USER'S GUIDE

Fusion-MPT™ Device Management

January 2007

Version 1.3

LSI LOGIC®

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Document Description

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This document describes version 1.3 of LSI Logic Corporation's Fusion-MPT driver and utility products and will remain the official reference source for all revisions/releases of these products until rescinded by an update.

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Preface

This User's Guide is the primary reference for installing, configuring, and using the Fusion-MPT™ (Message Processing Technology) firmware, device drivers, and utilities. Much of the information about device drivers and utility programs is derived from the readme files for those drivers and utilities.

The Fusion-MPT product encompasses Fusion-MPT firmware architecture, SCSI hardware architecture, Fibre Channel (FC) hardware architecture, Serial Attached SCSI architecture, and the operating system level device drivers that support these architectures.

Audience

This book assumes you have some familiarity with storage systems and have had experience installing drivers in the Windows, NetWare, Linux, and Unix operating systems. The people who benefit from this book are:

- OEM customers
- End users

Organization

This document has the following chapters:

- Chapter 1, **Fusion-MPT Device Management Product**, provides general information about the Fusion-MPT device management product.

- Chapter 2, **Windows Driver Installation**, provides instructions for installing the Fusion-MPT device driver onto Window-based system. It provides detailed instructions for Window XP, Windows Server 2003, and Windows 2000.

- Chapter 3, **UNIX Operating System Device Drivers**, provides instructions for installing the Fusion-MPT device driver into Unix- and Linux-based operating system.

- Chapter 4, **NetWare Drivers**, provides instructions for installing the Fusion-MPT NetWare device driver.

- Chapter 5, **Host Adapter Flash Utility**, explains how to use the DOS-based LSI Flash Utility to download firmware and BIOS images to LSI Fibre Channel and Serial Attached SCSI controllers.

- Chapter 6, **Integrated RAID Configuration Utility**, explains how to use the CFGGEN Integrated RAID (IR) Configuration Utility to create Integrated Mirroring (IM), Integrated Mirroring Enhanced (IME) and Integrated Striping (IS) volumes.

- Chapter 7, **SCSI BIOS and Setup Utility**, describes the Fusion-MPT SCSI BIOS and Configuration Utility (CU) for 32-bit systems.

- Chapter 8, **SCSI EFI BIOS and Setup Utility**, describes the Fusion-MPT EFI and CU for 64-bit systems.

- Chapter 9, **Fusion-MPT SAS BIOS and Setup Utility**, provides instructions for using the Fusion-MPT SAS BIOS Configuration Utility to monitor and configure storage configurations.

- Chapter 10, **Fibre Channel BIOS and Configuration Utility**, explains how to use the LSI Fibre Channel BIOS and Configuration Utility to create RAID volumes on LSI Fibre Channel controllers.

Related Publications

MyStorage Management Software User's Guide, Document No. DB15-000308-03

MyStorage management software is designed to simplify storage area network (SAN) management and reduce SAN installation time. MyStorage management software automates the task of configuring an LSI storage adapter and connecting to storage devices. Features include host adapter information screens, diagnostics, and statistics gathering.

MyStorage management software is written in Java, making it portable across multiple operating systems. LSI offers MyStorage management software for Windows and Linux environments.

LSI53C1030 PCI-X to Dual Channel Ultra320 SCSI Multifunction Controller, Document No. DB14-000156-05

LSI53C1020/1020A PCI-X to Ultra320 SCSI Controller Technical Manual, Document No. DB14-000176-06

LSIFC949E PCI Express to 4 Bbit/s Fibre Channel Controller Technical Manual, Document No. DB14-000345-00

LSIFC949X Dual Channel Fibre Channel I/O Processor Technical Manual, Document No. DB14-000284-02

LSIFC929XL Dual Channel Fibre Channel I/O Processor Technical Manual, Document No. DB14-000272-01

LSIFC929X Dual Channel Fibre Channel I/O Processor Technical Manual, Document No. DB14-000202-02

LSIFC929 Dual Channel Fibre Channel I/O Processor Technical Manual, Document No. DB14-000135-02

LSIFC919X Single Channel Fibre Channel I/O Processor Technical Manual, Document No. DB14-000225-00

LSIFC919 Single Channel Fibre Channel I/O Processor Technical Manual, Document No. DB14-000151-02

LSIFC909 Fibre Channel I/O Processor Technical Manual, Document No. DB14-000150-01

LSISAS1068E PCI Express to 8-Port Serial Attached SAS Controller Technical Manual, Document No. DB14-000330-02

LSISAS1068 PCI-X to 8-Port to 4-Port Serial Attached SAS Controller Technical Manual, Document No. DB14-000287-04

LSISAS1064E PCI Express to 4-Port Serial Attached SAS Controller Technical Manual, Document No. DB14-000331-02

LSISAS1064 PCI-X to 4-Port Serial Attached SCSI/SATA Controller Technical Manual, Document No. DB14-000274-05

PCI-X to 3.0 Gbit/s SAS Host Adapters User's Guide, Document No. DB15-000333-02

Ultra320 SCSI to PCI-X Host Board Adapter User's Guide,
Document No. DB15-000192-03

4 Gbits/s Fibre Channel Host Adapters User's Guide,
Document No. DB15-00334-02

2 Gbits/s Fibre Channel Host Adapters User's Guide,
Document No. DB15-00264-02

Conventions Used in This Manual

Hexadecimal numbers are indicated by the prefix "0x" —for example,
0x32CF. Binary numbers are indicated by the prefix "0b" —for example,
0b0011.0010.1100.1111.

Revision History

Revision	Date	Remarks
Version 1.3	1/2007	Updated all driver chapters from the most recent readme files. Added chapters on SAS configuration utility and CFGGEN utility. Many other edits and updates.
Version 1.2	7/2002	Added the SCSI Flash and NVDATA utilities chapter. Added the CIM Solution chapter. Added the Linux IM CU chapter. Combined the Unix OSes into a single chapter. Combined the Windows OSes into a single chapter. Added the Linux and Linux CU. Added the SCSI EFI and Configuration Utility chapter. Updated the Fibre Channel BIOS chapters. Updated SCSI CU and BIOS.
Preliminary Version 1.0	9/2001	Initial release of document.

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Chapter 1
Fusion-MPT Device Management Product

This chapter provides general information about the Fusion-MPT device management technology and about the contents of this document. This chapter contains the following sections:

- Section 1.1, "Fusion-MPT Overview"
- Section 1.2, "Fusion-MPT Features"

LSI provides a common device-level interface for Fusion-MPT compatible devices. Fusion-MPT architecture provides an open programming interface that supports a single binary device driver for LSI Ultra320 SCSI, Fibre Channel, and SAS solutions. LSI also provides a complete suite of common drivers, including the Windows, Linux, Solaris, and NetWare operating systems.

This document explains how to install and use the Fusion-MPT firmware, BIOS, and device drivers for the supported operating systems. It also documents the Fusion-MPT Common Information Model (CIM) Solution, which provides a user interface for monitoring storage systems on a network.

1.1 Fusion-MPT Overview

Fusion-MPT architecture is the newest generation of I/O architecture designed to deliver the highest performance available today.

The main elements of Fusion-MPT architecture are the Fusion-MPT firmware architecture, the Fibre Channel and SCSI hardware architecture, and the operating system level drivers that support these architectures. Fusion-MPT architecture offers the unique feature of having a single binary, operating system driver that supports both Fibre Channel and SCSI devices now and other bus architectures in the future. Figure 1.1 illustrates the Fusion-MPT architecture.

Figure 1.1   Fusion-MPT Architecture
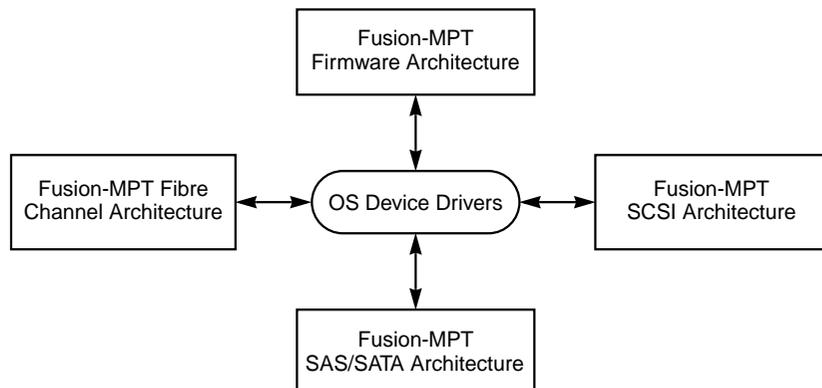
The message passing interface defines the host interface used by all LSI Common Architecture chipsets, such as the Fibre Channel LSIFC929, LSIFC929X, LSIFC949X, LSIFC949E; the SCSI LSI53C1020, LSI53C1030 chips; and the Serial Attached SCSI SAS1064, SAS1068, SAS1068E, and SAS1078 RAID on-a-Chip (ROC). These chips use the high-performance ARM® or PowerPC processor. Benefits of the ARM processor include reduced host CPU utilization and a decreased number of host interrupts per I/O. Using the Fusion-MPT architecture in all of its Common Architecture Chipsets, the host does not need to know the underlying bus protocol architecture to be able to communicate with the target devices.

1.2 Fusion-MPT Features

The Fusion-MPT design supports a single binary device driver, a message passing interface, intelligent firmware, and various hardware cores.

1.2.1 Fusion-MPT Firmware

The LSI Parallel SCSI, SAS, and Fibre Channel controllers contain firmware that presents a multi-protocol service layer based on the Fusion-MPT architecture. The firmware isolates the host drivers from the hardware and controls the device side of the message passing interface to the host device drivers. The firmware manages all phases of an I/O request and optimizes interrupt management for the system. For Fibre Channel, the firmware also manages all FC-2 through FC-4 services, which minimizes the amount of Fibre Channel unique services required with the host device driver.

1.2.2 Fusion-MPT Hardware

The Fusion-MPT hardware encapsulates various technologies that deliver new levels of performance. GigaBlaze transceivers are utilized in the Fusion-MPT technology based Fibre Channel and SAS products. LVDlink™ transceivers ensure robust, high-performance SCSI transfers in the Fusion-MPT architects Parallel SCSI product family.

Fusion-MPT Device Management Product

Chapter 2
Windows Driver Installation

This chapter describes the SYMMPI.SYS, LSI_FC.SYS, LSI_SCSI.SYS, and LSI_SAS.SYS drivers for Windows-based operating systems and provides driver installation instructions for Windows XP and Windows Server 2003. This chapter contains the following sections:

- Section 2.1, "Description of Windows Device Drivers"
- Section 2.2, "Installing the Windows XP Driver"
- Section 2.3, "Windows Server 2003 Drivers"

2.1 Description of Windows Device Drivers

Microsoft and LSI provide two types of miniport device drivers:

- The SYMMPI.SYS ScsiPort based driver, called the "LSI PCI Fusion-MPT MiniPort Driver"

- Several StorPort drivers: LSI_FC.SYS (LSI Fusion-MPT FC StorPort Driver), LSI_SCSI.SYS (LSI Fusion-MPT SCSI StorPort Driver), and LSI_SAS.SYS (LSI Fusion-MPT SAS StorPort Driver)

These drivers complete the path to the LSI controller with an optional SCSI or FC BIOS.

2.2 Installing the Windows XP Driver

This section describes the `SYMMPI.SYS` driver for Windows XP for 32-bit and 64-bit systems and explains how to install and configure it. This section includes these topics:

- Section 2.2.1, "Introducing the Windows XP Driver"
- Section 2.2.2, "Driver Features and LSI Device Support"
- Section 2.2.3, "Preparing to Install the Windows XP Driver"
- Section 2.2.4, "Installing the Driver on a New Windows XP System"
- Section 2.2.5, "Installing the Driver on an Existing Windows XP System"
- Section 2.2.6, "Performance Tuning for Windows XP"
- Section 2.2.7, "Hibernation Support"
- Section 2.2.8, "Troubleshooting"

2.2.1 Introducing the Windows XP Driver

Windows XP is designed to run on Intel-architecture (32-bit) and Itanium Processor Family (64-bit) processors using current technology. An I/O manager handles I/O requests in Windows XP. To address a SCSI peripheral, the I/O manager goes through the appropriate drivers. Windows XP provides class drivers for hard disk, optical, CD-ROM, printer, and scanner peripherals. Other class drivers, provided by peripheral manufacturers, may be added to support new devices. Tape device support is built into the operating system itself and does not require a class driver.

Microsoft provides the port driver and LSI provides the `SYMMPI.SYS` miniport driver. This driver completes the path to the LSI controller or processor with an optional SCSI or Fibre Channel BIOS.

LSI uses the same filenames for their drivers for different Windows operating systems. The driver files are packaged either in separate subdirectories based on the Windows operating system or on different disks. To determine the driver file for Windows XP, note that the filename ends with `.SYS`. For example, this driver is `SYMMPI.SYS`.

To determine the operating system version, open Windows Explorer, find the driver file, right click on the filename, click on **Properties**, and click on the **Version** tab. Click on the Internal Filename in the lower section. For Windows XP, the filename appears as filename (XP32) for 32-bit systems and filename (XP64) for 64-bit systems.

The SYMMPI.SYS driver meets the Microsoft specification for miniport drivers. This driver allows connection of parallel SCSI and Fibre Channel devices including disk drives, CD-ROMs, and tape drives for PCI and PCI-X based machines. To support a different SCSI or Fibre Channel device type, the Windows XP architecture requires that a class driver for that type of device be present (usually supplied by Microsoft, or possibly by the peripheral manufacturer). No changes to SYMMPI.SYS are required. The driver supports Windows XP and all subsequent Service Packs.

2.2.2   Driver Features and LSI Device Support

The SYMMPI.SYS miniport driver supports these features:

- 320 Mbyte/s parallel SCSI transfers (for LSI53C1020 and LSI53C1030 controllers)

- Integrated Mirroring technology (for LSI53C1020 and LSI53C1030 controllers)

- PCI and PCI-X bus protocols (for LSI53C1020 and LSI53C1030 controllers)

- 2 Gbaud Fibre Channel transfers (for LSIFC929XL and LSIFC919XL controllers)

- 4 Gbaud Fibre Channel transfers (for LSIFC949X and LSIFC949E controllers)

- LSI MPT common software interface

- Multiple host adapters

- Multiple Logical Unit Numbers (LUNs)

- Scatter-Gather

- SCSI pass-thru functionality

- Disk array configurations with no LUN 0

- Disk array configurations with non-contiguous LUNs

- Auto request sense

- Maximum block size support: 1 Mbyte (32-bit), 2 Mbyte (64-bit)

The SYMMPI.SYS driver supports the following LSI controller chips and their associated host adapters:

- LSI53C1020 (LSI20320)

- LSI53C1030 (LSI21320, LSI22320)

- LSIFC919 (LSI40919O, LSI40919LO, LSI40919H, LSI40919LH)

- LSIFC919X (LSI7102XP)

- LSIFC929 (LSI44929O, LSI44929LO, LSI44929H, LSI44929LH, 7004G2-LC)

- LSIFC929X (LSI7202XP, LSI7402XP)

2.2.3 Preparing to Install the Windows XP Driver

Before you install the SYMMPI.SYS driver onto a new or existing Windows XP system, you need to create a driver diskette. To do this, copy the following files from the LSI CD-ROM or the LSI website to the root directory of a clean diskette and label it **Windows XP Driver Diskette**:

```
\txtsetup.oem
\symmpi.tag
\32_bit\lsipseud.inf
\32_bit\mpixp32.cat
\32_bit\symmpi.inf
\32_bit\symmpi.sys
\64_bit\lsipseud.inf
\64_bit\mpixp64.cat
\64_bit\symmpi.inf
\64_bit\symmpi.sys
```

Note: You can download the most current Windows XP drivers from www.lsi.com/support. Click on **Downloads**. Next, click on **Download Center**. Select the product category, then the appropriate product. A bullet in the Drivers section will display all driver packages associated with the product selection.

2.2.4 Installing the Driver on a New Windows XP System

Follow this procedure to install the SYMMPI.SYS driver on a new Windows XP system. During installation, Windows XP automatically adds the driver to the registry and copies it to the appropriate directory. To install Windows XP you must boot the PC from the Windows XP CD-ROM. Refer to your system documentation if you need to change BIOS settings to enable the PC to boot from a CD-ROM.

1. Boot the system from the Windows XP CD-ROM.

2. Press **F6** to install the SYMMPI.SYS driver when the screen displays the message Windows Setup.

    Note: You must press **F6** in order for the system to recognize the new driver. Otherwise, the system will not recognize the devices controlled by the driver during Windows XP setup.

3. Select **S** to specify an additional device when the screen displays the following message:

    Setup was unable to load support for the mass storage
    device you specified...

    Note: If this message does not appear, the Setup program did not recognize the F6 key press. If this happens, reboot the system and try again.

    The system prompts you for the manufacturer-supplied hardware support disk.

