

# **USER'S GUIDE**

## **2 Gbit/s Fibre Channel Host Adapters**

LSI7102XP-LC, LSI7102LXP-LC  
LSI7202XP-LC, LSI7202LXP-LC  
LSI7402XP-LC  
LSI7202EP-LC, LSI7202EP  
LSI7402EP-LC, LSI7402EP

**August 2005**

*Version 2.1*

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# Preface

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This book is the primary reference and user's guide for the LSI Logic family of 2 Gbit/s Fibre Channel host adapter boards. It contains a complete functional description of these boards as well as complete physical and electrical specifications. LSI Logic uses Class 1 transceivers on the host adapter boards contained in this user's guide.

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## 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.

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## Organization

This document has the following chapters:

- [Chapter 1, Installation Procedures](#), provides both quick and detailed installation instructions.
- [Chapter 2, 2 Gbit/s FC Host Adapter Characteristics](#), describes the physical and operational environments of the host adapters.
- [Chapter 3, Firmware Installation Procedure](#), describes the installation and configuration 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.

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## Related Publications

*LSIFC929X Dual Channel Fibre Channel I/O Processor Technical Manual*, Document No. DB14-000202-01

*LSIFC919X Single Channel Fibre Channel I/O Processor Technical Manual*, Document No. DB15-000225-01

*Fusion-MPT™ Device Management User's Guide, Volume 1.2*, Document No. DB15-000186-01

PCI Local Bus Specification, Rev. 2.2

PCI-X/133 Local Bus Specification, Rev. 1.0a

PCI Express Base Specification, Rev. 1.0a

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## Revision Record

Revision	Date	Remarks
1.0	10/02	Preliminary release
2.0	04/03	Final release
2.1	08/05	Updated to add the LSI7102LXP-LC, LSI7202LXP-LC, LSI7202EP, LSI7202EP-LC, LSI7402EP, and LSI7402EP-LC.

# Contents

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## Chapter 1

### Installation Procedures

1.1	General Description	1-1
1.2	Quick Installation Procedure	1-2
1.3	Detailed Installation Procedure	1-3
1.3.1	Before You Start	1-3
1.3.2	Installing the Host Adapter	1-3

---

## Chapter 2

### 2 Gbit/s FC

#### Host Adapter Characteristics

2.1	General Description	2-1
2.2	Features	2-3
2.2.1	PCI-X Interface	2-3
2.2.2	PCI Express Interface	2-4
2.2.3	FC Interface	2-4
2.3	Physical Environment	2-4
2.3.1	Electrical Characteristics	2-5
2.3.2	Thermal, Atmospheric Characteristics	2-5
2.3.3	Electromagnetic Compliance	2-6
2.3.4	Safety Characteristics	2-6
2.4	Operational Environment	2-6
2.4.1	PCI-X Interface	2-6
2.4.2	PCI Express Interface	2-6
2.4.3	FC Interface	2-7
2.4.4	FC Link Activity/Link Fault LED	2-7
2.5	PCI System ID Values	2-7
2.6	PCI Subsystem ID Values	2-8
2.7	Unique World Wide Name	2-9

2.8	Physical Characteristics	2-9
2.8.1	LSI7102XP-LC Host Adapter Configuration	2-9
2.8.2	LSI7102XP-LC Connector and Indicator LED	2-10
2.8.3	LSI7102LXP-LC Host Adapter Configuration	2-12
2.8.4	LSI7102LXP-LC Connector and Indicator LED	2-13
2.8.5	LSI7202XP-LC Host Adapter Configuration	2-14
2.8.6	LSI7202XP-LC Connectors and Indicator LEDs	2-15
2.8.7	LSI7202LXP-LC Host Adapter Configuration	2-16
2.8.8	LSI7202LXP-LC Connectors and Indicator LEDs	2-17
2.8.9	LSI7202EP-LC Host Adapter Configuration	2-18
2.8.10	LSI7202EP-LC Connectors and Indicator LEDs	2-19
2.8.11	LSI7202EP Host Adapter Configuration	2-20
2.8.12	LSI7202EP Connectors and Indicator LEDs	2-21
2.8.13	LSI7402XP-LC Host Adapter Configuration	2-22
2.8.14	LSI7402XP-LC Connectors and Indicator LEDs	2-23
2.8.15	LSI7402EP-LC Host Adapter Configuration	2-24
2.8.16	LSI7402EP-LC Connectors and Indicator LEDs	2-25
2.8.17	LSI7402EP Host Adapter Configuration	2-26
2.8.18	LSI7402EP Connectors and Indicator LEDs	2-27

---

## Chapter 3

### Firmware Installation Procedure

3.1	FC Firmware	3-2
3.1.1	Features	3-2
3.1.2	Description	3-2
3.2	Download New FC Firmware	3-3
3.3	Update the FC Firmware	3-4
3.3.1	GUI Update Tool for Windows and Linux Platforms	3-4
3.3.2	Command Line Update Tool for Solaris, Linux, and Windows	3-4
3.3.3	Command Line Update Tool for DOS	3-7
3.4	Advanced User: Adjusting Default Firmware Settings	3-8
3.4.1	Adjusting Link Speed	3-9
3.4.2	Adjusting Interrupt Coalescing	3-10
3.5	Troubleshooting	3-12

---

## Chapter 4 BIOS Features

4.1	LSI Logic Boot BIOS	4-2
4.1.1	LSI Logic Boot BIOS Features	4-2
4.1.2	BIOS Overview	4-2
4.1.3	LSI Logic BIOS Boot Specification (BBS)	4-2
4.2	Starting the LSI Logic Boot BIOS Configuration Utility	4-3
4.3	Using the LSI Logic Boot BIOS CU	4-3
4.4	Main Menu	4-3
4.4.1	Adapter Properties Menu	4-4
4.4.2	Persistent ID Menu	4-4
4.4.3	Device Properties Menu	4-5
4.4.4	Boot Adapter List Menu	4-5
4.4.5	Global Properties Menu	4-6
4.5	Exiting the LSI Logic Boot BIOS Configuration Utility	4-6
4.6	Troubleshooting	4-6
4.7	OpenBoot BIOS	4-7
4.7.1	OpenBoot BIOS Features	4-7
4.7.2	Identifying the FC Devices	4-8
4.7.3	Verifying Installation	4-9
4.7.4	Adapter-Specific Settings	4-10
4.7.5	Interrupt Coalescing	4-13
4.7.6	Set FC Link Speed	4-14
4.7.7	Persistent Device Naming	4-15
4.7.8	Manual Selection of FC Topology	4-17

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## Customer Feedback



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## Figures

1.1	Hardware Connections for the LSI Logic Host Adapter	1-4
1.2	Inserting the LSI Logic Host Adapter	1-5
2.1	LSI7102XP-LC Host Adapter Configuration	2-10
2.2	LSI7102XP-LC Connector and Indicator LED	2-11
2.3	LSI7102LXP-LC Host Adapter Configuration	2-12
2.4	LSI7102LXP-LC Connector and Indicator LED	2-13
2.5	LSI7202XP-LC Host Adapter Configuration	2-14
2.6	LSI7202XP-LC Connectors and Indicator LEDs	2-15
2.7	LSI7202LXP-LC Host Adapter Configuration	2-16
2.8	LSI7202LXP-LC Connectors and Indicator LEDs	2-17
2.9	LSI7202EP-LC Host Adapter Configuration	2-18
2.10	LSI7202EP-LC Connectors and Indicator LEDs	2-19
2.11	LSI7202EP Host Adapter Configuration	2-20
2.12	LSI7202EP Connectors and Indicator LEDs	2-21
2.13	LSI7402XP-LC Host Adapter Configuration	2-22
2.14	LSI7402XP-LC Connectors and Indicator LEDs	2-23
2.15	LSI7402EP-LC Host Adapter Configuration	2-24
2.16	LSI7402EP-LC Connectors and Indicator LEDs	2-25
2.17	LSI7402EP Host Adapter Configuration	2-26
2.18	LSI7402EP Connectors and Indicator LEDs	2-27
3.1	LSIUtil Device Selection	3-5
3.2	LSIUtil Download Options	3-6
3.3	LSIUtil File Download	3-6
3.4	MPTUtil Device Selection	3-7
3.5	MPTUtil Options	3-8
3.6	Interrupt Coalescing Values	3-11
4.1	Select Controller	4-15
4.2	Select Device	4-16
4.3	Inserting Disk Name in Command Line	4-16
4.4	Setting Device 0 as Persistent	4-16
4.5	Clearing Persistent Device Map	4-16



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## Tables

2.1	LSI Logic 2 Gbit/s FC Host Adapter Descriptions	2-2
2.2	Hardware and Software Requirements	2-3
2.3	Maximum Power Requirements	2-5
2.4	LED Appearance to Represent Link Status	2-7
2.5	PCI System ID Values	2-8
2.6	PCI Subsystem ID Values	2-8
2.7	LSI7102XP-LC Link Activity/Link Fault LEDs	2-11
2.8	LSI7102LXP-LC Link Activity/Link Fault LEDs	2-13
2.9	LSI7202XP-LC Link Activity/Link Fault LEDs	2-15
2.10	LSI7202LXP-LC Link Activity/Link Fault LEDs	2-17
2.11	LSI7202EP-LC Link Activity/Link Fault LEDs	2-19
2.12	LSI7202EP Link Activity/Link Fault LEDs	2-21
2.13	LSI7402XP-LC Link Activity/Link Fault LEDs	2-23
2.14	LSI7402EP-LC Link Activity/Link Fault LEDs	2-25
2.15	LSI7402EP Link Activity/Link Fault LEDs	2-27



# Chapter 1

## Installation Procedures

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This chapter contains general information about the LSI Logic 2 Gbit/s family of Fibre Channel (FC) host adapters. It also provides host adapter installation instructions. This chapter describes these topics in the following sections:

- [Section 1.1, “General Description”](#)
  - [Section 1.2, “Quick Installation Procedure”](#)
  - [Section 1.3, “Detailed Installation Procedure”](#)
- 

### 1.1 General Description

LSI Logic provides high-performance, cost-effective 2 Gbit/s FC controllers and host adapters. The LSI Logic controllers and their associated host adapters that support 2 Gbit/s FC contained in this User's Guide are as follows:

<b>Controller</b>	<b>Host Adapter</b>
LSIFC919X	LSI7102XP-LC, LSI7102LXP-LC
LSIFC929X	LSI7202XP-LC, LSI7202LXP-LC, LSI7202EP-LC, LSI7202EP, LSI7402XP-LC, LSI7402EP-LC, LSI7402EP

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Installing these host adapters into your PCI-X system allows you to connect FC devices. You can use these FC boards in computer systems with a standard bracket type or with a low profile bracket (LSI7102LXP-LC or LSI7202LXP-LC).

