USER'S GUIDE

2 Gbit/s Fibre Channel to PCI Host Adapters

Version 2.0

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LSI LOGIC ®

FC

CE

Electromagnetic Compatibility Notices

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

LSI Logic is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by LSI Logic. The correction of interferences caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

The LSI Logic 2 Gbit/s Host Adapters, model numbers LSI40919O, LSI40919LO, LSI40919H, LSI40919LH, LSI44929O, LSI44929LO, LSI44929H, LSI44929LH, and ITI7004G2-LC are tested to comply with FCC standards for home or office use.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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> を目的としていますが、この装置がラジオやテレビジョン受信機に近接して
> 使用されると、受信障害を引き起こすことがあります。
>   取扱説明書に従って正しい取り扱いをして下さい。

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

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The host adapter(s) referred to in this User's Guide contain one or more transceivers that are certified as Class 1 laser products that conform to the requirements contained in the US Food and Drug Administration - Center for Devices and Radiological Health (FDA/CDRH) regulation 21 CFR 1040, Performance Standards for Light-Emitting Products and 21 CFR 1010, Performance Standards for Electronic Products: General.

Internationally, these transceivers are certified as Class 1 laser products that conform to the requirements contained in the International Electrotechnical Commission (IEC) standard 825-1 (1993). Class 1 laser products are not considered to be hazardous based upon current medical knowledge. This class includes all lasers or laser systems which cannot emit levels of optical radiation above the exposure limits for the eye under any exposure conditions inherent in the design of the laser product. The design of the transceivers on this host adapter is such that access to laser radiation above a Class 1 emission level during operation, user maintenance, or service conditions is prevented. However, there may be a laser embedded in the enclosure of the Class 1 laser that is more hazardous, but harmful radiation cannot escape the intact enclosure. With any laser, the following precautions should be followed to prevent accidental exposure to any levels of optical radiation.

CAUTION: Do not look into the transceiver ports, do not view the transceiver ports with optical instruments, and avoid direct exposure to the beam.

The following certification information is permanently affixed to or inscribed on the transceiver product so as to be legible and readily accessible to view when the transceiver is fully assembled for use.

- Laser Manufacturer
- Model #
- Serial #

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DB

To receive product literature, visit us at http://www.lsilogic.com.

Preface

This book is the primary reference and user's guide for the LSI Logic family of 2 Gbit/s Fibre Channel to PCI Host Adapter boards. It contains a complete functional description for each of these boards as well as complete physical and electrical specifications.

Audience

This document assumes that you have some familiarity with Fibre Channel protocol and related support devices and will benefit persons installing and using these boards.

Organization

This document has the following chapters and appendix:

- Chapter 1, **Installing the 2 Gbit/s Host Adapters**, describes the installation procedures for the 2 Gbit/s host adapters.

- Chapter 2, **2 Gbit/s Host Adapter Characteristics**, defines the interfaces and characteristics of the 2 Gbit/s host adapters and describes their physical and operational environments.

- Chapter 3, **Firmware Installation Procedure**, describes the installation procedures for the Fusion-MPT and Fibre Channel drivers.

- Chapter 4, **BIOS Features**, describes the installation procedures for the Fibre Channel BIOS and Configuration Utility.

- Appendix A, **Glossary of Terms and Abbreviations**, provides definitions of various terminology that is referenced throughout this user's guide.

Related Publications

LSIFC929 Dual Channel Fibre Channel I/O Processor Technical Manual, August 2001 (LSI Order # S14073)

LSIFC919 Single Channel Fibre Channel I/O Processor Technical Manual, October 2001 (LSI Order # DB15-000151-01)

Fusion-MPT™ Device Management User's Guide, September 2001 (LSI Order # DB15-000186-00)

Revision Record

Revision	Date	Remarks
1.0	06/01	First printing.
2.0	03/02	Final printing. Changes throughout, including addition of section covering Manual Selection of Fibre Channel Topology, correction of Interrupt Coalescing timeout and depth values, addition of tables in Chapter 2 for Link Activity and Link Fault LEDs, and addition of reference in Chapter 2 (and in the Preface) to Fusion-MPT Device Management User's Guide.

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Chapter 1
Installing the 2 Gbit/s
Host Adapters

This chapter contains general information about the LSI Logic family of 2 Gbit/s Fibre Channel (FC) to PCI host adapters. It also provides host adapter installation instructions and quick installation instructions for Windows NT or Windows 2000 device drivers. This chapter describes these topics:

- Section 1.1, "General Description," page 1-1
- Section 1.2, "Obtaining Windows NT/Windows 2000 Drivers," page 1-2
- Section 1.3, "Quick Host Adapter Installation Procedure," page 1-2
- Section 1.4, "Detailed Installation Procedure," page 1-3

1.1 General Description

LSI Logic provides high-performance, cost-effective 2 Gbit/s Fibre Channel to PCI controllers and host adapters. The LSI Logic controllers and their associated host adapters that support 2 Gbit/s Fibre Channel are:

Table 1.1   LSI Logic 2 Gbit/s Controllers and Associated Host Adapters

Controller	Host Adapter
LSIFC919	LSI40919O, LSI40919LO, LSI40919H, LSI40919LH
LSIFC929	LSI44929O, LSI44929LO, LSI44929H, LSI44929LH, ITI7004G2-LC

Installing any of these adapters into your PCI system allows you to connect Fibre Channel devices. You can use the 2 Gbit/s Fibre Channel

to PCI boards in PCI computer systems with either a standard or Low Profile PCI (LPPCI) bracket type.

1.2 Obtaining Windows NT/Windows 2000 Drivers

Before you begin the 2 Gbit/s Fibre Channel to PCI host adapter installation, create a Windows NT or Windows 2000 driver diskette by copying the driver files from either the LSI Logic SDMS CD-ROM or from the LSI Logic web site at `http://www.lsilogic.com`. If you obtain the driver software from the LSI Logic web site, the zipped package that you download contains the appropriate files. To obtain the driver software from the Fusion-MPT™ (Message Passing Technology) Software Device Drivers and Utilities CD-ROM, copy all the files starting from the `I386` subdirectory through the `MINIPORT` subdirectory (`I386/WINNT/MINIPORT`) to the root directory of a clean diskette. You will use the driver diskette during installation process.

Contact the LSI Logic technical support team for LSI Logic Storage I/O Components if you have any questions. In the U.S., customers may contact us at (719) 533-7230.

1.3 Quick Host Adapter Installation Procedure

This section provides an overview of the installation procedure. If you are an experienced computer user with prior host adapter installation and FC setup experience, this section may sufficiently describe the procedure for you. If you prefer more detailed instructions for installing the host adapter, proceed to Section 1.4, "Detailed Installation Procedure."

For safe and proper installation, check the user's manual supplied with your computer and perform the following steps.

Step 1. *Ground yourself* before removing this host adapter board from the packaging.

Step 2. Remove the host adapter from the packaging and check that it is not damaged.

Figure 1.1 illustrates an example of this host adapter board. Also refer to Chapter 2 to see more detailed drawings of the 2 Gbit/s host adapter boards.

Step 3. Switch off the computer and unplug power cords for all components in your system.

Step 4. Open your PC cabinet and select an appropriate open PCI slot.

Step 5. Insert the host adapter board.

Step 6. Make any configuration changes.

Step 7. Close your PC cabinet cover.

Step 8. Connect the FC cable to the host adapter.

Step 9. Reconnect all power cords and boot your PC.

1.4 Detailed Installation Procedure

This section provides step-by-step instructions for installing the host adapter. If you are experienced in these tasks, you may prefer to use Section 1.3, "Quick Host Adapter Installation Procedure."

1.4.1 Before You Start

Before starting, look through the following task list to get an overall idea of the steps you will be performing. If you are not confident you can perform the tasks as described here, LSI Logic recommends getting assistance.

Each FC host adapter channel that you install can act as host for up to 126 Arbitrated Loop FC devices, not including the adapter itself. Follow the detailed instructions in the next section to successfully install your host adapter board.

1.4.2 Inserting the Host Adapter

For safe and proper installation, use the user's manual supplied with your computer. Perform the following steps to install the host adapter.

Step 1. *Ground yourself* before removing this host adapter board from the packaging.

Step 2. Remove the host adapter from the packaging and check that it is not damaged.

Figure 1.1 illustrates an example of this host adapter board. Also refer to Chapter 2 to see more detailed drawings of the 2 Gbit/s host adapter boards.

Step 3. Switch off the computer and unplug power cords for all components in your system.

Step 4. Remove the cover from your computer per the instructions in the user's manual for your system to access the PCI slots.

Caution: *Ground yourself* by touching a metal surface before removing the cabinet top. Static charges on your body can damage electronic components. Handle plug-in boards by the edge; do not touch board components or gold connector contacts. The use of a static ground strap is recommended.

Step 5. Locate the slots for PCI plug-in board installation.

Refer to the computer's user's manual to confirm the location of the PCI slots.

This host adapter requires a 32-bit or 64-bit PCI slot that allows bus master operation. If a 32-bit PCI slot is used, the portion of the J1 connector farthest from the bracket remains uninserted. See Figure 1.2.

Note: For this host adapter to function as a 64-bit device, it must be inserted in a 64-bit PCI slot. If the host adapter is inserted in a 32-bit PCI slot, it will function as a 32-bit device.

Step 6. On the back of the computer, remove the blank bracket panel that is aligned with the PCI slot you intend to use. Save the bracket screw.

Figure 1.1   Hardware Connections for the LSI Logic Host Adapter

Fibre Channel
Link Activity/
Link Fault LED

SFF Optical
Connector

LSI Logic Host Adapter
PCI Bus Edge Connector J1
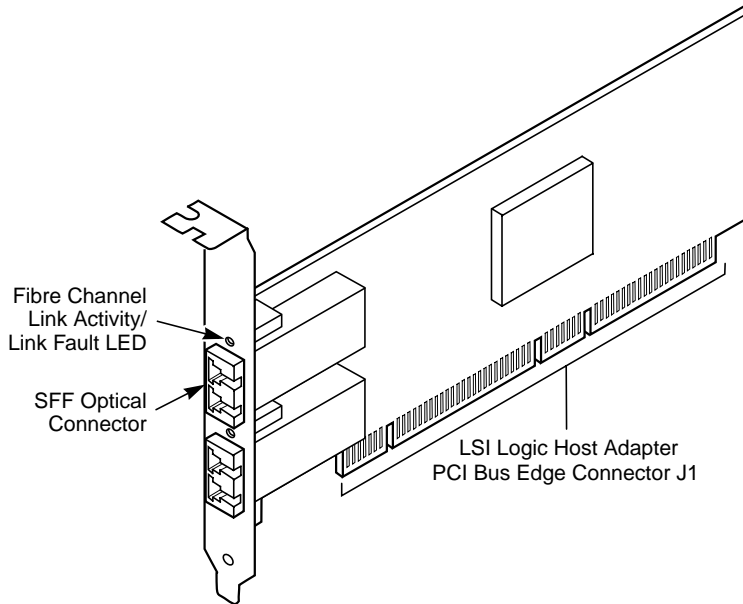
Step 7.   Carefully insert edge connector J1 (see Figure 1.1) of the host
adapter into the PCI slot.

Make sure the edge connector is properly aligned before
pressing the board into place as shown in Figure 1.2. The
bracket around connector J2 should fit where you removed the
blank panel.