4. Insert the Window XP Driver Diskette that you prepared earlier and press **Enter**.

5. The screen displays a list of two drivers:

    LSI Logic PCI SCSI/FC MPI Driver (XP 32-bit)
    LSI Logic PCI SCSI/FC MPI Driver (XP 64-bit)

6. Select either the 32-bit or 64-bit driver by highlighting it, and press **Enter** to continue.

    You are returned to the Windows XP Setup screen.

7. Press **Enter** to continue.

    A message appears to notify you that Setup is loading files.

8. Follow the Windows XP installation procedure from this point to complete the installation.

2.2.5 Installing the Driver on an Existing Windows XP System

This procedure installs or upgrades the SYMMPI.SYS driver on an existing Window XP system.

> Note: When an LSI adapter is added to an existing system installation, Windows XP automatically detects the new adapter at the next reboot. When the Device Driver Wizard appears at boot, click the **Next** button and continue at step 8 below.

1. Boot Windows XP and logon as a user with Administrator privileges.

2. Click the **Start** button, then right-click **My Computer** in the menu.

3. Select **Properties**.

4. Click the **Hardware** tab, and then click the **Device Manager** button.

5. Click the plus sign to the left of the SCSI and RAID controllers line. Double-click the entry for the adapter whose driver you want to upgrade.

6. Click the **Driver** tab.

   Information on the currently installed driver is displayed. You can view more driver information by clicking the **Driver Details** button.

7. Click the **Update Driver** button to update the existing driver. The Hardware Update Wizard starts.

8. Click **Install from a list or specific location...**, then click **Next**.

9. Click **Don't search, I will choose the driver to install**, then click **Next**.

10. Click **Have Disk** and type the path to the driver, or click **Browse**. Drivers for 32-bit systems are in the \32_bit directory and drivers for 64-bit systems are in the \64_bit directory.

11. Select the path to the driver, and click **OK**.

12. Select the driver from the list and click **Next**.

13. Click **Next** again to start the driver update.

    In some cases, a message will appear stating that this driver has not passed logo testing. In other words, it is a nonsigned driver.

    > Note: Drivers are digitally signed by the Microsoft Windows Hardware Quality Lab (WHQL) when they complete logo

testing. Due to the time lag between the LSI general customer release of Windows drivers and the completion of WHQL logo testing, some drivers distributed with adapters or downloaded from the LSI web site may not be digitally signed.

14. Click **Continue Anyway** to continue the installation, or click **STOP Installation** if you do not want to install an unsigned driver.

    The system loads the driver from the Windows XP driver diskette. A message may appear indicating that the target (existing) driver is newer than the source (upgrade) driver.

15. Click **Yes** to continue the installation, or click **No** to cancel the driver upgrade at this point.

    Windows copies the driver to the system disk. For any adapter other than the boot adapter, the updated driver becomes active immediately. For the boot adapter, a message appears indicating that you must reboot your system in order for the new driver to take effect.

16. Click **Finish** to complete the driver upgrade.

2.2.6 Performance Tuning for Windows XP

Windows XP has registry entries that you can use to tune SCSI I/O performance for certain configurations. The tunable parameters are *large transfer block size support* and *guaranteed number of concurrent I/Os* for a particular SCSI bus.

By default, the LSI ScsiPort and StorPort miniport drivers provide optimum performance in most standard computer systems. Some nonstandard systems require fine tuning to obtain peak system memory utilization and performance. If you observe less than the advertised functionality and performance on any platform after installation, contact LSI Technical Support. Go to the LSI technical support home page at:

`http://www.lsi.com/support/index.html#hotline`

and call the listed number for assistance. LSI can provide additional registry settings to customize the driver for specific systems and applications.

2.2.6.1 Large Block Size Support

The SYMMPI.SYS driver can support up to a 1 Mbyte transfer size in Windows XP; however, the default Windows XP transfer size is 64 Kbytes. To enable better performance, the driver installation process adds a registry entry to enable the maximum 1 Mbyte transfer size. Also, the mpi_256K.reg file can be used to set or enable a 256 Kbyte maximum transfer size, and it can be edited to set other maximum transfer sizes as well. There are two ways to add this registry setting:

- Locate the mpi_256K.reg data file using Windows Explorer, double-click on the file, and edit it.

- Type the following at the command prompt:

  regedit mpi_256K.reg

  This command inserts an entry in the registry to enable 256 Kbyte block size support.

By editing mpi_256K.reg, you can set any maximum block size between 64 Kbytes and 1 Mbyte. The formula to calculate the proper value for MaximumSGList in a 32-bit OS is:

MaximumSGList = ((Maximum Block Size)/4 Kbytes) + 1

For example, to determine the MaximumSGList value for 256 Kbytes in a 32-bit OS, take ((256 Kbytes/4 Kbytes) +1) = 65 (or 0x41 in hexadecimal).

The maximum value allowed for MaximumSGList is 0xFF (255 decimal). For the particular value of 0xFF, the internal value passed to Windows XP is increased to 0x101, allowing support for a full 1 Mbyte transfer.

Read the information in the mpi_256K.reg data file before editing it. You must reboot the system for the new registry setting to take effect.

For 64-bit systems, the OS page size is 8 Kbytes instead of 4 Kbytes. Therefore, the maximum transfer size is 2 Mbytes, and the default driver installation enables support for 512 Kbytes transfer size. The formula to calculate the MaximumSGList is:

MaximumSGList = ((Maximum Block Size)/8 Kbytes) + 1

To reset the maximum block size to the default of 64 Kbytes, follow the instructions above, except use mpidfblk.reg as the data file.

2.2.6.2 Maximum Number of Concurrent I/Os (Guaranteed)

Windows XP guarantees a maximum of 32 concurrently active I/Os on a particular SCSI bus. Due to the method of memory allocation, the actual limit of concurrent I/Os can vary between different drivers or versions of drivers. This can have a significant impact on performance benchmarking between different driver versions or adapter vendors. In effect, one adapter may be able to support 70 or 80 outstanding I/Os, while another adapter could support only 32 outstanding I/Os. This can also affect systems with high performance storage subsystems, such as disk arrays.

To enable better performance, the driver installation process adds a registry entry to support 255 concurrent I/Os. If you want a different maximum value, you can use the `mpi100io.reg` data file to add a registry entry that sets the maximum number of concurrent I/Os. There are two ways to add this registry setting:

- FInd the `mpi100io.reg` data file using Windows Explorer, double-click on the file name, and edit it to change the maximum concurrent I/Os to some other number. (This file is included with the driver files.)

- Type the following at the command prompt:

      regedit mpi100io.reg

  This command inserts an entry in the registry to guarantee a maximum of 100 concurrent I/Os per adapter.

Be sure to read the information in the `mpi100io.reg` data file before editing it. If you set the number of concurrent I/Os to a high number, large amounts of non-paged pool memory (a critical NT resource) will be used and system performance can be degraded.

To reset the guaranteed number of concurrent I/Os to the Windows XP default of 32, follow the instructions above but use `mpidefio.reg` as the data file.

You must reboot the system for the new registry settings to take effect.

2.2.7 Hibernation Support

The LSI Fusion-MPT storage adapters and the `SYMMPI.SYS` driver are high-performance storage solutions. This performance level requires more resources than typical storage adapters. Windows XP supports this resource level adequately during normal operations. However, due to

limitations imposed by Windows XP, when attempting to Hibernate the system may fail to Hibernate and display the following error message:

```
Windows - System Error Insufficient system resources exist
to complete the API.
```

To allow Windows XP to Hibernate successfully, all critical Windows update patches should be applied to the system. These patches can be downloaded at:

> http://windowsupdate.microsoft.com

2.2.8 Troubleshooting

The SYMMPI.SYS driver logs error messages to the system error log. For these errors, the system errorlog EventID is 11, and the specific error code values are displayed at offset 0x10. Data is displayed in text format.

2.3 Windows Server 2003 Drivers

This section describes the LSI Fusion-MPT StorPort drivers for the Windows Server 2003 operating system and explains how to install them. There are three of the Windows Server 2003 drivers:

- LSI_SCSI.SYS (StorPort) for U320 SCSI
- LSI_FC.SYS (StorPort) for Fibre Channel
- LSI_SAS.SYS (StorPort) for Serial Attached SCSI (SAS)

This section has the following topics:

- Section 2.3.1, "Introducing the Windows Server 2003 Drivers"
- Section 2.3.2, "Driver Features and LSI Device Support"
- Section 2.3.3, "Preparing to Install the Windows Server 2003 Drivers"
- Section 2.3.4, "Installing the Driver on a New Windows Server 2003 System"
- Section 2.3.5, "Installing the Driver on an Existing Windows Server 2003 System"
- Section 2.3.6, "Performance Tuning for Windows Server 2003"
- Section 2.3.7, "Troubleshooting"

2.3.1 Introducing the Windows Server 2003 Drivers

Windows Server 2003 runs on Intel architecture (32-bit), Itanium Processor Family (IA-64), and Extended-64 (AMD64/EM64T) processors. A Windows application uses the SCSI pass-thru facility to pass SCSI commands directly to the parallel SCSI, Fibre Channel, or SAS Protocol devices. This facility allows applications to directly control and access devices by filling in a data structure and calling into the port or class driver. Windows Server 2003 provides class drivers for hard disk drives, optical drives, CD-ROM drives, printers, and scanners. Other class drivers, provided by peripheral manufacturers, may be added to support new devices. (Tape device support is built into the operating system itself and does not require a class driver.)

Microsoft provides the port driver and LSI provides the `LSI_SCSI.SYS`, `LSI_FC.SYS`, and `LSI_SAS.SYS` miniport drivers. These drivers complete the path to the LSI controller or processor with an optional U320 SCSI, Fibre Channel, or SAS BIOS. The `LSI_SCSI.SYS`, `LSI_FC.SYS` and `LSI_SAS.SYS` drivers meet the Microsoft specification for miniport drivers. These drivers allow connection of parallel SCSI, Fibre Channel, and SAS devices including disk drives, CD-ROM drives, and tape drives for PCI and PCI-X based systems. The drivers support all Windows Server 2003 Service Packs.

The LSI miniport drivers use the Microsoft StorPort port driver (instead of the Microsoft ScsiPort driver used in earlier versions of Windows). The StorPort driver has architectural enhancements that provide performance improvements on large server systems with many storage adapters. The miniport drivers are designed to take advantage of these enhancements for improved performance.

2.3.2 Driver Features and LSI Device Support

The `LSI_SCSI.SYS`, `LSI_FC.SYS`, and `LSI_SAS.SYS` miniport drivers support the following:

- 320 Mbytes/s parallel SCSI transfers for LSI53C1020 and LSI53C1030 controllers using the `LSI_SCSI.SYS` driver

- 1 Gbyte, 2 Gbyte, and 4 Gbyte Fibre Channel transfers for LSIFC949X, LSIFC939X, LSIFC929X, LSIFC919X, LSIFC929, and LSIFC919 controllers using the `LSI_FC.SYS` driver

- End-to-End Data Protection (EEDP) for LSIFC949X and LSIFC939X controllers

- 1.5 Gbyte and 3 Gbyte SAS expanders/devices and SATA devices for the LSISAS1064 controller using the `LSI_SAS.SYS` driver.

- PCI and PCI-X bus protocols

- LSI Fusion-MPT common software interface

- Multiple host adapters

- Multiple Logical Unit Numbers (LUNs)

- Scatter-Gather operations

- SCSI pass-thru functionality

- Disk array configurations with no LUN 0

- Disk array configurations with non-contiguous LUNs

- Auto request sense

- Maximum block size support: 1 Mbyte (32-bit systems), 2 Mbyte (64-bit systems)

- Microsoft WMI HBA API for Fibre Channel devices using the `LSI_FC.SYS` driver.

The miniport drivers support the following LSI devices and associated host adapters:

- The `LSI_SCSI.SYS` driver supports the LSI53C1020, LSI53C1020A, LSI53C1030, and LSI53C1030T controllers.

- The `LSI_FC.SYS` driver supports the LSIFC919, LSIFC919X, LSIFC929, LSIFC929X, LSIFC939X, and LSIFC949X controllers.

- The `LSI_SAS.SYS` driver supports the LSISAS1064 and LSISAS1068 controllers.

2.3.3 Preparing to Install the Windows Server 2003 Drivers

Before you install the LSI Windows Server 2003 drivers on a new or existing system, you must create a driver installation CD. To do this, copy the files listed in Table 2.1 from the LSI CD-ROM or the LSI website to the root directory of a writable CD-ROM and label it **Windows Server 2003 Driver Installation**.

Table 2.1   Files for Windows 2003 Server Driver Installation CD

Driver	Files to Copy to Driver Installation CD
LSI_SCSI.SYS	\txtsetup.oem \lsi_scsi.tag \i386\p2k332.cat \i386\lsi_scsi.inf \i386\lsi_scsi.sys \IA64\p2k3ia64.cat \IA64\lsi_scsi.inf \IA64\lsi_scsi.sys \AMD64\p2k3am64.cat \AMD64\lsi_scsi.inf \AMD64\lsi_scsi.sys
LSI_FC.SYS	\txtsetup.oem \lsi_fc.tag \i386\f2k332.cat \i386\lsi_fc.inf \i386\lsi_fc.sys \IA64\f2k3ia64.cat \IA64\lsi_fc.inf \IA64\lsi_fc.sys \AMD64\f2k3am64.cat \AMD64\lsi_fc.inf \AMD64\lsi_fc.sys
LSI_SAS.SYS	\txtsetup.oem \lsi_sas.tag \i386\s2k332.cat \i386\lsi_sas.inf \i386\lsi_sas.sys \IA64\s2k3ia64.cat \IA64\lsi_sas.inf \IA64\lsi_sas.sys \AMD64\s2k3am64.cat \AMD64\lsi_sas.inf \AMD64\lsi_sas.sys

> Note: You can download the most current Windows Server 2003 drivers from www.lsi.com/support. Click on **Downloads**. Next, click on **Download Center**. Select the product category, then the appropriate product. A bullet in the Drivers section will display all driver packages associated with the product selection.

In the following driver installation sections, LSI_xxx means the LSI_SCSI, LSI_FC, or LSI_SAS driver, depending on which driver you are installing.

2.3.4 Installing the Driver on a New Windows Server 2003 System

Follow this procedure to install the LSI_xxx.SYS driver onto a new Windows Server 2003 system. Windows Server 2003 automatically adds the driver to the registry and copies the driver to the appropriate directory.

> Note: Windows Server 2003 contains a SYMMPI.SYS driver that supports the U320, 919, and 929 devices. When you perform a fresh installation with a device that is supported by the bundled SYMMPI.SYS driver, you cannot load the LSI_xxx.SYS driver using the F6 key. Pressing this key has no effect, and the SYMMPI.SYS driver is used. To use the LSI_xxx.SYS driver, you must upgrade the driver after the installation has completed, as described in Section 2.3.5, "Installing the Driver on an Existing Windows Server 2003 System."

A CD-ROM is used to install Windows Server 2003 on a new system. Follow these steps for a new system installation:

1. Boot from the Windows Server 2003 CD-ROM. If necessary, change the BIOS settings to enable CD-ROM booting.

2. Press **F6** to install the LSI_xxx.SYS driver when the screen displays *Windows Setup*.

> Note: You must press **F6** in order for the system to recognize the new driver. Otherwise, the system will not recognize the devices controlled by the driver during Windows Server 2003 setup.

3. Select **S** to specify an additional device when the screen displays the following message:

```
Setup could not determine the type of one or more mass
storage devices...
```

> Note: If this message does not appear, the Setup program did not recognize the F6 key press. If this happens, reboot the system and try again.

The system prompts you for the manufacturer-supplied hardware support disk.

4. Insert the CD-ROM containing the Windows Server 2003 driver required to support your LSI adapter(s) and press **Enter**.

The screen lists three driver selections:

– LSI Fusion-MPT *xxx* Driver (Server 2003 32-bit)

– LSI Fusion-MPT *xxx* Driver (Server 2003 IA-64)

– LSI Fusion-MPT *xxx* Driver (Server 2003 AMD64)

(where *xxx* is SCSI, FC, or SAS, depending on which driver is being installed)

5. Select the driver that matches the processor architecture of the system (32-bit, IA-64, or AMD64). For Intel EM64T architecture processors, use the AMD64 driver.

6. Press **Enter** to continue. You are returned to the Windows Server 2003 Setup screen.

7. Press **Enter** to continue.

The message about setup loading files appears.

8. Follow the Microsoft Windows Server 2003 installation procedure at this point.

2.3.5 Installing the Driver on an Existing Windows Server 2003 System

Follow these steps to install or upgrade the LSI_xxx.SYS drivers onto an existing Windows Server 2003 system.

Note: When an LSI SCSI, Fibre Channel, or SAS adapter is added to an existing system installation, Windows automatically detects the new adapter at the next reboot. When the Device Driver Wizard appears at boot, click the **Next** button and continue at step 8 below.

