



CompactPCI[®] Multi-Function Adapters



The Communications Company[™]

Installation and User's Guide

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The IntraServer Technology, Inc. CompactPCI® Ultra2 SCSI, Video and Ethernet adapter, model numbers ITI-8241, ITI-8240, ITI-8200, ITI-8040 and ITI-8001 comply with the requirements of FCC part 15, class A as defined under paragraph 2.909 of these rules.

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A copy of the test report substantiating compliance is available on request from:

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Introduction

IntraServer's ITI-8000 Series Ultra2/Ultra3 SCSI, Quad Fast Ethernet and Video adapters for CompactPCI® combine state of the art Low Voltage Differential (LVD) Ultra2 and Ultra3 SCSI technology with multiport Fast Ethernet and Video. IntraServer ITI-8000 Series adapters provide maximum integration of the most commonly required server functions, leaving the maximum number of free CompactPCI® slots available for your application.

IntraServer provides state of the art software drivers, which take full advantage of the embedded RISC SCRIPTS multiport SCSI controller to minimize system overhead and maximize data throughput. Four integrated Fast Ethernet channels provide high performance network connectivity, with full compatibility with the Sun™ Solaris™ QFE driver. An integrated ATI Rage2C graphics engine provides high performance graphics capability without the need for an additional CompactPCI® slot.

IntraServer provides the highest performance and the maximum functionality, while leaving the system integrator the most expandable system platform. Available CompactPCI® compliant hot swap makes the ITI-8000 Series a must for your high availability CompactPCI® application.

This manual will serve as a step by step guide during the installation of your CompactPCI® IntraServer host adapter in your computer.

ITI-8000 Series Adapters Included in This Guide

This guide covers the installation and operation of IntraServer's ITI-8000 Series CompactPCI® Combination adapters as follows:

IntraServer Part	Description
ITI-8241C-S	IntraServer CompactPCI® Combination Adapter with: Two Ultra2 SCSI ports, Four Fast Ethernet Ports and one Video Port.
ITI-8240C-S	IntraServer CompactPCI® Combination Adapter with: Two Ultra2 SCSI ports and Four Fast Ethernet Ports.
ITI-8200C-S	IntraServer CompactPCI® Adapter with two Ultra2 SCSI ports.
ITI-8040C-S	IntraServer CompactPCI® Adapter with four Fast Ethernet Ports.
ITI-8001C-S	IntraServer CompactPCI® Adapter with one Video Port.

Table 1: Hardware Covered by this Guide

The following variations are available for the adapters above. The variations can be combined when applicable. Contact IntraServer sales for additional information.

-Variation	Description
-S	Sun™ Solaris™ Support
-H	Hot Swap
-R	Rear I/O

Table 2: Available Options

Software Covered by This Guide

All IntraServer's ITI-8000 Series CompactPCI adapters are supported by the Solaris operating system on SPARC™ based systems. Information regarding software installation is included in the software driver section of this guide.

Support is currently available for the following operating systems:

Operating System	Intel	SPARC™
Sun Solaris Version 2.6	No	Yes ¹
Sun Solaris Version 7.0	No	Yes ¹
Sun Solaris Version 8.0	No	Yes ²
WindowsNT/Windows95/98	No	N/A
Linux	No	N/A

- Notes:
1. No Hot Swap
 2. Currently in qualification. Contact IntraServer Sales for more information.

Table 3: Operating System Support

Documentation Organization

This manual is organized into the following sections:

- Adapter Configuration and Installation
- BIOS and Firmware Configuration
- Testing the Installation
- Software Driver Installation and Configuration

Adapter Configuration

IntraServer CompactPCI® Combination adapters will have a different connector configuration depending on which variation you have purchased. This guide will cover the ITI-8241C-S, two Ultra2/LVD SCSI port, four Fast Ethernet and Video, fully configured module. For all other variations of the adapter, simply skip those sections that do not apply to your adapter.

I/O Connectors

SCSI

ITI-8000 host adapters include an external SCSI Connector for each SCSI channel, accessible through the front bulkhead handle. The ITI-8241C-R variant of the module allows SCSI to exit the rear of the system enclosure, by connecting to J3 and J5 of the ITI-8000 module. See appendix A and Appendix B for additional Information.

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

The terminators for LVD/SE and SE on the ITI-8000 Series adapters are fully automatic, and in normal circumstances need no manual intervention for correct operation. Indicator lights on the handle of the module will confirm correct operation of each of the buses.

Each of the two Ultra2 SCSI ports are capable of running Low Voltage Differential (LVD) at up to 80MB/sec, or Single Ended (SE) at up to 40MB/sec. Placing a Single Ended device on an LVD bus will cause the bus to run in SE mode, and reduce the overall bandwidth of the bus to 40MB/sec.

Ethernet

Four Ethernet connectors are provided on the adapter handle. They will be known to the Solaris system as qfe0 – qfe3¹, and 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 1 for location of the ports, and Appendix A for connector pin-out.

¹*Note: Your ports will be named with the next four available qfe numbers if there are existing qfe ports in your system.*

Video

A 15-pin “D” standard VGA connector is provided on the module handle. Plug your VGA monitor into this connector, and your system keyboard and mouse to the CPU keyboard and mouse port. Solaris will automatically recognize the ATI video subsystem under the m64 driver.

ITI-8241C-S Handle Connections

Use the following diagram as a guide when connecting your external devices to IntraServer's ITI-8241C-S adapter.

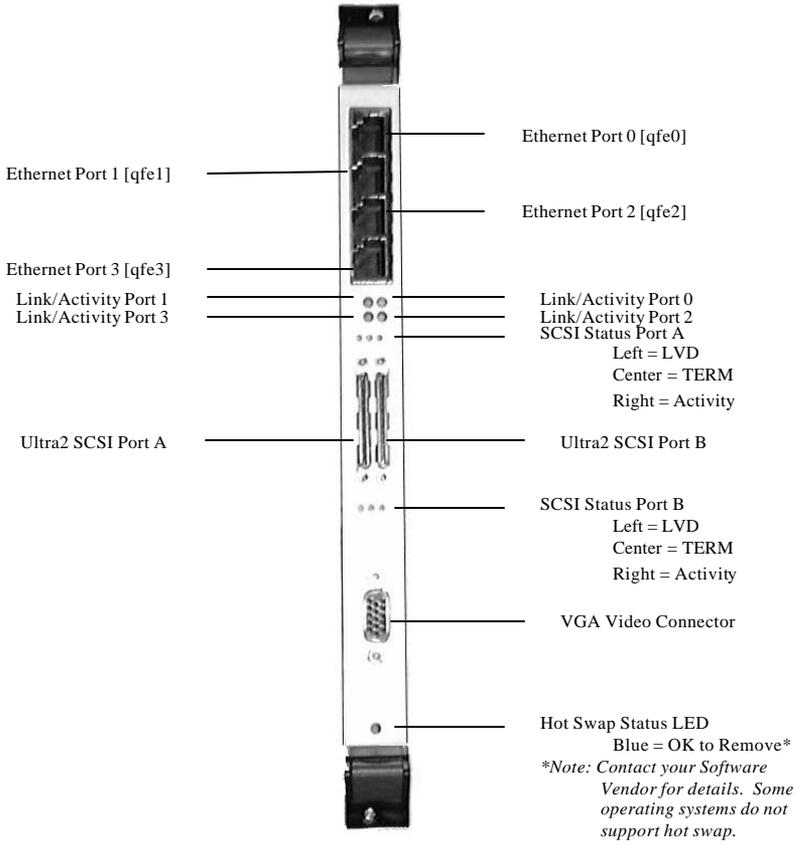


Figure 1: ITI-8241C-S I/O Connector Configuration

ITI-8241C-R Handle Connections

Use the following diagram as a guide when connecting your external devices to IntraServer's ITI-8241C-R rear I/O module.