For specific information about the FC controllers, refer to *LSIFC929X Dual Channel Fibre Channel I/O Processor Technical Manual* and *LSIFC919X Single Channel Fibre Channel I/O Processor Technical Manual*.

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## 1.2 Quick 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 describe the procedure sufficiently. If you prefer more detailed guidance for installing the host adapter, proceed to [Section 1.3, "Detailed Installation Procedure."](#)

For safe and proper installation, refer to the user's manual supplied with your computer and perform the following steps:

- Step 1. *Ground yourself* before removing this host adapter board.
- Step 2. Remove the host adapter from the packaging and check that it is not damaged.

[Figure 1.1](#) on [page 1-4](#) illustrates an example of this host adapter board. Also refer to [Chapter 2, "2 Gbit/s FC Host Adapter Characteristics,"](#) to see more detailed drawings of the 2 Gbit/s host adapter boards.

- Step 3. Open your PC cabinet and select an appropriate open PCI slot.
- Step 4. Insert the host adapter board.
- Step 5. Make any configuration changes.
- Step 6. Close your PC cabinet cover.
- Step 7. Connect the FC cable to the host adapter.

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## 1.3 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 1.2, "Quick Installation Procedure."](#)

### 1.3.1 Before You Start

Before starting, look through the following task list to get an overall idea of the steps you will perform. 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 a host for up to 126 Arbitrated Loop FC devices, not including the adapter itself. Follow the detailed instructions in [Section 1.3.2, "Installing the Host Adapter,"](#) to install your host adapter board successfully.

### 1.3.2 Installing the Host Adapter

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

- Step 1. *Ground yourself* before removing this host adapter board.
- 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, "2 Gbit/s FC Host Adapter Characteristics,"](#) to see more detailed drawings of the 2 Gbit/s host adapter boards.

- Step 3. Switch off the computer and unplug the power cords for all components in your system.
- Step 4. Remove the cover from your computer according to 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. LSI Logic recommends using a static ground strap.

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

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

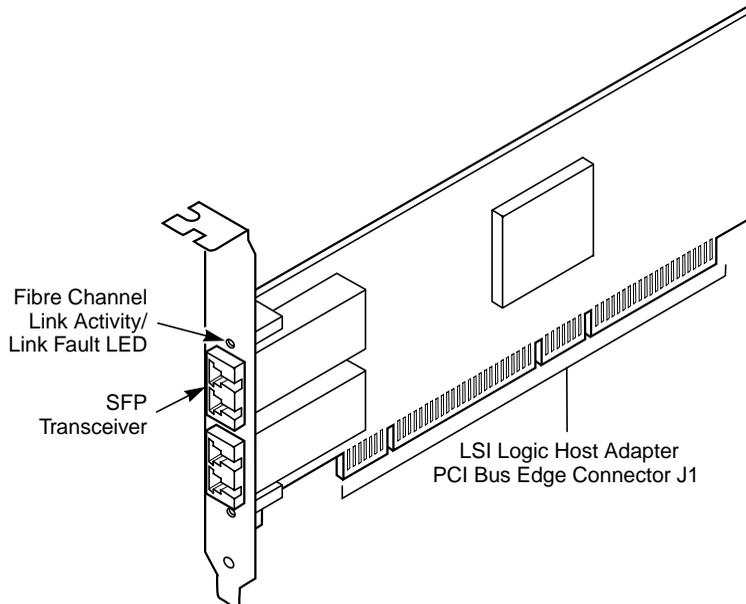
This host adapter requires a 32-bit or 64-bit PCI slot that allows bus master operation. If a 32-bit PCI slot is used, the portion of the J1 connector opposite the bracket remains uninserted.

Refer to [Table 1.2](#) for details.

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

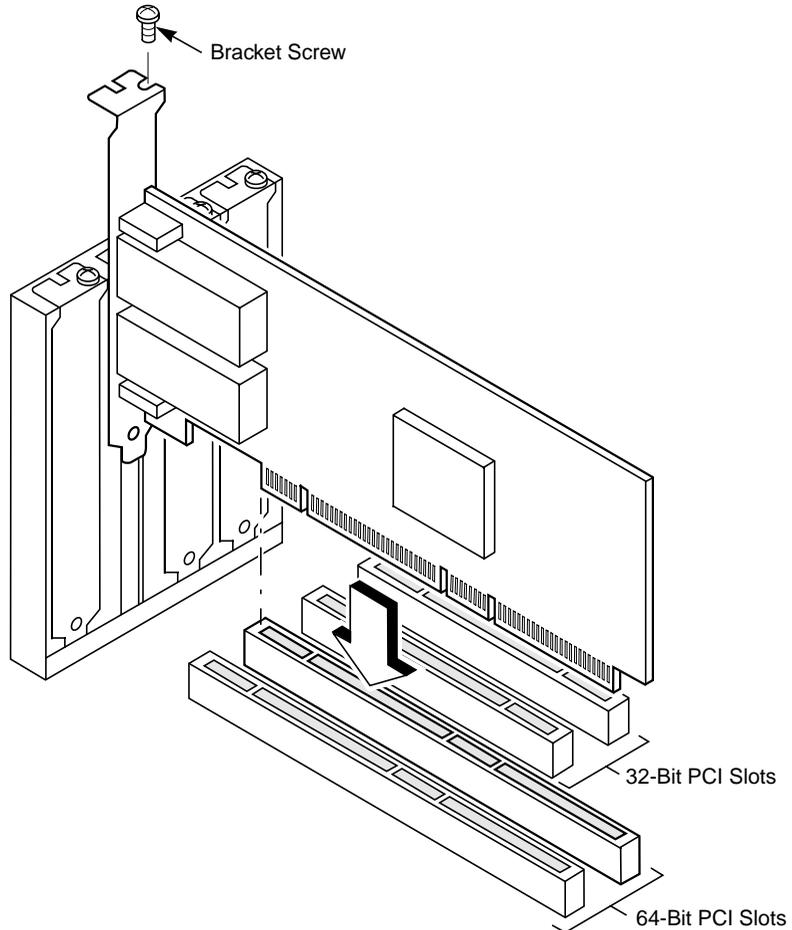
**Figure 1.1 Hardware Connections for the LSI Logic Host Adapter**



Step 7. Carefully insert PCI Bus 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 the Small Form-Factor Pluggable (SFP) transceiver cages should fit where you removed the blank panel.

**Figure 1.2 Inserting the LSI Logic Host Adapter**



Step 8. Secure the board with the bracket screw (see [Figure 1.2](#)), then make the external FC link connection.



# Chapter 2

## 2 Gbit/s FC

### Host Adapter

### Characteristics

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This chapter provides specific details about the physical environment associated with the 2 Gbit/s family of FC host adapters. This chapter includes the following sections:

- [Section 2.1, “General Description”](#)
  - [Section 2.2, “Features”](#)
  - [Section 2.3, “Physical Environment”](#)
  - [Section 2.4, “Operational Environment”](#)
  - [Section 2.5, “PCI System ID Values”](#)
  - [Section 2.6, “PCI Subsystem ID Values”](#)
  - [Section 2.7, “Unique World Wide Name”](#)
  - [Section 2.8, “Physical Characteristics”](#)
- 

## 2.1 General Description

The LSI Logic 2 Gbit/s family of FC host adapters makes use of state-of-the-art, 2 Gbit/s FC technology to provide the highest possible performance and most flexible storage configuration available. These LSI Logic host adapters support 1 Gbit/s or 2 Gbit/s FC speeds, and detect and correctly set the speed of operation automatically. LSI Logic host adapters are available with LC optical interfaces using optical SFP transceivers.

These LSI Logic FC host adapters offer the highest degree of integration available for your PCI-X or PCI Express based computer system, allowing for maximum performance, optimized use of system resources, and true Plug and Play installation.

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

[Table 2.1](#) lists the 2 Gbit/s FC host adapters discussed in this User's Guide.

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

Adapter	Description
LSI7102XP-LC	2 Gbit/s, PCI-X, single-port, standard height bracket, optical
LSI7102LXP-LC	2 Gbit/s, PCI-X, single-port, low-profile bracket, optical
LSI7202XP-LC	2 Gbit/s, PCI-X, dual-port, standard height bracket, optical
LSI7202LXP-LC	2 Gbit/s, PCI-X, dual-port, low-profile bracket, optical
LSI7202EP-LC	2 Gbit/s, PCI Express, dual-port, standard height bracket, optical
LSI7202EP	2 Gbit/s, PCI Express, dual-port, standard height bracket, no optics
LSI7402XP-LC	2 Gbit/s, PCI-X, quad-port, standard height bracket, optical
LSI7402EP-LC	2 Gbit/s, PCI Express, quad-port, standard height bracket, optical
LSI7402EP	2 Gbit/s, PCI Express, quad-port, standard height bracket, no optics

**Hardware and Software Support** – The LSI Logic 2 Gbit/s family of FC host adapter supports most major software operating systems, such as Sun Solaris (2.6 and greater), Windows Server (NT 4.0, 2000, XP, 2003), Linux (RedHat, Suse, Caldera, Turbo), NetWare, and UnixWare. These host adapters use 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 FC devices and other bus architectures. Refer to the *Fusion-MPT Device Management User's Guide* for details regarding software support for this family of host adapters.

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 a 3.3 V PCI 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 system with 3.3 V PCI slots
Software	Windows Server (NT 4.0, 2000, XP, 2003) Linux (Red Hat, Suse, Caldera, Turbo), NetWare, and UnixWare.
Firmware	Any Intel-compatible BIOS system

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## 2.2 Features

This section provides an overview of the [PCI-X Interface](#), the [PCI Express Interface](#), and the [FC Interface](#) for the 2 Gbit/s family of host adapters.

### 2.2.1 PCI-X Interface

PCI-X interfaces I/O components to the processor and memory subsystems in equipment ranging from PCs to servers. The PCI-X interface operates as a 64-bit DMA bus master capable of 64-bit addressing.