1. Boot Windows Server 2003 and logon as a user with Administrator privileges.

2. Click the **Start** button, then right-click **My Computer** on the menu.

3. Select **Properties**.

4. Click the **Hardware** tab, and then click the **Device Manager** button.

5. Click the plus sign to the left of the SCSI and RAID controllers line. Double-click the entry for the adapter whose driver you want to upgrade.

6. Click the **Driver** tab.

   Information about the currently installed driver is displayed. You can view more driver information by clicking the **Driver Details** button.

7. Click **Update Driver** to update the existing driver. The Hardware Update Wizard starts.

8. Click **Install from a list or specific location...**, and then click **Next**.

9. Click **Don't search, I will choose the driver to install**, and then click **Next**.

10. Click **Have Disk** and type the path to the driver, or click **Browse**. Drivers for 32-bit systems are in the \i386 directory. Drivers for IA-64 systems are in the \IA64 directory. Drivers for AMD64/EM64T systems are in the \AMD64 directory.

11. When the path to the driver has been selected, click **OK**.

12. Select the driver from the list and click **Next**.

13. Click **Next** again to start the driver update.

    In some cases, a message appears saying that this driver has not passed logo testing—in other words, it is a nonsigned driver.

    Note: Drivers are digitally signed by the Microsoft Windows Hardware Quality Lab (WHQL) when they complete logo testing. Due to the time lag between the LSI general customer release of Windows drivers and the completion of WHQL logo testing, some drivers distributed with adapters or downloaded from the LSI web site may not be digitally signed.

14. Click **Continue Anyway** to continue the installation, or click **STOP Installation** if you do not want to install an unsigned driver.

    The system loads the driver from the Windows Server 2003 driver CD-ROM. A message box may appear indicating that the target (existing) driver is newer than the source (upgrade) driver.

15. Click **Yes** to continue the installation, or click **No** to cancel the driver upgrade.

The system copies the driver to the system disk. For any adapter other than the boot adapter, the updated driver becomes active immediately. For the boot adapter, a message box appears indicating that you must reboot your system for the new driver to take effect.

16. Click **Finish** to complete the driver upgrade.

2.3.6   Performance Tuning for Windows Server 2003

Windows Server 2003 has registry entries that you can use to tune the performance of SCSI I/O for certain configurations. The tunable parameter for LSI_xxx.SYS is a guaranteed number of concurrent I/Os for a particular SCSI bus.

The LSI_SCSI.SYS, LSI_FC.SYS, and LSI_SAS.SYS drivers are configured by default to provide optimum performance in most standard computer systems. Some nonstandard systems require fine tuning to obtain peak system memory utilization and performance. If you observe less than the advertised functionality and performance on any platform after installation, contact LSI Technical Support. Go to the LSI technical support home page at:

http://www.lsi.com/support/index.html#hotline

and call the listed number for assistance. LSI can provide additional registry settings to customize the driver for specific systems and applications.

2.3.6.1   Maximum Number of Concurrent I/Os (Guaranteed)

Windows Server 2003 guarantees a maximum of 32 concurrent I/Os active on a particular SCSI bus. However, due to the method of memory allocation, the actual limit of concurrent I/Os can vary greatly between different drivers or versions of drivers. This can have a large impact on performance benchmarking between different driver versions or adapter vendors. In effect, one adapter may actually be able to have 70 or 80 I/Os outstanding, while another adapter could only have 32. This can also affect systems with high performance storage subsystems, such as disk arrays.

To enable the best performance, the driver installation process adds a registry entry to support 255 concurrent I/Os. If you want a different maximum value, you can use the mpi100io.reg file to add a registry

entry that guarantees the desired number of concurrent I/Os. There are two ways to add this registry setting:

- Locate the `mpi100io.reg` data file (supplied with the driver files) using Windows Explorer, double-click on the file name, and edit the file.

- Type this command at the command prompt:

  `regedit mpi100io.reg`

  This command inserts an entry in the registry to guarantee a maximum of 100 concurrent I/Os per adapter.

If you want a different maximum number, you can edit the `mpi100io.reg` data file; however, setting this value to a high number uses increasing amounts of non-paged pool memory, a critical Windows resource. High values for this setting can degrade system performance. Be sure to read the information in the `mpi100io.reg` data file before editing it. You must reboot the system to activate the new registry setting.

To reset the guaranteed number of concurrent I/Os to the operating system default of 32, follow the instructions above, but use `mpidefio.reg` as the data file.

2.3.7 Troubleshooting

The `LSI_SCSI.SYS`, `LSI_FC.SYS`, and `LSI_SAS.SYS` drivers log error messages to the system error log. For these errors, the system error log EventID is 11, and the specific error code values are displayed at offset 0x10. Data should be displayed in words.

Chapter 3
UNIX Operating System Device Drivers

This chapter describe the Fusion-MPT device driver for various UNIX operating systems. This chapter contains the following sections:

- Section 3.1, "Installing the Solaris x86 Device Driver"
- Section 3.2, "Installing the Solaris SPARC Driver"
- Section 3.3, "Installing the UnixWare 7 and Open Unix 8 Device Driver"
- Section 3.4, "SCO OpenServer 5 Device Driver Installation"
- Section 3.5, "Installing the Fusion-MPT Linux Device Drivers"

3.1 Installing the Solaris x86 Device Driver

This section describes version 5.xx.xx of the LSI Fusion-MPT device driver for Solaris x86. This section includes the following topics:

- Section 3.1.1, "Introducing the Solaris x86 Driver"
- Section 3.1.2, "Driver Features and LSI Device Support"
- Section 3.1.3, "Preparing to Install the Solaris x86 Driver"
- Section 3.1.4, "Installing the Driver on an Existing Solaris x86 System"
- Section 3.1.5, "Installing the Driver on a New Solaris x86 System"

3.1.1 Introducing the Solaris x86 Driver

The LSI Solaris X86 driver, `itmpt`, allows the Solaris x86 operating system (for Solaris versions 8.0, 9.0, and 10.0) to interface with the devices connected to the LSI Ultra320 SCSI, SAS, and Fibre Channel host adapters. The LSI driver is optimized for low CPU overhead and

high I/O throughput, making use of the Fusion-MPT architecture. This driver takes advantage of new hardware features in the LSI Ultra320 SCSI, SAS, and LSI Fibre Channel chips to minimize CPU utilization, including interrupt coalescing, which can result in less than one interrupt per I/O.

The `lsiutil` utility, which is included with the `itmpt` driver, provides a wealth of functionality for displaying and modifying settings for LSI MPT adapters. You can execute `lsiutil` with no arguments to start an interactive session. You can also use the command `lsiutil -h` to view information about the `lsiutil` command line options. This utility is installed to `/usr/bin/lsiutil`.

In order to preserve a consistent mapping between Solaris target IDs and fibre channel target devices, the driver maintains a configuration file with entries that map each Solaris target ID to an FC target World Wide Name (WWN). Entries are created for all FC target devices; this is in addition to the Root Boot persistent target ID selection, which is configurable through the BIOS. By default, the `itmpt` driver does not maintain persistent bindings between targets and WWNs. However, persistent bindings are recommended for most RAID controllers such as Engenio RAID controllers. The `lsiutil` utility can be used to modify persistent bindings, similar to the way this is done through the BIOS. Additional entries can be made in the `/kernel/drv/itmpt.conf` configuration file. See the syntax and examples that are included in that file.

3.1.2 Driver Features and LSI Device Support

The Solaris x86 driver supports these features:

- State-of-the-art Fusion-MPT interface, providing support for FC, SCSI, SAS, and RAID devices with a single binary image

- Highly efficient, low CPU usage architecture

- Multiple host adapters

- Multiple Logical Unit Numbers (LUNs)

- Scatter-gather

- Disk array configurations with no LUN 0

- Disk array configurations with non-contiguous LUNs

- Multiprocessor environments.

The LSI Solaris X86 driver supports the following LSI host adapters:

- **Fibre Channel:** LSI7104XP, LSI7204XP, LSI7404XP, LSI7104XLP, LSI7204XLP, LSI7102XP, LSI7202XP, LSI7402XP, LSI7402EP, LSI7102XLP, LSI7202XLP, LSI44929, LSI44919
- **SCSI:** LSI22320-R, LSI21320-R, LSI20320-R
- **SAS (Serial Attached SCSI):** LSI3041X, LSI3442X, LSI3080X, LSI3800X

The LSI Solaris X86 driver supports the following LSI microchip controllers:

- LSIFC949X, LSIFC929X, LSIFC919X, LSIFC929, LSIFC919
- LSI53C1030, LSI53C1020
- LSI1064, LSI1064E, LSI1068, LSI1068E

3.1.3 Preparing to Install the Solaris x86 Driver

Your Solaris x86 system must have the following available resources in order to install the LSI Host Adapter and the itmpt Solaris x86 driver.

- **Host Bus Slot:** Sun Solaris system with available PCI slot
- **Operating System:** Solaris 8.0 release or later

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

> Note: When the itmpt driver initializes an LSI host adapter's disks, it attaches under the Sun sd target driver. To alter the probing of target IDs and probing for non-zero LUNs on devices attached to an LSI adapter, modify the /kernel/drv/sd.conf file.

3.1.4 Installing the Driver on an Existing Solaris x86 System

Follow these steps to install the itmpt driver on a system in which Solaris x86 is already installed:

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

1. Uncompress and untar the `itmpt-x86-XXX.tar.Z` file by typing the following commands in order to create a directory named install:

```
uncompress itmpt-x86-XXX.tar.Z
tar -xvf itmpt-x86-XXX.tar
cd install
```

2. Enter the following command to execute the `pkgadd` procedure and add the `itmpt` driver to the operating system:

```
pkgadd -d .
```

You will see the following text on the screen:

```
The following packages are available:

1 ITImpt LSI Logic FusionMPT(tm) Fibrechannel/SCSI drivers

        (X86) itmpt kit version 5.07.01
Select package(s) you wish to process (or 'all' to process
all packages).
        (default: all) [?,??,q]: 1

Processing package instance <ITImpt> from </floppy/lsilogic>

LSI Logic FusionMPT(tm) Fibrechannel/SCSI drivers (X86)
itmpt kit version 5.xx.xx

LSI Logic
Using </> as the package base directory.
## Processing package information.
## Processing system information.

2 package pathnames are already properly installed.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with
superuser permission during the process of installing
this package.

Do you want to continue with the installation of <ITImpt>
[y,n,?] y

Installing LSI Logic FusionMPT(tm)
Fibrechannel/SCSI drivers as <ITImpt>
## Installing part 1 of 1.
/kernel/drv/itmpt
/kernel/drv/itmpt.conf
```

```
[ verifying class <none> ]
## Executing postinstall script.

Following installation, please reboot the system to properly
configure and load the drivers.
Installation of <ITImpt> was successful.
```

3.1.5   Installing the Driver on a New Solaris x86 System

See your LSI host adapter user's guide for instructions if you are
installing a new LSI host adapter to support the system disk on a new
Solaris x86 installation. If you need to do this, you must first build an
Install Time Update (ITU) diskette using the `itmpt-x86-XXX-itu-YYY.dd`
file. Instructions for creating the diskette are included here for your
convenience. (The instructions are also in the `bldsol.txt` file.)

3.1.5.1   Preparing to Create the ITU Diskette

These directions are for the zip file distribution of the ITMPT driver
package. They assume you have already successfully unzipped the
contents of the original zip file into a directory somewhere on your
system's hard drive.

To create a ITMPT diskette for X86 Solaris installations, copy the raw
`itmpt-x86-XXX-itu-YYY.dd` image file onto a 1.44 Mbyte floppy
diskette.

>   Note: XXX indicates the driver version and YYY indicates the
>   version of Solaris that the image is for. `s9` is for Solaris 9
>   and `s10` is for Solaris 10.

See the following instructions for creating the ITU diskette on a Solaris
system or a DOS/Windows System.

3.1.5.2   Creating the ITU Diskette on a Solaris System

Follow these steps to create the ITMPT driver diskette on a Solaris
system:

1.   Insert a 3.5-inch diskette in the floppy disk drive.

2.   At the shell prompt, type the following:

```
# volcheck -v
# dd if=/<path>/itmpt-x86-XXX-itu.dd of=/vol/dev/aliases/floppy0 bs=32768
# eject floppy
```

<path> is the path name where the file `itmpt-x86-XXX-itu.dd` is located. The `dd` command copies the image to the floppy diskette, thus creating the ITMPT driver diskette.

3. Label this diskette *ITMPT Driver Diskette*.

3.1.5.3 Creating the ITU Diskette on a DOS or Windows System

To create the ITU diskette on a DOS or Windows system, you must use a utility that will copy the raw diskette image onto a 1.44 Mbyte floppy diskette. The easiest way to do this is to use `fdimage.exe`, a public domain utility written by Robert Nordier that is included in the zip file with the Solaris x86 driver.

The usage information and command syntax for fdimage is as follows. (This text appears on the screen when you enter the command name at the DOS prompt.)

Usage: `fdimage [-dqsv] [-f size] [-r count] file drive`

- `-d`: Debug mode
- `-f` *size*: Specify the capacity of the floppy disk; the choices are 160K, 180K, 320K, 360K, 720K, 1.2M, 1.44M, 2.88M
- `-q`: Quick mode: don't format the disk
- `-r` *count*: Retry count for format/write operations
- `-s`: Single-sector I/O
- `-v`: Verbose mode

The following command syntax example assumes that a formatted, 1.44 Mbyte diskette is inserted in the `a:` floppy drive and that all the files from the zip file are in the current working directory.

```
fdimage -qv itmpt-x86-XXX-itu.dd a:
```

This command works when running MS-DOS, Windows 9x, Windows ME, Windows NT, Windows 2000, or Windows XP. If you are running anti-virus software, it is recommended that you temporarily disable it when running `fdimage`. Otherwise, `fdimage` may not be able to get exclusive access to your floppy drive which it needs in order to write the image to a diskette.

When the diskette is created, label it *ITMPT Driver Diskette*.

3.2   Installing the Solaris SPARC Driver

This section provides instructions for installing version 5.xx.xx of the Solaris SPARC Fusion-MPT driver. This section includes the following topics:

- Section 3.2.1, "Introducing the Solaris SPARC Driver"
- Section 3.2.2, "Driver Features and LSI Device Support"
- Section 3.2.3, "Preparing to Install the Solaris SPARC Driver"
- Section 3.2.4, "Installing the Driver on an Existing Solaris SPARC System"
- Section 3.2.5, "Network System Installation of the Solaris SPARC Driver"

3.2.1   Introducing the Solaris SPARC Driver

The LSI driver, `itmpt`, allows the Solaris SPARC operating system to interface with the devices connected to the LSI Ultra320 SCSI, SAS, and Fibre Channel host adapters. The LSI driver is optimized for low CPU overhead and high I/O throughput, making use of the LSI Fusion-MPT architecture. LSI adapters have built-in FCode, designed to operate in the Sun OpenBoot environment, allowing devices to be available to the OpenBoot (ok) prompt. The driver takes advantage of new hardware features in the LSI Ultra320 SCSI, SAS, and Fibre Channel chips to minimize CPU utilization, including interrupt coalescing, which can result in less than one interrupt per I/O.

The `lsiutil` utility, which is included with the `itmpt` driver, provides a wealth of functionality for displaying and modifying settings for LSI MPT adapters. This includes updating the FCode, firmware, and BIOS on an MPT adapter as well as managing target persistence. You can execute `lsiutil` with no arguments to start an interactive session. You can also use the command `lsiutil -h` to view information about the `lsiutil` command line options. This utility is installed to `/usr/bin/lsiutil`.

For Fibre Channel adapters, the `lsiprobe` utility configures extended LUN support by automatically adding or deleting extended LUN support from the `/kernel/drv/ssd.conf` file, used by the `itmpt` driver.

3.2.2 Driver Features and LSI Device Support

The Solaris SPARC Fusion-MPT driver supports these features:

- State-of-the-art Fusion-MPT interface, providing support for Fibre Channel, SCSI, SAS, and RAID devices with a single binary image
- Highly efficient, low CPU usage architecture
- Multiple host adapters
- Multiple Logical Unit Numbers (LUNs)
- Scatter-Gather
- Disk array configurations with no LUN 0
- Disk array configurations with non-contiguous LUNs
- Multiprocessor environments

The LSI Solaris SPARC driver supports the following LSI host adapters:

- **Fibre Channel:** LSI7104XP, LSI7204XP, LSI7404XP, LSI7104XLP, LSI7204XLP, LSI7102XP, LSI7202XP, LSI7402XP, LSI7402EP, LSI7102XLP, LSI7202XLP, LSI44929, LSI44919
- **SCSI:** LSI22320-R, LSI21320-R, LSI20320-R
- **SAS (Serial Attached SCSI):** LSI3041X, LSI3442X, LSI3080X, LSI3800X

The LSI Solaris SPARC driver supports the following LSI microchip controllers:

- LSIFC949X, LSIFC929X, LSIFC919X, LSIFC929, LSIFC919
- LSI53C1030, LSI53C1020
- LSI1064, LSI1064E, LSI1068, LSI1068E

3.2.3 Preparing to Install the Solaris SPARC Driver

Table 3.1 lists the Solaris SPARC system resources that are required in order to install a supported LSI host adapter and the Solaris SPARC driver.