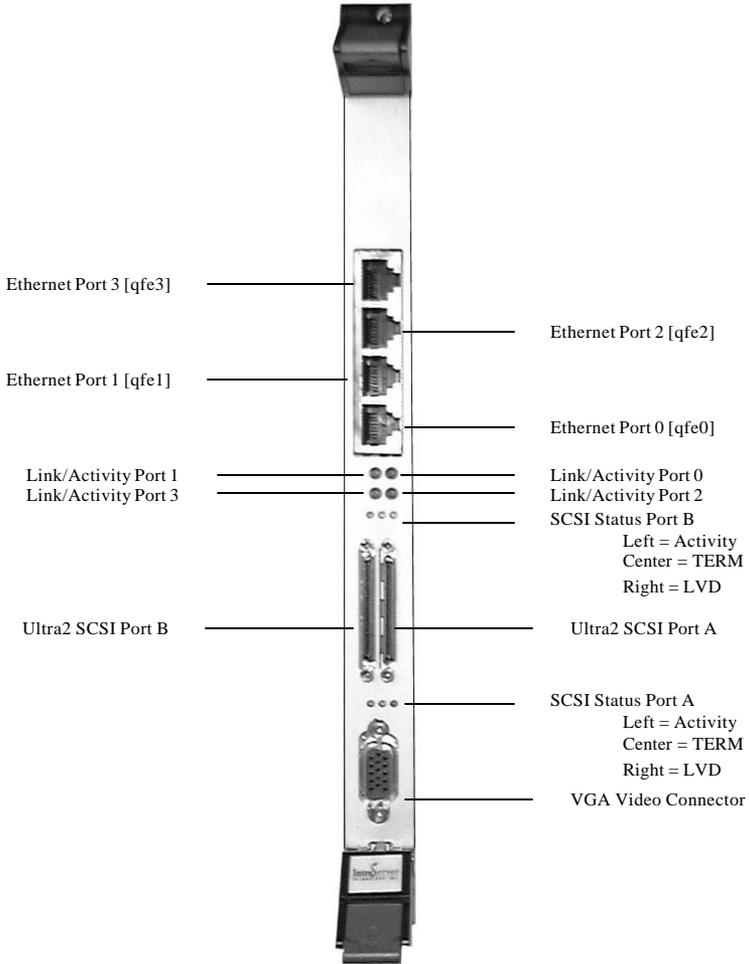


Figure 2: ITI-8241C-R Rear I/O Connector Configuration

ITI-8241C-S Module Configuration

The following diagram can be used to locate the major components and option jumpers on the ITI-8241C-S adapter.

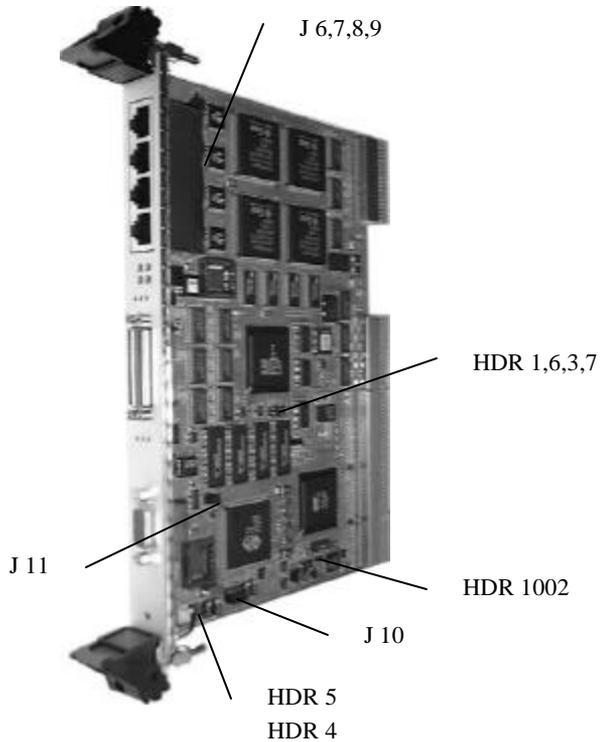


Figure 3: ITI-8241C-S Configuration Jumper and Header Location

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
J 6	Ethernet Port 0 Front/Rear Select
J 7	Ethernet Port 1 Front/Rear Select
J 8	Ethernet Port 2 Front/Rear Select
J 9	Ethernet Port 3 Front/Rear Select
J 11	Video Front/Rear
J 10	Video Front/Rear

Table 4: Configuration Headers and Jumpers

ITI-8241C-R Rear I/O Transition Module

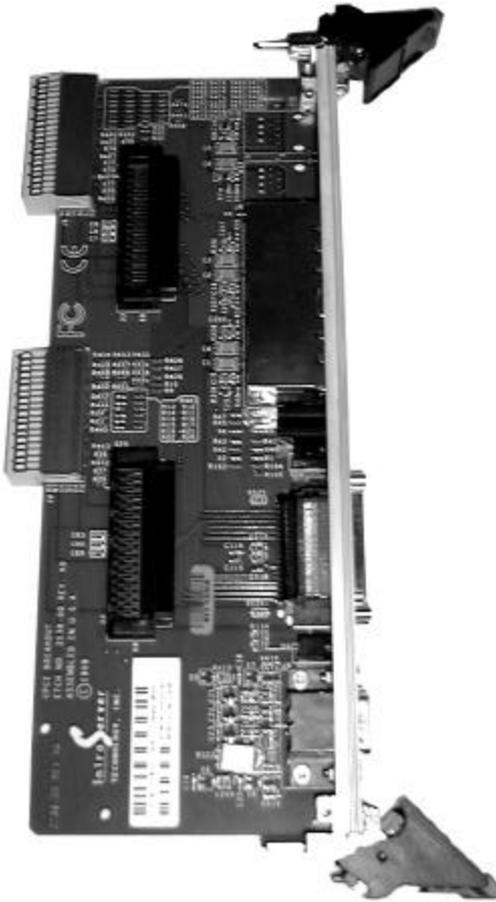


Figure 4: IntraServer ITI-8241C-R Rear I/O Transition Module

Installing the ITI-8241C-S Adapter

The ITI-8241C-S Combination host adapter is plug and play compatible with Sun Solaris SPARC™ systems. All functions of the ITI-8241C-S adapter are accessible from the front of the adapter. With the addition of the optional ITI-8241C-R rear I/O module, all functions can also be brought to the rear of the system.

If you plan on using the ITI-8241C-R rear I/O module, you must configure your ITI-8241C-S adapter to select rear or front output for the Video and Ethernet functions.

Configuring SCSI for Rear I/O

The ITI-8241C-S SCSI ports on the front and rear are all active at the same time. If the Front ports are used alone, or the rear ports are used alone, the module will terminate the SCSI bus. If the rear and front SCSI port on either the A or B SCSI channel are used together, the module will automatically disable 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.

Configuring the Video for Rear I/O

To configure the ITI-8241C-S Video to exit the rear of the system cabinet via the ITI-8241C-R rear I/O module, use the following procedure:

- Locate J10 and J11. (See Figure 2 for jumper locations)
- Move each of the jumpers on J10 and J11 from the “F” position to the “R” position.

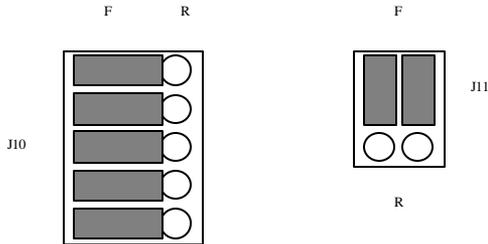


Figure 5: Video Configured for Front I/O

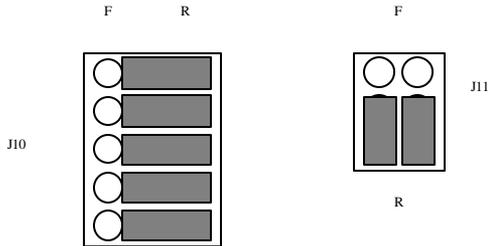


Figure 6: Video Configured for Rear I/O

The Video connector on the ITI-8241C-R rear I/O module will now be active, and the front Video connector on the ITI-8241C-R module will be inactive.