The PCI-X interface includes the following features:

- Full 64-bit DMA bus master
- LSIFC929X/LSIFC919X functionality:
  - Zero wait-state bus master data bursts up to 1 Kbyte
  - Host adapters comply with PCI Local Bus Specification, Rev. 2.2
  - 3.3 V interface
- Serial EEPROM configuration storage
- Host adapters comply with PCI-X/133 Local Bus Specification, Rev. 1.0a

## 2.2.2 PCI Express Interface

The PCI Express (launched in 2002) interface is a new serial I/O interface standard being used in next generation computer, storage and communications platforms. This scalable interface allows vendors to choose the number of 2.5 Gbit serial lanes (two to 16) most suitable to their product design and application need.

The PCI Express interface featured on the LSI Logic Fibre to PCI Express boards includes:

- 8 serial I/O lanes, 2.5 GHz, full duplex
- Fully PCI-compatible software model
- Serial EEPROM configuration storage

## 2.2.3 FC Interface

The LSIFC929X and LSIFC919X processors contain the FC functionality for all the LSI Logic 2 Gbit/s FC host adapters. The LSIFC929X and LSIFC919X processors generate signal timing and link protocol in compliance with FC standards.

The FC interface includes these features:

- 2 Gbit/s serial link
- LSIFC929X and LSIFC919X processor functionality:
  - Class 3, Arbitrated Loop (AL), Fabric, Point-to-Point
  - 2 Kbyte frame payloads
  - Multiframe buffering
- Link activity/link fault LED

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## 2.3 Physical Environment

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

## 2.3.1 Electrical Characteristics

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

**Table 2.3 Maximum Power Requirements**

Host Adapter	PCI +3.3 V	Over the Operating Range
LSI7102XP-LC	4.7 W @ 3.6 V	0 °C to 55 °C
LSI7102LXP-LC	4.7 W @ 3.6 V	0 °C to 55 °C
LSI7202XP-LC	6.5 W @ 3.6 V	0 °C to 55 °C
LSI7202LXP-LC	6.5 W @ 3.6 V	0 °C to 55 °C
LSI7202EP-LC	11.5 W @ 12.6 V	0 °C to 55 °C
LSI7202EP	10.7 W @ 12.6 V plus SFP power, if any	0 °C to 55 °C
LSI7402XP-LC	14.7 W @ 3.6 V plus 4.2 W @ 5.25 V	0 °C to 55 °C
LSI7402EP-LC	16.0 W @ 12.6 V	0 °C to 55 °C
LSI7402EP	14.4 W @ 12.6 V plus SFP power, if any	0 °C to 55 °C

## 2.3.2 Thermal, Atmospheric Characteristics

The thermal, atmospheric characteristics of the LSI Logic 2 Gbit/s family of FC host adapters are:

- Temperature range: 0 °C to 55 °C (dry bulb), 100 linear feet per minute (LFPM) airflow minimum
- Relative humidity range: 5% to 90% noncondensing
- Maximum dew point temperature: 32 °C

The following parameters define the storage and transit environment for the LSI Logic 2 Gbit/s family of FC host adapters:

- Storage Temperature: –45 °C to +85 °C (dry bulb)
- Relative Humidity Range: 0% to 95%, noncondensing

### **2.3.3 Electromagnetic Compliance**

These boards are designed and implemented to minimize susceptibility to electromagnetic emissions, 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 the 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 name or trademark, type, and UL flammability rating. Because these boards are installed in a PCI bus slot, all voltages are below the SELV 42.4 V limit.

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## **2.4 Operational Environment**

Use the LSI Logic 2 Gbit/s family of FC host adapters in PCI-X or PCI Express computer systems with an Industry Standard Architecture/Extended Industry Standard Architecture (ISA/EISA) bracket type. The LSI Logic-supplied FC BIOS and firmware operate the host adapters. An on-board flash memory device and a serial EEPROM are provided to allow BIOS code and OpenBoot code support over the PCI bus.

### **2.4.1 PCI-X Interface**

The PCI-X interface operates as a 64-bit DMA bus master. The edge connector makes the PCI-X connection, which provides connections on both the front and back of the board. The signal definitions and pin numbers conform to the PCI-X/133 Specification, Revision 1.0a. Refer to that specification for details regarding the signal assignments.

### **2.4.2 PCI Express Interface**

The LSI Logic PCI Express interface operates as a x8 lane DMA bus master. The narrow edge connector makes the PCI Express connection, which provides connections on both the front and back of the board. The signal definitions and pin numbers conform to the PCI Express base Specification, Revision 1.0a. Refer to that specification for details regarding the signal assignments.

### 2.4.3 FC Interface

The FC interface varies, depending on which LSI Logic 2 Gbit/s host adapter you have selected. Refer to [Section 2.8, “Physical Characteristics,” page 2-9](#) for details.

### 2.4.4 FC Link Activity/Link Fault LED

The LSI Logic 2 Gbit/s host adapters provide dual-purpose LEDs that indicate activity on the FC link. These LEDs (one per port) are visible near the ports on the bracket. [Figure 2.4](#) shows the appearance of the Link Activity/Link Fault LED that represents the given link status for each of the LSI Logic host adapters.

**Table 2.4 LED Appearance to Represent Link Status**

Adapter	Link	Activity	Fault
LSI7102XP-LC	Off	Green Blinking	Yellow
LSI7102LXP-LC	Off	Green Blinking	Yellow
LSI7202XP-LC	Off	Green Blinking	Yellow
LSI7202LXP-LC	Off	Green Blinking	Yellow
LSI7202EP-LC	Off	Green Blinking	Yellow
LSI7202EP	Off	Green Blinking	Yellow
LSI7402XP-LC	Off	Green Blinking	Yellow
LSI7402EP-LC	Off	Green Blinking	Yellow
LSI7402EP	Off	Green Blinking	Yellow

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## 2.5 PCI System ID Values

All LSI Logic 2 Gbit/s host adapters share common PCI Vendor ID (VID) values and are assigned device ID (DID) values to allow drivers and BIOS to recognize them as 2 Gbit/s capable FC products. [Table 2.1](#) provides the VID and DID for all LSI Logic 2 Gbit/s FC host adapters.

**Table 2.5 PCI System ID Values**

Host Adapter	VID Number	DID Number
LSI7102XP-LC	0x1000	0x0628
LSI7102LXP-LC	0x1000	0x0628
LSI7202XP-LC	0x1000	0x0626
LSI7202LXP-LC	0x1000	0x0626
LSI7402XP-LC	0x1000	0x0626
LSI7202EP-LC	0x1000	0x0626
LSI7202EP	0x1000	0x0626
LSI7402EP-LC	0x1000	0x0626
LSI7402EP	0x1000	0x0626

---

## 2.6 PCI Subsystem ID Values

All LSI Logic 2 Gbit/s host adapters are assigned PCI Subsystem Vendor IDs (SVIDs) and Subsystem IDs (SSIDs) to allow drivers and BIOS to differentiate the individual host adapter variants. The SVID and SSID are listed below. [Table 2.6](#) provides the SVID and SSID for all the LSI Logic 2 Gbit/s FC host adapters discussed in this user's guide.

**Table 2.6 PCI Subsystem ID Values**

Host Adapter	SVID Number	SSID Number
LSI7102XP-LC	0x1000	0x0530
LSI7102LXP-LC	0x1000	0x0530
LSI7202XP-LC	0x1000	0x1010
LSI7202LXP-LC	0x1000	0x1010
LSI7402XP-LC	0x1000	0x1020
LSI7202EP-LC	0x1000	0x1180
LSI7202EP	0x1000	0x1170
LSI7402EP-LC	0x1000	0x1090
LSI7402EP	0x1000	0x1190

---

## 2.7 Unique World Wide Name

Each LSI Logic FC host adapter is provided with a unique World Wide Name, specified by IEEE. The last 12 hexadecimal characters of this address appear on a host adapter label. This address is stored in the host adapter serial EEPROM.

---

## 2.8 Physical Characteristics

The LSI Logic 2 Gbit/s family of FC host adapters includes one to four external FC connectors, depending on the host adapter you have chosen. The host adapters are all available with optical or copper interconnects. No host adapter configuration is necessary.

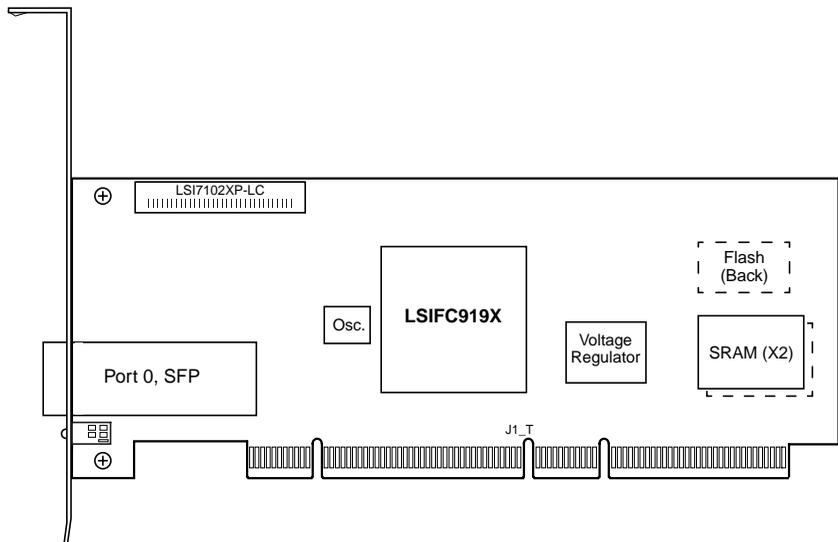
### 2.8.1 LSI7102XP-LC Host Adapter Configuration

The LSI Logic LSI7102XP-LC is a single channel 2 Gbit/s FC adapter. One LC optical connector is used for I/O, which is accessible through the module bracket. The LSI7102XP-LC host adapter uses the LSIFC919X processor, providing one Fusion-MPT channel.

The LSI7102XP-LC is a PCI short card; the dimensions are 6.625 inches x 2.53 inches. The external FC connections are made through a 2 Gbit/s SFP optical module.

The component height on the top and bottom of the board conforms to the PCI-X/133 Specification, Revision 1.0a. [Figure 2.1](#) illustrates the major components on the LSI7102XP-LC.

**Figure 2.1 LSI7102XP-LC Host Adapter Configuration**



## 2.8.2 LSI7102XP-LC Connector and Indicator LED

The LSI7102XP-LC I/O bracket is configured as shown in [Figure 2.2](#). The LC connector provides the connection from the adapter channel to the FC subsystem. The indicator LED indicates link status, activity, and link fault.