Table 3.1   Solaris SPARC Resource Requirements

Resource	Requirement
Host Bus Slot	Sun Solaris system with available PCI slot
Operating System	Solaris 2.6 release or later
Network Boot Server	SPARC or Intel Solaris boot server (required only if you are using the LSI host adapter to control the Solaris system disk)
Firmware	OpenBoot PROM version 3.0 or greater

After you physically install the LSI host adapter in the computer, you can use the following procedure to verify that it is installed correctly, before you boot the system and install the Solaris SPARC driver.

1. Power on the system.

2. When the banner text appears, press the **Stop-A** keys to interrupt the boot process and stop at the ok prompt.

3. Type the following command at the ok prompt to list the system devices:

   ok show-devs

   The system displays an output similar to the following (the text will vary depending on the physical configuration and installed devices):

   ```
   /SUNW,UltraSPARC-IIi@0,0
   /pci@1f,0
   /virtual-memory
   /memory@0,10000000
   /aliases
   /options
   /openprom
   /chosen
   /packages
   /pci@1f,0/pci@1
   /pci@1f,0/pci@1,1
   /pci@1f,0/pci@1/pci@2
   /pci@1f,0/pci@1/IntraServer,Ultra2-scsi@1
   /pci@1f,0/pci@1/pci@2/IntraServer,fc@4
   /pci@1f,0/pci@1/pci@2/IntraServer,fc@4/disk
   /pci@1f,0/pci@1/pci@2/IntraServer,fc@4/tape
   /pci@1f,0/pci@1/IntraServer,Ultra2-scsi@1/tape
   /pci@1f,0/pci@1/IntraServer,Ultra2-scsi@1/disk
   /openprom/client-services
   ```

4. If the LSI host adapter is not listed, shut down the system and be sure that the host adapter is firmly seated in the slot and is connected properly. Check the diagrams and instructions in the host adapter user's guide. Some LSI adapters include the string *LSILogic* and others, such as the example above, include *IntraServer*. Both are valid LSI products.

To determine if all SCSI, SAS, and/or Fibre Channel disk drives are properly connected and functional, use the probe-scsi-all command at the ok prompt. The system displays output similar to the following:

```
/pci@1f,0/pci@1/IntraServer,Ultra2-scsi@1
    Target 0
          Unit 0 Disk IBM DNES-309170W SA30
/pci@1f,0/pci@1/pci@2/IntraServer,fc@7
MPT Firmware Version 1.00
Target 0
          Unit 0 Disk SEAGATE ST39173FC 6615
          WWN 220000203710d063 ID 111d2
Target 1
          Unit 0 Disk SEAGATE ST39173FC 6258
          WWN 220000203710c09b ID 111d6
Target 2
          Unit 0 Disk SEAGATE ST39173FC 6258
          WWN 220000203710b066 ID 111d5
Target 3
          Unit 0 Disk SEAGATE ST39173FC 6258
          WWN 220000203710b063 ID 111d3
Target 4
          Unit 0 Disk SEAGATE ST39173FC 6258
          WWN 220000203710b04f ID 111d4
Target 5
          Unit 0 Disk SEAGATE ST39173FC 6615
          WWN 2200002037104f73 ID 111d9
Target 6
          Unit 0 Disk SEAGATE ST39173FC 6615
          WWN 2200002037102d0f ID 111d1
```

If some of the disk drives connected to the host adapter(s) are not listed in this display, check the following:

- Are all the cables correctly connected to the disk enclosure?

- Is the disk enclosure powered up?

- If the external disk enclosure requires a loopback connector, is the loopback connector correctly installed?

3.2.4 Installing the Driver on an Existing Solaris SPARC System

> Note: If you are using an LSI host adapter to control the Solaris system disk, follow the instructions in Section 3.2.5, "Network System Installation of the Solaris SPARC Driver."

Follow these instructions to install the itmpt Solaris SPARC driver on an already existing Solaris system.

1. Log on as root to perform the installation.

2. Uncompress and untar the itmpt_install.tar.Z file by typing the following commands:

```
# uncompress itmpt_install.tar.Z
# tar -xvf itmpt_install.tar
# cd install
```

3. Load the itmpt driver by typing the following command:

```
pkgadd -d .
```

You will see the following text on the screen:

```
The following packages are available:

1 ITImpt LSI Logic FusionMPT(tm) Fibrechannel/SCSI drivers

          (sparc) itmpt kit version xx.xx.xx
Select package(s) you wish to process (or 'all' to process
all packages).
          (default: all) [?,??,q]: 1

Processing package instance <ITImpt> from </floppy/intraserver>

LSI Logic FusionMPT(tm) Fibrechannel/SCSI drivers (sparc)
itmpt kit version 5.xx.xx

LSI Logic
Using </> as the package base directory.
## Processing package information.
## Processing system information.

2 package pathnames are already properly installed.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with
superuser permission during the process of installing this
package.

Do you want to continue with the installation of <ITImpt>
[y,n,?] y
```

```
Installing LSI Logic FusionMPT(tm)
Fibrechannel/SCSI drivers as <ITImpt>
## Installing part 1 of 1.
/kernel/drv/itmpt
/kernel/drv/itmpt.conf
[ verifying class <none> ]
## Executing postinstall script.

Following installation, please reboot the system to properly
configure and load the drivers.
Installation of <ITImpt> was successful.
```

> Note: Refer to the file `Errata_0708.pdf` for configuration instructions regarding non-zero LUNs.

> Note: When the `itmpt` driver initializes an LSI Ultra320 SCSI or LSI SAS host adapter's disk drives, it attaches under the Sun `sd` target driver. To alter the probing of target IDs and probing for non-zero LUNs on devices attached to an LSI host adapter, modify the `/kernel/drv/sd.conf` file.
>
> When the `itmpt` driver initializes an LSI Fibre Channel host adapter's disk drives, it attaches under the Sun `ssd` target driver. To alter the probing of target IDs and probing for non-zero LUNs on devices attached to an LSI Fibre Channel adapter, modify the `/kernel/drv/ssd.conf` file or use the `lsiprobe` utility.

3.2.5 Network System Installation of the Solaris SPARC Driver

If you install an LSI host adapter that you will use to control a Solaris SPARC system disk, you must install the Solaris operating system and the Solaris SPARC driver using the network installation instructions in this section. This section describes a complete installation of Solaris to a client system that is using an LSI host adapter to control the system disk. The method described in this section installs the LSI `itmpt` driver onto a network boot kit, making it available during the SPARC installation process.

If the LSI FC host adapter is an additional storage adapter added to an existing Solaris SPARC system, refer instead to Section 3.2.4, "Installing the Driver on an Existing Solaris SPARC System."

3.2.5.1 Setting Up a Boot/Install Server

Refer to the "Preparing to Install Solaris Software Over the Network" section of the *Solaris Advanced Installation Guide*, available at `http://docs.sun.com`.

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

1. Insert the Solaris distribution CD-ROM in the CD-ROM drive of the boot/install server.

2. Change the directory to the Tools area on the Solaris distribution CD-ROM:

   ```
   cd /cdrom/cdrom0/Solaris_2.7/Tools
   ```

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

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

3.2.5.2 Installing the itmpt Driver on the Boot/Install Server

After you have set up your network boot and install server, follow these steps to run the `install.sh` script and copy the driver kit to the boot server's boot files:

1. Place the diskette in the floppy drive and execute the `volcheck` command to ensure that the system sees the diskette.

2. Change the directory to the root of the floppy:

   ```
   cd /floppy/floppy0
   ```

3. Execute the `install.sh` shell script to add the `itmpt` driver to the boot installation area (for Solaris 2.8 systems, substitute `Solaris_2.8` on the command line):

   ```
   ./install.sh –n /export/home/install/Solaris_2.7
   ```

   You can safely ignore the following message that may appear:

   ```
   major number maximum based on server, not client
   ```

When you run the `install.sh` script in this way, it copies and installs the Fusion-MPT drivers into the `Tools/Boot/` area of the boot files and allows LSI host adapters to be booted for installation using the bootserver.

3.2.5.3   Adding Clients to the Boot/Install Server

Follow these steps to add a client entry on the boot/install server for each machine that boots into the boot/install server:

1. Change the directory to the boot/install kit (for Solaris 2.8 systems, substitute `Solaris_2.8` on the command line):

    `cd /export/home/install/Solaris_2.7/Tools`

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

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

    where:

    `ipaddr` is the TCP/IP address of the client.
    `ethernetid` is the Ethernet hardware (mac) address of the client.
    `client_name` is the client's system name.
    `platform_group` is the client's vendor defined hardware group.

    An example is:

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

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

3.2.5.4   Booting the Client Using the itmpt Driver

Now you can begin the installation of the Solaris operating system to the client target machine using the boot and install server. To do this, follow these steps:

1. On the client machine, boot the network install kit you created in the preceding steps by entering this command at the OpenBoot prompt:

    `ok boot net -v`

2. Choose *Manual Reboot* rather than *Auto Reboot* during the installation of Solaris on the target machine. If you choose *Auto Reboot* you will not be able to complete the installation of the LSI drivers, and the system will fail to boot.

    After the installation has completed, the system waits for a manual reboot.

3. Run the following script from a console window:

`/sbin/itmptinst`

This script copies the drivers from the boot server and installs them to the newly created Solaris installation. After the script has finished, the LSI device driver installation is complete.

4. Manually reboot the system.

You can safely ignore the following message that may appear:

`major number maximum based on server, not client`

The system prompts you to allow power saving automatic shutdown.

5. Respond **No** to the power saving prompt if you are using the LSI host adapter to support your boot disk.

If you change the disk drive configuration of the machine, you may need to issue the `touch /reconfigure` command. Then reboot the system so it can detect and correctly install the new disks.

3.3 Installing the UnixWare 7 and Open Unix 8 Device Driver

This section describes the LSI Fusion-MPT driver for the Caldera UnixWare 7 and Open Unix 8 operating systems. Both of these operating systems will be referred to as *UnixWare* in this section. Older versions of these operating system are not supported. The driver itself is referred to as `mpt`.

This section includes the following topics:

- Section 3.3.1, "Introducing the UnixWare 7 and Open Unix 8 Driver"

- Section 3.3.2, "Driver Features and LSI Device Support"

- Section 3.3.3, "Preparing to Install the UnixWare 7 and Open Unix 8 Driver"

- Section 3.3.4, "Installing the Driver on a New UnixWare or Open Unix System"

- Section 3.3.5, "Installing the Driver on an Existing UnixWare or Open Unix System"

- Section 3.3.6, "Troubleshooting"

3.3.1 Introducing the UnixWare 7 and Open Unix 8 Driver

> Note: The UnixWare 7/Open Unix 8 driver files are named
> `uw103xx.z`, `uw103xx.dd`, etc. The *xx* refers to the last two
> digits of the actual driver version number. For example, files
> associated with `mpt` driver version 1.03.04 are labeled
> `uw10304.z`, `uw10304.dd`, etc.

UnixWare software extends the UNIX SVR4.2 operating system.
UnixWare features include a graphical user interface (GUI), networking,
application compatibility, multitasking and multiuser capabilities, and
multiprocessor support. The `mpt` driver allows UnixWare operating
systems to interface with devices connected to the LSI Fusion-MPT
family of chipsets and/or LSI Fusion-MPT host adapter boards.

3.3.2 Driver Features and LSI Device Support

The UnixWare/Open Unix `mpt` driver supports these features:

- Easy installation using UnixWare tools
- Multiple host adapters
- Multiple and non-contiguous Logical Unit Numbers (LUNs)
- Dynamic interrupt mapping
- Scatter/gather
- Pass-thru functionality
- Multiple processors
- One Ultra320 SCSI bus with 15 SCSI devices per bus
- Eight buses with 15 Fibre Channel devices per bus

The `mpt` driver supports the following LSI controller chips and the LSI
host adapters that use them:

- LSI53C1030
- LSI53C1020
- LSIFC929XL
- LSIFC919XL
- LSIFC949X
- LSIFC949E

3.3.3   Preparing to Install the UnixWare 7 and Open Unix 8 Driver

The mpt driver for UnixWare operating systems is available on a 3.5-inch diskette labeled *Fusion-MPT UnixWare driver*. Use this diskette to load the driver during the installation of the operating system, or to access attached devices after a UnixWare installation. The following sections describe these procedures.

The current UnixWare Fusion-MPT driver is also available from the LSI web site at http://www.lsi.com.

3.3.4   Installing the Driver on a New UnixWare or Open Unix System

Follow these steps to install the mpt driver on a new UnixWare or Open Unix system:

1. Boot the system using the installation diskettes or CD-ROMs in the UnixWare Operating System media kit.

2. Follow the instructions on the screen.

3. Insert the mpt driver diskette when the installation prompts for the host adapter diskette.

    The system loads the required drivers, such as mpt, and displays a message when they are finished loading. At the end of the installation, the system prompts you to reinsert the host adapter driver diskette.

4. When this prompt appears, insert the mpt driver diskette and press **Enter**. The kernel builds and the installation terminates.

5. Remove the driver diskette when prompted.

6. Reboot the system.

3.3.5   Installing the Driver on an Existing UnixWare or Open Unix System

Before you install the mpt driver on an existing UnixWare or Open Unix system, make a backup copy of the existing kernel, as explained in the following steps:

1. Log on as root.

2. At the shell prompt type the following:

    ```
    cp /stand/unix     /stand/unix.safe
    ```

Use this copy of the old kernel to reboot the system if the driver installation fails. See Section 3.3.6, "Troubleshooting," for more information.

3. Insert the mpt UnixWare driver diskette after the kernel backup completes.

4. Load the driver using the pkgadd command:

```
pkgadd -d diskette1
```

5. Select the mpt package.

The mpt driver on the diskette is then loaded onto the system. The system prompts you again to load a driver, even if the driver was loaded successfully.

6. Type **q** (quit) and press **Enter**.

7. Verify that the driver loaded successfully by typing the command:

```
pkginfo mpt
```

If the driver loaded successfully, the package information looks like this:

```
system mpt LSI Logic IHV HBA
```

8. Reboot the system by typing this command:

```
init 6
```

During the boot process, the operating system scans the system and lists the devices found. If the kernel panics during boot, then reboot the system with the saved copy of the old kernel, as explained in Section 3.3.6, "Troubleshooting." If the reboot is successful, the system is ready to use.

3.3.6 Troubleshooting

If the mpt driver installation fails, you can recover by rebooting the system with the unix.safe kernel file that you created before attempting to installing the driver. To do this, follow these steps:

1. Reboot the system.

2. When the UnixWare Logo screen appears, press the space bar to begin an interactive boot session.

3. When the interactive boot prompt appears, type the command:

```
boot unix.safe
```

The UnixWare Logo screen reappears and the system boots from the `unix.safe` kernel file.

3.4   SCO OpenServer 5 Device Driver Installation

This section describes how to install the `lsil` device driver for the SCO OpenServer 5 operating system environments. This section consists of the following subsections:

3.4.1   Introducing the SCO OpenServer Driver

SCO UNIX is the first UNIX operating system licensed for IBM-compatible microcomputers. The integrated communications, file system, international application support, and documentation create an ideal platform for those requiring a full-featured, UNIX-based operating system. SCO UNIX takes full advantage of the capabilities of the 80386 and above microprocessors.

Version 1.03.xx of the `lsil` driver supports all OpenServer 5 releases of SCO UNIX (5.0.0, 5.0.2, 5.0.4, 5.0.5 and 5.0.6).

The Fusion-MPT `lsil` driver allows SCO OpenServer 5 operating systems to interface with devices connected to LSI Ultra320 SCSI and Fibre Channel controller chips and host adapter cards.

When you add SCSI disk drives, tape drives, and CD-ROM drives to an SCO OpenServer system, the system prompts you for the name of the package/driver that will control the devices. Enter **lsil** as the package/driver name.

3.4.2 Driver Features and LSI Device Support

The `lsil` OpenServer device driver supports these features:

- Provides easy UNIX installation through the `lsil` BTLD diskette
- SureLINK Domain Validation
- Multiple host adapters
- Multiprocessor support

The `lsil` driver supports the following devices and LSI host adapters based on those devices:

- LSI53C1030 and LSI53C1020 Ultra320 SCSI Chips
- LSIFC929X, LSIFC919X, LSIFC929, LSIFC919 and LSIFC909 Fibre Channel Chips

3.4.3 Preparing to Install the SCO OpenServer Driver

Note: You can download the latest versions of the Fusion-MPT SCO OpenServer driver from the LSI web site at `http://www.lsi.com`. Click the **Downloads** link and follow the instructions on the screen to download the driver.