Configuring Ethernet for Rear I/O

To configure the ITI-8241C-S Ethernet to exit the rear of the system cabinet via the ITI-8241C-R rear I/O module, use the following procedure:

- Locate J6, J7, J8 and J9. (See Figure 2 for jumper locations)
- Move the jumpers for each port to the Front “F” or Rear “R” position.

Each port can be configured for front I/O or rear I/O.

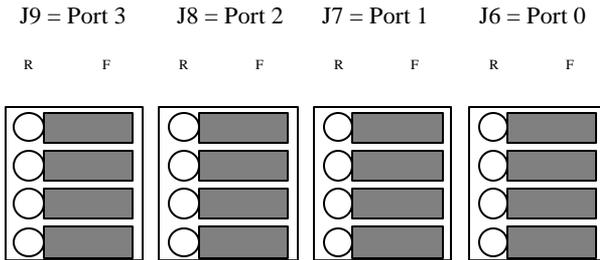


Figure 7: Ethernet Configured for Front I/O

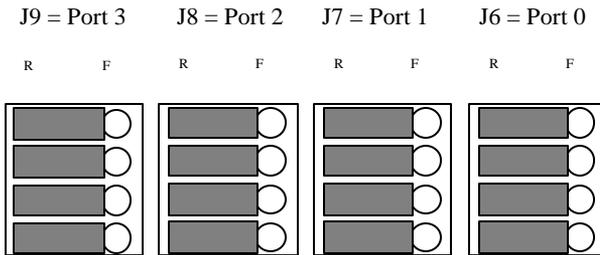


Figure 8: Ethernet Configured for Rear I/O

The following procedure should be used to install all IntraServer CompactPCI® adapters:

1. Turn OFF the power to the computer system, and to all peripherals directly connected to the system (monitor, printer, external SCSI enclosures, etc.)
2. Unplug the system from the AC power line
3. Use an anti-static strap or precautions to avoid static discharge to your computer system or the IntraServer CompactPCI® adapter
4. Remove the access cover for your system (refer to the system's documentation).
5. Locate a free CompactPCI® expansion slot and remove the screws and metal cover for the selected slot. *Be certain not to install the adapter in a CPU slot*
6. Install the adapter in the selected slot. The module should fit without forcing, and should line up with the I/O bulkhead. Be certain that the adapter is fully seated in the slot.
7. Tighten the retaining screws.
8. Connect any SCSI devices to the SCSI connectors (see figure 1), following the guidelines in the "Configuring the SCSI Bus" chapter of this manual.
9. Plug your VGA monitor into the 15-Pin VGA port shown in figure 1.
10. Plug your network cables into the four network jacks, starting from the top (qfe0) port.

Configuring the SCSI Bus

Some basic SCSI principles must be applied to correctly configure the SCSI bus on your system.

Termination

Most difficulties with the SCSI bus can be traced to improper termination and cabling.

The SCSI bus must be terminated at both ends, and only at the ends. Configure the termination on your IntraServer CompactPCI[®] adapter using the configuration information in the preceding chapter. Refer to the documentation for each device on the SCSI bus, to ensure:

- 1 Devices at the ENDS of the bus have TERMINATION ENABLED
- 2 Devices not at the END of the bus have TERMINATION DISABLED
- 3 Use LVD/SE termination on the Ultra2 buses.
- 4 Use active termination for Ultra Wide SCSI.

Automatic SCSI Termination

All IntraServer's ITI-8000 Series adapters employ automatic termination. In normal cases, no operator action is required to correctly terminate the SCSI bus, provided the following rules are observed:

- Each SCSI bus must be terminated **ONLY** at the ends. If the IntraServer ITI-8000 Series module is at the end of the SCSI bus, the termination will be set Automatically Enabled (the TERM light will light to indicate the module IS terminating the bus).
- If the LVD/SE bus on an ITI-8000 Series module is located on a bus containing LVD devices, it will automatically set to

LVD signal levels. The LVD light will light to indicate the bus is running in ULTRA2 LVD (80MB/sec) mode.

- If the LVD/SE bus on an ITI-8000 Series module senses ANY Single Ended (SE Only) devices on the bus, it will automatically set to SE signal levels and run in ULTRA (40MB/sec) mode.

NOTE: *Placing Single Ended devices on the LVD bus on a ITI-8000 Series adapter will force the LVD bus to run in ULTRA mode.*

QUICK CHECK: *If the LVD LED (see Figure 1) is ON, the bus is capable of Ultra2 (80MB/sec) performance. If the LED is OFF the bus is capable of 40MB/sec.*

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 speeds, while the SE devices will run at their maximum Ultra performance.

If a “Y” cable is used on the FRONT external connector, placing the ITI-8000 Series adapter in the middle of the LVD SCSI bus, you must install a jumper on the invert termination headers HDR1 and HDR3 (see Figure 2), this will force the module NOT to terminate the bus. This situation could arise in a SCSI cluster.

If a “Y” cable is used on the REAR external connector, placing the ITI-8000 Series adapter in the middle of the LVD SCSI bus, you must install a jumper on the invert termination headers HDR6 and HDR7 (see Figure 2), this will force the module NOT to terminate the bus. This situation could arise in a SCSI cluster.

QUICK CHECK: *If the TERM LED (see Figure 1) is ON the ITI-8000 Series adapter is terminating the bus. If you are using the “Y” configuration as described above, the termination LED must be OFF.*

LVD technology is not compatible with the older High Voltage Differential SCSI standard. If an HVD device is placed on the Ultra2/LVD bus, the IntraServer host adapter will turn off the port, and indicate the 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, a HVD device has been sensed on the LVD bus, and the bus has been disabled. Remove the HVD device.*

SCSI IDs

Each device and host adapter on the SCSI bus must have a unique SCSI ID. It is recommended that the host adapter be left at its default ID of 7. Should it be necessary for the host adapter ID to be changed, use the OBP `setenv` command to change the `scsi-initiator-id` from 7 to the desired value. It will be necessary to change the SCSI ID of one or more of the adapters in a SCSI Clustered system because there will be more than one IntraServer CompactPCI® adapter on the same SCSI bus.

On a 16-bit (WIDE) SCSI bus, each device must have a unique SCSI ID from 0 - 15. All IntraServer CompactPCI® adapters default to ID 7. All other devices on the bus should be given IDs from 0 - 6 or 8 - 15. Refer to the target devices' documentation setting the targets' SCSI ID.

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

Cabling SCSI Devices

All IntraServer 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 FAST SCSI operation, it is recommended that the total bus (cable) length from end to end be kept to 3 meters. For Ultra2 SCSI running in Low Voltage Differential (LVD) mode, the cable must be kept within 12 meters for multidrop connections or 25 meters point to point. For Ultra2 SCSI in Single Ended (SE) mode, it is recommended that the total bus (cable + module etc) length be kept to 1.5 meters.

It is highly recommended that a high quality SCSI cable be selected for all device connections, due to the importance of optimal signal integrity, and to ensure compliance with regulatory agency approval for system emissions. Most problems encountered during the initial installation of a SCSI system can be traced to improper or low quality cabling and termination. IntraServer carries a complete line of high quality SCSI cables, which can be ordered to meet the requirements of your configuration.

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

ITI-8000 Series LVD/SE 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, rt. 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
External 68-pin, high density, one end right angle cable exit. NOTE: Extends 50-500170	16-Bit LVD External	2.0	68-pin High Density	68-pin High Density, rt. Angle	50-500120

Table 5: ITI-8000 Series SCSI Cable Selection Guide

Connecting Internal SCSI Devices

Internal SCSI devices (disks inside the host enclosure) can be connected to the ITI-8241C-R rear I/O adapter using a multi-conductor 68 position ribbon cable for 16-bit (WIDE) 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.