Figure 1.2   Inserting the Host Adapter
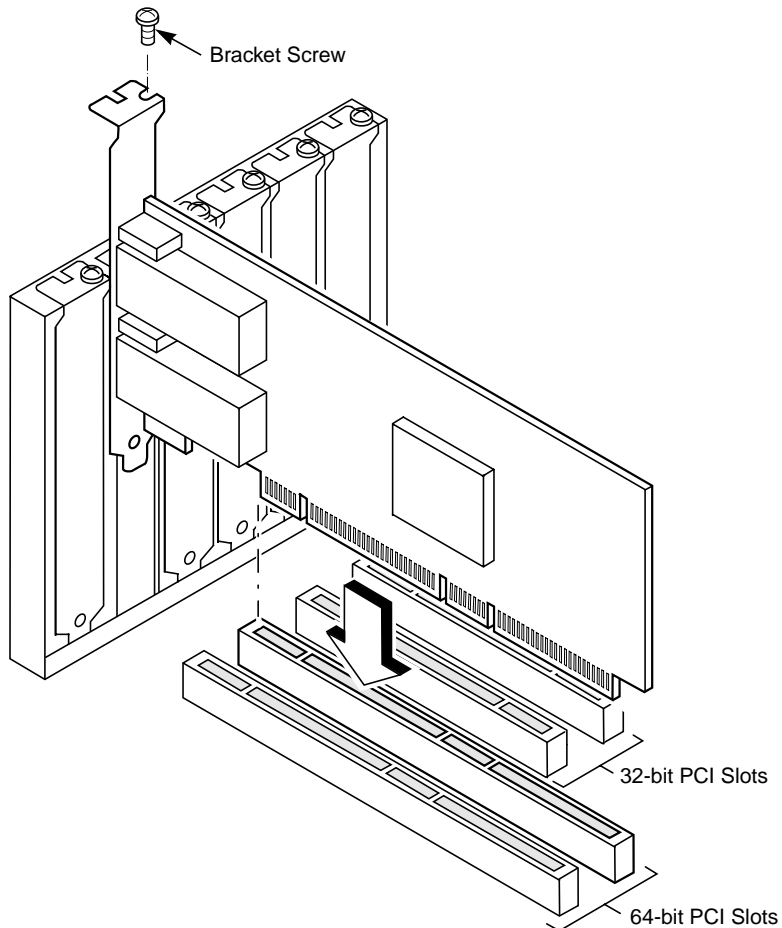
Step 8.   Secure the board with the bracket screw (see Figure 1.2) before making the external FC link connection.

Step 9.   Reconnect all power cords and boot your PC.

Chapter 2
2 Gbit/s Host Adapter Characteristics

This chapter provides specific details about the physical environment associated with the LSI Logic 2 Gbit/s Fibre Channel to PCI host adapters. This chapter includes these topics:

2.1 General Description

The LSI Logic 2 Gbit/s Fibre Channel to PCI host adapter family uses state-of-the-art 2 Gbit/s Fibre Channel technology to provide the highest possible performance and most flexible storage configuration available. Adapters are available in single-channel, two-channel, and four-channel 2 Gbit/s variations. The LSI Logic 2 Gbit/s adapters support 1 Gbit/s or 2 Gbit/s Fibre Channel speeds, and automatically detect and correctly set the speed of operation. LSI Logic adapters are available with copper or optical interfaces using SFF optics.

These LSI Logic Fibre Channel host adapters offer the highest degree of integration available for your PCI based computer system, allowing for maximum performance, optimized use of system resources, and Plug and Play installation.

This manual will serve as a step by step guide during the installation of your LSI Logic host adapter.

Table 2.1 lists the 2 Gbit/s Fibre Channel to PCI host adapters discussed in this user's guide.

Table 2.1   LSI Logic 2 Gbit/s FC Host Adapter Descriptions

Adapter	Description
LSI40919O	2 Gbit/s, Single-port, standard height bracket, optical
LSI40919LO	2 Gbit/s, Single-port, low-profile bracket, optical
LSI40919H	2 Gbit/s, Single-port, standard height bracket, copper, HSSDC
LSI40919LH	2 Gbit/s, Single-port, low-profile bracket, copper, HSSDC
LSI44929O	2 Gbit/s, Dual-port, standard height bracket, optical
LSI44929LO	2 Gbit/s, Dual-port, low-profile bracket, optical
LSI44929H	2 Gbit/s, Dual-port, standard height bracket, copper, HSSDC
LSI44929LH	2 Gbit/s, Dual-port, low-profile bracket, copper, HSSDC
ITI7004G2-LC	2 Gbit/s, Quad-port, Short-card, optical

2.1.1 Hardware and Software Support

The LSI Logic 2 Gbit/s Fibre Channel to PCI host adapter family supports most major software operating systems, such as Sun Solaris (2.6 and greater), Windows Server (NT 4.0, 2000, XP, .NET), Linux (RedHat, Suse, Caldera, Turbo), NetWare, UnixWare, HP-UX, and OS/2. These host adapters utilize the Fusion-MPT architecture for all major operating systems. Fusion-MPT architecture offers the unique feature of having a single binary, operating system driver that supports Fibre Channel devices and other bus architectures. For more information regarding software support for the 2 Gbit/s Fibre Channel to PCI host adapter family, see the *Fusion-MPT Device Management User's Guide*.

Before you use any of this family of host adapters, make sure your system meets the specific hardware and software requirements shown in Table 2.2.

Table 2.2   Hardware and Software Requirements

Component	Requirements
For Solaris SPARC hardware environments	
Hardware	Any Sun Microsystems computer with an available CompactPCI slot
Software	Solaris 8 operating environment
Firmware	OpenBoot PROM, version 2.1 or greater
For Intel IA-32 or IA-64 hardware environments	
Hardware	Any Intel compatible
Software	Windows Server (NT 4.0, 2000, XP, .NET) Linux (RedHat, Suse, Caldera, Turbo) NetWare, UnixWare, HP-UX, and OS/2
Firmware	Any Intel compatible BIOS system

2.2 Features

This section provides an overview of the PCI Interface and the FC Interface for the 2 Gbit/s host adapter boards.

2.2.1 PCI Interface

PCI interfaces I/O components to the processor and memory subsystems in equipment ranging from PCs to servers. The PCI interface operates as a 64-bit DMA bus master capable of 64-bit addressing. The LSIFC919 (single channel) and the LSIFC929 (dual channel) contain the PCI functionality for all the LSI Logic 2 Gbit/s Fibre Channel to PCI host adapters.

The PCI interface includes these features:

- Full 64-bit DMA bus master

- LSIFC919/LSIFC929 functionality:

    - Zero wait-state bus master data bursts up to 1 Kbyte

- – Complies with PCI Local Bus Specification, Rev. 2.2
- – 3.3 V interface (5.0 V tolerant)
- Serial EEPROM configuration storage
- Card edge keyed as a universal add-in card

2.2.2 FC Interface

The LSIFC919/LSIFC929 contain the FC functionality for all the LSI Logic 2 Gbit/s Fibre Channel to PCI host adapters. The LSIFC919/LSIFC929 generate signal timing and link protocol in compliance with FC standards.

The FC interface includes these features:

- 2 Gbit/s serial link
- LSIFC919/LSIFC929 functionality:
  - – Class 3, Arbitrated Loop (AL), Fabric, Point-to-Point
  - – 2 Kbyte frame payloads
  - – Multiframe buffering
- Link fault LED

2.3 Physical Environment

This section provides information about the physical, electrical, thermal, and safety characteristics of the LSI Logic 2 Gbit/s Fibre Channel to PCI host adapters. Additionally, these boards are compliant with electromagnetic standards set by the FCC.

2.3.1 Electrical Characteristics

Table 2.3 lists the maximum power requirements, and includes all of the LSI Logic 2 Gbit/s Fibre Channel to PCI host adapter boards, under normal operation.

Table 2.3   Maximum Power Requirements

Host Adapter	PCI +5.0 V	Over the Operating Range
LSI44929O	1.43 A	0 ˚C to 55 ˚C
LSI44929LO	1.43 A	0 ˚C to 55 ˚C
LSI44929H	1.06 A	0 ˚C to 55 ˚C
LSI44929LH	1.06 A	0 ˚C to 55 ˚C
LSI40919O	1.02 A	0 ˚C to 55 ˚C
LSI40919LO	1.02 A	0 ˚C to 55 ˚C
LSI40919H	0.96 A	0 ˚C to 55 ˚C
LSI40919LH	0.96 A	0 ˚C to 55 ˚C
ITI7004G2	3.0 A (typical)	0 ˚C to 55 ˚C

2.3.2 Thermal, Atmospheric Characteristics

The thermal, atmospheric characteristics of the 2 Gbit/s host adapters are:

- Temperature range: 0 °C to 55 °C (dry bulb)
- Relative humidity range: 5% to 90% noncondensing
- Maximum dew point temperature: 32 °C

The following parameters define the storage and transit environment for these host adapters:

- Storage Temperature: −45 °C to +85 °C (dry bulb)
- Relative Humidity Range: 5% to 95% noncondensing

2.3.3 Electromagnetic Compliance

These boards are designed and implemented to minimize electromagnetic emissions, susceptibility, and the effects of electromagnetic discharge. The boards are tested to comply with Class B and carry markings for CE, VCCI, Canada, C-Tick, and FCC.

2.3.4 Safety Characteristics

The bare boards meet the requirements of flammability rating UL 94 V-0. The bare boards are also marked with the supplier's name or trademark, type, and UL flammability rating. Since these boards are installed in a PCI bus slot, all voltages are below the SELV 42.4 V limit.

2.4 Operational Environment

Use the LSI Logic 2 Gbit/s Fibre Channel to PCI host adapter in PCI computer systems. The LSI Logic supplied FC BIOS and firmware operate the boards. An on-board flash memory device and a serial EEPROM are provided to allow BIOS code and open boot code support through PCI.

2.4.1 The PCI Interface

The PCI interface operates as a 64-bit DMA bus master. Edge connector J1 makes the PCI connection, which provides connections on both the front and back of the board. The signal definitions and pin numbers conform to the PCI Local Bus Specification, Revision 2.2. See that specification for more details regarding the signal assignments. The on-board regulators provide power to the board's 3.3 V devices.

Note: The PCI +3.3 V pins are tied together and decoupled with high frequency bypass capacitors to ground. No current from these +3.3 V pins is used on the board. The board derives power from the +5 V pins, directly and through a 3.3 V voltage regulator. The PCI +3 V/+5 V pins are used to differentiate between a 5 V or a 3.3 V PCI signaling environment.

2.4.2 The FC Interface

The FC interface varies, depending on which specific LSI Logic 2 Gbit/s host adapter you have selected. See Section 2.6 for more information.

2.4.3 The FC Link Activity/Link Fault LED

The LSI Logic 2 Gbit/s optical host adapter boards provide dual-purpose LEDs (one per port), visible through the bracket, which indicate activity on the FC link. Table 2.4 shows the appearance of the Link Activity/Link Fault LED for the given link status for each of the LSI Logic optical host adapters.

Table 2.4   Appearance of LED to Represent Link Status

Adapter	Link	Activity	Fault
LSI40919O	Off	Green Blinking	Yellow
LSI40919LO	Off	Green Blinking	Yellow
LSI44929O	Off	Green Blinking	Yellow
LSI44929LO	Off	Green Blinking	Yellow
ITI7004G2-LC	Green	Green Blinking	Yellow

2.5 IEEE Unique Address

Each LSI Logic 2 Gbit/s host adapter channel is provided with a unique World Wide Name, specified by IEEE. The last six hexadecimal characters of this address appear on a label on the board. This address is stored in the serial EEPROM on the board.