Driver files are labeled `sco103xx.z`, `sco103xx.dd`, etc. The *xx* refers to the last two digits of the actual driver version number. For example, files associated with `lsil` driver version 1.03.04 are labeled `sco10304.z`, `sco10304.dd`.

To connect SCSI devices to one or more host adapters, you must place the proper host adapter driver in the SCO UNIX kernel. The `lsil` Boot Time Loadable Driver (BTLD) diskette contains the driver for SCO OpenServer 5.

You must link-edit the proper driver into the SCO UNIX kernel. The kernel must reside on the boot drive: either an internal, non-SCSI hard drive or a SCSI hard drive attached to host adapter 0 with SCSI ID 0 and LUN 0. The BTLD permits an easy installation of SCO UNIX with the software provided by SCO.

SCO OpenServer 5 provides only one installation diskette, labeled *Boot Disk*. This diskette, the `lsil` BTLD driver diskette, and other software media are used during an SCO OpenServer 5 installation.

3.4.4 Installing the Driver on an New OpenServer UNIX System

> Note: LSI recommends that you complete the entire installation
> procedure in one session. This may take an hour or more.

This procedure installs SCO UNIX onto a hard disk drive and builds a
new UNIX kernel that includes the `lsil` driver. During installation you are
given the option of retaining current partitions on the root hard disk drive.
For example, you might have already created a DOS partition or a UNIX
partition on the hard disk drive. Refer to the *SCO OpenServer Handbook*
for more details on SCO UNIX installation.

To complete a new installation of SCO UNIX and the `lsil` driver, follow
these steps:

1. Insert the SCO UNIX installation diskette and reboot the system. For
   SCO OpenServer 5, this diskette is labeled *Boot Disk*.

2. At the `boot` prompt, type **link** and press **Enter**.

3. At the next prompt, type **lsil** and press **Enter**. Do not remove the
   diskette.

4. When the installation prompts for the diskette, insert either the
   installation diskette or the `lsil` BTLD diskette, and press **Enter**.

5. If you see the following system prompt for a routine number, enter
   the routine number that precedes the prompt:

```
Please enter which routine (0-40) to replace'?' to list):
    'a' to add "lsilinit" at the end [default],
    'n' to do nothing, or
    'q' to quit"
```

6. If you see this additional system prompt for another routine number,
   enter the indicated routine number that precedes the prompt:

```
Please enter which routine (0-2) to replace '?' to list),
    'a' to add "lsilpoll" at the end [default],
    'n' to do nothing, or
    'q' to quit"
```

7. Continue the installation according to the instructions in the SCO
   UNIX documentation.

   The SCO OpenServer 5 system automatically creates a file,
   `unix.safe`, during installation. To access this UNIX kernel, type
   unix.safe at the boot prompt.

8. Install SCSI device support by continuing from step 10 in Section 3.4.5, "Installing the Driver on an Existing SCO OpenServer 5 System."

3.4.5 Installing the Driver on an Existing SCO OpenServer 5 System

This procedure assumes that SCO UNIX is already installed on a hard disk drive. This procedure is necessary to build a new UNIX kernel that includes the lsil LSI host adapter driver. The basic steps for accomplishing this task are outlined below. For more details on UNIX installation, refer to the *SCO UNIX System Administrator's Reference Manual.*

1. The SCO OpenServer 5 system automatically creates a unix.safe file during installation. To access this UNIX kernel, type "unix.safe".

2. Insert the lsil BTLD diskette in the drive. Type **installpkg** and press **Enter**.

3. When you are prompted to insert the requested diskette, press **Enter**. (The BTLD diskette is already inserted.)

4. When you are prompted for the name of the package, type **lsil** and press **Enter**.

5. If you are prompted about replacing a driver from a previous installation, press **y** for Yes.

6. After the package installation routine completes, relink the kernel by entering the following command:

   /etc/conf/cf.d/link_unix

7. When you see the following prompt, type **y** and press **Enter**:

   Do you want this kernel to boot by default (y/n)?

   The system backs up the old kernel.

8. When you see the following prompt, type **y** and press **Enter**:

   Do you want the kernel environment rebuilt (y/n)?

9. Reboot the system by typing **reboot** and pressing **Enter**. This activates the new kernel.

10. After the system has rebooted, add a SCSI or Fibre Channel disk drive to the configuration by following the sub-steps below. (If you are not adding a SCSI or FC disk drive, skip to step 11.)

a. Type **mkdev hd** at the command prompt and press **Enter**.

    You are prompted to enter the identifier of the host adapter that supports this disk drive.

b. If the displayed default identifier is not lsil, type **lsil** and press **Enter**.

c. When you are prompted for the host adapter that supports the disk drive, type the host adapter number and press **Enter**. (The host adapter number appears on the screen during boot-up.)

    If you are adding another LSI host adapter to the SCO UNIX kernel, the system might prompt you to update the link-kit. If this happens, type **y** and press **Enter**. If you entered the host adapter number incorrectly, type **n** and press **Enter**. The system then prompts for the host adapter identifier.

d. When you are prompted for the bus number of the disk drive, press **Enter** to accept the default (zero).

e. When you are prompted for the target ID of the disk drive, type the disk drive ID number and press **Enter**. (The target ID number appears on the screen during boot-up.)

f. When you are prompted for the LUN of the disk drive, type the LUN number and press **Enter**, or press **Enter** to accept the default value of zero.

g. When you are prompted to update the configuration file, type **y** and press **Enter** if the displayed values are correct. Type **n** if the values are incorrect and retry from step 4.

h. When you are prompted to create a new kernel. Type "y" and go to step 13 if this is the last device to add. Type "n" and return to step 10 if there are more devices to add.

11. Add a tape drive to the configuration by following the sub-steps below. (If you are not adding a tape drive, skip to step 12.)

a. Type **mkdev tape** at the command prompt and press **Enter**.

b. When the Tape Drive Configuration Program menu appears, select option 1 to install a tape drive, and press **Enter**.

c. When the Tape Drive Installation menu appears, select option 4 to install a tape drive, and press **Enter**.

d. From the next list, select the type of tape drive to install and press **Enter**.

e. When you are prompted to configure the tape drive, type **y** and press **Enter**.

f. When you are prompted for the name of the device driver, type **lsil** and press **Enter**.

g. When you are prompted for the host adapter that supports the tape drive, type the host adapter number and press **Enter**. (The host adapter number appears on the screen during boot-up.)

   If you are adding another LSI host adapter to the SCO UNIX kernel, the system might prompt you to update the link-kit. If this happens, type **y** and press **Enter**. If you entered the host adapter number incorrectly, type **n** and press **Enter**. The system then prompts for the host adapter identifier.

h. When you are prompted for the bus number of the tape drive, press **Enter** to accept the default (zero).

i. When you are prompted for the target ID of the tape drive, type the tape drive ID number and press **Enter**. (The target ID number appears on the screen during boot-up.)

j. When you are prompted for the LUN of the tape drive, type **0** [zero] and press **Enter**.

k. When you are prompted to update the configuration file, type **y** and press **Enter**. A list appears showing the special devices created.

l. Press **Enter**. A list appears showing the links to the installed tape drive.

m. When you are prompted for a boot string, type **q** and press **Enter** to return to the Tape Drive Configuration Program menu.

n. Type **q** and press **Enter** to terminate the Tape Drive Configuration Program menu.

o. When you are prompted to create a new kernel type **y** and proceed to step 13 if this is the last device to add. Type **n** and return to step 10 if you want to add more devices.

12. Add a CD-ROM drive to the configuration by following the sub-steps below. (If you are not adding a CD-ROM drive to this system, skip to step 13.)

a. Type **mkdev cdrom** at the command prompt and press **Enter**.

b. When the CD-ROM Configuration Program menu appears, select option 1 to install a CD-ROM drive and press **Enter**.

c. When you are prompted to configure the CD-ROM drive, type **y** and press **Enter**.

d. When you are prompted for the identifier of the host adapter that supports this device, type **lsil** and press **Enter**.

e. When you are prompted for the host adapter that supports the CD-ROM drive, type the host adapter number and press **Enter**. (The host adapter number appears on the screen during boot-up.)

    If you are adding another LSI host adapter to the SCO UNIX kernel, the system might prompt you to update the link-kit. If this happens, type **y** and press **Enter**. If you entered the host adapter number incorrectly, type **n** and press **Enter**. The system then prompts for the host adapter identifier.

f. When you are prompted for the bus number of the CD-ROM drive, press **Enter** to accept the default (zero).

g. When you are prompted for the ID of the CD-ROM drive, type the ID number and press **Enter**. (The target ID number appears on the screen during boot-up.)

h. When you are prompted for the LUN of the CD-ROM drive, type the LUN number and press **Enter**, or press **Enter** to accept the default value of zero.

i. When you are prompted to update the configuration file, type **y** and press **Enter**. A prompt appears to configure a CD-ROM/TAPE installation device. Unless you want to do this, type **n** and press **Enter**.

j. When the installation prompts you to configure a CD-ROM/TAPE installation device, type **n** and press **Enter**.

k. When you are prompted to add a High-Sierra file system, type **y** and press **Enter**. The system displays the High Sierra/ISO9600 file system Configuration Program menu.

l. Select option 1 to add High-Sierra and press **Enter**. The system updates the configuration file and returns to the CD-ROM Configuration Program menu.

m. Type **q** and press **Enter** to terminate the CD-ROM Configuration Program menu.

n. When you are prompted to create a new kernel, type **y** and proceed to step 13 if this is the last device to add. Type **n** and return to step 10 if you want to add more devices.

13. To rebuild the kernel, type the following on the command line:

    /etc/conf/cf.d/link_unix

    The following prompt appears:

    Do you want this kernel to boot by default (y/n)?

14. Type **y** and press **Enter**. The system backs up the old kernel.

    The following prompt appears:

    Do you want the kernel environment rebuilt (y/n)?

15. Type **y** and press **Enter**.

16. Reboot the system by typing **reboot** and pressing **Enter**.

17. After the system reboots and the *boot:* prompt appears, press **Enter** to load the new kernel.

18. Log in as usual.

3.4.6 Troubleshooting

The following conditions should exist after a successful installation:

- The directory etc/conf/sdevice.d should contain a file named lsil. This file contains the sdevice entries.

- The directory etc/conf/cf.d should contain the files sdevice, mdevice, and mscsi. Files sdev.hdr and mdev.hdr describe the values of the possible field entries in the files sdevice and mdevice, respectively.

- The sdevice file should contain an lsil entry for each LSI host adapter configured in the system.

- The second field in the sdevice file should read *Y.*

- An lsil entry should appear in the mdevice file.

- An lsil entry for each configured device should appear in the mscsi file.

- Directory `/etc/conf/pack.d/lsil` should exist and should contain the files `Driver.o` and `space.c`.

Here are some potential problems and their suggested solutions:

- Difficulty loading the SCO UNIX kernel to an IDE hard drive.

  You only need to link if a device is attached to an LSI host adapter. Follow the instructions in the SCO UNIX Installation documentation. After the installation completes, proceed to Step 2 in Section 3.4.5, "Installing the Driver on an Existing SCO OpenServer 5 System," and use `installpkg` to install the `lsil` device driver.

- A device is not found.

  Reboot and press `Ctrl-C` when prompted to view the LSI Configuration Utility. Verify that the device has the correct host adapter and ID. If the device is not shown, it may be turned off or there may be a cabling problem.

- The UNIX system behaves unreliably after the configuration change.

  Whenever you change the hardware or software configuration, you must rebuild the kernel. Use the `/etc/conf/cf.d` directory and type the following command:

  `./link_unix`

- An error message occurs during the rebuild of the kernel.

  Reinstall the proper `lsil` driver using the `installpkg` utility. Relink the kernel and reboot the system.

- The root disk is not found or the partitioning of the disk fails.

  If the boot drive is a disk, use the BIOS Configuration Utility to check that the disk is assigned ID 0 and is configured to host adapter 0, LUN 0.

3.5 Installing the Fusion-MPT Linux Device Drivers

This section describes the LSI Fusion-MPT device drivers for Linux. It includes instructions for building, patching, and installing the drivers. This section has the following topics:

- Section 3.5.1, "Introducing the Linux Drivers"

3.5.1 Introducing the Linux Drivers

The LSI Fusion-MPT `mptlinux` drivers allow Linux operating systems to interface with devices connected to LSI Ultra320 SCSI and Fibre Channel controller chips and host adapter cards.

The LSI `mptlinux` drivers are free software and are supported in source form. These drivers are distributed in the hope that they will be useful, but without any warranty and without even the implied warranty of merchantability or fitness for a particular purpose. You can redistribute them and/or modify them under the terms of version 2 or later of the GNU Public License, as published by the Free Software Foundation. You should have received a copy of this license with your Linux kernel source tree (`/usr/src/linux/COPYING`).

For detailed information on the GNU Public License, contact the Free Software Foundation, Inc. at the following URL:

    http://www.gnu.org/copyleft/gpl.html.

3.5.2 Driver Features and LSI Device Support

The `mptlinux` drivers support these features:

- 1 Gbit/s and 2 Gbit/s Fibre Channel transfer rates
- Ultra320 transfer rates
- LSI Fusion-MPT Architecture and common software interface
- Low host CPU utilization with one, or less than one, interrupt per I/O

The `mptlinux` drivers support the following LSI controller chips:

- LSIFC949X

- LSIFC949E
- LSIFC919XL
- LSIFC929XL
- LSI53C1020
- LSI53C1030

3.5.3   Preparing to Install the Fusion-MPT Linux Drivers

The `mptlinux` drivers are provided in binary and source form to provide the greatest flexibility to LSI's customers. The binaries are suitably formatted for use as installation diskettes or post-install binary upgrades. The source may be added to an existing kernel for custom kernel builds.

The binaries and source may be downloaded from the LSI web site:

```
http://www.lsi.com
```

They may also be downloaded from the anonymous `ftp` site:

```
ftp://ftp.lsil.com/HostAdapterDrivers/linux/Fusion-MPT
```

3.5.3.1   Installing to a Fusion-MPT Controller

The Fusion-MPT driver is a bundled boot controller for Red Hat releases beginning with 7.3 and for SuSE releases beginning with 8.0. You may install to a disk attached to the controller with no additional media.

LSI provides 1.44 Mbyte images that are suitably formatted to use as driver update disks for installations where there is no bundled driver:

- Red Hat 7.0, 7.1, 7.2 (32 bit and 64 bit), 7.3, and 2.1ASE
- SuSE 7.2, 7.3, and 8.0
- Caldera 3.1 and 3.1.1

Use these commands on the `ftp` site:

```
ftp> cd 2.06.24
ftp> cd mptlinux-disks
```

Download the Vendor `readme` file for further instructions, and download the appropriate tarball.

For all other releases, the bundled driver must be used for installation. Post-installation upgrades are possible by using the driver RPM.

Use these commands on the `ftp` site:

```
ftp> cd 2.06.24
ftp> cd mptlinux-rpms
```

Download the `README_rpms.txt` file to obtain a listing of the kernels supported by the RPM.

3.5.3.2   Adding Pre-Compiled Binaries to an Existing Installation

Driver binaries are provided in 1.44-MB images that are suitably formatted to use as driver update disks for the following platforms:

- Red Hat 7.0, 7.1, 7.2 (32 bit and 64 bit), 7.3, and 2.1ASE

- SuSE 7.2, 7.3, and 8.0

- Caldera 3.1 and 3.1.1

And in RPMS:

- Red Hat i686: 7.2, 7.3, 8.0, 9, 2.1ASE

- Red Hat ia64: 7.2, 2.1ASE

- SuSE x86: 7.2, 7.3, 8.0, 8.1, 8.2, SLES8

- SuSE x86_64: SLES8

RPMs should be used to upgrade the driver post-install.

The RPMs contain binaries for the install kernel and the latest released errata kernel for each distribution at the time the RPM was created. The `README_rpms.txt` file has a listing of the kernels supported by the RPM. The update disks should be used for architectures that are not supported by RPM.

The RPMs contain binaries for the install kernel and the latest released errata kernel for each distribution at the time the RPM was created. The `README_rpms.txt` file to obtain a listing of the kernels supported by the RPM. The update disks should be used for architectures not supported by RPM.

To use the driver disks, follow the instructions from the previous section to transfer the image to a diskette. Then use the following commands:

```
# mount /dev/fd0
# cd /mnt/floppy
# ./post_install.scr
# cd
# umount /dev/fd0
```

To use the RPMs, the standard install, erase, and upgrade commands may be used. The driver source will be placed in your installations RPM Base directory (`/usr/src/redhat` or `/usr/src/packages`). On the `ftp` site, use the following commands to download the appropriate tarball:

```
ftp> cd 2.05.06
ftp> cd mptlinux-rpms
```

3.5.3.3 Adding or Upgrading the Fusion-MPT Source to the Linux Kernel

Adding or upgrading the Fusion-MPT source to the Linux kernel is a two step procedure:

1. Add or upgrade the Fusion-MPT source.

2. Patch the kernel.

Before you do this, LSI recommends that you save the original source:

```
# cd /usr/src/linux/drivers/message
# tar czvf fusion.orig.tar.gz fusion
```

Then continue with the following instructions.