Connectors that are labeled ULTRA2 LVD/SE are capable of running LVD SCSI at 80MB/sec. To maximize the performance of the card, use all LVD capable devices. Connecting a non-LVD device to the LVD bus will cause it to run in SE mode and reduce the maximum performance of the port to 40MB/sec.

If the SCSI bus is not in LVD mode (LVD LED is off), the SCSI bus length must be kept to the Ultra2 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/LVD device is on the LVD segment of the card.*

Attaching Ultra2 LVD Devices

A differential internal cable (50-401030) can be used to attach internal LVD disks to the ITI-8241C-R rear I/O module. The LVD cable should be plugged into one of the LVD/SE connectors on the rear I/O adapter (J7 or J8). All internal LVD devices should be connected to this cable.

To configure internal devices on the LVD/SE bus:

- Set the device to a unique SCSI ID (0-6 or 8-15), the host adapter default is 7.
- Plug the unterminated end of the SCSI cable into the IntraServer CompactPCI[®] adapter, making sure pin 1 (usually marked on the cable with a red stripe), corresponds to pin 1 on the connector.
- Plug one connector on the ribbon cable to each of the devices on the bus
- Plug a 4-pin power connector into the power connector of each SCSI device
- The end of the LVD differential cable has a built in LVD terminator, which will correctly terminate the end of the internal

LVD bus segment. The adapter will terminate the other end of the bus automatically.

Attaching SE (non-Ultra2/LVD) Devices

The IntraServer internal cable (50-401030) can also be used to attach internal Single Ended (SE) disks to the ITI-8241C-R rear I/O module. Note that placing any non-LVD drives on a bus will cause the entire bus to run in Single Ended mode, and reduce the maximum I/O throughput from 80MB/sec to 40MB/sec. 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 ITI-8241C-R adapter:

- Disable termination on all SE devices, and use a cable (50-401030) that is capable of SE/LVD termination. This will ensure the SCSI bus is only terminated at the end, and that a high quality terminator is being used.
- Set the device to a unique SCSI ID (0-6 or 8-15), the host adapter default is 7.
- Plug the end of the SCSI cable into the J7 or J8 connector on the ITI-8241C-R adapter, making sure pin 1 (usually marked on the cable with a red stripe), corresponds to pin 1 on the connector.
- Plug one connector on the ribbon cable to each of the devices on the SE bus
- Plug a 4-pin power connector into the power connector of each SCSI device

NOTE: *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. Attempting to use J7 and disks on the "A" external rear I/O connector, or disks on J8 and disks on the "B" external rear I/O connector will result in unpredictable behavior.*

Hard Disk Activity Light

IntraServer's ITI-8000 Series adapters have a built in activity LED, which indicates when the SCSI bus is busy. The LED will flash to indicate activity on the bus.

Connecting External SCSI Devices

Optional cables are available from IntraServer for all external devices. See the cable selection Table 5 in this guide to determine the correct cable for your application. You will need to know the type of connector you require on each end of the cable, and the length of cable required.

Apply the same rules for ID and termination as for internal devices:

- Only the end device on the bus (last device on the cable) should have termination enabled
- Each device must have a unique SCSI ID

All IntraServer ITI-8000 Series modules will automatically enable or disable SCSI termination by sensing the cable configuration.

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

Example SCSI Configurations

IntraServer's ITI-8000 Series adapters greatly increase the configuration flexibility for SCSI while allowing increased performance two to four times over previous generation products. LVD technology allows multi-drop cables up to 12 meters, while operating at 80MB/sec.

To maximize the performance of the ITI-8000 Series adapter, the following general rules must be followed.

- Ultra2/LVD devices must be connected only to the Ultra2/LVD connectors.
- If Ultra/SE devices must be connected to the adapter, put them all on one bus, SE drives will cause the bus they are on to run at Ultra speeds, and limit the bus performance to 40MB/sec.
- The maximum cable length, end to end, of the LVD bus must be 12 meters or less for multi-drop connections
- The maximum cable length, end to end, of any bus running in SE mode must be 1.5 meters or less
- Use the LVD cable supplied in your kit to attach LVD devices to the LVD/SE connector on the card
- The end of the SCSI bus **MUST** provide LVD termination.

Refer to the cabling examples below to correctly configure your adapter.

Cabling Internal Devices

Be certain to use the IntraServer 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 ITI-8000 Series adapter will terminate the controller end.

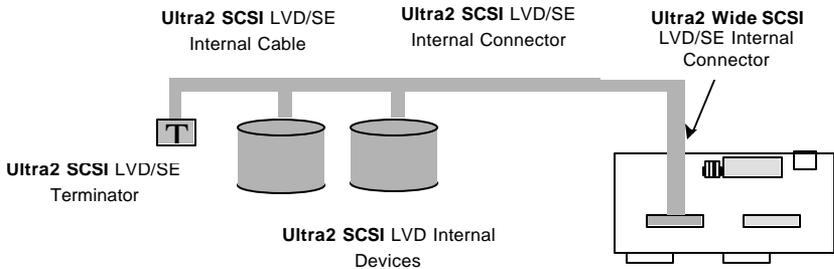


Figure 9: Internal Ultra2/LVD Devices Using ITI-8241C-R Rear I/O

This example shows correct cabling of internal LVD devices to SCSI bus B of the ITI-8241C-R Rear I/O module.

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

Cabling External Devices

Be certain to use high quality differential cable for all your external LVD/SE connections. When running in LVD mode (LVD LED indicator ON), your total LVD bus must be kept to 12 meters for multi-drop connections. If the bus is being used in SE mode (LVD LED indicator OFF), the bus must be kept to 1.5 meters. You must provide LVD termination at the end of the external bus.

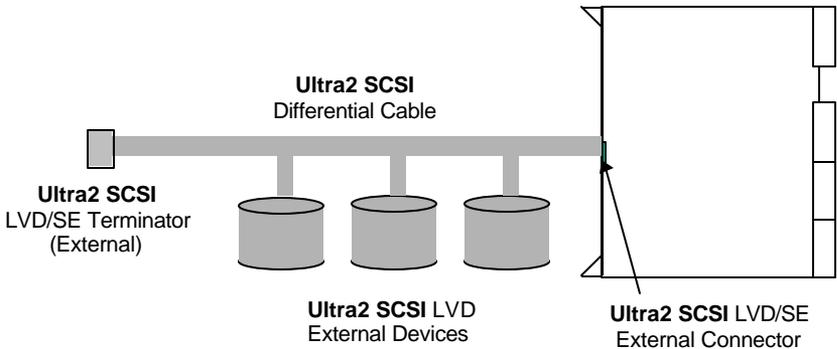


Figure 10: External Ultra2/LVD Devices

SUNCluster™ Cabling Examples

The SCSI cable shall not exceed 1.5M total length if the bus is running in Single Ended Mode, or 6M Ultra2/LVD Mode and needs correct termination at each end of the cable. There is a short internal cable inside the box, which connects the IntraServer rear transition card internal connector to the Cable adapter at the rear end of the HDD (see the cabling diagrams below).

There is ONE external cable per SCSI channel, which connects the two System boxes. SCSI terminators are required at each end of the cable. This is achieved by enabling the auto terminators on the SCA adapters. The same arrangement may be repeated for the second SCSI chain.

The configuration example figures in this section show how the shared disk drives, the cables, and the controller cards are physically located in Node 0 and Node 1.

Table 6 shows the recommended termination scheme and SCSI ID settings for one mirrored drive configuration. Table 6 can also be applied to the second mirrored drive configuration.