**Figure 2.2 LSI7102XP-LC Connector and Indicator LED**

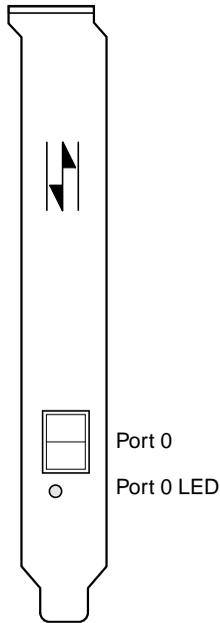


Table 2.7 describes the LSI7102XP-LC Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.7 LSI7102XP-LC Link Activity/Link Fault LEDs**

	<b>Link</b>	<b>Activity</b>	<b>Fault</b>
<b>LED Appearance</b>	Off	Green Blinking	Yellow

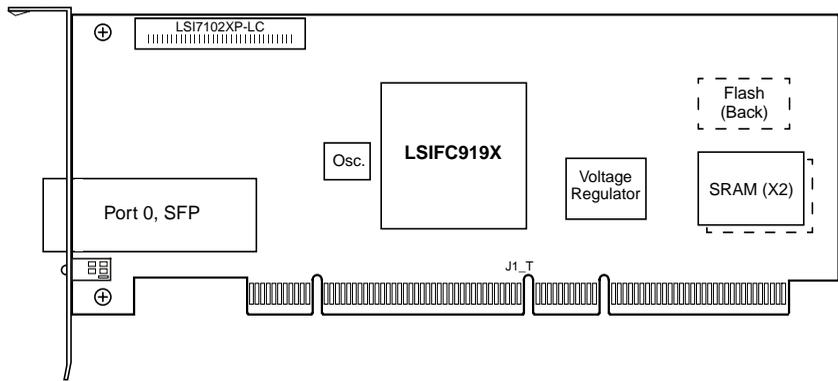
### 2.8.3 LSI7102LXP-LC Host Adapter Configuration

The LSI Logic LSI7102LXP-LC is a single channel 2 Gbit/s FC adapter. One LC optical connector is used for I/O, which is accessible through the module bracket. The LSI7102LXP-LC host adapter uses the LSIFC919X processor, providing one Fusion-MPT channel.

The LSI7102LXP-LC is a PCI short card; the dimensions are 6.625 inches x 2.53 inches. The external FC connections are made through a 2 Gbit/s SFP optical module.

The component height on the top and bottom of the board conforms to the PCI-X/133 Specification, Revision 1.0a. [Figure 2.3](#) illustrates the major components on the LSI7102LXP-LC.

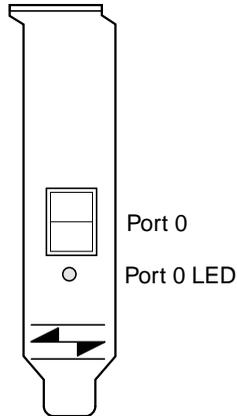
**Figure 2.3 LSI7102LXP-LC Host Adapter Configuration**



## 2.8.4 LSI7102LXP-LC Connector and Indicator LED

The LSI7102LXP-LC I/O bracket is configured as shown in [Figure 2.4](#). The LC connector provides the connection from the adapter channel to the FC subsystem. The indicator LED indicates link status, activity, and link fault.

**Figure 2.4 LSI7102LXP-LC Connector and Indicator LED**



[Table 2.8](#) describes the LSI7102LXP-LC Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.8 LSI7102LXP-LC Link Activity/Link Fault LEDs**

	Link	Activity	Fault
LED Appearance	Off	Green Blinking	Yellow

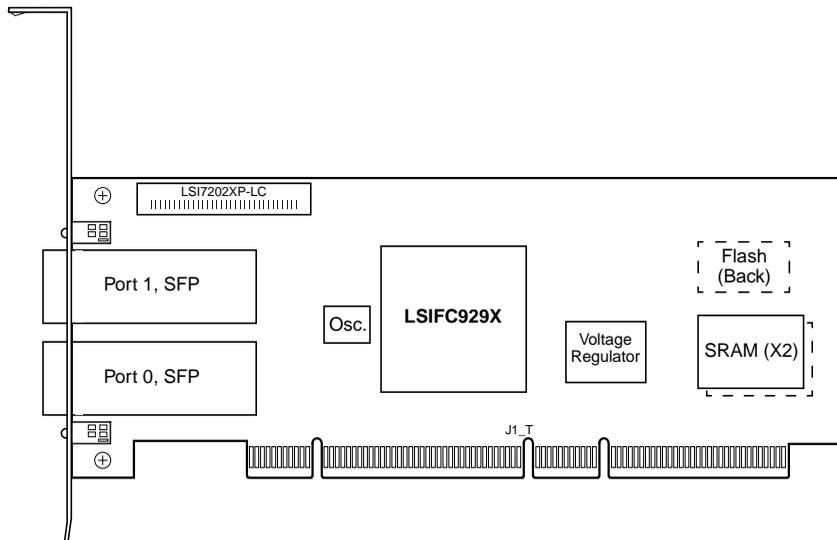
## 2.8.5 LSI7202XP-LC Host Adapter Configuration

The LSI Logic LSI7202XP-LC is a dual-channel, 2 Gbit/s FC adapter. Two LC optical connectors, used for I/O, are accessible through the module bracket. The LSI7202XP-LC uses the LSIFC929X, providing two Fusion-MPT channels.

The LSI7202XP-LC is a PCI short card; the dimensions are 6.625 inches x 2.53 inches. The external FC connections are made through the 2 Gbit/s SFP optical modules.

The component height on the top and bottom of the board conforms to the PCI-X/133 Specification, Revision 1.0a. [Figure 2.5](#) illustrates the major components on the LSI7202XP-LC.

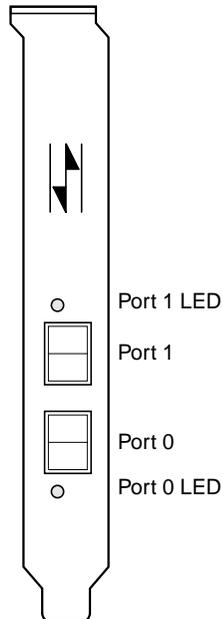
**Figure 2.5 LSI7202XP-LC Host Adapter Configuration**



## 2.8.6 LSI7202XP-LC Connectors and Indicator LEDs

The LSI7202XP-LC I/O bracket is configured as shown in [Figure 2.6](#). The LC connectors provide the connections from the adapter channels to the FC subsystem. The indicator LEDs indicate link status, activity, and link fault.

**Figure 2.6 LSI7202XP-LC Connectors and Indicator LEDs**



[Table 2.9](#) describes the LSI7202XP-LC Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.9 LSI7202XP-LC Link Activity/Link Fault LEDs**

	Link	Activity	Fault
LED Appearance	Off	Green Blinking	Yellow

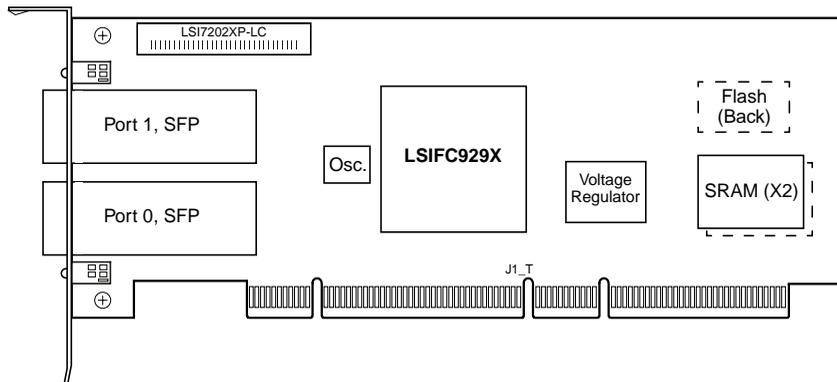
## 2.8.7 LSI7202LXP-LC Host Adapter Configuration

The LSI Logic LSI7202LXP-LC is a dual-channel, 2 Gbit/s FC adapter. Two LC optical connectors, used for I/O, are accessible through the module bracket. The LSI7202LXP-LC uses the LSIFC929X, providing two Fusion-MPT channels.

The LSI7202LXP-LC is a PCI short card; the dimensions are 6.625 inches x 2.53 inches. The external FC connections are made through the 2 Gbit/s SFP optical modules.

The component height on the top and bottom of the board conforms to the PCI-X/133 Specification, Revision 1.0a. [Figure 2.7](#) illustrates the major components on the LSI7202LXP-LC.

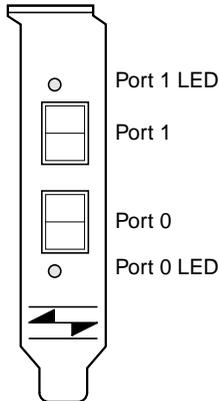
**Figure 2.7 LSI7202LXP-LC Host Adapter Configuration**



## 2.8.8 LSI7202LXP-LC Connectors and Indicator LEDs

The LSI7202LXP-LC I/O bracket is configured as shown in [Figure 2.8](#). The LC connectors provide the connections from the adapter channels to the FC subsystem. The indicator LEDs indicate link status, activity, and link fault.