For Red Hat 7.0, all 2.2 and 2.4.0 through 2.4.6 kernels, Fusion-MPT support must be added to the kernel source. To do this, follow these instructions:

1. Unpack the `mptlinux` driver source tar archive in a temporary directory (`/home/<myname>/mptlinux-tmp`). Example:

```
$ cd
$ mkdir mptlinux-tmp
$ cd mptlinux-tmp
$ zcat /tmp/mptlinux-2.05.06-src.tar.gz | tar xvf -
```

2. Run the `install` script to install the source to the kernel directory. For example, use these commands to install the source into `/usr/src/linux-2.4.18-20`:

```
$ su root
# ./install /usr/src/linux-2.4.18-20
```

Next, continue with the kernel patch instructions in the next section.

3.5.3.4 Kernel Patch Instructions

The mptlinux host drivers may require a small set of patches to your Linux kernel source tree. Patch sets for stock and well known kernel versions have been included with the packed source tar archive. Patches may be required even if the mptlinux driver is currently bundled.

See the driver readme files for more information about which kernel patches are available.

To identify which kernel version you have, examine the /usr/src/linux/Makefile as follows:

Example (on a RedHat 6.2 system):

```
VERSION = 2
PATCHLEVEL = 2
SUBLEVEL = 14
EXTRAVERSION = -5.0
```

Then apply the closest patch set you can find.

3.5.4 Configuring and Building the Fusion-MPT Linux Drivers

The following examples show how to configure and build the LSI Fusion-MPT driver(s) as kernel modules. However, the MPT base and ScsiHost drivers can alternatively be compiled into the Linux kernel instead of being built as modules.

1. From the /usr/src/linux directory, ensure a clean kernel source tree by executing the following command:

   ```
   # make mrproper
   ```

2. From the /usr/src/linux directory, run the normal kernel configuration routine:

   ```
   # make oldconfig
   ```
      or:
   ```
   # make config
   ```
      or:

```
# make menuconfig
  or:
# make xconfig
```

3. Look for the new top-level *Fusion-MPT device support* entry:

    ```
    Fusion-MPT device support   --->
    ```

    and select it to access the Fusion-MPT drivers submenu entries:

    ```
    <M>     Fusion-MPT (base + ScsiHost) drivers
    <M>     Enhanced SCSI error reporting
    < >     Fusion-MPT misc device (ioctl) driver
    ```

4. On the submenu, select **Fusion-MPT (base + ScsiHost) drivers**, and then enter **m** to configure for building this support as a module. (Alternatively, you can enter **y** to have this support built into the kernel.)

    Note: Enhanced SCSI error reporting and `ioctl` drivers are optional. LSI recommends that they only be built as modules, due to kernel size considerations.

    Note: *Do not* answer **y** for the Fusion-MPT LAN driver option! Support for this driver is currently restricted to module use only.

5. Save the kernel config changes. Follow any post config instructions, and do everything needed on your platform to rebuild the kernel. This typically includes the following:

    ```
    # make dep
      and:
    # make bzImage      # varies on non-Intel platforms
    ```

6. Rebuild the kernel modules with this command:

    ```
    # make modules
    ```

7. (Optional) Do everything needed on your Linux platform to install a newly built kernel. (This can be temporary, for sanity testing only.) Be *very careful* if you do this, and be sure you know what you are doing. It is easy to accidentally wipe out a good and stable kernel from this point forward in the procedure!

8. Install (or reinstall) newly compiled kernel modules:

    ```
    # make modules_install
    ```

The output from the last step should look something like this:

```
Installing modules under /lib/modules/2.2.14-5.0/block
Installing modules under /lib/modules/2.2.14-5.0/net
Installing modules under /lib/modules/2.2.14-5.0/ipv4
Installing modules under /lib/modules/2.2.14-5.0/scsi
Installing modules under /lib/modules/2.2.14-5.0/fs
Installing modules under /lib/modules/2.2.14-5.0/fs
Installing modules under /lib/modules/2.2.14-5.0/cdrom
Installing modules under /lib/modules/2.2.14-5.0/video
Installing modules under /lib/modules/2.2.14-5.0/net
Installing modules under /lib/modules/2.2.14-5.0/misc
```

9. Update the `/boot` sector with the new `System.map` and `bzImage`, re-create your ramdisk image (refer to your vendor literature), and update your boot manager (`lilo.conf`, `grub.conf`). If you are using `lilo`, you must run `lilo -v` prior to reboot.

10. Shut down the system. For example:

```
# shutdown -r now
```

11. Reboot with the newly built Linux kernel.

3.5.5 Loading the Drivers as Modules

Follow these steps to load the new driver binaries:

1. Load the Fusion-MPT base driver.

```
# insmod mptbase
Fusion-MPT base driver 2.xx.xx
Copyright (c) 1999-2002 LSI Corporation
```

2. Load the Fusion-MPT SCSI host driver.

```
# insmod mptscsih
Fusion-MPT SCSI Host driver 2.xx.xx
```

Depending on which FC devices you have attached to your FC link, you should see something like the following on the console and in the system log:

```
scsi0 : ioc0: LSIFC919, FwRev=1000h, Ports=1, MaxQ=256, IRQ=9
scsi : 1 host.
    Vendor: SEAGATE              Model: ST39102FC      Rev: 0007
    Type:   Direct-Access        ANSI SCSI revision: 02
Detected scsi disk sda at scsi0, channel 0, id 0, lun 0
    Vendor: SEAGATE   Model: ST19171FC        Rev: 0017
    Type:   Direct-Access                ANSI SCSI revision: 02
Detected scsi disk sdb at scsi0, channel 0, id 1, lun 0
```

```
SCSI device sda: hdwr sector= 512 bytes. Sectors= 17783240 [8683 MB] [8.7 GB]
   sda: sda1
SCSI device sdb: hdwr sector= 512 bytes. Sectors= 17783112 [8683 MB] [8.7 GB]
   sdb: sdb1
```

All Fibre Channel target devices should be detected and mapped to Linux SCSI devices, /dev/sd{a,b,c,...} when the mptscsih module is loaded.

All Linux commands pertaining to SCSI disk storage management (fdisk, mke2fs, mount, etc.) using the /dev/sdX[N] notation should now be functional.

FCP (SCSI) Device Access Example:

```
# fdisk /dev/sdb
# mke2fs /dev/sdb1
# mount /dev/sdb1 /mnt/s1
```

3.5.6   Boot Setup Commands

3.5.6.1   Syntax

Setup commands can be passed to the SCSI host driver mptscsih as a string variable using insmod. The following command installs the driver module with the bus width set to narrow and Domain Validation disabled:

```
insmod mptscsih.o mptscsih="dv:n width:0"
```

Each string argument must be specified as keyword:value. Only lower-case characters and digits are allowed.

3.5.6.2   Available Arguments

The available arguments are Domain Validation, Maximum SCSI Bus Width, and Minimum SCSI Synchronous Factor.

Domain Validation

- dv:n   Disabled
- dv:y   Enabled [default]

The SCSI host driver performs a sequence of write, read, and compare commands to each target device during driver initialization. If the driver detects data corruption or bus hangs during this sequence, it

automatically slows the transfer rate until reliable transmission is achieved.

Warning: These tests use a device's internal buffer. Some older SCSI devices freeze when they receive a Read or Write Buffer command.

DV may be disabled on a per-device basis by setting the transfer characteristics to *ASYNC* and *NARROW* in the adapter BIOS. Alternatively, DV may be disabled for the driver by passing in `dv:n` as a command line argument.

This option has no effect for LSIFC9XX parts.

Maximum SCSI Bus Width

- `width:0`   Wide SCSI disabled
- `width:1`   Wide SCSI enabled

The maximum allowed SCSI bus data transfer width is set to the minimum of the command line options, adapter capabilities, and NVRAM settings.

This option has no effect for LSIFC9XX parts.

Minimum SCSI Synchronous Factor

- `factor:0x08`   Ultra320 (160 Mega-transfers / second)
- `factor:0x09`   Ultra160 (80 Mega-transfers / second)
- `factor:0x0A`   Ultra2 (40 Mega-transfers / second)
- `factor:0x0C`   Ultra (20 Mega-transfers / second)
- `factor:0x19`   FAST (10 Mega-transfers / second)
- `factor:0x32`   SCSI (5 Mega-transfers / second)
- `factor:0xFF`   5 Mega-transfers/second and asynchronous

The minimum allowed SCSI synchronous factor is set to the maximum of the command line input, adapter capabilities, and NVRAM setting. If the minimum synchronous factor is 0xFF, the synchronous offset is set to 0 (asynchronous).

This option has no effect for LSIFC9XX parts.

3.5.7   Troubleshooting

If you have compiled your Linux kernel with `/proc` file system support, you can examine SCSI devices using this command:

```
$ cat /proc/scsi/scsi
```

A summary of attached/recognized Fusion-MPT adapters can be examined with the following command:

```
$ cat /proc/mpt/summary
```

The driver version is stored in:

```
$ cat /proc/mpt/version
```

If an LSI Fibre Channel RAID subsystem is attached to the system, some of the standard Linux SCSI devices that show up will not be accessible, depending on the exact configuration of the RAID controller(s). For example, if you have dual active controllers in one subsystem with 8 active LUNs configured for each controller, all 16 LUNs will be visible through each controller (32 SCSI devices total), although only 8 LUNs will actually be accessible from each controller. There is currently no filtering out of the entries that are visible but not accessible.

UNIX Operating System Device Drivers

Chapter 4
NetWare Drivers

This chapter describes the features and use of the LSI Fusion-MPT NetWare Peripheral Architecture (NWPA) device drivers for the Novell NetWare 5.1 and Novell Netware 6.0 operating systems. This chapter contains the following sections:

4.1   Introduction and Driver Features

The LSI MPT NWPA driver for the Novell NetWare operating system allows you to utilize LSI SCSI Fusion MPT controllers and processors. The MPT SCSI BIOS (version 5.02 or higher) controls these controllers or processors with NetWare. This driver, together with the designated LSI controllers or processors and an appropriate Custom Device Module (CDM), provides a SCSI solution within the NetWare environment.

A single driver is provided for the Novell NetWare versions 5.1 and 6.0 environments. This chapter explains how to install and use the LSI MPT NWPA SCSI Host Adapter Module (HAM) driver for NetWare.

> Note: Current Netware drivers can be downloaded from the LSI web site at http://www.lsi.com/support. After you are connected to this web site, go to the *Download Center*. Select the product category, then the appropriate product. A bullet in the Drivers section will display all driver packages associated with the product selection.

4.1.1 Driver Features

The MPT HAM driver supports these features:

- Multiple host adapters
- Multiple logical unit numbers (LUNS)
- Large LUN support (larger than 7.844 Gigabytes)
- SCSI Fibre Channel protocol.
- Disconnect/Reselect
- Tagged command queuing
- Simple and ordered queue tags
- Scatter/Gather
- Shared interrupts
- MPT 5.xx BIOS (with ASPIMPT.SYS version 5.02 or greater)
- MPT 5.xx BIOS (without ASPIMPT.SYS)
- MPT 5.xx DOS drivers

The following features are supported for parallel SCSI devices only:

- Data Transfers at up to Ultra320 SCSI speeds
- Domain Validation
- Synchronous negotiation (Fast/Ultra/Ultra2/Ultra160/Ultra320 SCSI)
- Wide SCSI (single-ended and differential)

The following features are supported in conjunction with Novell software:

- MPI IOCTL Interface for NetWare using the LSICFGNW.NLM utility driver.
- Support for SCSI CD-ROM devices via NetWare's SCSICD.CDM
- Support for tape and ASPI devices by using NetWare's NWTAPE.CDM for NetWare versions 5.1 and 6.0.

In addition to the Release Definitions, the following restrictions apply:

- NWPA.NLM must be version 3.12 (or higher) for NetWare 6.0, or version 3.09 (or higher) for Netware 5.1 or newer in SMP environments.

Follow these instructions to upgrade to SMP after NetWare has been installed:

1. At the server prompt, type: `load install`

   A menu appears.

2. Select **Multiprocessor**.

   Another menu appears.

3. Select the default: MPS14

4. Follow the remaining prompts and then exit load install.

5. Shut down the server and reboot the system.

   Note: Other third-party CDMs may also support these devices.

4.1.2 Supported LSI Devices

The LSIMPTNW.HAM supports the following devices and associated LSI host adapters:

- LSI53C1020, LSI53C1030 (SCSI chips)
- LSIFC929X (Fibre Channel chips)
- LSI20320, LSI21320, LSI22320 (host adapters)
- LSI7202 (Fibre Channel host adapter)

4.1.3 Driver Description

The LSI MPT NWPA solution consists of the device driver LSIMPTNW.HAM and the NetWare NWPA installation file LSIMPTNW.DDI.

LSIMPTNW is an NWPA Host Adapter Module (HAM). In order to support SCSI devices, you must load the HAM module in conjunction with a SCSI Custom Device Module (CDM). Novell has developed generic CDMs to support SCSI Hard Drives, SCSI CD-ROM devices, SCSI tape devices, and SCSI changer devices. In addition, third party vendors are developing CDMs to support their specific devices.

4.1.4   Configuration IOCTL Interface Support

Support for the MPI IOCTL Interface (see LSI specification for details) for NetWare is provided by the `LSICFGNW.NLM` utility driver. This software in conjunction with this driver provides an interface for management and SCSI pass-thru utility applications. If your application requires this functionality, the `LSICFGNW.NLM` software must be loaded after the driver instances are loaded. This can be accomplished by adding the following line to the `startup.ncf` file:

```
LOAD LSICFGNW.NLM
```

Only one instance of this NLM should be loaded. The NLM will automatically attach to all of the adapter driver instances at that point. In order for the `LSICFGNW.NLM` software to load from the `startup.ncf` file, it should be placed in the `C:\NWSERVER` directory on the DOS partition.

4.1.5   ASPI Support

NWPA ASPI support is provided via NetWare's NWTAPE driver. NetWare, or third party applications, may use this interface to communicate with a SCSI device attached to an LSI MPT-controller, including SCSI tape devices using NWTAPE.CDM.

4.2   Installing the NWPA NetWare Driver

To install NetWare, follow the instructions in the *Novell NetWare Installation Manual*. The following information is provided to assist in the installation. The LSI MPT NWPA NetWare driver must be loaded once for each SCSI channel on an LSI controller installed in the system.

4.2.1   Preparing Your System for the NWPA Driver

The LSI NWPA driver, LSIMPTNW.HAM supports the following DOS drivers:

- ASPIMPT.SYS (Version 5.02 or greater)

- SYMCD.SYS

- SYMDISK.SYS

The MPT BIOS version 5.xx is the minimum MPT BIOS required for NetWare when not used with ASPIMPT.SYS.

Follow these steps to check the status of DOS drivers:

1. Edit the CONFIG.SYS file.

2. If any of the following lines appear, you may remove or delete them. (LSI recommends commenting them out with the REM command in case they are needed later.)

```
DEVICE=<path>\CDROM.SYS /d:<name>
DEVICE=<path>\SYMDISK.SYS
DEVICE=<path>\HIMEM.SYS
DEVICE=<path>\EMM386.SYS
```

3. If SCSI CD-ROM support is required, add the following:

```
DEVICE=<path>\ASPIMPT.SYS
DEVICE=<path>\SYMCD.SYS /d:<name>
```

4. Add the following line to the AUTOEXEC.BAT file:

```
DEVICE=<path>\mscdex /d:<name>
```

4.2.2   NetWare 5.1 and 6.0 Driver Installation

Follow these steps to install the NetWare 5.1/6.0 driver.

1. Begin the file server installation according to the instructions in the file server installation chapter in the *Novell NetWare Installation Manual*.

2. When the NetWare installation procedure prompts you for a disk driver, insert the LSI device driver diskette into drive A: or B:.

3. Use the INS key to select an unlisted driver.

   A dialog box appears.

4. If the driver diskette is in the A: drive, press **Enter** to continue. If the driver diskette is in the B: drive, press **F3** (to specify the path to search for the driver), enter the drive letter B: and press **Enter**.

   The LSIMPTNW.HAM driver will appear as a selection.

   Note: If the INS key option does not appear during the installation, choose **Server Drivers** to go to the Summary page. Highlight **Disk and CD-ROM Drivers** (e.g., IDEATA). Press **Enter** and load an additional driver. Then press the **INS** key. The system defaults to the A: path. Highlight the

LSI NWPA driver and press **Enter**. Select **Yes** to save and move the driver into the operating system. Press **Enter** to copy the files.

Next, the system prompts you with the available command line options to load the driver. A description of each option appears in the box at the bottom of the installation screen. A more detailed description is given in the section titled Command Line Options.

5. Modify any option values, as needed.

    A description of each option appears in the box at the bottom of the installation screen. A more detailed description is given in Section 4.3, "Command Line Options."