2.6 Physical Characteristics

The LSI Logic 2 Gbit/s Fibre Channel host adapters include one to four external Fibre Channel connectors, and are available with copper or optical interconnect options. No configuration of the adapter is necessary.

2.6.1 LSI40919O Host Adapter Configuration

The LSI Logic LSI40919O is a single-channel 2 Gbit/s Fibre Channel adapter. One LC optical connector is used for I/O, which is accessible through the module bracket. The LSI40919O uses one LSIFC919 device, providing one Fusion-MPT channel.

The LSI40919O is a PCI low-profile short card with standard height bracket; the dimensions are 6.6 x 2.53 inches. J1 is the PCI edge connector. The external FC connection is made through a 2 Gbit/s SFF (Small Form Factor) optical module.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.1 illustrates the components on the LSI40919O.

Figure 2.1   LSI40919O Host Adapter Configuration

2.6.2 LSI40919O Connector and Indicator LED

The LSI40919O I/O bracket is configured as shown in Figure 2.2. One LC connector is used to connect the adapter channel to the Fibre Channel subsystem. The indicator LED is used to indicate link status, activity, and link fault.

Table 2.5   Link Activity/Link Fault LED - LSI40919O

	Link	Activity	Fault
Appearance of LED	Off	Green Blinking	Yellow

Figure 2.2   LSI40919O Connector and Indicator LED

○   Channel 0 LED

Channel 0

2.6.3 LSI40919LO Host Adapter Configuration

The LSI Logic LSI40919LO is a single-channel 2 Gbit/s Fibre Channel adapter. One LC optical connector is used for I/O, which is accessible through the module bracket. The LSI40919LO uses one LSIFC919 device, providing one Fusion-MPT channel.

The LSI40919LO is a PCI low-profile short card; the dimensions are 6.6 x 2.53 inches. J1 is the PCI edge connector. The external FC connection is made through a 2 Gbit/s SFF optical module.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.3 illustrates the components on the LSI40919LO.

Figure 2.3   LSI40919LO Host Adapter Configuration

2.6.4 LSI40919LO Connector and Indicator LED

The LSI40919LO I/O bracket is configured as shown in Figure 2.4. One LC connector is used to connect the adapter channel to the Fibre Channel subsystem. The indicator LED is used to indicate link status, activity, and link fault.

Table 2.6   Link Activity/Link Fault LED - LSI40919LO

	Link	Activity	Fault
Appearance of LED	Off	Green Blinking	Yellow

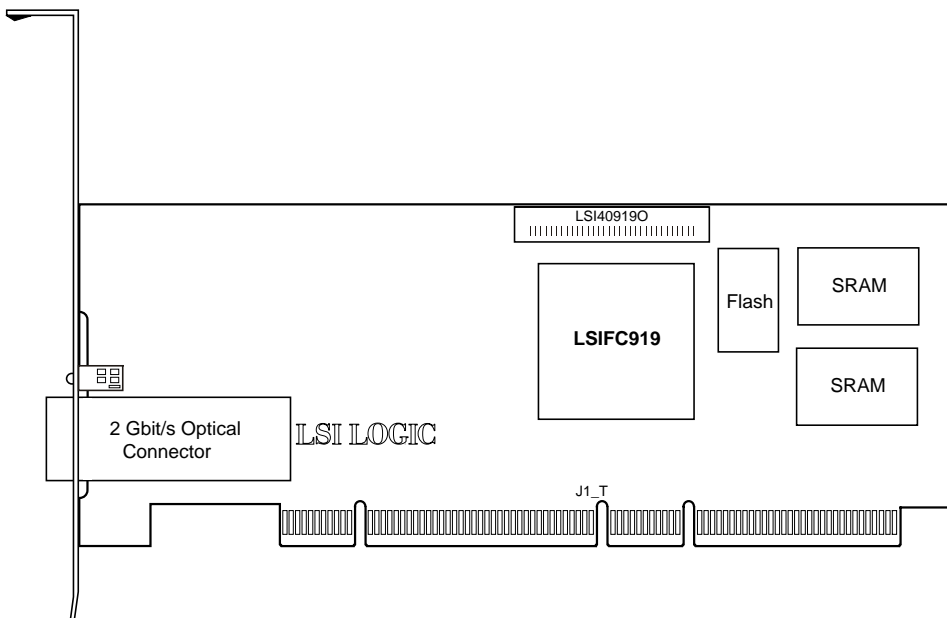**Figure 2.4   LSI40919LO Connector and Indicator LED**

○ Channel 0 LED

Channel 0

2.6.5 LSI40919H Host Adapter Configuration

The LSI Logic LSI40919H is a single-channel 2 Gbit/s Fibre Channel adapter. One HSSDC connector is used for I/O, which is accessible through the module bracket. The LSI40919H uses one LSIFC919 device, providing one Fusion-MPT channel.

The LSI40919H is a PCI low-profile short card with standard height bracket; the dimensions are 6.6 x 2.53 inches. J1 is the PCI edge connector. The external FC connection is made through a 2 Gbit/s copper HSSDC module.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.5 illustrates the components on the LSI40919H.

Figure 2.5   LSI40919H Host Adapter Configuration
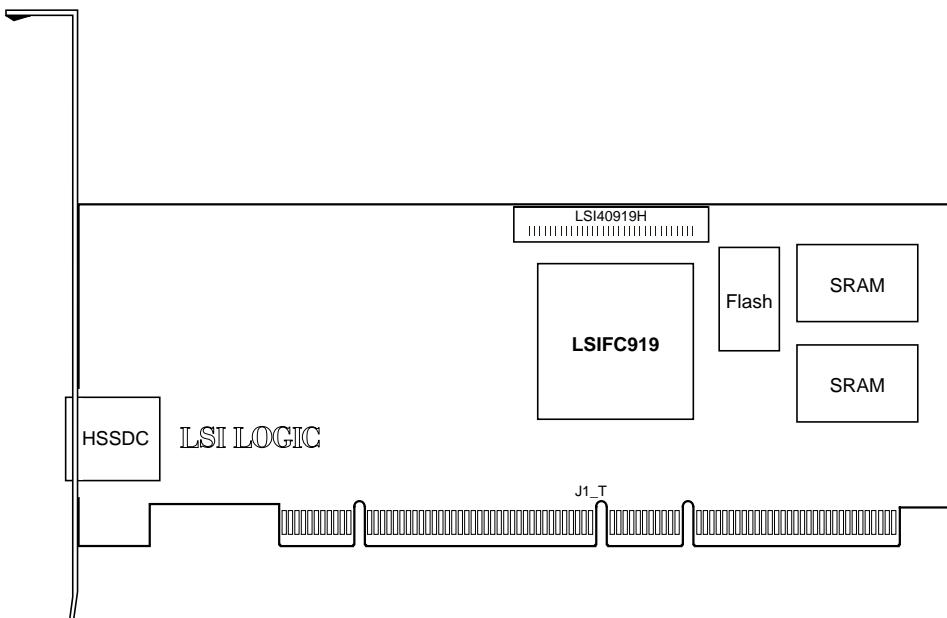
2.6.6 LSI40919H Connector

The LSI40919H I/O bracket is configured as shown in Figure 2.6. One HSSDC connector is used to connect the adapter channel to the Fibre Channel subsystem.

Figure 2.6   LSI40919H Connector
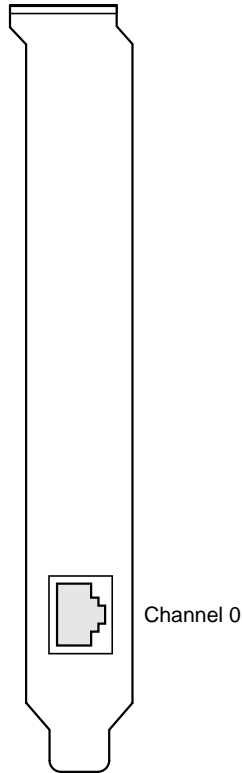
Channel 0

2.6.7 LSI40919LH Host Adapter Configuration

The LSI Logic LSI40919LH is a single-channel 2 Gbit/s Fibre Channel adapter. One HSSDC connector is used for I/O, which is accessible through the module bracket. The LSI40919LH uses one LSIFC919 device, providing one Fusion-MPT channel.

The LSI40919LH is a PCI low-profile short card; the dimensions are 6.6 x 2.53 inches. J1 is the PCI edge connector. The external FC connection is made through a 2 Gbit/s copper HSSDC module.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.7 illustrates the components on the LSI40919LH.
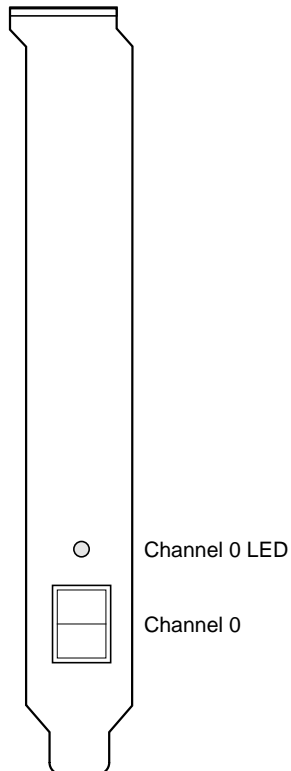
Figure 2.7   LSI40919LH Host Adapter Configuration
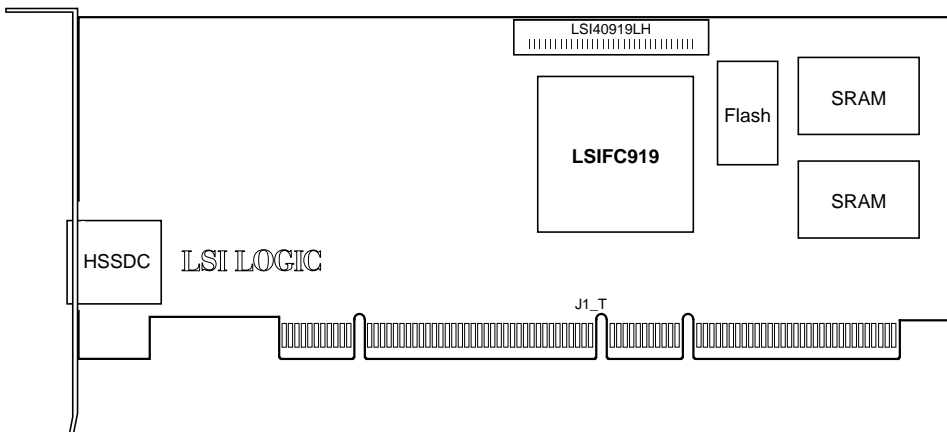
2.6.8 LSI40919LH Connector

The LSI40919LH I/O bracket is configured as shown in Figure 2.8. One HSSDC connector is used to connect the adapter channel to the Fibre Channel subsystem.
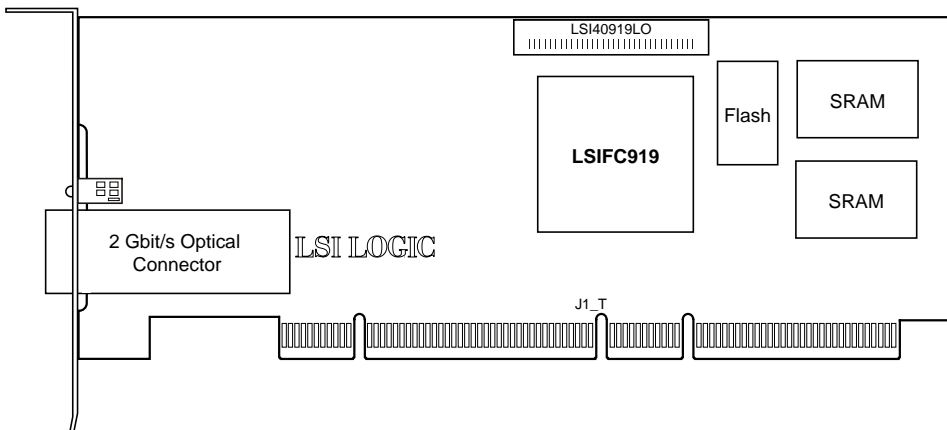
Figure 2.8   LSI40919LH Connector

Channel 0

2.6.9 LSI44929O Host Adapter Configuration

The LSI Logic LSI44929O is a dual-channel 2 Gbit/s Fibre Channel adapter. Two LC optical connectors are used for I/O, which are accessible through the module bracket. The LSI44929O uses one LSIFC929 device, providing two Fusion-MPT channels.