**Figure 2.8 LSI7202LXP-LC Connectors and Indicator LEDs**



[Table 2.10](#) describes the LSI7202LXP-LC Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.10 LSI7202LXP-LC Link Activity/Link Fault LEDs**

	<b>Link</b>	<b>Activity</b>	<b>Fault</b>
<b>LED Appearance</b>	Off	Green Blinking	Yellow

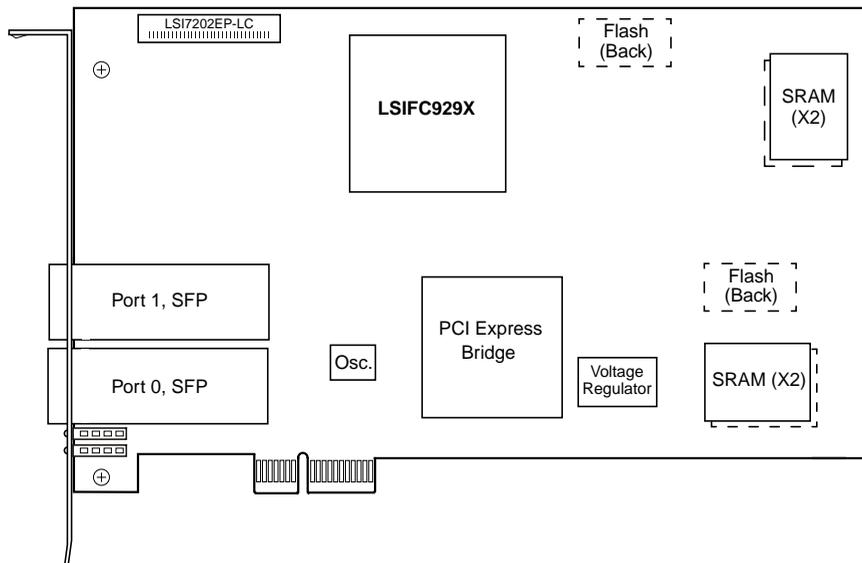
## 2.8.9 LSI7202EP-LC Host Adapter Configuration

The LSI Logic LSI7202EP-LC is a dual-channel, 2 Gbit/s FC adapter. Two LC optical connectors, used for I/O, are accessible through the module bracket. The LSI7202EP-LC uses the LSIFC929X, providing two Fusion-MPT channels.

The LSI7202EP-LC is a PCI short card; the dimensions are 6.875 inches x 4.2 inches. The external FC connections are made through the 2 Gbit/s SFP optical modules.

The component height on the top and bottom of the board conforms to the PCI Express Specification, Revision 1.0a. [Figure 2.9](#) illustrates the major components on the LSI7202EP-LC.

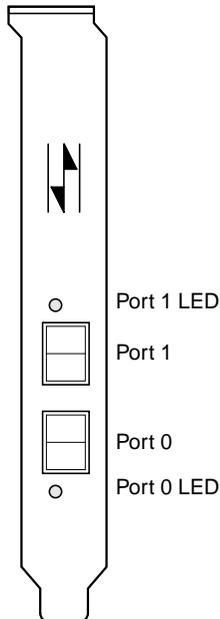
**Figure 2.9 LSI7202EP-LC Host Adapter Configuration**



## 2.8.10 LSI7202EP-LC Connectors and Indicator LEDs

The LSI7202EP-LC I/O bracket is configured as shown in [Figure 2.10](#). The Port 0 and Port 1 connectors provide the connections from the adapter channels to the FC subsystem. The indicator LEDs indicate link status, activity, and link fault.

**Figure 2.10 LSI7202EP-LC Connectors and Indicator LEDs**



[Table 2.11](#) describes the LSI7202EP-LC Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.11 LSI7202EP-LC Link Activity/Link Fault LEDs**

	Link	Activity	Fault
LED Appearance	Off	Green Blinking	Yellow

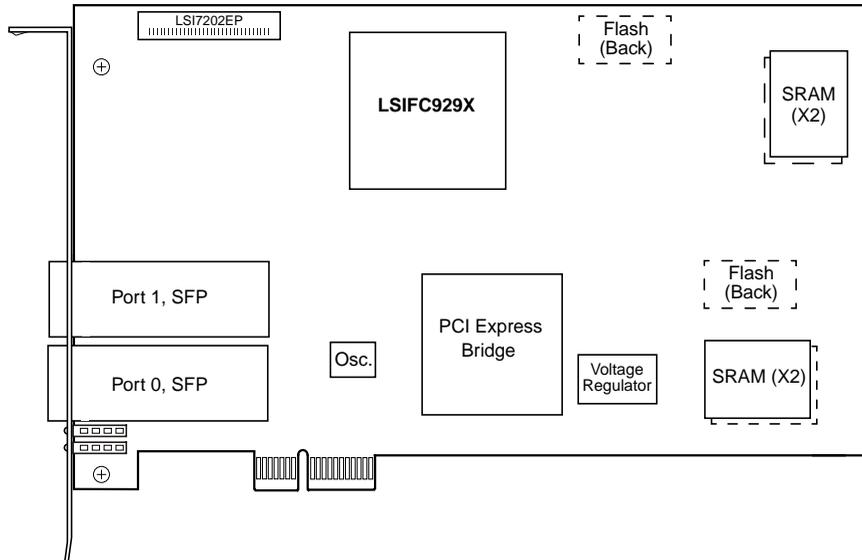
## 2.8.11 LSI7202EP Host Adapter Configuration

The LSI Logic LSI7202EP is a dual-channel, 2 Gbit/s FC adapter. Two connectors, used for I/O, are accessible through the module bracket. The LSI7202EP uses the LSIFC929X, providing two Fusion-MPT channels.

The LSI7202EP is a PCI short card; the dimensions are 6.875 inches x 4.2 inches. The external FC connections are made through the 2 Gbit/s SFP optical modules.

The component height on the top and bottom of the board conforms to the PCI Express Specification, Revision 1.0a. [Figure 2.11](#) illustrates the major components on the LSI7202EP.

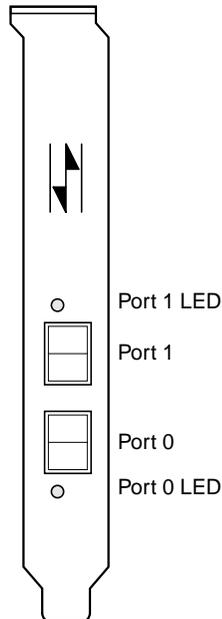
**Figure 2.11 LSI7202EP Host Adapter Configuration**



## 2.8.12 LSI7202EP Connectors and Indicator LEDs

The LSI7202EP I/O bracket is configured as shown in [Figure 2.12](#). The Port 0 and Port 1 connectors provide the connections from the adapter channels to the FC subsystem. The indicator LEDs indicate link status, activity, and link fault.

**Figure 2.12 LSI7202EP Connectors and Indicator LEDs**



[Table 2.12](#) describes the LSI7202EP Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.12 LSI7202EP Link Activity/Link Fault LEDs**

	Link	Activity	Fault
LED Appearance	Off	Green Blinking	Yellow

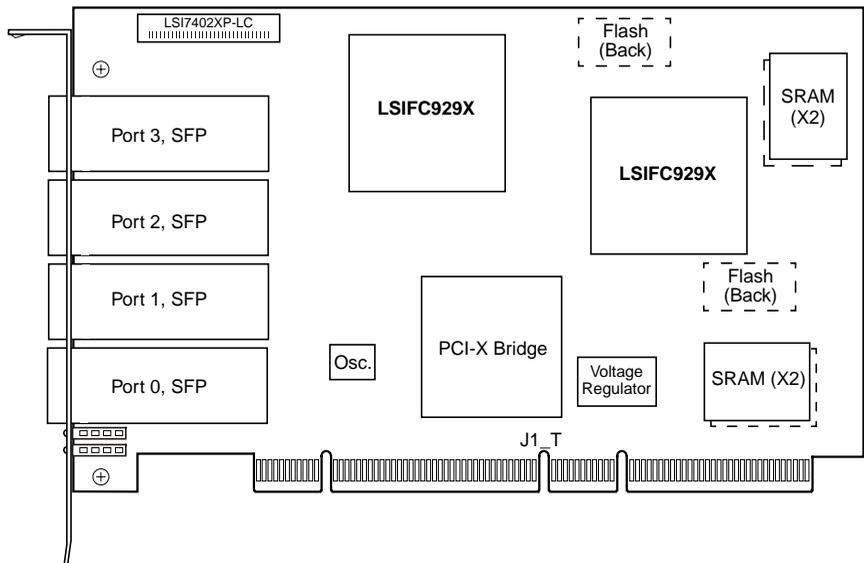
## 2.8.13 LSI7402XP-LC Host Adapter Configuration

The LSI Logic LSI7402XP-LC is a quad-channel, 2 Gbit/s FC adapter. Four LC optical connectors, used for I/O, are accessible through the module bracket. The LSI7402XP-LC uses two LSIFC929X devices, providing four Fusion-MPT channels.

The LSI7402XP-LC is a PCI short card; the dimensions are 6.875 inches x 4.2 inches. The external FC connections are made through the 2 Gbit/s SFP optical modules.

The component height on the top and bottom of the board conforms to the PCI-X/133 Specification, Revision 1.0a. [Figure 2.13](#) illustrates the major components on the LSI7402XP-LC.

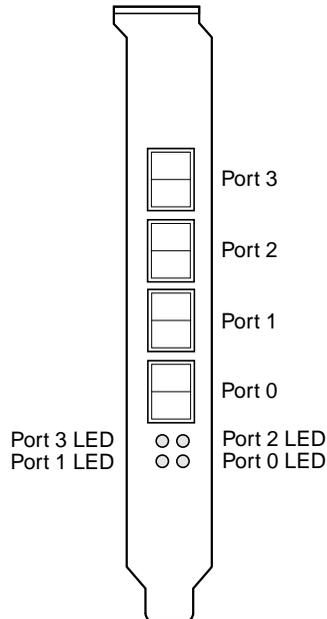
**Figure 2.13 LSI7402XP-LC Host Adapter Configuration**



## 2.8.14 LSI7402XP-LC Connectors and Indicator LEDs

The LSI7402XP-LC I/O bracket is configured as shown in [Figure 2.14](#). The LC connector provides the connection from the adapter channel to the FC subsystem. The indicator LEDs indicate link status, activity, and link fault.