6. Load a separate instance of the driver for every LSI controller SCSI channel or host adapter present in the system.

7. When prompted for a slot number, accept the slot numbers displayed. Be sure to write these slot numbers down for later use.

8. When asked to edit the `STARTUP.NCF` file, be sure the `LSIMPTNW.HAM` is loaded once per LSI controller SCSI channel. Add the following statement to each load line in the `STARTUP.NCF`, specifying the slot numbers written down in the previous step, with only one slot number per load instance:

    `SLOT=<slot number>`

    The HAM driver(s) are loaded for each LSI controller SCSI channel from the first LOAD statement to the last LOAD statement.

4.2.3 Reconfiguring Driver Options

Follow these steps to reconfigure driver options:

1. To unload all instances of the driver, type:

    `unload LSIMPTNW.HAM`

2. To reload each instance of the driver with the desired option settings, type:

    `load LSIMPTNW.HAM slot=<slot number> <options>`

3. If the changes made to the load options of one or more load instance are permanent, and the driver is loaded automatically at server boot time, you must specify these options in the `STARTUP.NCF` or `AUTOEXEC.NCF` files.

4.3   Command Line Options

The LSIMPTNW.HAM driver has many tuning parameters, as listed below. A default is listed for each option, as well as a list of valid entries. Each option has a description of when to use it, the syntax used, and any impact its use may have on the system.

If an option is specified but the assignment is not valid, the default value is used.

The options described below are used by typing the specified characters on the load command line for the NWPA driver. For example, the load command line to specify the Width SCSI Option is:

```
load LSIMPTNW.HAM width=narrow
```

Note: No spaces are allowed in a single command line option, but spaces are required between different command line options.

4.3.1   Information Option: Using the Help Mode Option

- **Command line option:** ? or h
- **Function:** Display the options available in the driver.
- **Possible Impact:** The driver will not load with ? or h specified.

Use this command line option to view a brief description of each driver option, as well as valid entries for each option. If the ? or h option is specified along with other options, the help screen is invoked, the other options are ignored, and the driver is not loaded.

4.3.2   NetWare NWPA Driver Customizable Options

Each command may be preceded by a "/" or "-" for backwards compatibility at the discretion of the user. The line options with multiple names are simply aliases for the same command. The command line is case insensitive, so you can mix upper and lower case.

4.3.2.1   Using the Elevator Threshold Option

- **Syntax:**   elev=<option>[targetIDlist] or
                     elevator=<option>[targetIDlist]

- **Default value:** 32
- **Valid entries:** 0–250 (0 = disable)
- **Function:** Specifies the maximum number of I/Os that the HAM queues before allowing NWPA to filter and organize requests.

NWPA uses elevator queues to determine how many I/Os are queued to the HAM before organizing requests and generating scatter gather lists. If this number is set too low, adapter I/O starvation can result. If the number is too high, I/Os may not be sorted and/or scatter gather lists may not be generated. Varying the elevator threshold value affects performance.

4.3.2.2 Using the Handles Option

- **Syntax:**   handles=<option>[targetIDlist] or
                   handle =<option>[targetIDlist] or
                   hdl=<option>[targetIDlist]
- **Default value:** 144 handles
- **Valid entries:** Number of handles
- **Function:** Defines the maximum number of bus/device/target handles.

For larger configurations, increase this value to the total number of bus/target/device(s) in a system.

4.3.2.3 Using the Minimum Timeout Option

- **Syntax:**   mintimeout=<option>[targetIDlist] or
                   mint=<option>[targetIDlist]
- **Default value:** 0 (0 = no timeout)
- **Valid entries:** 0–1200
- **Function:** Specifies the minimum device timeout, in seconds.

This option uses a timeout mechanism to support particularly slow devices. When a driver issues a command to a SCSI device, a timer is started. If the timer expires before the command completes, the driver assumes something has gone wrong and takes steps to recover. The minimum setting is 0, which is no timeout.

4.3.2.4   Using the Tagged Queuing Option

- **Syntax:**   `qtags=<option>[targetIDlist]` or
  `qtag=<option>[targetIDlist]` or
  `tag=<option>[targetIDlist]`

- **Default value:** on

- **Valid entries:** on, off

- **Function:** Enables/disables use of simple/ordered tagged command queueing.

Enabling the `qtags` option causes the driver to issue tagged I/O requests to the devices that support tagged queuing. Tagged I/O requests are not issued to devices that do not support tagged queuing. Depending on the drive controller, use of queue tags increases throughput of the device. However, the optimal number of queue tags is based on the specific device type. Tagged queuing may result in improved I/O throughput in devices that support it.

4.3.2.5   Using the Scan Option

- **Syntax:**   `scan=<option>[targetIDlist][lunIDlist]`

- **Default value:** list

- **Valid entries:** on, off, list, or order

- **Function:** Specifies the Logical Unit Numbers (LUNs) to scan.

This option allows you to change the default for scanning LUNs per target ID on the SCSI bus.

4.3.2.6   Using the Slot Option

- **Syntax:**   `slot=<option>[targetIDlist]`

- **Default value:** None

- **Valid entries:** 0–10099

- **Function:** Specifies the slot instance number of the LSI controller to which the load instance applies.

The slot option specifies the LSI controller SCSI channel (embedded chip or host adapter) that pertains to the current load. This information is required to load the driver. If this information is not specified on the load line, the driver will prompt for the slot number.

4.3.2.7   Using the Synchronous SCSI Option

- **Syntax:**   `synchronous=<option>[targetIDlist]` or
                    `sync=<option>[targetIDlist]` or
                    `sync=<option>[targetIDlist]` or
                    `speed=<option>[targetIDlist]`

- **Default value:** Maximum of the HBA

    Examples of rate specifier are:
    0 MB or *10 MB* (megabytes per second)
    20 MT or *40 MT* (mega transfers per second)

- **Valid entries:**

0 =	asynchronous
5 =	5 mt/sec
10 =	10 mt/sec
20 =	20 mt/sec
40 =	40 mt/sec
80 =	80 mt/sec
160 =	160 mt/sec
OFF =	asynchronous
ASYNC =	asynchronous
MAX =	Adapter maximum rate

- **Function:** Sets synchronous transfer rate for specified target(s).

- **Possible Impact:** Could cause a device to operate slower than its maximum speed.

This synchronous SCSI option allows you to enable/disable support of Fast, Ultra, Ultra2, Ultra160 and Ultra320 SCSI synchronous data transfers when using a Fast, Ultra, Ultra2, Ultra160, or Ultra320 SCSI controller. Synchronous data transfers increase the I/O performance of a system.

4.3.2.8   Using the Verbose Option

- **Syntax:**   `verbose=<option>[targetIDlist]`

- **Default value:** off

- **Valid entries:** on, off

- **Function:** Displays more detailed information on options and DOS configuration.

This option is useful when multiple adapters are present in the system, and the PCI Device ID, PCI Bus number, and PCI Device/Function number for each adapter need to be known.

4.3.2.9 Using the Width Option

- **Syntax:**   width=<option>[targetIDlist] or
                   wide=<option>[targetIDlist] or
                   wid=<option>[targetIDlist]

- **Default value:** on

- **Valid entries:**
  narrow = 8 bit data bus
  wide = 16 bit data bus
  off =   8 bit data bus
  on =   16 bit data bus
  8 =   8 bit data bus
  16 =   16 bit data bus
  max = Adapter maximum width

- **Function:** Sets bus width negotiations for specified targets.

This option allows you to disable support of wide SCSI when using a wide SCSI controller. Set this option to *narrow*, *off*, or *8* to disable a wide SCSI device when an 8-bit SCSI cable is connected on the bus between the wide SCSI host adapter and the wide device. This type of connection prohibits the transfer of wide data.

If this option is set to *narrow*, *off*, or *8*, the wide device still works, but all data transferred to or from the device is narrow (8 bit). The driver does not initiate a wide SCSI transfer request negotiation. Alternatively, to enable support of wide SCSI transfers, set this option to *wide*, *on*, or *16*.

4.4 Supported DOS Configurations and DOS Drivers

The LSIMPTNW.HAM driver supports the following DOS configurations:

- MPT 5.XX or greater BIOS, without ASPIMPT.SYS

- MPT 5.XX BIOS with ASPIMPT.SYS

- No MPT BIOS, ASPIMPT.SYS[1]

The MPT ASPIMPT.SYS (version 5.02 or greater) DOS driver supports the MPT 5.xx or later BIOS. SYMCD.SYS and SYMDISK.SYS provide support for CD-ROM and MO devices under DOS. Neither SYMCD.SYS nor SYMDISK.SYS are required for NetWare support of CD-ROM and MO devices. For SCSI CD-ROM installation, ASPIMPT.SYS and SYMCD.SYS are required.

The MPT NWPA driver, LSIMPTNW.HAM supports the list of DOS drivers described below.

- **ASPIMPT.SYS**
  The ASPIMPT.SYS driver provides an ASPI layer interface for disk and non-disk devices. If NetWare is being installed from a SCSI CD-ROM device on an LSI controller, SYMCD.SYS is required with ASPIMPT.SYS.

- **SYMCD.SYS**
  To install the NetWare operating system from CD-ROM, load the SYMCD.SYS driver with ASPIMPT.SYS. Once the NetWare operating system installation has completed, SYMCD.SYS is not needed. The NetWare NWPA environment provides support for SCSI CD-ROMs through the NetWare driver interface.

- **MSCDEX.EXE**
  The MSCDEX.EXE driver (provided with DOS) is required in conjunction with SYMCD.SYS to install NetWare from a CD-ROM.

- **SYMDISK.SYS**
  The SYMDISK.SYS driver provides support for removable media and large sector size devices under DOS. This driver is not required for NetWare support of these devices.

  Note: The NetWare drivers can function independently of any DOS drivers, except for the installation of NetWare from a SCSI CD-ROM drive.

---

1. In addition to ASPIMPT.SYS (version 5.XX or greater), SYMCD.SYS and/or SYMDISK.SYS can be loaded for DOS CD-ROM and DOS Magneto Optical (MO) support, respectively. SYMCD.SYS and SYMDISK.SYS are NOT required for CD-ROM or MO support under Net-Ware.

Chapter 5
Host Adapter Flash
Utility

This document explains how to use the DOS-based LSI Flash Utility to download firmware and BIOS images to LSI Fibre Channel (FC) and Serial Attached SCSI (SAS) host adapter cards.

This chapter has the following sections:

- Section 5.1, "Features and Supported Controller Chips"
- Section 5.2, "Starting the Host Adapter Flash Utility"
- Section 5.3, "Running the Host Adapter Flash Utility"
- Section 5.4, "Supported Flash ROM Chips"

5.1 Features and Supported Controller Chips

The Host Adapter Flash Utility supports the following features:

- Host adapter selection for updating
- Total flash part erasure (FC only)
- Command line execution
- Provides a means to identify the firmware or BIOS image version on the adapter or residing in a file.

The Host Adapter Flash Utility allows you to update the LSI Fusion-MPT based firmware and/or BIOS on the following controller chips and host adapters:

- **Fibre Channel Controller Chips**: LSIFC929, LSIFC929X, LSI929XL, LSI949X
- **Fibre Channel Host Adapters**: LSI40919H, LSI409190, LSI40919LO, LSI449290, LSI44929H, LSI44929L0, LSI7004G2-LC,

LSI7102AX-LC, LSI7102LXP-LC, LSI7102XP-LC, LSI7104EP-LC, LSI7104XP-LC, LSI7104XP-SGI, LSI7202AX-LC, LSI7202X-LC, LSI7202LXP-LC, LSI7202LXP-NCR, LSI7202XP, LSI7202XP-4M, LSI7202XP-LC, LSI7204EP-LC, LSI7204XP-LC, LSI7204XP-SGI, LSI7402AX, LSI7402AX-LC, LSI7402EP-LC, LSI7402XP-LC, LSI7402XP-NCR, LSI7404EP-LC, LSI7404XP-LC

- **SAS Controller Chips**: LSISAS1064, LSISAS1068, LSISAS106xE

- **SAS Host Adapters**: SAS3040X, SAS3041X, SAS3440X, SAS3041XL-S, SAS3080X, SAS3441X, SAS3442X, SAS3800X, SAS3041E, SAS3442E

5.2 Starting the Host Adapter Flash Utility

The utility's executable name is mptutil.exe. This utility requires the DOS extender, dos4gw.exe, to operate. LSI strongly recommends that you copy both files to a DOS bootable diskette and execute the utility from this diskette. Either MS-DOS or PC-DOS is acceptable. No memory manager or other drivers beyond the minimum required should be installed via the config.sys file. The utility can optionally be executed from a hard drive. However, the drive should not be connected to an adapter board that you are updating, and the DOS4GW extender should reside in the same directory as the mptutil.exe executable file.

Note: The host adapter must have an onboard flash in order to use this utility.

Follow these steps to start the Host Adapter Flash Utility:

1. Insert the diskette into drive A:.

2. Boot the system to the DOS prompt a:\>.

3. Type mputil and press **Enter**.

   DOS4GW will be loaded automatically if it is located in the same directory as the utility or is in the defined path. The main menu appears, as shown in Figure 5.1.