The LSI44929O is a PCI low-profile short card with standard height bracket; the dimensions are 6.6 x 2.53 inches. J1 is the PCI edge connector. The external FC connections are made through two 2 Gbit/s SFF optical modules.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.9 illustrates the components on the LSI44929O.
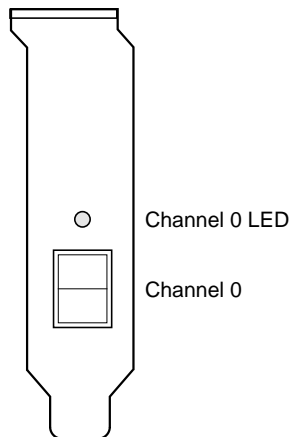
Figure 2.9   LSI44929O Host Adapter Configuration

2.6.10 LSI44929O Connector and Indicator LED

The LSI44929O I/O bracket is configured as shown in Figure 2.10. Two LC connectors are used to connect the adapter channel to the Fibre Channel subsystem. The indicator LEDs are used to indicate link status, activity, and link fault for each channel.

Table 2.7   Link Activity/Link Fault LED - LSI44929O

	Link	Activity	Fault
Appearance of LED	Off	Green Blinking	Yellow

Figure 2.10 LSI44929O Connectors and Indicator LEDs

○ Channel 1 LED

Channel 1

○ Channel 0 LED

Channel 0

2.6.11 LSI44929LO Host Adapter Configuration

The LSI Logic LSI44929LO is a dual-channel 2 Gbit/s Fibre Channel adapter. Two LC optical connectors are used for I/O, which are accessible through the module bracket. The LSI44929LO uses one LSIFC929 device, providing two Fusion-MPT channels.

The LSI44929LO is a PCI low-profile short card; the dimensions are 6.6 x 2.53 inches. J1 is the PCI edge connector. The external FC connections are made through two 2 Gbit/s SFF optical modules.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.11 illustrates the components on the LSI44929LO.

Figure 2.11 LSI44929LO Host Adapter Configuration

2.6.12 LSI44929LO Connector and Indicator LED

The LSI44929LO I/O bracket is configured as shown in Figure 2.12. Two LC connectors are used to connect the adapter channel to the Fibre Channel subsystem. The indicator LEDs are used to indicate link status, activity, and link fault for each channel.

Table 2.8   Link Activity/Link Fault LED - LSI44929LO

	Link	Activity	Fault
Appearance of LED	Off	Green Blinking	Yellow

Figure 2.12 LSI44929LO Connectors and Indicator LEDs
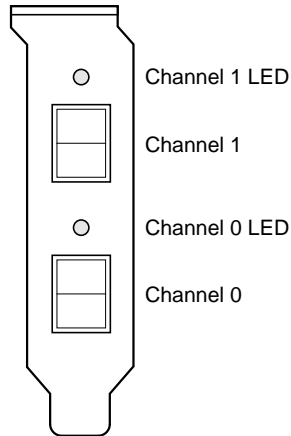
## 2.6.13 LSI44929H Host Adapter Configuration

The LSI Logic LSI44929H is a dual-channel 2 Gbit/s Fibre Channel adapter. Two HSSDC connectors are used for I/O, which are accessible through the module bracket. The LSI44929H uses one LSIFC929 device, providing two Fusion-MPT channels.

The LSI44929H is a PCI low-profile short card with standard height bracket; the dimensions are 6.6 x 2.53 inches. J1 is the PCI edge connector. The external FC connections are made through two 2 Gbit/s copper HSSDC modules.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.13 illustrates the components on the LSI44929H.
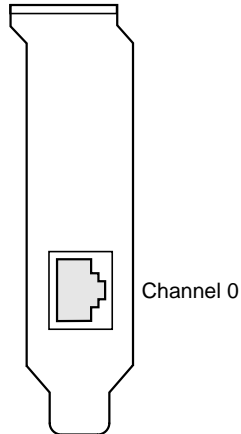
Figure 2.13 LSI44929H Host Adapter Configuration
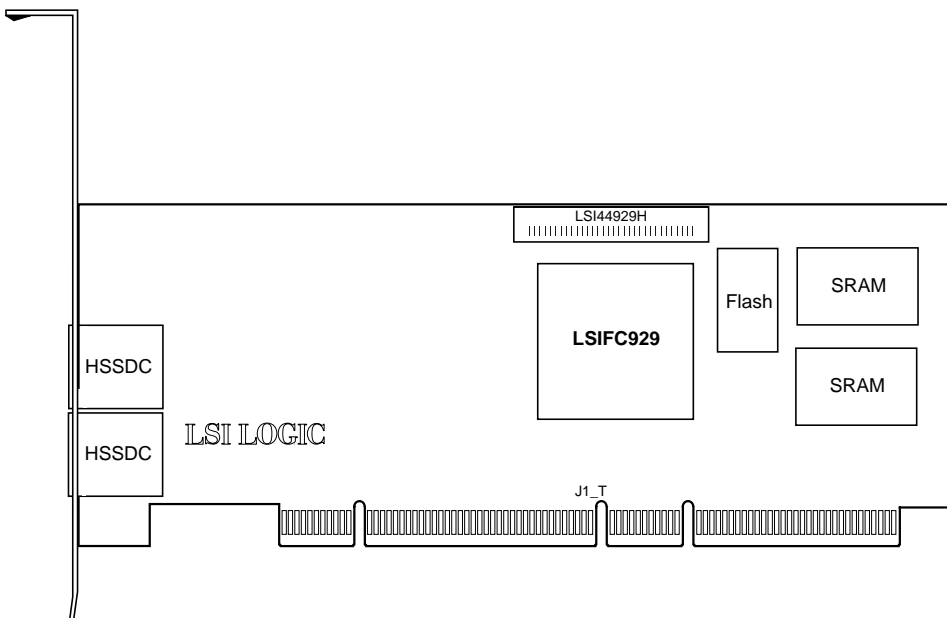
2.6.14 LSI44929H Connectors

The LSI44929H I/O bracket is configured as shown in Figure 2.14. Two HSSDC connectors are used to connect the adapter channel to the Fibre Channel subsystem.
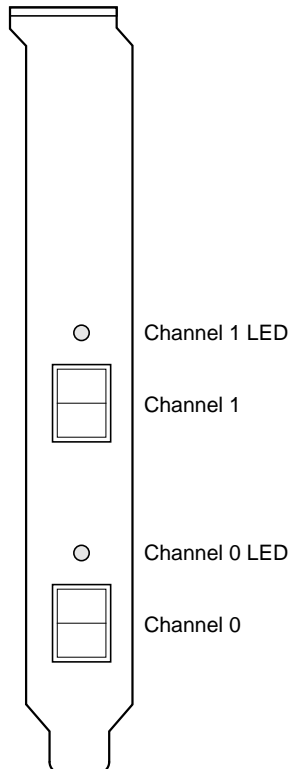
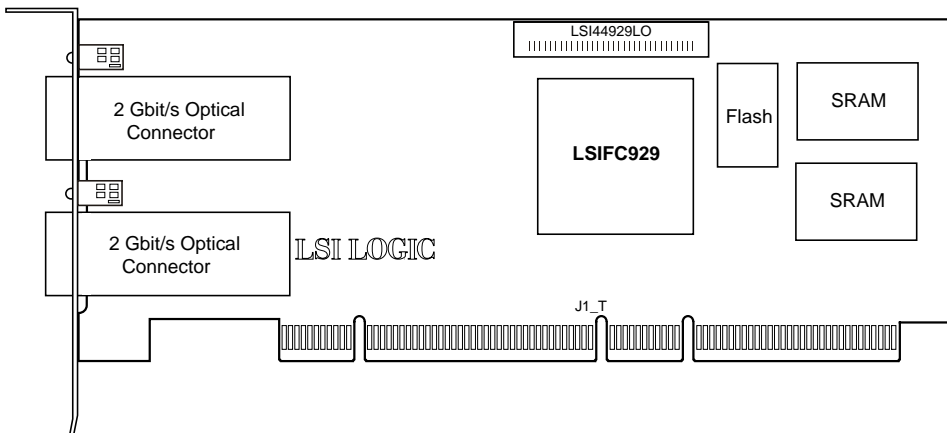**Figure 2.14 LSI44929H Connectors**
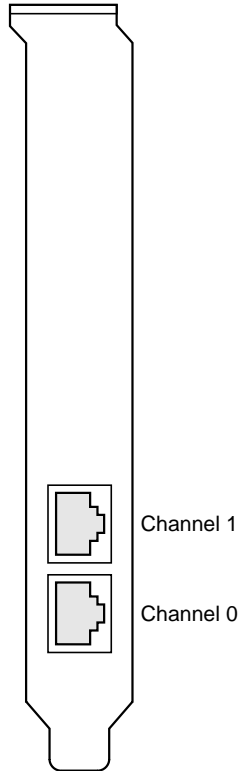
Channel 1

Channel 0

2.6.15 LSI44929LH Host Adapter Configuration

The LSI Logic LSI44929LH is a dual-channel 2 Gbit/s Fibre Channel adapter. Two HSSDC connectors are used for I/O, which are accessible through the module bracket. The LSI44929LH uses one LSIFC929 device, providing two Fusion-MPT channels.

The LSI44929LH is a PCI low-profile short card; the dimensions are 6.6 x 2.53 inches. J1 is the PCI edge connector. The external FC connections are made through two 2 Gbit/s copper HSSDC modules.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.15 illustrates the components on the LSI44929LH.