**Figure 2.14 LSI7402XP-LC Connectors and Indicator LEDs**



[Table 2.13](#) describes the LSI7402XP-LC Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.13 LSI7402XP-LC Link Activity/Link Fault LEDs**

	Link	Activity	Fault
<b>LED Appearance</b>	Off	Green Blinking	Yellow

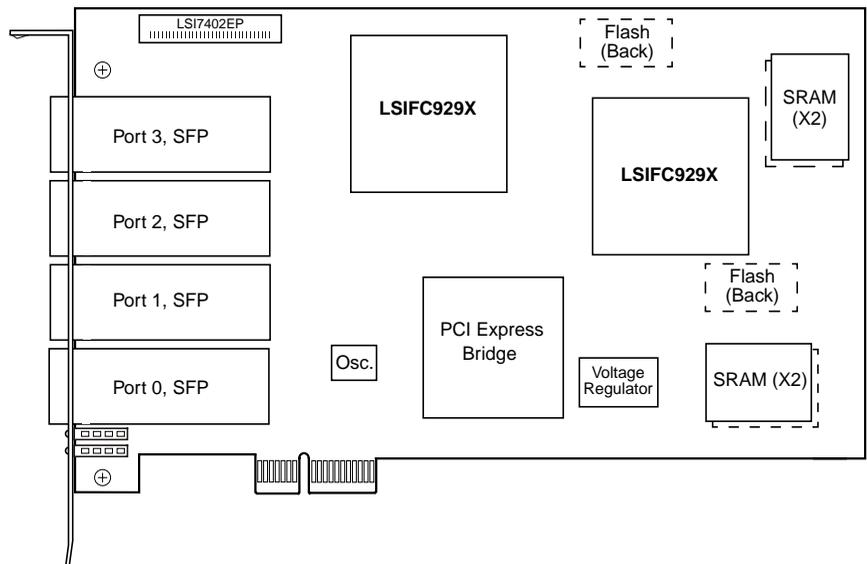
## 2.8.15 LSI7402EP-LC Host Adapter Configuration

The LSI Logic LSI7402EP-LC is a quad-channel, 2 Gbit/s FC adapter. Four LC optical connectors, used for I/O, are accessible through the module bracket. The LSI7402EP-LC uses two LSIFC929X devices, providing four Fusion-MPT channels.

The LSI7402EP-LC is a PCI short card; the dimensions are 6.875 inches x 4.2 inches. The external FC connections are made through the 2 Gbit/s SFP optical modules.

The component height on the top and bottom of the board conforms to the PCI Express Specification, Revision 1.0a. [Figure 2.15](#) illustrates the major components on the LSI7402EP-LC.

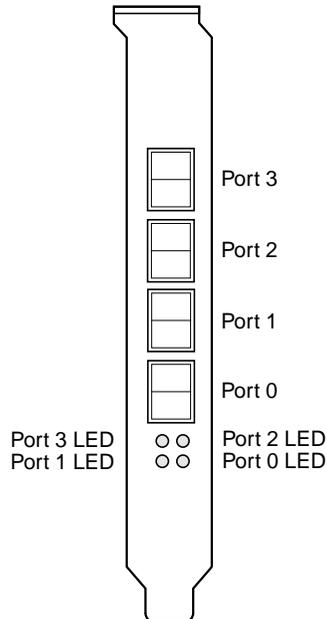
**Figure 2.15 LSI7402EP-LC Host Adapter Configuration**



## 2.8.16 LSI7402EP-LC Connectors and Indicator LEDs

The LSI7402EP-LC I/O bracket is configured as shown in [Figure 2.16](#). The LC connectors provide the connections from the adapter channels to the FC subsystem. The indicator LEDs indicate link status, activity, and link fault.

**Figure 2.16 LSI7402EP-LC Connectors and Indicator LEDs**



[Table 2.14](#) describes the LSI7402EP-LC Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.14 LSI7402EP-LC Link Activity/Link Fault LEDs**

	Link	Activity	Fault
<b>LED Appearance</b>	Off	Green Blinking	Yellow

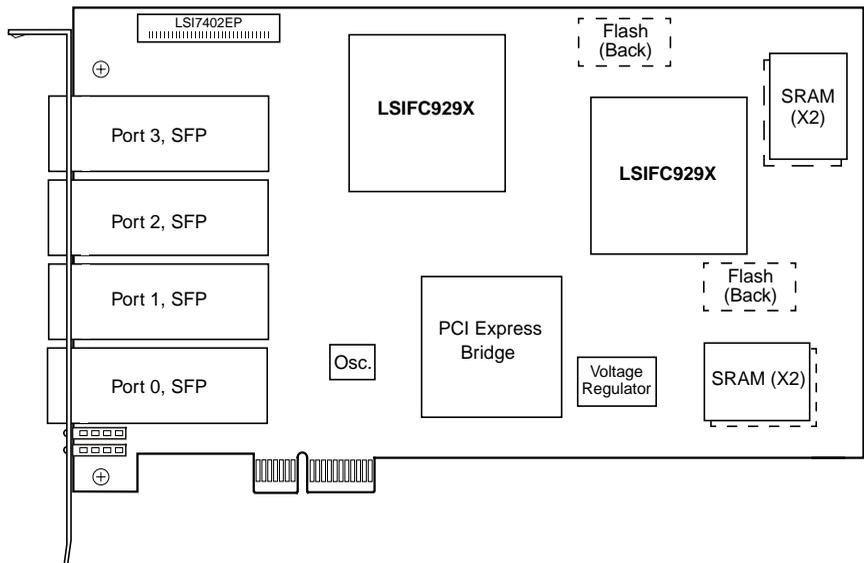
## 2.8.17 LSI7402EP Host Adapter Configuration

The LSI Logic LSI7402EP is a quad-channel, 2 Gbit/s FC adapter. Four connectors, used for I/O, are accessible through the module bracket. The LSI7402EP uses two LSIFC929X devices, providing four Fusion-MPT channels.

The LSI7402EP is a PCI short card; the dimensions are 6.875 inches x 4.2 inches. The external FC connections are made through the 2 Gbit/s SFP optical modules.

The component height on the top and bottom of the board conforms to the PCI Express Specification, Revision 1.0a. [Figure 2.17](#) illustrates the major components on the LSI7402EP.

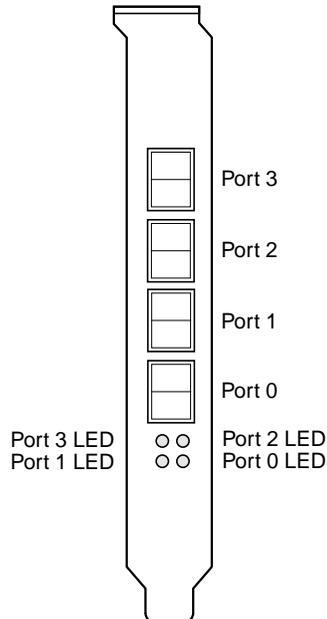
**Figure 2.17 LSI7402EP Host Adapter Configuration**



## 2.8.18 LSI7402EP Connectors and Indicator LEDs

The LSI7402EP I/O bracket is configured as shown in [Figure 2.18](#). The Port 0, Port 1, Port 2, and Port 3 connectors provide the connections from the adapter channels to the FC subsystem. The indicator LEDs indicate link status, activity, and link fault.

**Figure 2.18 LSI7402EP Connectors and Indicator LEDs**



[Table 2.15](#) describes the LSI7402EP Link Activity/Link Fault LED appearance that indicates a valid link, presence of link activity, or a fault on the link.

**Table 2.15 LSI7402EP Link Activity/Link Fault LEDs**

	Link	Activity	Fault
<b>LED Appearance</b>	Off	Green Blinking	Yellow



# Chapter 3

## Firmware Installation Procedure

---

This chapter provides information about installing and configuring FC firmware and includes the following sections:

- [Section 3.1, “FC Firmware”](#)
- [Section 3.2, “Download New FC Firmware”](#)
- [Section 3.3, “Update the FC Firmware”](#)
- [Section 3.4, “Advanced User: Adjusting Default Firmware Settings”](#)
- [Section 3.5, “Troubleshooting”](#)

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

The `FC929X.ROM` file contains the firmware to operate the LSIFC929X or LSIFC919X controllers used on the associated 2 Gbit/s LSI Logic host adapters. When updates are necessary, LSI Logic releases new firmware to improve the functionality or performance of these host adapters. You may download the latest firmware from the LSI Logic web site at: <http://drivers.lsillogic.com>.

---

## 3.1 FC Firmware

This section includes the features, description, installation, and configuration of the FC firmware. The installation method varies depending on the operating system. LSI Logic provides firmware installation tools for the Windows, Linux, and Solaris operating systems.

### 3.1.1 Features

The FC firmware for the LSI Logic FC chips supports the following features:

- 1 Gbit/s and 2 Gbit/s FC transfers, with AutoNegotiation (select 1 Gbit/s, 2 Gbit/s, or Auto)
- 64-bit/66 MHz host PCI bus and 133 MHz PCI-X bus (backward-compatible with 32-bit/33 MHz)
- 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
- Fusion-MPT common software interface
- Initiator, Target, and FC LAN capability

### 3.1.2 Description

The LSIFC929X and LSIFC919X controllers operate 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 FC 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 FC-specific sequences, frames, and primitives that are delivered to the FC transmit and receive physical interfaces. The firmware-based Link Services library transparently provides all link service support that the host uses for all FC topologies. The firmware also manages all link exceptions, which isolates the host driver from FC-unique exceptions. With the Fusion-MPT architecture, parallel SCSI host drivers can be used with the LSI Logic FC controllers with little or no additional functionality for FC.

---

## 3.2 Download New FC Firmware

To begin, you must first download new host adapter firmware component(s) from the LSI Logic web site ([www.lsillogic.com](http://www.lsillogic.com)). Type the following address into your preferred browser:

<http://drivers.lsillogic.com>

The web page presents three drop-down menus under **Find Specific Products**. Make the following selections:

- Step 1. Select **Storage Adapters**.
- Step 2. Select **Fibre Channel HBAs**.
- Step 3. Select **LSI7202XP-LC** (or other 2 Gbit/s LSI Logic host adapter).
- Step 4. Check the box next to **BIOS/Firmware**. Then click the **Go** button.

This search locates the latest BIOS/Firmware available for your host adapter. Save the file to your hard drive. You may have to unzip this file.

Typically, the download will contain three separate files:

FC929X.ROM —LSI Logic Firmware update  
MPTBIOS.ROM —LSI Logic Boot BIOS update  
LSI9x9f.ROM —LSI Logic Fcode update

These files represent updated code that you may store on your LSI Logic host adapter using one of the methods described in the next sections.

---

## 3.3 Update the FC Firmware

The process of updating the FC firmware varies slightly, depending on the operating system.

### 3.3.1 GUI Update Tool for Windows and Linux Platforms

With the MyStorage™ management software installed on either Windows or Linux operating systems, you can use the MyStorage software to update LSI Logic host adapters with new firmware (Section 3.2, “Download New FC Firmware”). The CD-ROM media distributed with many LSI Logic host adapter kits contains the MyStorage software; alternatively, users can download the MyStorage software from the LSI Logic web site ([www.lsilogic.com](http://www.lsilogic.com)).

Refer to *LSI Logic MyStorage Management Software User's Guide* for detailed usage instructions.