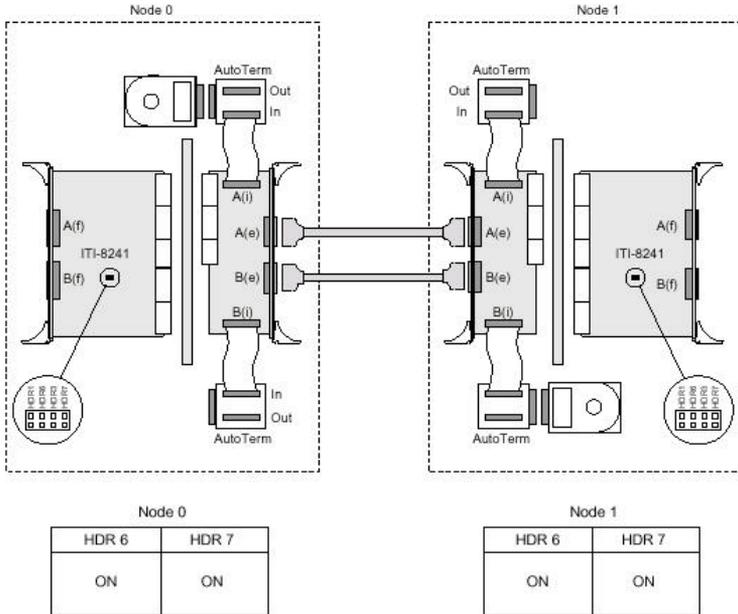


Figure 11: Dual Rear SCSI Cabling in Side-by-Side Layout - one disk per node using SCA adapter

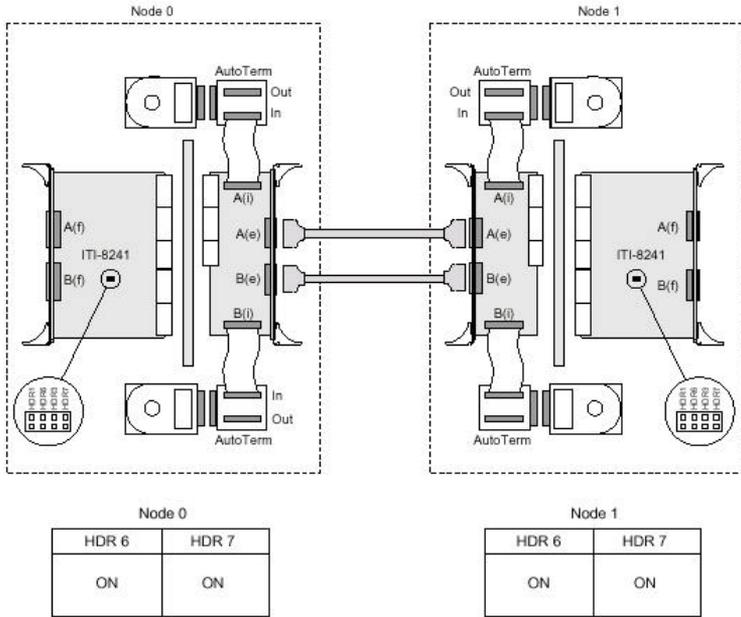


Figure 12: Dual Rear SCSI Cabling in Side-by-Side Layout - two disks per node using SCA adapter

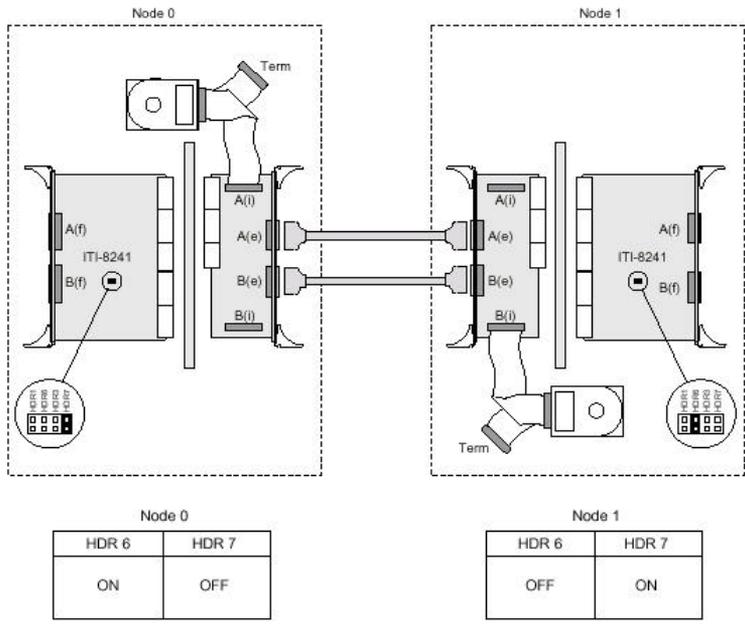


Figure 13: Dual Rear SCSI Cabling in Side-by-Side Layout - one disk per node using internal SCSI cable with terminator

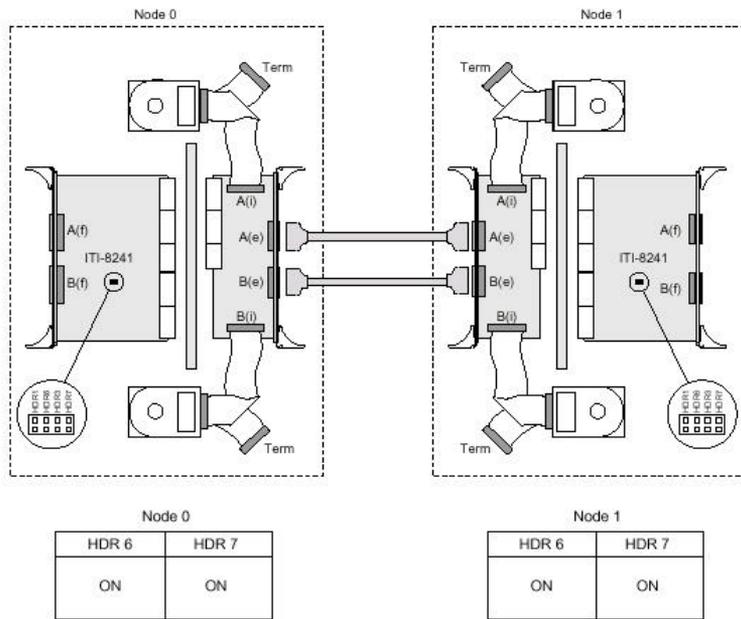


Figure 14: Dual Rear SCSI Cabling in Side-by-Side Layout - two disks per node using internal SCSI cable with terminator

Device	at	Description	Notes
HDD	Node0	Shared Disk Drive 1 mounted on the removable caddy. The drive has an SCA connector that permits hot swap.	SCSI-ID = 0 Terminator = Disabled TermPwr = Off
SCA-Adapter	Node0	Adapter fixed at the rear of the backplane on top section.	Terminator = Auto
Internal Cable	Node0	SCSI-68 pin ultra-wide cabel 8' long that connects the SCA-adapter (IN) and the ITI-8241C-R (Channel A)	
ITI-8241C-R	Node0	The rear I/O Transition card has a SCSI channel A internal connector and an external micro connector.	This card is plugged at the rear of the ITI-8241C-S.
External Cable (One End)	Node0	Micro connector SCSI external cable	
External Cable (Other end)	Node1	Micro connector SCSI external cable	
ITI-8241C-R	Node1	The rear I/O Transition card has a SCSI channel A internal connector and an external micro connector.	This card is plugged at the rear of t he ITI-8241C-S.
Internal Cable	Node1	SCSI-68 pin ultra-wide cable 8' long that connects between SCA-adapter (IN) and ITI-8241C-R (channel A)	
SCA-Adapter	Node1	Adapter fixed at the rear of the backplane on top section.	Terminator = Auto
DHH	Node1	Shared Disk Drive 1 mounted on the removable caddy. The drive has an SCA connector that permits hot swap.	SCSI-ID=0 Terminator = Disabled TermPwr = Off

Table 6: SUNCluster™ Cabling and Termination Details

Additional configurations are possible, additional diagrams may be added in a future manual revision.