Figure 2.15 LSI44929LH Host Adapter Configuration
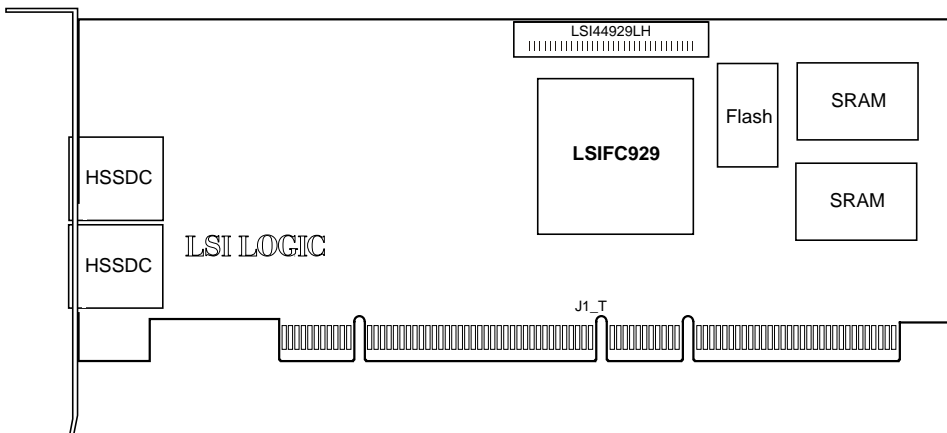
## 2.6.16 LSI44929LH Connectors

The LSI44929LH I/O bracket is configured as shown in Figure 2.16. Two HSSDC connectors are used to connect the adapter channel to the Fibre Channel subsystem.

Figure 2.16 LSI44929LH Connectors
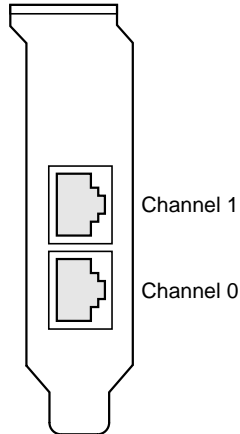
Channel 1

Channel 0

2.6.17 ITI7004G2-LC Host Adapter Configuration

The LSI Logic ITI7004G2-LC is a quad-channel 2 Gbit/s Fibre Channel adapter. Four LC optical connectors are used for I/O, which are accessible through the module bracket. The ITI7004G2-LC uses two LSIFC929 devices, providing four Fusion-MPT channels.

The ITI7004G2-LC is a PCI short card; the dimensions are 6.875 x 4.2 inches. J1 is the PCI edge connector. The external FC connections are made through four 2 Gbit/s SFF optical modules.

The component height on the top and bottom of the board conforms to the *PCI Local Bus Specification, Revision 2.2*. Figure 2.17 illustrates the components on the ITI7004G2-LC.

Figure 2.17 ITI7004G2-LC Host Adapter Configuration
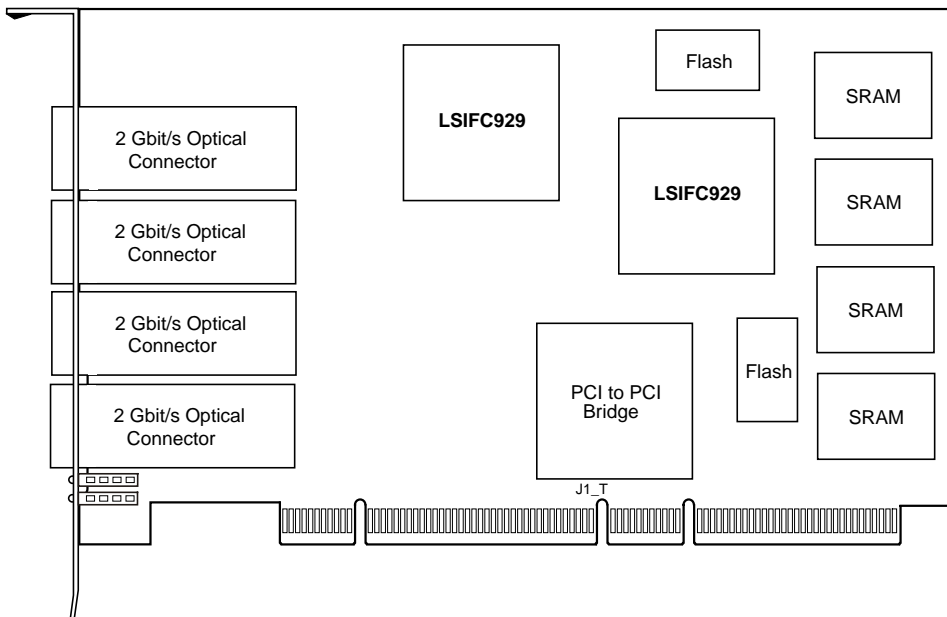
2.6.18 ITI7004G2-LC Connector and Indicator LED

The ITI7004G2-LC I/O bracket is configured as shown in Figure 2.18. Four LC connectors are used to connect the adapter channel to the Fibre Channel subsystem. The indicator LEDs are used to indicate link status, activity, and link fault for each channel.

Table 2.9   Link Activity/Link Fault LED - ITI7004G2-LC

	Link	**Activity**	**Fault**
Appearance of LED	Green	Green Blinking	Yellow

Figure 2.18 ITI7004G2-LC Connectors and Indicator LEDs

2 Gbit/s Host Adapter Characteristics
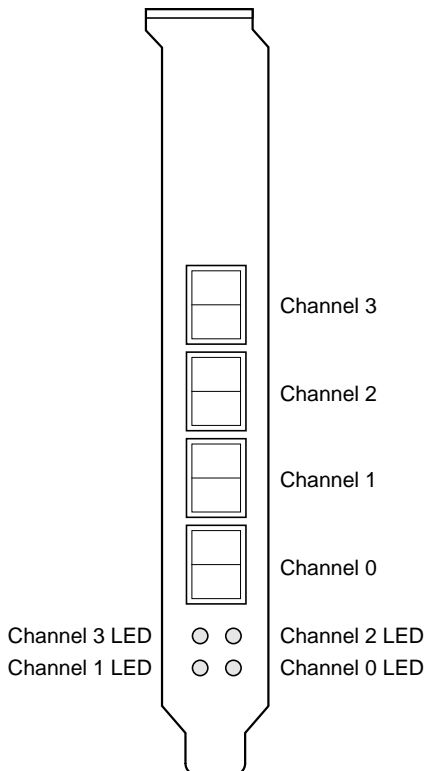
Chapter 3
Firmware Installation Procedure

This chapter provides information about installing and configuring Fibre Channel firmware and includes these topics:

3.1 Introduction

The LSI Logic Fibre Channel chips and host adapters contain firmware that presents a multi-protocol service layer based on the LSI Logic Fusion-MPT architecture. The Fibre Channel firmware provides FCP (SCSI-3 over Fibre Channel) Initiator, FCP Target, and LAN interface services to the host system.

The `FC929.ROM` file contains the firmware that supports the LSIFC929 or LSIFC919 chips and all associated host adapters.

3.2 FC Firmware

This section includes the features, description, installation, and configuration of the FC firmware.

3.2.1 Features

The Fibre Channel firmware for the LSI Logic Fibre Channel chips supports these features:

- 1 Gbit/s and 2 Gbit/s Fibre Channel transfers, with Auto Negotiation (user selects 1 Gbit/s, 2 Gbit/s, or Auto)
- 32-bit and 64-bit PCI support
- 33 MHz and 66 MHz PCI support
- Transaction performance capability of >70,000 I/Os per second (both channels)
- Throughput capability of ~400 Mbytes/s, across 64-bit/66 MHz PCI (both channels)
- Low host CPU utilization
- Interrupt coalescing, tunable to system requirements
- Auto Topology Detection for Arbitrated Loop, Fabric Loop, or Direct Fabric attachment (user selects N_Port, NL_Port, or Auto)
- FC Class 3 support
- FC-Tape/FC-AL2 Class 3 confirmed delivery support
- LSI Logic Fusion-MPT common software interface
- Initiator, Target, and FC LAN capability

3.2.2 Description

The LSIFC929 controller operates in an environment where one or more host drivers serve as the interface layer between the operating system and the Fusion-MPT services provided by the LSI Logic Fibre Channel firmware. The host driver is responsible for initializing the controller, building request message frames, issuing request message frames to the controller, and processing reply message frames received from the controller.

The LSI Logic firmware translates Fusion-MPT message frames into Fibre Channel specific sequences, frames, and primitives that are delivered to the Fibre Channel transmit and receive physical interfaces. The firmware-based Link Services library provides all link service support used by the host for all FC topologies, transparently. The firmware also

manages all link exceptions, which serves to isolate the host driver from Fibre Channel unique exceptions. With the Fusion-MPT architecture, parallel SCSI host drivers can be used with the LSI Logic Fibre Channel controllers with little or no additional functionality for Fibre Channel.

3.3 Installing the Firmware

The Fibre Channel firmware may be updated using the Fibre Channel Flash Utility, which comprises an executable program called FCUTIL.EXE. This section provides the procedure for installing this program.

3.3.1 Installing the FcUtil Program

Use the FcUtil program to update the LSI Logic FC Firmware on an LSIFC929 or LSIFC919 Fibre Channel chip or host adapter. Locate the FCUTIL.EXE program and FC929.ROM code on your distribution media, as well as the DOS4GW.EXE file. Copy these files to a blank, formatted diskette. Label it "FC Firmware diskette."

To update the LSIFC929 (or LSIFC919) firmware, complete the following steps:

Step 1. Ensure that the host adapter is properly installed in the system PCI slot.

Step 2. Insert the LSI Logic FC Firmware diskette into drive A:.

Step 3. Boot the system to the DOS prompt A:\>.

Step 4. Execute the FCUTIL program directly from the DOS command line by typing at the prompt:

```
A:\ fcutil
```

The FcUtil program identifies all LSI host adapters in the system, and allows you to select which adapter to update.

Step 5. The FCUTIL program displays a menu of options.

To update the firmware, select the option **a - Update Firmware**. The update process requires about 20–30 seconds.

Step 6. Exit the FCUTIL utility using the menu option **q - Quit**.

3.4 Configuring the Firmware

The LSI Logic firmware supports several configuration options, defined individually below. All options may be configured using the FCUTIL utility menu, as described in Section 3.3.1, "Installing the FcUtil Program."

3.4.1 Link Speed

The link speed of these host adapters is configurable. By default, the link speed is set to Auto, meaning the host adapter automatically detects the link speed of all other nodes on the link, and automatically adjusts itself to work with those nodes. If for some reason this automatic operation fails (e.g., other nodes on a loop not supporting Auto Negotiation), the LSI Logic host adapters may be configured to either the 2 Gbit/s or 1 Gbit/s speed, specifically.

Note that the LSI44929 has two FC ports (the ITI7004G2-LC has four), so the link speed must be configured for each port. The LSI40919 has only one port.

Step 1. To set the link speed of the host adapter, execute this command from DOS:

A:\ fcutil

The FCUTIL program identifies all LSI Logic host adapters in the system, and allows you to select which adapter to update.

Step 2. The FCUTIL program displays a menu of options.

To change the link speed on the LSI44929, LSI40919, or ITI7004G2-LC Port 0, select one of the following menu options:

```
f - Change Port 0 Board Speed to 1GB

g - Change Port 0 Board Speed to 2GB

h - Change Port 0 Board Speed to Auto
```

To change the link speed on the LSI44929 or ITI7004G2-LC Port 1, select one of the following menu options:

```
i - Change Port 1 Board Speed to 1GB

j - Change Port 1 Board Speed to 2GB
```

```
                k - Change Port 1 Board Speed to Auto
```
Step 3.   Exit the `FCUTIL` utility using the menu option **q - Quit**.

3.4.2 Interrupt Coalescing

These host adapters have the ability to complete multiple I/O requests per host interrupt. This ability may be enabled or disabled. When enabled, the Interrupt Coalescing depth and timeout values are configurable. These values may be used to tune host adapter performance within a system environment.

Note that the LSI44929 has two FC ports (the ITI7004G2-LC has four), so Interrupt Coalescing must be configured for each port. The LSI40919 has only one port.