### 3.3.2 Command Line Update Tool for Solaris, Linux, and Windows

LSI Logic provides a FC Flash command line utility called LSIUtil to update LSI Logic host adapters with new firmware (Section 3.2). The software is available for the Windows, Linux, and Solaris operating systems. This section provides the procedure for operating this program.

**Note:** The LSIUtil program will not operate properly unless an LSI Logic OS driver is also installed.

**Running the LSIUtil Program** – The LSIUtil program may be used to update the LSI Logic FC firmware of any 2 Gbit/s host adapter. Locate and copy the `LSIUtil.exe` program and the `FC929X.ROM` code files to a directory on your hard drive. To update the firmware, complete the following steps:

- Step 1. Ensure that the host adapter is properly installed in the system PCI/PCI-X or PCI Express slot.

- Step 2. Open a terminal window, and open the directory containing the LSIUtil program.
- Step 3. Execute the LSIUtil program.
- Step 4. Select a device to update ([Figure 3.1](#)).

### Figure 3.1 LSIUtil Device Selection

```
[root]# lsiutil  
  
LSI Logic MPT Configuration Utility, Version 1.28, November 12,  
2004  
  
2 MPT Ports found  
  
   Port Name           Chip Vendor/Type      MPT Rev   Firmware Rev  
1.  /proc/mpt/ioc0      LSI Logic FC929X      103       01021200  
2.  /proc/mpt/ioc1      LSI Logic FC929X      103       01021200  
  
Select a device: [1-2 or 0 to quit]
```

- Step 5. From the subsequent displayed list, select option menu 2 or 4 as shown ([Figure 3.2](#)).

### Figure 3.2 LSIUtil Download Options

1. Identify firmware, BIOS, and/or FCode
- 2. Download firmware (update the FLASH)**
3. Upload firmware
- 4. Download BIOS and/or FCode (update the FLASH)**
5. Upload BIOS and/or FCode
6. Download SEEPROM
7. Upload SEEPROM
8. Scan for devices
9. Read/change configuration pages
10. Change IOC settings (interrupt coalescing)
13. Change FC Port settings
14. Change (enable/disable) multi-pathing
15. Change persistent mappings
16. Display logged-in devices
17. Show port aliases
19. Test configuration page actions
20. Diagnostics
21. RAID actions
22. Reset bus
23. Reset target
80. Set port offline
81. Set port online
94. Send GID\_FT
95. Send GA\_NXT
96. Send ELS
97. Reset FC link, Maintain Logins
98. Reset FC link
99. Reset port

Select an option: [1-99 or 0 to quit]

Step 6. When prompted, type the firmware file name.

Step 7. Type Yes, when asked to continue ([Figure 3.3](#)).

### Figure 3.3 LSIUtil File Download

```
Enter firmware name: FC929X.ROM
Do you want to continue? [Yes or No, default is No] Y

Downloading image...
Download succeeded
```

The update process requires about 20–30 seconds. Upon completion, the system should display this message: “download succeeded”.

Step 8. Reset the adapter using option 99, or reboot to begin running the new firmware.

Step 9. Enter 0 to quit the program.

### 3.3.3 Command Line Update Tool for DOS

Using a DOS bootable floppy, users can use a FC Flash Utility called `MPTUtil` to update LSI Logic adapters with new firmware ([Section 3.2, “Download New FC Firmware,” page 3-3](#)). This section provides the procedure for operating this program.

**Note:** The `MPTUtil` program will not operate properly from a windows command window. It must be run from a DOS floppy.

**Running the MPTUtil Program** – Use the `MPTUtil` program to update the LSI Logic FC firmware on any 4 Gbit/s host adapter. Locate the `MPTUtil.exe` program and `FC929X.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 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 `MPTUtil` program directly from the DOS command line by typing at the prompt:

```
A:\ MPTutil
```

The `MPTUtil` program identifies all LSI Logic host adapters in the system, and it allows you to select which adapter to update ([Figure 3.4](#)).

**Figure 3.4 MPTUtil Device Selection**

```
LSIMPTUTIL 1.00.00

Choice  Vendor  Device  Bus  Device
-----  -
      1  1000h  0626h  0h   28h   LSI 929X Fibre Channel Host
Adapter
      2  Refresh

Which chip (0 to quit)?  _
```

Step 5. The MPTUtil program displays a menu of options (Figure 3.5).

To update the firmware, select option **a - Update Firmware**.

### Figure 3.5 MPTUtil Options

```
LSI Logic Corp. FC/SAS Serial EEPROM / FLASH Utility.
LSIMPTUTIL 1.00.00
Copyright (c) 2005 LSI Logic Corporation. All rights reserved.
*****

          Currents              Port 0              Port 1
World Wide P/N... 0x100000062B092448  0x100000062B092449
World Wide P/N... 0x200000062B092448  0x200000062B092449
Topology..... Auto
Speed..... Auto
Device Pathing... All Paths to a device
Protocol Support. INIT TARG LAN

Firmware: LSIFC929X 1.02.12 (2005.06.15)
*****

a - Update Firmware
b - Update BIOS & Firmware

c - Upload current firmware to a file
d - Upload current BIOS to a file

f - Toggle Board Speed on Function 0
g - Toggle Board Speed on Function 1
f - Toggle Topologies on Function 0
g - Toggle Topologies on Finction 1

l - Change Interrupt Coalescing Values on Port 0
m - Change Interrupt Coalescing Values on Port 1

x - Erase BIOS
y - Change Protocol Support
z - Change Adapters
q - Quit

Selection:
```

Step 6. When prompted, type the filename of the BIOS/Fcode update. The update process commences and completes in about 20–30 seconds.

Step 7. Exit the MPTUtil utility using the menu option **q - Quit**.

---

## 3.4 Advanced User: Adjusting Default Firmware Settings

Occasionally, a user may find it necessary to adjust default firmware parameters set by LSI Logic during the original manufacturing process. Adjustments to these parameters will affect future behavior of the

LSI Logic Adapter, and should be reserved for advanced users who fully understand the implications of such changes.

The LSI Logic firmware supports several configuration options, defined individually in [Section 3.4.1, “Adjusting Link Speed,”](#) and [Section 3.4.2, “Adjusting Interrupt Coalescing.”](#) These options may be configured using the MPTUtil utility menu, as described in the [subsection entitled “Running the MPTUtil Program”](#).

### 3.4.1 Adjusting Link Speed

The link speed of the LSI Logic host adapters is configurable. By default, the link speed is set to Auto. This means 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 this automatic operation fails (for example, other nodes on a loop do not support AutoNegotiation), the LSI Logic host adapters may be configured specifically to either the 2 Gbit/s or 1 Gbit/s speed.

**Note:** The LSI7202XP-LC, LSI7202EP-LC, and LSI7202EP each have two FC ports and the LSI7402XP-LC, LSI7402XP-LC, and LSI7402XP-LC each have four FC ports, so the link speed must be configured for each port. The LSI7102XP-LC has only one port.

Configure the link speed of the host adapter by following these steps:

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

```
A:\ MPTutil
```

The MPTUtil program identifies all LSI Logic host adapters in the system, and allows you to select which adapter to update ([Figure 3.4](#)).

Step 2. The MPTUtil program displays a menu of options. ([Figure 3.5](#)).

To change the link speed on the LSI7202XP-LC Port 0 (lower port, near the PCI connector), select the following menu option:

**f** - Toggle Board Speed on Function 0

To change the link speed on the LSI7202XP-LC Port 1 (upper port from the PCI connector), select the following menu option:

### **g** - Toggle Board Speed on Function 1

Successively pressing the F key (for Function 0) or the G key (for Function 1) toggles the PORT speed setting between these three modes:

- AUTO
- 1 Gbit/s
- 2 Gbit/s

Step 3. Exit the FCUtil utility using the menu option **q** - **Quit**.

## **3.4.2 Adjusting Interrupt Coalescing**

The LSI Logic host adapters can complete multiple I/O requests per host interrupt. Interrupt coalescing is used to reduce CPU interrupts by pooling multiple disk command completions (I/O) into one interrupt. This feature may be enabled or disabled.

Important: LSI Logic has performed significant testing under multiple I/O conditions and has determined that interrupt coalescing can be very valuable for small transfer lengths or random, transaction-oriented I/O workloads. For this type of workload, LSI Logic recommends that the Interrupt Coalescing values be set to a queue depth of 9, with a timeout of 1280 (0x500)  $\mu$ s. This means that the host is interrupted only once for 9 I/Os processed by the chip, unless 1280  $\mu$ s have passed since the host was last interrupted. If the workload is of a large transfer length and sequential, LSI Logic recommends that interrupt coalescing be disabled to prevent performance degradation.

Note: The LSI7202XP-LC, LSI7202EP-LC, and LSI7202EP each have two FC ports and the LSI7402XP-LC, LSI7402EP-LC, and LSI7402XP-LC each have four FC ports, so Interrupt Coalescing must be configured for each port. The LSI7102XP-LC has only one port.

Use the following procedure to adjust Interrupt Coalescing depth and timeout values:

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

A:\ Mptutil

The MPTUtil program identifies all LSI Logic host adapters in the system, and allows you to select which adapter to update. (See [Figure 3.4.](#))

Step 2. The MPTUtil program displays a menu of options. (See [Figure 3.5.](#))

To change Interrupt Coalescing on the LSI7202XP-LC Port 0, select the following menu option:

### 1- Change Interrupt Coalescing Values on Port 0

The current values are displayed within a submenu that allows the values to be changed ([Figure 3.6](#)).

### Figure 3.6 Interrupt Coalescing Values

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

**Flags** – By default, the host adapter has Interrupt Coalescing enabled, as indicated by the Flags value of 0x0001. If you want to disable Interrupt Coalescing, enter a value of 0x0000 for Flags. Interrupt Coalescing should only be disabled to resolve issues in unique system configurations. Consult LSI Logic Host Adapter Support to verify the need to disable Interrupt Coalescing for specific system configurations. When enabled, two parameters are relevant for interrupt coalescing:

**Coalescing Depth** – Specifies the number of I/Os that must complete before a host interrupt is generated. For example, if set to 4, then the adapter waits until four I/Os complete before notifying the host CPU via the interrupt mechanism. You can decrease this value to improve system performance if the system contains lower performance servers and/or peripherals.

**Coalescing Timeout** – This is failsafe time period that specifies the maximum amount of time (in milliseconds) to interrupt regardless of Coalescing depth.

