces.

```
intra # cat /etc/hostname.qfe0
intra-1
intra # cat /etc/hostname.qfe1
intra-2

intra # cat /etc/hostname.qfe2
intra-3

intra # cat /etc/hostname.qfe3
intra-4
```

Create an appropriate entry in the `/etc/hosts` file for each active qfe channel.

```
intra # cat /etc/hosts
...
```



```
127.0.0.1          localhost
192.168.120.10     intra loghost
192.168.121.10     intra-1
192.168.122.10     intra-2
192.168.123.10     intra-3
192.168.124.10     intra-4
```

Reboot your system.

4.3 Booting from the Network Using Solaris

You can use the qfe driver on your ITI8241C-S adapter to boot over the network. Follow these instructions to boot from the network:

Step 1. Find the hme device from the ok prompt:

```
ok show-devs
```

Step 2. Find the full name of the qfe you want to boot, for example:

```
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@1,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@2,1
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@3,1
```

Note: You need only to select one of these qfe devices for booting.

Step 3. Start the boot:

```
ok boot /pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
```

4.4 Customizing the Installation

This section allows you to customize your ITI8241C-S adapter to optimize its performance on your system.

4.4.1 Disabling Link Pulses

Certain 10BASE-T hubs are not compliant with the IEEE 802.3 Ethernet standards for link pulses. To connect your system to these hubs that do

not send link pulses, you must disable your system from looking for link pulses, as in the following example:

Step 1. Find the qfe device from the `ok` prompt:

```
ok show-devs
```

Step 2. Find the full name of the qfe that you want to modify. For example, you might type:

```
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
```

Step 3. Type at the `ok` prompt:

```
ok nvedit
```

Step 4. Type the following, and press the return key at the end of line 0:

```
0: probe-all install-console banner
1: apply disable-link-pulse /pci@1f, 0/pci@1/pci@2/IntraServer,qfe@0,1
```

Type line 1 all on the same line.

Step 5. Press the `Ctrl-C` keys after typing:

```
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
```

Step 6. Type at the `ok` prompt:

```
ok nvstore
ok setenv use-nvramrc? true
```

Step 7. Reboot your system.

4.4.2 Increasing TCP/IP Performance

You can increase the TCP/IP performance of the ITI8241C-S adapter by changing the TCP high water mark to 64 Kbytes. This can be done with the `ndd` (1M) utility as follows.

As superuser, type at the command prompt:

```
# ndd -set /dev/tcp tcp_xmit_hiwat 65535
# ndd -set /dev/tcp tcp_recv_hiwat 65535
# ndd -set /dev/tcp tcp_cwnd_max 65534
```

The changes take effect immediately and affect all system networking interfaces.

4.4.3 Specifying Network Speed

If you need to manually specify the speed of the network your ITI8241C-S adapter is on, follow this process at the `ok` prompt:

Step 1. Find the hme device from the `ok` prompt:

```
ok show-devs
```

Step 2. Find the full name of the hme you want to modify, for example:

```
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
```

Step 3. Type:

```
ok nvedit
```

Step 4. Type the following, and press the return key at the end of line 0:

```
0: probe-all install-console banner
1: apply transfer-speed=10 /pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
```

Note: To specify 100 Mbits/s operation, apply `transfer-speed = 100`.

Step 5. Press the `Ctrl-C` keys after typing

```
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1
```

Step 6. Type:

```
ok nvstore
ok setenv use-nvramrc? true
```

Step 7. Reboot your system.

Refer to the *Platform Notes: The Sun Quad Fast Ethernet Device Driver* document for more information on the qfe device driver and forcing network speed. This document is also available on the Solaris AnswerBook2.

4.4.4 Assigning a Local-MAC-Address

Each of the network interfaces of the ITI8241C-S Four Port Ethernet PCI adapter has been assigned a unique Media Access Control (MAC) address, which represents the 48-bit Ethernet address for that channel.

The OpenBoot firmware on the ITI8241C-S qfe adapter contains an Ethernet number that software can use to identify the adapter.