Step 1.   To set Interrupt Coalescing for the host adapter, execute this command from DOS:

A:\ fcutil

The `FCUTIL` program identifies all LSI Logic host adapters in the system, and allows you to select which adapter to update.

Step 2.   The `FCUTIL` program displays a menu of options.

To change Interrupt Coalescing on the LSI44929, LSI40919, or ITI7004G2-LC Port 0, select the following menu option:

```
    l - Change Interrupt Coalescing Values on Port 0
```

The current values are displayed within a submenu, which allows the values to be changed:

```
          ---  IOC Page 1  ---
    1) Flags ................ 0x0001
    2) Coalescing Timeout ... 0x500
    3) Coalescing Depth ....... 0x9
```

By default, the host adapter has Interrupt Coalescing enabled, as indicated by the Flags value of 0x0001. If Interrupt Coalescing needs to be disabled, enter a value of 0x0000 for Flags. Interrupt Coalescing should only be disabled to resolve issues in very unique system configurations. Please consult with LSI Host Adapter Support to verify the need to disable Interrupt Coalescing for specific system configurations.

Configuring the Firmware   *3-5*

The Coalescing Timeout value determines how long the host adapter waits before generating an interrupt, when less than Coalescing Depth I/O requests are present. By default, the host adapter is pre-programmed with a value of 0x500 µsec. This default value is optimized for very high performance servers and peripherals. The user can decrease this value to improve system performance, if the system contains lower performance servers and/or peripherals.

The Coalescing Depth value determines how many requests are queued before generating an interrupt. By default, the host adapter is pre-programmed with a value of 0x9. This default value is optimized for very high performance servers and peripherals. The user can decrease this value to improve system performance, if the system contains lower performance servers and/or peripherals.

3.5 Troubleshooting

Some potential problems and their suggested solutions are:

The Firmware and BIOS revisions typically need to be in sync for proper operation.

Check with LSI Logic Technical Support to make sure that the Firmware is the correct version to use with your BIOS. If the Firmware revision is not in sync with the BIOS revision, system failures may occur.

How do you identify the version number of the Firmware?

The UNIX-compatible WHAT.EXE program for DOS included on your distribution media can be used to identify the ROM files on the diskette(s).

Examples:

```
what *.*

what *.* nt/*.*
```

Many types of errors are reported through the LED on the LSI Logic Host Adapter boards.

When these errors occur, the LED flashes a four-digit sequence, which is the error code. These types of errors should be reported to LSI Logic Technical Support. The technical support person will ask for additional system configuration information, including the type of system used, the FC configuration and type of peripherals (including version numbers), and the sequence of events when the error occurred.

Chapter 4
BIOS Features

This chapter describes the Fibre Channel BIOS and Configuration Utility and includes these topics:

4.1 Introduction

A BIOS is the ROM code that is loaded by the system to facilitate booting from Fibre Channel drives. The BIOS also contains an embedded configuration manager, used to configure options provided by the firmware. The LSI Logic BIOS integrates with a standard system BIOS, extending the standard disk service routine provided through INT13h.

Two types of BIOS are available for the LSI Logic host adapters:

- An Intel BIOS for Intel-based platforms, and
- Open Boot BIOS for Solaris SPARC platforms.

Both Intel and Open Boot BIOS concurrently reside on the boards.

4.2 Intel BIOS

This section provides the features, description, and installation of the Intel Fibre Channel BIOS.

4.2.1 Intel BIOS Features

The LSI Logic FC Intel BIOS supports:

- Selection and Configuration for up to 256 adapters
- Boot device selection from any four host adapters
- Automatic INT13 drive mapping for Fibre Channel drives

4.2.2 BIOS Overview

During the boot time initialization, the Intel BIOS determines if there are other hard disks, such as an IDE drive, already installed by the system BIOS. If there are, the Intel BIOS maps any Intel drives it finds after the drive(s) already installed. Otherwise, the Intel BIOS installs drives starting with the system boot drive. In this case, the system boots from a drive controlled by the Intel BIOS.

4.2.3 Intel BIOS Boot Specification (BBS)

The Intel BIOS provides support for the BIOS Boot Specification (BBS), which allows you to choose which device to boot from by selecting the priority.

To use this feature, the system BIOS must also be compatible with the BBS. If your system supports the BBS, then you will use the system BIOS setup menu to select the boot and drive order. In the system BIOS setup, the Boot Connection Devices menu appears with a list of available boot options. Use that menu to select the device and rearrange the order. Then exit to continue the boot process.

4.3 Starting the Intel BIOS Configuration Utility

The LSI Logic Intel BIOS allows you to change the default configuration of your host adapters, using the embedded BIOS Configuration Utility.

When the BIOS loads, the following message appears on your monitor:

`Press Ctrl-C to start LSI Logic Configuration Utility...`

This message remains on your screen for about five seconds, giving you time to start the utility. After you press `Ctrl-C`, the message changes to:

`Please wait, invoking LSI Logic Configuration Utility...`

After a brief pause, your computer monitor displays the Main menu of the BIOS Configuration Utility.

> Note: Not all devices detected by the Configuration Utility can be controlled by the BIOS. Devices such as tape drives and scanners require that a device driver specific to that peripheral be loaded. The BIOS Configuration Utility does allow parameters to be modified for these devices.

4.4 Using the Intel BIOS Configuration Utility

This section provides the menu formats and user inputs available to inform users about the Intel BIOS Configuration Utility prior to running it. All BIOS Configuration Utility screens that display various menus are partitioned into fixed areas. This area provides static general help text information.

4.5 Main Menu

When you invoke the LSI Logic Intel BIOS Configuration Utility, the Main menu appears. This screen displays a scrolling list of up to 256 host adapters in the system and information about each of them.

Use the arrow keys to highlight an adapter. Then, press **Enter** to view and modify the selected adapter's properties (and to gain access to the

attached devices). After selecting an adapter and pressing **Enter**, the FC Link bus is scanned and the Adapter Properties screen appears.

On the Main menu, two selections are the Boot Adapter List and Global Properties menus.

Boot Adapter List allows selection and ordering of boot adapters. Refer to Section 4.5.4, "Boot Adapter List Menu," page 4-5, for more detailed information.

Global Properties allows changes to global scope settings. Refer to Section 4.5.5, "Global Properties Menu," page 4-6, for more detailed information.

Only adapters with LSI Logic Control enabled can be accessed.

4.5.1 Adapter Properties Menu

The Adapter Properties menu allows you to view and modify adapter settings. It also provides access to an adapter's device settings. To display this menu, select a device under the Adapter field on the Main menu and press **Enter**.

4.5.2 Persistent IDs Menu

The Persistent ID screen is used simply to review the automatic mapping between a drive WorldWide Name and its assigned logical SCSI bus and target ID. The screen can also be used to force a drive to a specific logical Target ID.

Selecting **Add WWN** at an unused location clears out the associated WWN/DID field and allows the user to enter the first 16 characters of the WWN. Pressing <**Enter**> afterwards allows the last 16 characters to be entered. The CU automatically adds any leading zeros, if necessary. If an entry was put in by mistake, selecting **Erase** on the appropriate line removes the entry.

Logical ID selection defaults to be the lowest ID available. This can be changed by using the <+> or <–> keys to cycle the numbers. The Bus field always defaults to 0 and cannot be changed. It is displayed in the case where an outside utility had reserved a different number.

Next Page and Previous Page options are provided on the persistent ID screens, through the F2 key, which moves the screen forward or back by 16 entries. However, the CU requires that any modifications to the current page be stored before new entries may be viewed or modified. A pop-up confirmation window asks to store or discard changes, if needed.

4.5.3 Device Properties Menu

The Device Properties menu allows you to view and update individual device settings for an adapter.

> Note: The number of fields on the menu requires that you scroll left/right to view all the information. When accessing this menu, use the Home/End keys to scroll to columns currently not displayed. The scroll indicator on the bottom of the menu shows where the cursor is, relative to the first and last columns.

4.5.4 Boot Adapter List Menu

The Boot Adapter List menu specifies the order in which adapters boot when more than one LSI Logic host adapter is in a system. Up to four adapters in a system can be selected as bootable. Only one of the four bootable adapters can be used to control a Boot Volume.

To select this menu:

1. Press **F2** while on the Main menu to move the cursor to the menu area.
2. Move the cursor to Boot Adapter List with the arrow keys.
3. Press **Enter**.

Adapters can be added or deleted using this menu. To add an adapter to the boot list, press the **Insert** key while on the Boot Adapter List. Use the arrow keys to select the desired adapter and press **Enter** to add it to the end of the Boot Adapter List.

To remove an adapter from the boot list, press the **Delete** key while the desired adapter is selected in the Boot Adapter List. You can also change the boot order by using the "+" or "−" keys. For example, place the cursor on the adapter that you want to change, and use the "+" or "−" key to raise or lower the boot order.

4.5.5 Global Properties Menu

The Global Properties menu allows you to pause if an alert message has been displayed, to view display boot information, and to set display and video modes.

4.6 Exiting the Intel BIOS Configuration Utility

The Exit menu for the Intel BIOS Configuration Utility is used for all five of the menus listed above. However, the available functionality is different for the Main menu and the four subordinate menus.

To exit from the Adapter Properties, Device Properties, Boot Adapter List, or Global Properties menus, use these exit options:

Cancel exit	This option returns you to the previous menu.
Save changes then exit this menu	This option implements any changes you made on the previous menu and returns you to the Main menu.
Discard changes then exit this menu	This option restores the default settings and returns you to the Main menu.

To exit from the Main menu, use these exit options:

Cancel exit	This returns you to the Main menu.
Exit the Configuration Utility	This option exits the configuration and automatically reboots your system.

Important: If you reboot the system without properly exiting from this utility, some changes may not take effect.

4.7 Troubleshooting

The LSI Logic Intel BIOS Configuration Utility is a powerful tool. If, while using it, you somehow disable all of your controllers, pressing Ctrl-A or Ctrl-E after memory initialization during reboot allows you to re-enable and reconfigure.

These messages may appear during the boot process:

- `Adapter removed from boot order, parameters will be updated accordingly!` appears when an adapter is removed from the system or is relocated behind a PCI bridge. This message is for information only, and no further user action is required.

- `Configuration data invalid, saving default configuration!` appears if none of the information in NonVolatile Random Access Memory (NVRAM) is valid. This message is for information only, and can occur when the BIOS is upgraded, or when some external event has rendered the NVRAM temporarily unreadable.

- `Found FC Controller not in following Boot Order List, to Add: Press Ctrl-C to start LSI Logic Configuration Utility...` appears when fewer than four adapters are in the boot order and adapters exist in the system which are not in the boot order. This message is for information only, and indicates that more than four adapters exist in the system. The additional adapters will not be managed by the Configuration Utility.

4.8 Open Boot BIOS

LSI Logic Solaris capable Fusion-MPT host adapters have Fcode resident on board, allowing operation under Sun's openboot console. All basic functionality is available at openboot, including the ability to display devices connected to the adapter, and to boot devices on the adapter.

4.8.1 Open Boot BIOS Features

The LSI Logic FC Open Boot BIOS supports:

- Solaris Sparc 2.6, 2.7, and Solaris 8 Open Firmware environments
- Root Boot device selection from any target device
- Standard command line interface, with help query
- Configuration options and selection for each host adapter

4.8.2 Identifying the Fibre Channel Disks

The **probe-scsi-all** command is used to identify the Fibre Channel devices on your Fusion-MPT adapter.