Installing the Ethernet Function

The IntraServer ITI-8241C-S adapter contains four fully-buffered twisted-pair Ethernet ports (RJ-45), providing four 10BASE-T/100BASE-TX channels on one CompactPCI® adapter.

Features

- Fully complies with the ANSI/IEEE std. 802.3 CSMA/CD physical layer specification
- Four switchable 10BASE-T/100BASE-TX Ethernet channels with auto-negotiation. Conforms to IEEE 802.3 Ethernet standard
- Up to 100 meters of twisted-pair without the use of repeaters
- Four independent Ethernet channels can run at either 10Mbps or 100Mbps
- Support for half duplex or full duplex operation
- Multiple 48-bit IEEE 802.3 style media access control (MAC) identifiers, one for each Ethernet channel
- LED indicators – link integrity for each Ethernet channel

Hardware and Software Requirements for Ethernet

Before installing the adapter, the system must meet the following hardware and software requirements:

Table 7: Hardware and Software Requirements

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

Note – For up to date technical information visit IntraServer’s web site at <http://www.intraserver.com>

Checking the OpenBoot PROM Revision Level

You can use the OpenBoot command **.version** to display your system’s OpenBoot PROM revision level.

Displaying the OpenBoot PROM Revision Level

At the **ok** prompt, type **.version** to check your system’s OpenBoot PROM revision level.

```
ok .version
```

```
Release 3.00 Version 1203 created 97/04/19 09:44:48
```

Installing the Ethernet Ports

This chapter covers how to install the Ethernet portion of the ITI-8241C-S CompactPCI® Combination adapter in your system and how to verify that the Ethernet ports have been installed correctly.

Refer to section “Installing the IntraServer CompactPCI Host Adapter” to install the combination adapter in your CompactPCI® machine.

Ethernet 10/100 Auto-Negotiation

The qfe Ethernet interface used on the IntraServer ITI-8241C-S adapter supports auto-negotiation. The auto-negotiation protocol, as specified in the 100BASE-T standard, automatically selects the operation mode (half-duplex or full-duplex) and speed (10Mbps or 100Mbps) based on the network the adapter is on.

The link speed and modes supported by the IntraServer ITI-8241C-S adapter are listed below in order of decreasing priority:

- 100Mbps, full-duplex
- 100Mbps, half-duplex
- 10Mbps, full-duplex
- 10Mbps, half-duplex

When the system is booted, the IntraServer CompactPCI® adapter advertises these capabilities to the Link Partner at the other end of the link (a hub, switch, or another network interface card (NIC) in a host system). If the Link Partner also supports auto-negotiation, it will advertise its capabilities over the link, the common highest priority mode supported by both sides will be selected automatically for the link operation.

If the IntraServer CompactPCI® adapter is connected to a remote system or to an interface that is capable of auto-negotiation, your system will automatically select the speed and duplex mode.

If the IntraServer CompactPCI® adapter is connected to a Link Partner in which auto-negotiation protocol is not operational, you can configure the device to not use this protocol and force the driver to set up the link in the mode and speed of your choice.

Refer to the Platform Notes; “The qfe Ethernet Device Driver” document for mode information on the qfe driver and auto-negotiation. This document is also available in the Solaris™ AnswerBook.

Verifying the Installation

After you have installed the ITI-8241C-S combination adapter, but before you boot the system, perform the following tasks to verify the installation.

Power on the system and when the banner appears, press the Stop-A keys to interrupt the boot process and to get to the **ok** prompt.

1. 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 identified as “[/pci@1f.2000/pci@2/IntraServer.qfe@0.1](#)” are the IntraServer fast Ethernet ports on the ITI-8241C-S adapter.

Your system will vary significantly from the example below depending on your system configuration.

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*

Diagnostic Testing

The following tests are available to help identify problems when the system containing the IntraServer ITI-8241C-S adapter does not boot.

The FCode **selftest** is added to the device tree during the probing phase of the OpenBoot™ PROM start-up sequence. You can invoke the FCode **selftest** diagnostics by using the OpenBoot™ user interface **test** or **test-all** commands. If you encounter an error while running the diagnostics, appropriate messages will be displayed. Refer to the OpenBoot™ 3.X Command reference Manual for more information on the **test** and **test-all** commands.

The **selftest** exercises most functionality of the adapter and checks for the following conditions:

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

Use the following example to run selftest using the test command:

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

```
ok test <device-path>
```

```
(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)
```

```
Hme register test --- succeeded.
```

```
Internal loopback test -- succeeded.
```

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

```
passed
```

```
ok
```

The following tests are run when the test command is executed and the adapter is connected to a network.

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

Note: To test other channels of the adapter, you will need to execute the **test** command separately on each channel.

Note: After testing is complete use the following command:

ok setenv diag-switch? False

to turn off diagnostic mode. If **diag-switch?** is left as true the time for the system to initialize will increase.

Verify Connectivity by Monitoring Network Activity

Perform the following task 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, type the following at the ok prompt, including quotation marks and spaces:

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

```
ok apply watch-net <full path name of the qfe interface>
```

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

```
.....  
.....  
.....
```

```
ok
```

Note: <full path name of the qfe interface> in the example above is the full path name of the qfe found with the show-devs command at the ok prompt. 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: After testing is complete use the following command:

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

to turn off diagnostic mode. If **diag-switch?** is left as true the time for the system to initialize will increase.

Reboot the system after examining the network activity.

Software Installation

Custom, high performance, Ultra2 SCSI device drivers for Sun Solaris SPARC™ based platforms, including Versions 2.6 and 7.0 are available from IntraServer, and are included with your adapter.

Detailed instructions for software installation for Sun Solaris are included in this section.

The Ethernet ports on the card are supported under the qfe Ethernet driver, which is resident on the Solaris 2.6 and later software distribution media.

The video section of the card is based on ATI's RAGE IIC, and is supported under the m64 driver on the Solaris 2.6 and later software distribution media.

NOTE: *It is highly recommended that you make a backup of your system disk before installing any software. Failure to back up all files on your system may result in unrecoverable loss of data.*

Installation for Sun™ SPARC™ Solaris™ Ultra2 SCSI Options (ITI-8200 Series)

IntraServer's ITI-8000 Series adapters offer the highest possible performance on Sun™ Solaris™ systems. IntraServer's Ultra2 SCSI drivers, (ITSPS and ITHPS) are optimized for low CPU overhead and high I/O throughput, making use of IntraServer's single interrupt scripts.

IntraServer's Ultra2 SCSI adapters have built in Fcode, designed to operate in Sun's OpenBoot environment, allowing Ultra2 SCSI devices to be available to the OpenBoot (ok) prompt.

This chapter describes the features and use of the IntraServer Device Drivers for the Solaris Operating system 2.6 and 7.0

Introduction

The IntraServer driver, ITHPS, allows the Solaris operating system to interface with SCSI devices connected to IntraServer 8200 series Ultra2 controllers with support for Low Voltage Differential (LVD) devices. This driver takes advantage of new hardware features in the 8200 series controllers to minimize CPU utilization, including a single interrupt per I/O.

Features

- Provides synchronous negotiation (including Fast SCSI/Ultra SCSI/Ultra2 SCSI)
- Supports multiple host adapters
- Supports disconnect/reselect
- Allows multiple and non-contiguous LUN support
- Supports scatter/gather
- Supports wide devices, and tagged command queuing
- Supports multiprocessors

System Requirements

Your SPARC™ Solaris™ system must have the following available resources in order to install the ITI-8000 Series Ultra2 SCSI adapter.