After the Openboot PROM probes the adapter's FCode PROM, a local-mac-address property is created in the adapter's device node. The property's value corresponds to the Ethernet number that can be used with the adapter.

The device driver, or any other qfe adapter utility, can use this local-mac-address property for configuring that Ethernet interface.

4.4.5 Conflicting With Fast Ethernet Switches

There are two Fast Ethernet (100BASE-T) switches that may present difficulties when working with the ITI8241C-S Fast Ethernet PCI adapter:

- Bay Networks model 28115/ADV
- SynOptics model 28115

If you use the adapter with these switches, you will encounter difficulties. Please refer to the Sun Microsystems bug ID 4071199 for more information. A patch is available from Sun Microsystems that fixes these difficulties.

Note: For information on how to get the latest patches and patch revisions visit the SunSolve site at <http://sunsolve.sun.com>.

4.4.6 Increasing Performance on Enterprise Servers

If you deploy four ITI8241C-S Four Port Fast Ethernet adapters in an Enterprise Server, you may experience slow performance and response times during peak periods of high network traffic. This poor performance is usually caused by applications that use data buffer and socket buffer sizes greater than 8 Kbytes.

Improved performance can be achieved by adjusting the application's data buffer size to be less than or equal to 8 Kbytes.

4.4.7 IP Forwarding Routing Protocols

When you install the ITI8241C-s adapter, the Solaris operating system automatically configures systems with more than one network interface to be an IP forwarding router.

An application server that might be running a database or NFS file services is typically “multihomed”. This means that it contains more than one network interface but does not run IP protocols or forward IP packets.

If IP forwarding and routing protocols on multihomed application servers is not disabled, the servers may experience poor performance.

For more information, refer to *the TCP/IP and Data Communications Administration Guide* shipped with the Solaris documentation.

Appendix A

Glossary

The following terms are used throughout this guide.

10/100	Both 10 and 100 Mbits/s on the same port.
100BASE-T	Physical layer specification for 100 Mbits/s Ethernet over various wiring specs.
10BASET	IEEE 802.3 physical layer specification for 10 Mbits/s Ethernet over 2 pairs of UTP wire
BIOS	Basic Input/Output System
CSMA/CD	Carrier Sense Multiple Access/Collision Detect. Protocol for carrier transmission access in Ethernet networks.
EISA	Extended ISA (Performance Enhanced ISA)
Ethernet	IEEE-standard data link protocol that specifies how data is placed on and retrieved from a common transmission medium.
Fast Ethernet	100 Mbits/s technology based on the 10BaseT Ethernet CSMA/CD network access method.
FAST SCSI	SCSI clocked at 10 MHz 10 Mbytes/s 8-bit, 20 Mbytes/s 16-bit
Hub	Connects 2 or more devices together in order for them to communicate on a network
HVD	High Voltage Differential (Ultra SCSI Standard for Differential Devices)
I/O	Input/Output
ISA	Industry Standard Architecture (Older PC Standard I/O bus)
LUN	Logical Unit Number

LVD	Low Voltage Differential (Ultra2 SCSI Standard)
NIC	Network Interface Card, e.g. ITI-8241C-S
Packet	Unit of information packaged in a predetermined structure for communications using Ethernet protocols.
PCI	Peripheral Component Interconnect (Industry Standard Bus)
POST	Power-On Self-Test
RJ-45	The 8-conductor version of an RJ-11 (telephone, but wider).
Router	Component which receives and transmits and forwards packets to their destinations via the shortest route possible.
SCAM	SCSI Configured AutoMatically (Most SCSI devices do not yet support SCAM)
SCSI	Small Computer Storage Interconnect
SE	Single Ended (Ultra SCSI Standard)
Switch	Hardware that routes packets across a network.
Ultra SCSI	SCSI clocked at 20 MHz, 20 Mbytes/s 8-bit, 40 Mbytes/s 16-bit
Ultra2 SCSI	SCSI clocked at 40 MHz, 40 Mbytes/s 8-bit, 80 Mbytes/s 16-bit
UTP	Unshielded twisted pair
Wide SCSI	16-Bit SCSI

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