---

## 3.5 Troubleshooting

Some potential problems and their suggested solutions are as follows:

**The firmware and BIOS revisions typically must 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 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 representative 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 (FC) BIOS and Configuration Utility and includes the following sections:

- [Section 4.1, “LSI Logic Boot BIOS”](#)
- [Section 4.2, “Starting the LSI Logic Boot BIOS Configuration Utility”](#)
- [Section 4.3, “Using the LSI Logic Boot BIOS CU”](#)
- [Section 4.4, “Main Menu”](#)
- [Section 4.5, “Exiting the LSI Logic Boot BIOS Configuration Utility”](#)
- [Section 4.6, “Troubleshooting”](#)
- [Section 4.7, “OpenBoot BIOS”](#)

A BIOS is the ROM code that the system loads to facilitate booting from FC drives. The BIOS also contains an embedded configuration manager, with which you 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:

- LSI Logic FC boot BIOS for Intel/AMD-based platforms, and
- LSI Logic FC OpenBoot BIOS for Solaris SPARC platforms.

Both the LSI Logic boot BIOS and OpenBoot BIOS are stored on the FC host adapter boards.

---

## 4.1 LSI Logic Boot BIOS

This section provides the features, description, and installation of the LSI Logic FC boot BIOS.

### 4.1.1 LSI Logic Boot BIOS Features

The LSI Logic FC boot BIOS supports:

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

### 4.1.2 BIOS Overview

If Boot is enabled, the boot BIOS scans for FC Hard disks connected to the FC host adapter. All discovered disks are enumerated with drive letters and appended to a master list of disks discovered on the host. Upon scan completion, the host serially inspects the master list of disks beginning with drive letter A and attempts to boot from the first device it finds with a boot record. If boot from FC is desired, you may elect to remove or disable IDE drives, as these tend to get lower drive letter assignments than FC devices.

Note: The Boot feature is disabled by default on all host adapters shipped from LSI Logic.

### 4.1.3 LSI Logic BIOS Boot Specification (BBS)

The LSI Logic 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 be compatible with the BBS. If your system supports the BBS, 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.

---

## 4.2 Starting the LSI Logic Boot BIOS Configuration Utility

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

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 CU.

**Note:** Not all devices detected by the CU can be controlled by the BIOS. Devices such as tape drives and scanners require loading a device driver specific to that peripheral. The BIOS CU allows parameters to be modified for these devices.

---

## 4.3 Using the LSI Logic Boot BIOS CU

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

---

## 4.4 Main Menu

When you invoke the LSI Logic boot BIOS CU, 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 a host adapter. Then press ENTER to view and modify the selected host adapter 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 4.4.4, "Boot Adapter List Menu,"](#) for details.

Global Properties allows changes to global scope settings. Refer to [Section 4.4.5, "Global Properties Menu,"](#) for details.

Only host adapters with LSI Logic Control enabled can be accessed.

#### 4.4.1 Adapter Properties Menu

The Adapter Properties menu allows you to view and modify adapter settings. It also provides access to the device settings of a host adapter. To display this menu, select a device under the Adapter field on the Main menu and press ENTER.

#### 4.4.2 Persistent ID Menu

You can use the Persistent ID menu simply to review the automatic mapping between a drive World Wide Name (WWN) and its assigned logical SCSI bus and Target ID. The screen also can 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 you to enter the first 16 characters of the WWN. Pressing ENTER afterwards allows the last 16 characters to be entered. The Configuration Utility 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 PLUS or MINUS keys to cycle the numbers. The Bus field always defaults to 0 and cannot be changed. It is displayed whenever an outside utility has reserved a different number.

The 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 storing any modifications to the

current page before new entries may be viewed or modified. A pop-up confirmation window asks to store or discard changes, if needed.

### 4.4.3 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 and END keys to scroll to columns currently not displayed. The scroll indicator on the bottom of the menu shows the position of the cursor relative to the first and last columns.

### 4.4.4 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 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 PLUS or MINUS keys. For example, place the cursor on the adapter that you want to change, and use the PLUS or MINUS key to raise or lower the boot order, respectively.

## 4.4.5 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.

---

## 4.5 Exiting the LSI Logic Boot BIOS Configuration Utility

The Exit menu for the LSI Logic boot BIOS configuration utility is used for all six of the menus listed in [Section 4.4, “Main Menu,” page 4-3](#). However, the available functionality is different for the Main menu and the five subordinate menus.

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

<b>Cancel exit</b>	Returns you to the previous menu.
<b>Save changes then exit this menu</b>	Implements any changes you made on the previous menu and returns you to the Main menu.
<b>Discard changes then exit this menu</b>	Restores the default settings and returns you to the Main menu.

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

<b>Cancel exit</b>	Returns you to the Main menu.
<b>Exit the Configuration Utility</b>	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.

---

## 4.6 Troubleshooting

The LSI Logic boot BIOS Configuration Utility is a powerful tool. If you disable all of your controllers while using it, pressing CTRL+A or

CTRL+E after memory initialization during reboot. This allows you to re-enable and reconfigure.

The following 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 that 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 are not managed by the CU.

---

## 4.7 OpenBoot BIOS

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

### 4.7.1 OpenBoot BIOS Features

The LSI Logic FC OpenBoot BIOS supports the following:

- Solaris SPARC 2.6, Solaris SPARC 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 capability for each host adapter

## 4.7.2 Identifying the FC Devices

The **probe-scsi-all** command identifies the FC 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 FC 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 FC devices on your IntraServer™ adapter are not identified by your system, check the following:

- Is the FC 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.

### 4.7.3 Verifying Installation

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

Step 1. Power-up 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* FC interface on an LSIFC929X-based adapter.
- `/pci@8,700000/IntraServer,fc@1,1` identifies the *second* FC interface on an LSIFC929X-based adapter.
- An LSIFC919X-based adapter shows only one such FC device.

**Note:** The above listing is an example. The **show-devs** output 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 reseal the adapter in the PCI slot if necessary.

## 4.7.4 Adapter-Specific Settings

In certain circumstances, advanced users 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 FC bus speed, host adapter ID (SCSI only: not applicable to FC), 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 because some commands (such as forcing 1 Gbit/s operation on a 2 Gbit/s FC loop) could render the bus unusable.

#### 4.7.4.1 **select Command**

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

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

#### 4.7.4.2 **.properties Command**

Use the **.properties** command 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
```

### 4.7.4.3 show-children Command

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

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
```

## 4.7.5 Interrupt Coalescing

The LSI Logic host adapters can complete multiple I/O requests per host interrupt. Interrupt coalescing is used to reduce CPU interrupts by pooling multiple disk command completions (I/O) into one interrupt. This feature may be enabled or disabled.

LSI Logic has performed significant testing under multiple I/O conditions and has determined that interrupt coalescing can be very valuable for small transfer lengths or random, transaction-oriented I/O workloads. For this type of workload, LSI Logic recommends that the Interrupt Coalescing values be set to a queue depth of 9, with a timeout of 1280 (0x500)  $\mu$ s. This means that the host is interrupted only once for 9 I/Os processed by the chip, unless 1280  $\mu$ s have passed since the host was last interrupted. If the workload is of a large transfer length and sequential, LSI Logic recommends that interrupt coalescing be disabled to prevent performance degradation.

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 nonvolatile 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
```

**Note:** The OpenBoot BIOS provides help when you enter a command that does not contain the proper arguments. In this case, OpenBoot responds with:

```
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.

## 4.7.6 Set FC Link Speed

There are two modes of operation for FC: 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 autonegotiation on the 2 Gbit/s-capable, Fusion-MPT devices. If you are experiencing difficulty with the AutoNegotiate algorithm on your fabric or loop, or if you wish to set or show the link speed for the adapter manually, 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
```

**Note:** The OpenBoot BIOS provides help when you enter a command that does not contain the proper arguments. In this case, OpenBoot responds with:

```
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.

## 4.7.7 Persistent Device Naming

One of the most powerful benefits of storage area networks (SANs) is scalability; the freedom to quickly add or delete storage components. To facilitate trouble-free SAN reconfigurations, you can save a list of devices currently connected to the host adapter. Later, if certain devices are powered off, the adapter ensures that the remaining devices appear at the same mount point. Technically, the LSI Logic host adapter “locks” the association of an FC target with an alias name reference. The LSI Logic host adapter manages the details. When you mark a device persistent, mapping information is saved on the LSI Logic host adapter in a nonvolatile memory device.

The following is an example of how to save devices in the persistent device table using LSI Logic Fcode:

Step 1. Select the controller you want to modify, making a selection from the list as shown in [Figure 4.1](#).

### Figure 4.1 Select Controller

```
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
```

Step 2. From the displayed list, select a device to mark persistent as shown in [Figure 4.2](#).

### Figure 4.2 Select Device

```
/pci@1f,0/pci@1/IntraServer,fc@2/disk has been selected.
```

```
ok select /pci@1f,0/pci@1/IntraServer,fc@2
ok show-children
MPT Firmware Version 1.02.12
Target 0
Unit 0 Disk SEAGATE ST39173FC 6615
WWN 200000203710c4e8 PortID a3
```

Step 3. Type ^Y (Ctrl-Y) to insert disk name in the command line as shown in [Figure 4.3](#).

### Figure 4.3 Inserting Disk Name in Command Line

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

**Note:** The OpenBoot BIOS (Fcode) provides help when you enter a command that does not contain the proper arguments. In this case, OpenBoot responds with usage syntax.

### Figure 4.4 Setting Device 0 as Persistent

```
ok 0 0 set-persistent
ok show-persistent
Entry 1 WWN 200000203710c4e8 Target 0
```

**Note:** The command sequence in [Figure 4.4](#) records an entry for device 0, as item 0 in the persistent device list.

### Figure 4.5 Clearing Persistent Device Map

```
ok 1 clear-persistent
Entry 1 has been cleared
ok show-persistent
ok
```

**Note:** The command sequence in [Figure 4.5](#) may be used to clear an entry in the persistent device map.

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

## 4.7.8 Manual Selection of FC Topology

Under certain configurations, you may want to force the selection of FC topology and disable the auto detect mechanism in the FC adapter. This can be done on a port-by-port basis by using the following procedure.

**Note:** It should not be necessary to change from automatic detection of topology. Also, firmware version 1.00.03 is the earliest version to support this functionality.

The following is an example of how to select a manual topology N\_Port or NL\_Port on a selected FC 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
           2    N_Port
           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.

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