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*
Firmware	OpenBoot™ PROM Version 3.0 or greater

* Only required if you will be using the IntraServer module to support your System disk.

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.

Verifying Correct Installation

Use this procedure to verify installation of your ITI-8000 Series Ultra2 SCSI adapter before booting your system:

- 1 Power on the system.
- 2 When the banner is displayed, press the Stop-A keys to interrupt the boot process and stop at the **ok** prompt.
- 3 Use the **show-devs** command to list the system devices. You should see an output similar to the following:

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

Note: *The above are examples. The output of show-devs will vary depending on your system and configuration. Use the corresponding entries on your system, not the ones given here.*

If these devices are not listed, check that the adapter is correctly installed, and re-seat the adapter if necessary.

Identifying the SCSI disks

The `probe-scsi-all` command is used to identify the SCSI devices on your IntraServer adapter.

ok probe-scsi-all

```
/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 the SCSI disks on your IntraServer adapter are not identified by your system, check the following:

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

IntraServer adapters can be identified at the **ok** prompt using the following procedure:

1. select the adapter entry:

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

2. use `.properties` to show the adapter properties

```
.properties
```

```
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
```

ITHPS and ITSPS Device Drivers

The IntraServer ITHPS and ITSPS drivers are designed to Sun Microsystems SCSI specifications' for device drivers. These drivers 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 2.6/7.0 architecture requires that the device complies to the SCSI standard.

The following sections describe the procedures to install the drivers on Solaris.

Installing ITHPS Ultra2 SCSI Drivers

IntraServer's ITI-8200 Series adapter uses the ITHPS Ultra2 SCSI driver for Solaris, this driver is included with your adapter kit.

Note: If you plan on using an IntraServer adapter for your SYSTEM DISK, you MUST use the NETWORK install procedure in order to load the device driver during installation.

Existing System Installation

These instructions provide details to install the IntraServer ITHPS driver to an existing Solaris operating system installation.

Note: You must be logged on as root to perform the installation.

Floppy Disk Install

If you received the drivers on a floppy diskette:

1. Place the diskette in the floppy drive and execute the "**volcheck**" command to ensure the system sees the floppy.
2. Change directory to the root of the floppy (e.g. "**cd /floppy/floppy0**")
3. Execute the install.sh shell script to add the ITHPS and ITSPS drivers to the operating system:

`./install.sh`

4. The ITHPS and ITSPS device drivers are now installed. Reboot the machine to reconfigure the system and to recognize the new devices.

Distribution File Install

If you received the drivers in an `itis_install.tar.Z` file:

1. Uncompress and un-tar the `itis_install.tar.Z` file by typing the following commands in order to create a directory named `install`:

```
uncompress itis_install.tar.Z
```

```
tar -xvf itis_install.tar
```

```
cd install
```

2. Execute the `install.sh` shell script to add the ITHPS and ITSPS drivers to the operating system:

```
/install.sh
```

3. The ITHPS and ITSPS device drivers are now installed. 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.

Network Installation Procedure

If you are using your IntraServer adapter to support your SPARC™ Solaris 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 IntraServer SCSI adapters for the system disk. The method described in this section allows you to install the IntraServer ITSPS and ITHPS drivers onto a network boot kit, making them available during the SPARC™ installation script.

If you are simply installing an IntraServer adapter as an additional storage adapter in an existing system, use the driver installation procedure described in the previous section.

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>

The basic steps to set up a boot/install server are as follows:

1. Insert your Solaris distribution CD in your boot/install server's CDROM drive.
2. Change your directory to the Tools area on your distribution CD:

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

3. Use the setup_install_server script to copy the boot and installation files to your boot/install server:

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

Installing the ITHPS/ITSPS Drivers on the Boot/Install Server

Once you have set up your network boot and install server, run the "install.sh" script with the "-n" parameter to copy the driver kit to the boot server's boot files:

1. Place the diskette in the floppy drive and execute the "volcheck" command to ensure the system sees the floppy.
2. Change directory to the root of the floppy

```
cd /floppy/floppy0
```

3. Execute the install.sh shell script to add the ITHPS and ITSPS drivers 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.

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

Running the install.sh script this way will copy and install the IntraServer drivers into the Tools/Boot/ area of the boot files and allow IntraServer adapters be booted for installation via the bootserver.

Adding Clients to your Boot/Install Server

For each machine that will boot into the boot/install server add a client entry on the boot/install server, as follows:

1. Change directory to the boot/install kit

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

-
2. Use the `add_install_client` script to add the client machine

```
./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

Example: `./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.

Booting the Client using ITHPS/ITSPS drivers

Now you can begin the installation of Solaris to the client target machine via the boot and install server. On the client machine, boot the network install kit you created in the preceding steps as follows:

```
ok boot net -v
```

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

Once the installation has completed and the system is waiting to be manually rebooted, proceed to a console window and run the following script:

```
./sbin/itisinst
```

This will copy and install the drivers from the boot server to the newly created Solaris installation. Once this script has been run, the IntraServer device driver installation is complete and the system can be rebooted.

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 IntraServer adapter to support your boot disk*

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.

Configuring the Driver Software

Beginning with the Solaris 2.6 Hardware: 5/98 release the Solaris qfe software driver that is used by the ITI-8241C-S is bundled with the Solaris operating system.

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

Configuring Host Files

After installing the IntraServer ITI-8241C-S CompactPCI® Adapter, you must create a *hostname.qfe<num>* file for each Ethernet interface. You must also assign an IP address and a hostname for each Ethernet interface in the */etc/hosts* file.

Installing the software for the ITI-8241C-S qfe adapter entry

Create an */etc/hostname.qfe0* file. The number 0 following qfe represents the first instance of the qfe device. Use channel qfe1 for a second Ethernet channel and so on.

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

Booting from the Network Using Solaris

You can use the qfe driver on your ITI-8241C-S adapter to boot over the network using the following example:

Find the hme device from the ok prompt:

```
ok show-devs
```

Find the full name of the hme you want to boot, for example:

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

<p>Note: You need to select only one of these qfe devices for booting</p>
--

Start the boot:

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

Customizing the Installation

Network Hubs that do not send 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 need to disable your system from looking for link pulses, as in the following example:

Find the qfe device from the ok prompt:

```
ok show-devs
```

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

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

Type:

```
ok nvedit
```

Type the following, 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
```

Press the Control-C keys after typing
/pci@1f,0/pci@1/pci@2/IntraServer,qfe@0,1

Type:

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

Reboot your system.

Configuring Driver Parameters

The qfe device driver controls the IntraServer ITI-8241C-S, qfe Ethernet Device. The device driver automatically selects the link speed using the auto-negotiation 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 `qfe` Fast Ethernet Device Driver document for more information on configuring driver parameters. This document is also available on the Solaris™ AnswerBook.

Increasing TCP/IP performance

You can increase the TCP/IP performance of the ITI-8241C-S `qfe` adapter by changing the TCP highwater mark to 64K. This can be done with the `ndd (1M)` utility as follows.

As superuser, type:

```
# 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 will take effect immediately and affect all system networking interfaces.

Manually Specifying 10Mbps or 100Mbps Connection

If you need to manually specify the speed of the network your ITI-8241C-S adapter is on, use the following process at the `ok` prompt:

Find the `hme` device from the `ok` prompt:

```
ok show-devs
```

Find the full name of the `hme` you want to boot, for example:

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

Type:

```
ok nvedit
```

Type the following, 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 100Mbit/sec operation, **apply transfer-speed=100**

Press the Control-C keys after typing

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

Type:

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

Reboot your system.

Refer to the Platform Notes: The qfe 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™ AnswerBook.

qfe local-mac-address

Each of the network interfaces of the ITI-8241C-S Four Port Ethernet PCI adapter has been assigned a unique MAC (Media Access Control) address, which represents the 48-bit Ethernet address for that channel.