To show all disks available from the openboot prompt, use the **probe-scsi-all** command. Note that this command is used regardless of whether the disks are Fibre Channel or SCSI. All disks available on all Fusion-MPT devices are displayed.

The following example shows the kind of information that is displayed when you enter this command.

```
ok probe-scsi-all

/pci@8,600000/SUNW,qlc@4

LiD HA LUN ---Port WWN--- ----Disk description----

1  1  0  2100002037e4d65b SEAGATE ST318304FSUN18G 0726


/pci@8,700000/IntraServer-Ultra160,scsi@3,1
/pci@8,700000/IntraServer-Ultra160,scsi@3

Target 0
   Unit 0   Disk   IBM    DDRS-34560D    DC1B

/pci@8,700000/IntraServer,fc@2

MPT Version 1.00, Firmware Version 1.02.00

Target 0
   Unit 0   Disk   SEAGATE ST39173FC     6615
   WWN 2100002037109d76  Port ID d9
Target 1
   Unit 0   Disk   SEAGATE ST39173FC     6258
   WWN 210000203710565a  Port ID 17
Target 2
   Unit 0   Disk   SEAGATE ST39173FC     6258
   WWN 2100002037105212  Port ID 1
Target 3
   Unit 0   Disk   SEAGATE ST39173FC     6258
   WWN 2100002037103da8  Port ID 26
Target 4
   Unit 0   Disk   SEAGATE ST39173FC     6258
   WWN 210000203710324a  Port ID 73

/pci@8,700000/scsi@6
```

```
Target 6
    Unit 0 Removable Read Only device PLEXTOR CD-ROM PX-20TS
```

If the Fibre Channel devices on your LSI Logic/IntraServer adapter are not identified by your system, check the following:

- Is the Fibre Channel enclosure powered ON?

- Does the LED on the adapter indicate LINK? (Note that LINK is valid only after the device is probed.)

- Does the LED on the switch or remote enclosure indicate LINK?

- Does the LINK-SPEED parameter selected by the adapter match that of the bus (1G, 2G, or Auto)?

If you do not see disks, the following additional debug information may help to identify the problem.

4.8.3 Verifying Correct Installation

Use this procedure to verify installation of your Fusion-MPT adapter in the system:

Step 1.   Power on the system.

Step 2.   When the banner is displayed, press the **stop-A** keys to interrupt the boot process and stop at the **ok** prompt.

Step 3.   Use the **show-devs** command to list the system devices. You should see an output similar to the following:

```
ok show-devs

/SUNW,UltraSPARC-III@0,0
/virtual-memory
/memory@m0,0
/aliases
/options
/openprom
/chosen
/packages
/upa@8,480000/SUNW,ffb@0,0
...
/pci@8,700000/IntraServer,fc@2
/pci@8,700000/IntraServer,fc@1,1
/pci@8,700000/IntraServer,fc@1
...
```

```
/pci@8,700000/IntraServer,fc@2/disk
/pci@8,700000/IntraServer,fc@2/tape
/pci@8,700000/IntraServer,fc@1,1/disk
/pci@8,700000/IntraServer,fc@1,1/tape
/pci@8,700000/IntraServer,fc@1/disk
/pci@8,700000/IntraServer,fc@1/tape
/pci@8,700000/scsi@6,1/tape
/pci@8,700000/scsi@6,1/disk

ok
```

- `/pci@8,700000/IntraServer,fc@1`
  identifies the *first* Fibre Channel interface on an LSI Logic LSIFC929-based adapter.

- `/pci@8,700000/IntraServer,fc@1,1`
  identifies the *second* Fibre Channel interface on an LSI Logic LSIFC929-based adapter.

- An LSI Logic LSIFC919-based adapter will show only one such Fibre Channel device.

  Note: The above are examples. The output of **show-devs** may 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 to assure that the adapter is correctly installed, and re-seat the adapter in the PCI slot if necessary.

4.8.4 Adapter-Specific Settings

In certain circumstances, the advanced user may want to change settings for an individual adapter or port, without affecting the other adapters in the system. Specific examples of such settings are Fibre Channel bus speed, host adapter ID (SCSI only: Not Applicable to Fibre Channel), and Interrupt Coalescing.

To select a specific Fusion-MPT adapter as the current adapter, use the **select** command. Selecting a port or adapter brings the port online, and allows you to show or set certain adapter specific parameters.

You should use caution while issuing the following commands, as some commands could render the bus unusable (such as forcing 1 Gbit/s operation on a 2 Gbit/s Fibre Channel loop).

4.8.4.1 select

Use the **select** openboot command to select the adapter entry. This opens the port to bring the port online.

ok select /pci@8,700000/IntraServer,fc@1

4.8.4.2 .properties

Use **.properties** to show the adapter properties.

ok .properties

```
firmware-version    1.02.00
mpt-version         1.00
scsi-initiator-id   00 00 00 0f
assigned-addresses  81001010 00000000 00000700 00000000 00000100
                    83001014 00000000 001a0000 00000000 00020000
                    8300101c 00000000 00190000 00000000 00010000
                    82001030 00000000 02000000 00000000 00100000
compatible          70 63 69 31 33 65 39 2c 36 32 31 00 70 63 69 31
model               LSI,929
reg                 00001000 00000000 00000000 00000000 00000000
                    01001010 00000000 00000000 00000000 00000100
                    03001014 00000000 00000000 00000000 00020000
                    0300101c 00000000 00000000 00000000 00010000
                    02001030 00000000 00000000 00000000 00100000
version             1.00.16
device_type         scsi-2
name                IntraServer,fc
fcode-rom-offset    00000000
66mhz-capable
devsel-speed        00000001
class-code          00010000
interrupts          00000001
latency-timer       00000040
cache-line-size     00000010
max-latency         00000008
min-grant           0000001e
subsystem-id        00000621
subsystem-vendor-id 000013e9
revision-id         00000001
device-id           00000621
vendor-id           00001000
```

4.8.4.3 show-children

While you have the adapter or port selected, to display the devices currently connected to this adapter, use the **show-children** command, as shown below.

First, select the port or adapter shown (use the port name your system assigns):

ok select /pci@8,700000/IntraServer,fc@1

ok show-children

```
MPT Version 1.00, Firmware Version 1.02.00
Link is ready, port is online
   WWN 100000a0b8040353  Port ID ef
Target 0
   Unit 0   Disk   SEAGATE ST39173FC      6615
   WWN 2100002037109d76  Port ID d9
Target 1
   Unit 0   Disk   SEAGATE ST39173FC      6258
   WWN 210000203710565a  Port ID 17
Target 2
   Unit 0   Disk   SEAGATE ST39173FC      6258
   WWN 2100002037105212  Port ID 1
Target 3
   Unit 0   Disk   SEAGATE ST39173FC      6258
   WWN 2100002037103da8  Port ID 26
Target 4
   Unit 0   Disk   SEAGATE ST39173FC      6258
   WWN 210000203710324a  Port ID 73
```

4.8.5 Interrupt Coalescing

Interrupt coalescing allows the firmware on the Fusion-MPT device to group I/Os together for the purpose of minimizing the overhead to the host system. This feature can result in significant performance benefits when I/Os are coming into the adapter rapidly—for example, when performing small sequential reads from a disk.

LSI Logic has performed significant testing under multiple I/O conditions, and has determined that the interrupt coalescence values that are beneficial over a wide range of I/O conditions are a depth of 9, with a

timeout of 1280 (0x500) microseconds. What this means is that the host is interrupted only once for 9 I/Os processed by the chip, unless 1280 microseconds has passed since the host was last interrupted.

Although LSI Logic has determined that these settings are optimal for a wide variety of situations, your own I/O load may benefit from a deeper queue, or a longer timeout. LSI Logic provides a mechanism to modify these values and write them to the non-volatile EEPROM on the adapter.

Select the port or adapter shown (use the port name your system assigns):

ok select /pci@8,700000/IntraServer,fc@1

Then enter commands as shown in the following example:

ok show-interrupt-coalescing

```
Interrupt coalescing timeout is 500 (1280 decimal) microseconds
Interrupt coalescing depth is 9 (9 decimal)
```

ok set-interrupt-coalescing <- *command with no arguments prints help*

```
usage is <timeout><depth> set-interrupt-coalescing
```

ok 100 8 set-interrupt-coalescing

```
Interrupt coalescing timeout selected is 100 (256 decimal) microseconds
Interrupt coalescing depth selected is 8 (8 decimal)
Interrupt coalescing has been set
Change will take effect after system reset
```

Note: The system must be power cycled before the changes take effect. It is not sufficient to execute the **reset-all** command.

4.8.6 Set Fibre Channel Link Speed

There are two modes of operation for Fibre Channel, 1 Gbit/s and 2 Gbit/s. It is important to match the speed of the port with the speed of the loop or fabric to which the port is attached.

LSI Logic has implemented auto-negotiation on the 2 Gbit/s capable Fusion-MPT devices. If you are experiencing difficulty with the auto negotiate algorithm on your fabric or loop, or if you wish to manually set or show the link speed for the adapter, use the following procedure:

Select the port or adapter shown (use the port name your system assigns):

ok select /pci@8,700000/IntraServer,fc@1

Then enter commands as shown in the following example:

ok show-link-speed

```
Link speed selected is 1 Gbaud
Current link speed is 1 Gbaud
```

ok set-link-speed <- *command with no arguments prints help*

```
usage is <link-speed> set-link-speed
```

ok a set-link-speed

```
Link speed selected is autobaud
Link speed has been set
Change will take effect after system power cycle
```

ok show-link-speed

```
Link speed selected is autobaud
Current link speed is 1 Gbaud
```

> Note: The system must be power cycled before the changes take
>   effect. It is not sufficient to execute the **reset-all** command.

4.8.7 Persistent Device Naming

Under certain configurations, such as when the Fibre Channel disk is the system's boot device, it may be preferable to lock a target disk to a unit number. LSI Logic/IntraServer Fcode allows the system administrator to write a non-volatile map of IDs to the Fibre Channel controller.

The following is an example of how to map devices in the persistent device table.

Select the controller you want to modify, as shown in the following example:

ok show-disks

```
a) /pci@1f,0/pci@1/IntraServer,fc@2/disk
b) /pci@1f,0/pci@1/IntraServer,Ultra2-scsi@1/disk
c) /pci@1f,0/pci@1,1/ide@3/cdrom
```

```
d) /pci@1f,0/pci@1,1/ide@3/disk
e) /pci@1f,0/pci@1,1/ebus@1/fdthree@14,3203f0
q) NO SELECTION

Enter Selection, q to quit: a
/pci@1f,0/pci@1/IntraServer,fc@2/disk has been selected.

Type ^Y ( Control-Y ) to insert it in the command line.
e.g. ok nvalias mydev ^Y for creating devalias mydev for
/pci@1f,0/pci@1/IntraServer,fc@2/disk
```

ok select /pci@1f,0/pci@1/IntraServer,fc@2
ok show-children

```
MPT Firmware Version 1.00

Target 0
   Unit 0        Disk   SEAGATE ST39173FC    6615
   WWN 200000203710c4e8  PortID a3
```

ok set-persistent <- *command with no arguments prints help*

```
usage is <current-target-id> <persistent-target-id> set-persistent
```

ok 0 0 set-persistent

ok show-persistent

```
Entry 1  WWN 200000203710c4e8  Target 0
```

To clear an entry in the persistent device map, use the clear-persistent
command:

ok 1 clear-persistent

```
Entry 1 has been cleared
```

ok show-persistent

ok

Entry 1 has been deleted from the table, and the table is now empty.