The OpenBoot firmware on the IntraServer ITI-8241C-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.

Conflicts With FastEthernet Switches

There are two FASTEthernet (100BASE-T) switches that may present difficulties when working with the ITI-8241C-S FastEthernet 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 Sun's bug ID 4071199 for more information. A patch is available from Sun that will fix these difficulties.

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

Increasing Performance on Enterprise Servers

If you deploy four ITI-8241C-S Four-Port FastEthernet 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 8Kbytes.

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

IP Forwarding Routing Protocols

The Solaris operating system will by default configure systems with more than one network interface to be an IP forwarding router. Installing an ITI-8241C-S in a system will make this occur.

An Application Server which might be running a Database or NFS file services is typically "multihomed" which means that they contain more than one network interface but do 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.

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> (or ITSPS(n) in case of the ITSPS driver) 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

ITHPS has been told to control a 53C896 (53C895 for ITSPS) hardware which is made by a manufacturer other than IntraServer Technology. This adapter requires a special driver provided by that manufacturer. Please contact the manufacturer for assistance.

ITHPS<n>: Failed to map device registers

ITHPS 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=xxxxh

The system has not properly enabled the configuration resources that ITHPS needs in order to use this hardware. The cmd=xxxxh 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..15.

ITHPS<n>: Could not allocate memory to read configuration data.

The 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 may need to manually configure the driver using the ithps.conf file.

ITHPS<n>: Unable to make reset notification callbacks

The ITHPS 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 IntraServer adapter licensed for use with Solaris.

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 can not 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 of one of the previous two errors, this adapter could not be "attached" to the I/O subsystem and will not be accessible. See the previous error message and solve that problem.

ITHPS<n>: Unable to obtain soft state structure

The 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 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 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 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 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 driver was unable to allocate the memory needed during initialization. You may have run out of available memory.

ITHPS<n>: Unbind failed!

The driver had a problem when attempting to unload itself. This is a fatal error.

7

Glossary of Terms

The following terms are used throughout this guide.

Term	Meaning	Notes
10/100	Both 10 and 100Mbps on the same port.	
100BaseT	Physical layer spec. for 100Mbps Ethernet over various wiring specs.	
10BaseT	IEEE 802.3 physical layer spec. for 10Mbps 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	100Mbps technology based on the 10BaseT Ethernet CSMA/CD network access method.	
FAST SCSI	SCSI clocked at 10 MHz	10 Mbytes/sec 8-bit, 20 Mbytes/sec 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/sec 8-bit, 40 Mbytes/sec 16-bit
Ultra2 SCSI	SCSI clocked at 40 MHz	40 Mbytes/sec 8-bit, 80 Mbytes/sec 16-bit
UTP	Unshielded twisted pair	

Wide SCSI	16-Bit SCSI
--------------	-------------

Table 8: Glossary of Terms

Appendix A Connector Specifications

VGA Video Connector

The VGA interface on the ITI-8241C-S uses the industry standard 15-pin “D” connector, and is wired as follows:

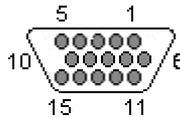


Figure 15: Video Connector

Connection	Signal	Connection	Signal
1	Red	9	+5V
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		

Table 9: Video Connector Pinout

Ethernet Connector

The 8-pin RJ-45 connector for 10/100 Mb/sec Ethernet is wired as shown:

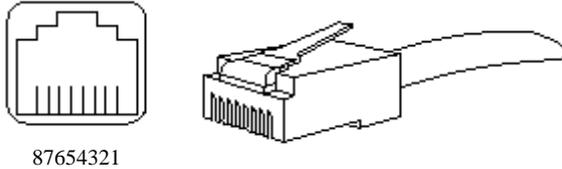


Figure 16: 8-Pin MJ Connector (Front)

With the connection pins assigned as shown:

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 10: 8-Pin MJ Connector Pin Assignments

Connection from the ITI-8241C-S adapter to a network hub must be made as shown:

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 11: Adapter to Network Hub Wiring

Connection from the ITI-8241C-S adapter to another network adapter (point to point) must be made as shown:

Adapter 1 Pin		Crossover	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	

Table 12: Adapter to Adapter (point to point) Wiring

Network Cabling Requirements

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 channel. For 10Mb/s operation, Category 3, or 5 cable is appropriate. When operating in 100Mb/s or 100Mb/s Full Duplex, a Category 5 cable should be used.

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

Appendix B: Block Diagram

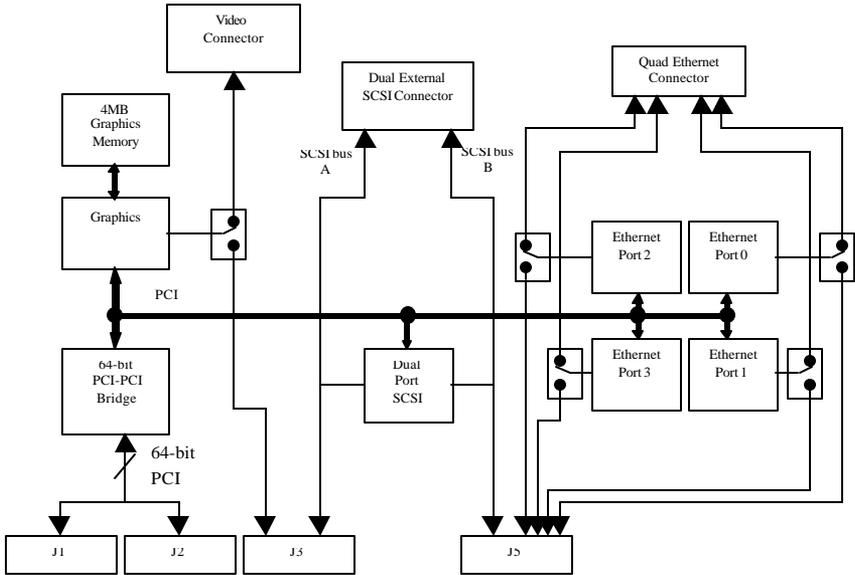


Figure 17: ITI-8241C-S Block Diagram

Appendix C: Rear I/O Backplane Connections

All I/O is accessible via the rear connectors of the module, on J3 and J5. J3 brings the Video and SCSI Channel A to the backplane, and J5 brings SCSI Channel B, and the four Ethernet channels to the backplane. Optional rear I/O module ITI-8241C-R uses J3 and J5 to bring SCSI, Video and Ethernet to the rear of the system enclosure.

CompactPCI® Connector J3					
Connector Row					
Pin	A	B	C	D	E
19	GND	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_TERM_PWR	A_TERM_PWR	GND	A_TERM_PWR	A_TERM_PWR
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+

Table 13: Backplane Connector J3 Pin-out

Note: Connector row 'F' all grounds.

Note: Bold Text Indicates Reserved pin on -F module variation.

Compact PCI® Connector J5					
Connector Row					
Pin	A	B	C	D	E
22	BPOR0_RX+	BPOR0_RX-	GND	BPOR0_TX-	BPOR0_TX+
21	GND	GND	BPOR0_LED	GND	GND
20	BPOR1_RX+	BPOR1_RX-	GND	BPOR1_TX-	BPOR1_TX+
19	GND	GND	BPOR1_LED	GND	GND
18	BPOR2_RX+	BPOR2_RX-	GND	BPOR2_TX-	BPOR2_TX+
17	GND	GND	BPOR2_LED	GND	GND
16	BPOR3_RX+	BPOR3_RX-	GND	BPOR3_TX-	BPOR3_TX+
15	B_TERM_PWR	B_TERM_PWR	BPOR3_LED	B_TERM_PWR	B_TERM_PWR
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+

Table 14: Backplane Connector J5 Pin-out

Note: Connector row 'F' all grounds.

Note: Bold Text Indicates Reserved pin on -F module variation.

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Clarity (easy to understand)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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