4.8.8 Manual Selection of Fibre Channel Topology

Under certain configurations, it may be desired to force the selection of
Fibre Channel topology, and disable the auto detect mechanism in the
Fibre Channel adapter. This can be done on a port by port basis, by
using the following procedure. Note that it should not be necessary to

change from auto detect of topology, and that firmware version 1.00.03 is the minimum revision to support this functionality.

The following is an example of how to select a manual topology N_Port or NL_Port on a selected Fibre Channel port.

Select the controller you want to modify, as follows:

ok show-disks

```
a) /pci@1f,0/pci@1/IntraServer,fc@2/disk
b) /pci@1f,0/pci@1/IntraServer,Ultra2-scsi@1/disk
c) /pci@1f,0/pci@1,1/ide@3/cdrom
d) /pci@1f,0/pci@1,1/ide@3/disk
e) /pci@1f,0/pci@1,1/ebus@1/fdthree@14,3203f0
q) NO SELECTION

Enter Selection, q to quit: a
/pci@1f,0/pci@1/IntraServer,fc@2/disk has been selected.
```

```
Type ^Y ( Control-Y ) to insert it in the command line.
e.g. ok nvalias mydev ^Y for creating devalias mydev for
/pci@1f,0/pci@1/IntraServer,fc@2/disk
```

ok select /pci@1f,0/pci@1/IntraServer,fc@2

Then enter commands as shown in the following example:

ok show-topology

```
Topology selected is auto
Current topology is unknown (no link)
```

ok set-topology <-Command with no options provides help

```
usage is <topology> set-topology
```

```
topology = 1    NL_Port
    topology = 2    N_Port
    topology = a    auto
```

ok 1 set-topology

```
Topology selected is NL_Port
Topology has been set
```

```
Change will take effect after system power cycle
```

```
ok 2 set-topology
```

Topology selected is N_Port
Topology has been set

Change will take effect after system power cycle

```
ok a set-topology
```

Topology selected is auto
Topology has been set

Change will take effect after system power cycle

> Note: The system must be power cycled before the changes take
> effect. It is not sufficient to execute the `reset-all` command.

Appendix A
Glossary of Terms and Abbreviations

8B/10B	A data encoding scheme developed by IBM, translating byte wide data to an encoded 10-bit format.
ANSI	American National Standards Institute, the coordinating organization for voluntary standards in the United States.
Arbitrated Loop Topology (FC-AL)	A FC Topology that provides a low-cost solution to attach multiple ports in a loop without hubs and switches.
BER	Bit Error Rate.
Bit	A binary digit. The smallest unit of information a computer uses. The value of a bit (0 or 1) represents a two-way choice, such as on or off, true or false, and so on.
Broadcast	Sending a transmission to all N_Ports on a fabric.
Bus	A collection of unbroken signal lines across which information is transmitted from one part of a computer system to another. Connections to the bus are made using taps on the lines.
Bus Mastering	A high-performance way to transfer data. The host adapter controls the transfer of data directly to and from system memory without involving the computer's microprocessor. This is the fastest way for multitasking operating systems to transfer data.
Byte	A unit of information consisting of eight bits.
Channel	A point-to-point link, the main task of which is to transport data from one point to another.

Configuration	Refers to the way a computer is set up; the combined hardware components (computer, monitor, keyboard, and peripheral devices) that make up a computer system; or the software settings that allow the hardware components to communicate with each other.
CPU	Central Processing Unit. The "brain" of the computer that performs the actual computations. The term Microprocessor Unit (MPU) is also used.
Crosspoint-Switched Topology (FC-XS)	Highest performance FC fabric, providing a choice of multiple path routings between pairs of F_Ports.
Device Driver	A program that allows a microprocessor (through the operating system) to direct the operation of a peripheral device.
DMA	Direct Memory Access. A method of moving data from a storage device directly to RAM, without using the CPU's resources.
DMA Bus Master	A feature that allows a peripheral to control the flow of data to and from system memory by blocks, as opposed to PIO (Programmed I/O), where the processor is in control and the flow is by byte.
EEPROM	Electronically Erasable Programmable Read Only Memory. A memory chip typically used to store configuration information.
EISA	Extended Industry Standard Architecture. An extension of the 16-bit ISA bus standard. It allows devices to perform 32-bit data transfers.
Exchange	A term that refers to one of the FC "building blocks", composed of one or more nonconcurrent sequences for a single operation.
Fabric	FC defined interconnection methodology that handles routing in FC networks.
FC-EP	The future FC Enhanced Physical standard, which will build on and is compatible with FC-PH.
FC-PH	FC Physical standard, consisting of the three lower levels; FC-0, FC-1, and FC-2.
FC-0	Lowest level of the FC Physical standard, covering the physical characteristics of the interface and media.

FC-1	Middle level of the FC-PH standard, defining the 8B/10B encoding/decoding and transmission protocol.
FC-2	Highest level of FC-PH, defining the rules for signaling protocol and describing transfer of the frame, sequence, and exchanges.
FC-3	The hierarchical level in the FC standard that provides common services, such as striping definition.
FC-4	The hierarchical level in the FC standard that specifies the mapping of Upper Layer Protocols (ULPs) to levels below.
FCC	Federal Communications Commission.
FCP	Fibre Channel Protocol.
FDDI	Fiber Distributed Data Interface. ANSI option for a Metropolitan Area Network (MAN); a network based on the use of optical fiber cable to transmit data at 100 Mbits/s.
Fibre Channel	Fibre Channel is the general name of an integrated set of standards being developed by the Americal National Standards Institute (ANSI) which defines new protocols for flexible information transfer.
Fibre Channel Service Protocol (FSP)	The common FC-4 level protocol for all services, transparent to the fabric type or topology.
File	A named collection of information stored on a disk.
Firmware	Software that is permanently stored in ROM. Therefore, it can be accessed during boot time.
F_Port	"Fabric" port, the access point of the fabric for physically connecting the user's N_Port.
FL_Port	An F_Port that contains arbitrated loop functions.
Frame	A linear set of transmitted bits that define a basic transport element.
HAL	Hardware Abstraction Layer.
Hard Disk	A disk made of metal and permanently sealed into a drive cartridge. A hard disk can store very large amounts of information.

HIPPI	High Performance Parallel Interface, an 800 Mbits/s interface to supercomputer networks (formerly known as high speed channel) developed by ANSI.
Host	The computer system in which a SCSI host adapter is installed. It uses the SCSI host adapter to transfer information to and from devices attached to the SCSI bus.
Host Adapter	A circuit board or integrated circuit that provides a SCSI bus connection or Fibre Channel link to the computer system.
IP	Internet Protocol.
IPI	Intelligent Peripheral Interface.
ISA	Industry Standard Architecture. A type of computer bus used in most PCs. It allows devices to send and receive data up to 16 bits at a time.
Kbyte	Kilobyte. A measure of computer storage equal to 1024 bytes.
LCT	Logical Configuration Table.
Link_Control_ Facility	A termination card that handles the logical and physical control of the FC link for each mode of use.
LLC	Logical Link Control.
Local Bus	A way to connect peripherals directly to computer memory. It bypasses the slower ISA and EISA buses. PCI is a local bus standard.
Login Server	An entity within the FC fabric that receives and responds to login requests.
L_Port	A FC port that supports the arbitrated loop topology.
LUN	Logical Unit Number. An identifier, zero to seven, for a logical unit.
Mbyte	Megabyte. A measure of computer storage equal to 1024 kilobytes.
MFA	Message Frame Address.
Multicast	Refers to delivering a single transmission to multiple destination N_Ports.
NIC	Network Interface Card.
N_Port	"Node" port, a FC defined hardware entity at the node end of a link.

NL_Port	An N_Port that contains arbitrated loop functions.
Operating System	A program that organizes the internal activities of the computer and its peripheral devices. An operating system performs basic tasks such as moving data to and from devices, and managing information in memory. It also provides the user interface.
Operation	A term, defined in FC-2, that refers to one of the FC "building blocks" composed of one or more, possibly concurrent, exchanges.
Ordered Set	A FC term referring to four 10-bit characters (a combination of data and special characters) that provide low level link functions, such as frame demarcation and signaling between two ends of a link. It provides for initialization of the link after power-on and for some basic recovery actions.
Originator	A FC term referring to the initiating device.
Parity Checking	A way to verify the accuracy of data transmitted over the SCSI bus. One bit in the transfer is used to make the sum of all the 1 bits either odd or even (for odd or even parity). If the sum is not correct, an error message appears.
PCI	Peripheral Component Interconnect. A local bus specification that allows connection of peripherals directly to computer memory. It bypasses the slower ISA and EISA buses.
PDB	Packet Descriptor Block.
PIO	Programmed Input/Output. A way the CPU can transfer data to and from memory using the computer's I/O ports. PIO is usually faster than DMA, but requires CPU time.
Port	The hardware entity within a node that performs data communications over the FC link.
Port Address	Also Port Number. The address through which commands are sent to a host adapter board. This address is assigned by the PCI bus.
Port Number	See Port Address.
RAM	Random Access Memory. The computer's primary working memory in which program instructions and data are stored and are accessible to the

CPU. Information can be written to and read from RAM. The contents of RAM are lost when the computer is turned off.

Responder A FC term referring to the answering device.

RISC Core LSIFC909 chips contain a RISC (Reduced Instruction Set Computer) processor, programmed through microcode scripts.

ROM Read Only Memory. Memory from which information can be read but not changed. The contents of ROM are not erased when the computer is turned off.

SAN Storage Area Network.

SCAM SCSI Configured AutoMatically. A method to automatically allocate SCSI IDs using software when SCAM compliant SCSI devices are attached.

Scatter/Gather A device driver feature that lets the host adapter modify a transfer data pointer so that a single host adapter transfer can access many segments of memory. This minimizes interrupts and transfer overhead.

SCB SCSI Command Block.

SCSI Small Computer System Interface. A specification for a high-performance peripheral bus and command set. The original standard is referred to as SCSI-1.

SCSI-3 The current SCSI specification, which adds features to the original SCSI-1 standard.

SCSI ID A way to uniquely identify each SCSI device on the SCSI bus. Each SCSI bus has eight available SCSI IDs numbered 0 through 7 (or 0 through 15 for Wide SCSI). The host adapter usually gets ID 7 giving it priority to control the bus.

Sequence A term referring to one of the FC "building blocks", composed of one or more related frames for a single operation.

SGL Scatter Gather List.

SNAP SubNetwork Access Protocol.

Synchronous Data Transfer One of the ways data is transferred over the SCSI bus. Transfers are clocked with fixed frequency pulses. This is faster than asynchronous

data transfer. Synchronous data transfers are negotiated between the SCSI host adapter and each SCSI device.

System BIOS   Controls the low level POST (Power-On Self-Test), and basic operation of the CPU and computer system.

TID   Target ID.

Topology   The logical and/or physical arrangement of stations on a network.

ULP   Upper Layer Protocol.

VCCI   Voluntary Control Council for Interference.

Virtual Memory   Space on a hard disk that can be used as if it were RAM.

VPD   Vendor Product Data.

Word   A two byte (or 16 bit) unit of information.

X3T9   A technical committee of the Accredited Standards Committee X3, titled X3T9 I/O Interfaces. It is tasked with developing standards for moving data in and out of central computers.

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