Figure 5.1   Host Adapter Flash Utility Main Menu

```
            Vendor      Device
   Choice     ID          ID         Bus       Device
  -------    ------      ------       ---      ------
     1        0x1000     0x0030      0x3        0x10
             LSI Logic, Inc.    LSIFC929X FC Host Adapter

     3        0x1000     0x0031      0x4        0x10
             LSI Logic, Inc.    LSISAS1064 SAS Host Adapter

     4   -   Refresh

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

The main menu allows you to choose which controller chip to use to update the BIOS and firmware. Dual channel cards have a single entry (chip) displayed on this screen. Note that choice selections may not always have concurrent choice selections (see example below). Since both channels of a dual channel board share a flash part, only one of the paths needs to be chosen. However, nothing is damaged if separate updates are done through both paths.

To continue, type the number of the controller chip you want.

5.3   Running the Host Adapter Flash Utility

When you choose a controller chip from the menu, a menu of options is displayed. The menu is different for fibre channel controller chips versus SAS controller chips.

5.3.1   Fibre Channel Controller Options

Table 5.1 lists the menu options that are displayed if you selected a fibre channel controller chip.

Note: If you are updating the firmware or BIOS/Fcode (options a or b on the menu), you should exit the Host Adapter Flash Utility after the update is complete and perform a cold reboot. Then you can restart the utility if you need to change other settings like board speed or interrupt coalescing values. This ensures that the updated firmware is running on the chip.

Table 5.1   Fibre Channel Option Menu

Option	Description
a - Update Firmware b - Update BIOS & FCode	Allows you to download images to the currently selected PCI chip. This option requires the user to input a filename to be flashed. In the case of BIOS & FCode it will require the user to input two file names to be concatenated and then flashed.
c - Upload current firmware to a file d - Upload current BIOS to a file	Allows you to upload the firmware or BIOS image to a designated file. Before you select one of these options, make sure there is enough disk space for the image.
f - Toggle Board Speed on Function 0 g - Toggle Board Speed on Function 1	Provides a quick one-stroke method for setting a particular port's board speed. Option g is not displayed if a single port host adapter is currently selected.
h - Toggle Topologies on Function 0 i - Toggle Topologies on Function 1	Provides a quick one-stroke method for setting a particular port's topology. Option i is not displayed if a single port host adapter is currently selected.
l - Change Interrupt Coalescing Values on Port 0 m - Change Interrupt Coalescing Values on Port 1	Allows you to set the Coalescing Timeout and Depth. You must press **c** to commit any changes made.
n - Change Device Pathing to One Path per device	Toggles the multi-pathing bit, which tells the firmware whether to present a target that is seen via multiple paths as a single target ID (multi-pathing is OFF) or as a target ID per path (multi-pathing is ON). If you enable multi-pathing, you should use a multi-pathing driver and you should be aware that the same target will be visible via multiple target IDs.
x - Erase BIOS	Removes the BIOS from the adapter, but leaves the firmware intact.
y - Change Protocol Support	Allows you to enable all protocols or just initiator or target only. These changes will affect both ports of a multi-port host adapter.
z - Change Adapters	Returns you to the host adapter selection menu (displayed earlier) so you can select a different host adapter.
q - Quit	Quits the utility.

5.3.2   SAS Controller Options

Table 5.2 lists the menu options that are displayed if you selected a SAS controller chip.

> Note: If you are updating the firmware or BIOS (options a or b on the menu), you should exit the Host Adapter Flash Utility after the update is complete and perform a cold reboot.

Then you can restart the utility if you need to manage the configuration settings. This ensures that the updated firmware is running on the chip.

Table 5.2   SAS Option Menu

Option	Description
a - Update Firmware b - Update BIOS	Allows you to download images to the currently selected PCI chip. This option requires the user to input a filename to be flashed.
c - Upload current firmware to a file d - Upload current BIOS to a file	Allows you to upload the firmware or BIOS image to a designated file. Before you select one of these options, make sure there is enough disk space for the image.
f - Manage configuration settings	Allows you to view and modify configuration pages. You must press **c** to commit any changes made. If a page cannot be modified, the information will be displayed.
z - Change Adapters	Returns you to the host adapter selection menu (displayed earlier) so you can select a different host adapter.
q - Quit	Quits the utility.

5.3.3   Command Line Options

Table 5.3 lists the command line options that the utility supports. You can use these commands to create an automated process to perform the utility's operations.

Table 5.3   Command Line Options

Command	Description
-ax	Select a port on a host adapter, where *x* is the port number. (FC only)
-bx	Download the BIOS image, where *x* is the name of the input file. If x is missing, you will be prompted for a file name.
-cx	Change current adapter where x is the number of the adapter.
-fx	Download the firmware image where x is the name of the input file. If x is missing, the user will be prompted for a file name.
-?	Displays a screen of help information.

5.4   Supported Flash ROM Chips

The Host Adapter Flash Utility supports the following Flash ROM chips in the following part numbers and corresponding sizes:

5.4.1   Fibre Channel (1-MB Capacity)

- Sharp LH28F008BJT   (LSIFC929x)
- Sharp LH28F008SCT   (LSIFC929)
- Sharp LH28F008SCHT-L12 (LSIFC929)
- Sharp LH28F008SCHT-TE (LSIFC929)
- Intel E28F008S3-120   (LSIFC929)
- Intel TE28F08B3BA   (LSIFC929X)

5.4.2   Serial Attached SCSI (1-MB Capacity)

- Sharp LH28F008SCT-L12
- Sharp LH28F008SCHT-L12
- Sharp LH28F008SCHT-TE
- Intel E28F008S3-120

5.4.3   Serial Attached SCSI (2-MB Capacity)

- AMD   AM29LV017D-120ED
- AMD   AM29LV017D-120EF
- AMD   AM29LV017D-70ED
- AMD   AM29LV017D-70EF
- AMD   AM29LV017D-90ED
- AMD   AM29LV017D-90EF
- Intel   E28F016S3-120
- Sharp   LH28F016SCT-120
- MACRONIX MX29LV017BTC-70G
- MACRONIX MX29LV017BTC-90G

5.4.4 Serial Attached SCSI (4-MB Capacity)

- AMD AM29LV033C-70EI
- AMD AM29LV033C-90EI

Host Adapter Flash Utility

Chapter 6
Integrated RAID
Configuration Utility

This chapter explains how to use the CFGGEN Integrated RAID (IR) Configuration Utility to create Integrated Mirroring (IM), Integrated Mirroring Enhanced (IME) and Integrated Striping (IS) volumes. CFGGEN is a command line utility that runs in the DOS, Linux, EFI, and Windows Pre-Installation (WinPE) environments. CFGGEN can be executed from a command line prompt or a shell script. The result from invoking this utility is communicated via the program status value that is returned when the program exits.

CFGGEN can be used to create IM, IME, and IS storage configurations on both SCSI controllers and SAS controllers.

This chapter contains the following sections:

- Section 6.1, "Hardware and Software Requirements"
- Section 6.2, "CFGGEN Interface Description"
- Section 6.3, "CFGGEN Commands"

  Note: CFGGEN is intended for use primarily in the manufacturing environment. End users can use the BIOS-based configuration utilities to create IM and IS volumes. (See Chapter 7, "SCSI BIOS and Setup Utility," Chapter 8, "SCSI EFI BIOS and Setup Utility," and Chapter 9, "Fusion-MPT SAS BIOS and Setup Utility.")

6.1   Hardware and Software Requirements

The CFGGEN IR Configuration Utility runs on any Intel IA-32 or IA64 compatible platform. It operates with any SCSI, SATA, or SAS device that is compliant with existing SCSI standards. CFGGEN supports the following LSI controllers:

- LSI53C1020 and LSI53C1030 SCSI controllers (DOS, Linux, and WinPE environments only)

- SAS1064/1064E, SAS1068/1068E, and SAS1078 SAS controllers (the SAS1078 controller is not currently supported in the EFI environment).

The supported versions of CFGGEN are as follows:

DOS Version –

CFGGEN operates in any environment that is fully compatible with MS-DOS 6.22 and has at least 2 MB of memory. The system BIOS must support 32-bit BIOS services, including the PCI BIOS services. CFGGEN uses these services to locate the controller and its interface registers. CFGGEN must be able to directly access the controller chip's interface registers.

> Note: You *cannot* run CFGGEN in a virtual DOS window from within Windows.

EFI Version –

CFGGEN operates in any environment that is fully EFI compatible. Currently, this includes only the SAS controllers listed above.

Linux Version –

CFGGEN is a statically linked Linux application. Static linking prevents any library version compatibility problems that might stop CFGGEN from working with a specific release or distribution of Linux. Version 3.02.04 or newer of the LSI mptlinux driver must be installed on the system. The required modules include mptbase.o, mptscsih.o and mptctl.o.

> Caution: mptbase.o, mptscsih.o and mptctl.o must be loaded into the Linux kernel before CFGGEN will function correctly. They can be loaded using the Linux modprobe command.

WinPE Version –

CFGGEN operates in Windows Pre-Installation Environment (WinPE) and is statically compiled with the LSI MptLib Library (MptLib.lib). The WinPE environment must have the appropriate LSI MPT Windows driver

(ScsiPort or Storport) installed and loaded in order to recognize and communicate with the I/O controller.

The WinPE utility does not recognize an LSI53C1030 or LSI53C1020 controller, unless there is at least one device attached to the controller.

6.2   CFGGEN Interface Description

CFGGEN uses a command line interface. Commands are formatted as follows:

    cfggen <controller #> <command> <parameters>

The program name, controller number, command, and parameters fields must be separated by a space. The format of the parameters is command specific, as described in Section 6.3, "CFGGEN Commands."

Information is passed between the user environment and CFGGEN via the command line, the standard output and standard error interfaces, and the program return value. You can redirect the output streams as permitted by the operating environment. The program return value is returned when the program exits. A value of 0 is returned if the command is successful. Otherwise, a value of 1 is returned.

6.3   CFGGEN Commands

Table 6.1 lists the CFGGEN commands and indicates which commands are supported under each operating environment.

Table 6.1   CFGGEN Commands

Command	Reference	Supported in these Operating Environments			
		DOS	Linux	EFI	WinPE
AUTO	Section 6.3.2		x	x	x
CREATE	Section 6.3.3	x	x	x	x
DELETE	Section 6.3.4	x	x	x	x
DISABLEIR	Section 6.3.5		x	x	
DISPLAY	Section 6.3.6	x	x	x	x

Table 6.1   CFGGEN Commands (Cont.)

Command	Reference	Supported in these Operating Environments			
		DOS	Linux	EFI	WinPE
ENABLEIR	Section 6.3.7		x	x	
FORMAT	Section 6.3.8	x	x	x	
HOTSPARE	Section 6.3.9	x	x	x	x
LIST	Section 6.3.10	x	x	x	
LOCATE[1]	Section 6.3.11		x	x	
LOGIR[1]	Section 6.3.12	x			
SETOFFLINE	Section 6.3.13	x	x		
SETONLINE	Section 6.3.14	x	x		
STATUS	Section 6.3.15	x	x	x	x
VSIME	Section 6.3.16	x			

1. This SAS-specific command is not supported on LSI53C1020/1030 SCSI controllers.

CFGGEN is not case sensitive. You can type CFGGEN commands and parameters in uppercase, lowercase, or a mixture of the two. The following conventions are used in the command descriptions:

- Text in *italics* must be entered exactly as shown on the command line.

- Text surrounded by <> must be replaced with a required parameter.

- Text surrounded by [ ] may be replaced by an optional parameter.

- Parameters surrounded by { } must be entered one or more times, as is appropriate for the command being executed.

- The command line definition characters <>, [ ], and { } must not be entered on the command line.

6.3.1   Common Command Line Parameters

This section describes CFGGEN command line parameters that are used with more than one command.

- **<controller #>**
  The unique controller number of a *PCI function* found in the system, starting with controller # 0. For SCSI controllers, the controller # is used to address a particular SCSI bus in the system. For example,

CFGGEN assigns two controller numbers to an LSI53C1030 dual SCSI bus chip. It assigns one controller number to an LSI53C1020 single SCSI bus chip.

For the LSI SAS1064/1064E and SAS1068/1068E controllers the controller # corresponds to a single SAS controller. For example, in a system with two SAS1068 controllers, CFGGEN uses *controller # 0* to reference the first controller and *controller # 1* to reference the other controller.

Valid controller number values are 0–255 (decimal).

- **<SCSI ID>**
  The SCSI bus address of a peripheral device attached to an LSI controller. The maximum value of *SCSI ID* depends on the type of I/O controller and the maximum number of devices supported by the OS for this controller.

  Valid *SCSI ID* values are:
  0–15 (decimal) per SCSI bus for LSI53C1020/1030 controllers
  0–127 (decimal) per controller for SAS1064/1064E and SAS1068/1068E controllers

  Note: With PBSRAM, the SAS1068/1068E controllers can support more than 128 devices.

- **<Enclosure:Bay>**
  The Enclosure and bay/slot of a peripheral device attached to the bus. The argument must use a colon (:) as a separator and must follow the *enclosure:bay* format. Only devices connected to LSI SAS controllers can be addressed using *enclosure:bay.* Therefore, this option is not supported on LSI53C1020/1030 controllers. Valid numbers are:
  Enclosure: A 16-bit EnclosureHandle value set by the IOC. A value of 0 is invalid.
  Bay/Slot: A 16-bit Slot value set by IOC.
  The Enclosure and Slot numbers of a drive can be obtained from the DISPLAY command.

6.3.2   AUTO Command

The AUTO command automatically creates an IM, IME, or IS volume on an LSI1064/1064E or LSI1068/1068E controller. The volume is created with the maximum number of disks available for use in the specified

volume type. The main difference from the CREATE command is that with the AUTO command you do not specify SCSI ID values for disks to use in the volume. CFGGEN automatically creates the volume with the first usable disks it finds. Firmware and hardware limitations for the family of controllers limit the number of configurations that are possible.

When a disk drive is added to an IM, IME, or IS volume, its entire storage capacity may or may not be used, depending on drive capacity and volume capacity. For example, if you add a 36 Gbyte disk drive to a volume that only uses 9 Gbytes of capacity on each disk drive, the remaining 27 Gbytes of capacity on the disk drive are unusable.

When you create an IM volume with the AUTO command, the first disk found is assigned as the primary disk drive. If the controller is allowed to resync the disk drives, the data on the primary disk drive will be available by accessing the newly created volume.

CFGGEN follows these rules when creating IM, IME, and IS volumes and hot spare disks with the AUTO command:

1. All disks that are part of a volume or a hot spare for a volume must be connected to the same controller.

2. IM, IME, and IS volumes are supported.

3. Only two volumes per controller can be created.

4. SAS and SATA drives cannot be mixed in a volume. With the AUTO command, all drives used must be the same type as the first available disk found.

5. The total number of disks in a volume, including hot spare disks, cannot exceed eight for LSI1064/1064E and LSI1068/1068E controllers, and the total number of disks combined for two volumes cannot exceed ten.

6. An IM volume must have exactly two disks.

7. An IME volume can have three to six disks for an LSI SCSI controller, and three to eight disks for an LSI SAS controller, as long as rules 4 and 5 are not violated.

Command Line –

cfggen <controller #> *auto* <volume type> <size> [*qsync*] [*noprompt*]

Parameters –

- <controller #> – Number of the SAS controller targeted by this command.

  Note: (**Linux version only**) If you specify *SAS* instead of *controller #* in the command line, CFGGEN will configure all SAS controllers in the system.

- <volume type> – Volume type for the volume to be created. Valid values are *IM*, *IME* and *IS*.

- <size> – Size of the RAID volume in Mbytes, or *MAX* for the maximum size available.

- [*qsync*] – If this optional parameter is specified, the new volume is synchronized quickly. If the volume type is *IME* or *IS*, a quick synchronization is always performed even if this option is not specified. A quick synchronization means that the first 32 Kbytes of the drives in the volume are cleared to 0.

- *noprompt* – Suppresses display of warnings and prompts.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.3   CREATE Command

The CREATE command creates IM, IME, and IS volumes on the LSI53C1020/1030 and SAS1064/1064E and SAS1068/1068E controllers. The firmware and hardware limitations for these controllers determine the number of configurations that can be created.

When a disk drive is added to an IM, IME, or IS volume, its entire storage capacity may or may not be used, depending on drive capacity and volume capacity. Any unused capacity is not accessible for other purposes. For example, if you add a 36 Gbyte disk drive to a volume that only uses 9 Gbytes of capacity on each disk drive, the remaining 27 Gbytes of capacity on the disk drive is unusable.

The disk identified by the first SCSI ID on the command line is assigned as the primary disk drive when an IM volume is created. If the controller

is allowed to resync the disk drives, the data on the primary disk drive will be available when you access the newly created volume.

The following rules must be observed when creating IM, IME, and IS volumes and hot spare disks:

1. All disks that are part of a volume, including hot spares for that volume, must be on the same SAS controller or on the same SCSI bus (for SCSI controllers).

2. IM, IME, and IS volumes are supported.

3. A maximum of two IM, IME, or IS volumes per controller can be created.

4. The total number of disks in a volume, including hot spare disks, cannot exceed six for LSI53C1020/1030 controllers.

5. The total number of disks in a volume, including hot spare disks, cannot exceed eight for SAS1064/1064E and SAS1068/1068E controllers, and the total number of disks combined for two volumes cannot exceed ten. (Ten disks is a theoretical upper limit for the firmware; the SAS controller may actually support a lesser number of disks.)

6. An IM volume must have exactly two disks.

7. An IME volume can have a minimum of three disks and a maximum of six disks (for LSI53C1020/1030 controllers) or eight disks (for SAS controllers), as long as rules 4 and 5 are not violated.

Command Line –

cfggen <controller #> *create* <volume type> <size> {<SCSI ID>} [*qsync*] [*noprompt*]

cfggen <controller #> *create* <volume type> <size> {<enclosure:bay>} [*qsync*] [*noprompt*]

Parameters –

*   <controller #> – Number of the SCSI bus or SAS controller targeted by this command.

*   <volume type> – Volume type for the new volume to be created. Valid values are *IM, IME,* or *IS.*

- <size> – Size of the RAID volume in megabytes, or *MAX* for the maximum size available.

- <SCSI ID> – SCSI ID of a hard disk drive to be included in the RAID volume.

- <enclosure:bay> – The *enclosure:bay* value for the disk drive to be included in the RAID volume. These values can be obtained from the output of the DISPLAY command.

- *qsync* – If this optional parameter is specified, a quick synchronization of new volume will be performed. If the volume type is *IME* or *IS*, a quick synchronization is always performed even if *qsync* is not specified. A quick synchronization means that the first 32 Kbytes of the drives in the volume are cleared to 0.

- *noprompt* – Suppresses display of warnings and prompts.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.4   DELETE Command

The DELETE command deletes all IM, IME, and IS volumes and hot spare drives. No other controller configuration parameters are changed.

Command Line –

cfggen <controller #> *delete* [*noprompt*]

Parameters –

- <controller #> – Number of the SCSI bus or SAS controller targeted by this command.

- *noprompt* – Suppresses display of warnings and prompts.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.5 DISABLEIR Command

The DISABLEIR command disables Integrated RAID functionality on an LSI1064/1064E or LSI1068/1068E controller. This is done by setting the MPI_IOUNITPAGE1_DISABLE_IR bit in the IO Unit 1 MPT Configuration Page.

If there are any existing IM, IME, or IS volumes when this command is run, CFGGEN notifies you via an output message, no action is taken, and CFGGEN returns FAILURE. If Integrated RAID is already disabled when this command is run, CFGGEN returns SUCCESS.

Command Line –

cfggen <controller #> *disableir*

Parameters –

- <controller #> – Number of the SAS controller targeted by this command.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.6 DISPLAY Command

The DISPLAY command displays configuration information for the supported LSI controllers. The information includes controller type, firmware version, BIOS version (version executed), volume information, and physical drive information. The sample output below shows an example of the information that is output by this command.

> Note: 1 Mbyte = 1,048,576 bytes. All sizes displayed in Mbytes are rounded down to the nearest Mbyte.

Command Line –

cfggen <controller #> *display* [*filename*]

Parameters –

- <controller #> – Number of the SCSI bus or SAS controller targeted by this command.

- [*filename*] – Optional valid filename to store output of command to a file.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

Sample Output –

The following example shows the output of the DISPLAY command for an IM configuration on a SAS1068 controller.

Note: The format and content of the DISPLAY command output varies, depending on the CFGGEN version being used.

```
Read configuration has been initiated for controller 0
-------------------------------------------------------------
Controller information
-------------------------------------------------------------
Controller type                  : SAS1068
  BIOS version                   : 6.xx.xx.00
  Firmware version               : 0.09.03.219
  Channel description            : 1 Serial Attached SCSI
  Initiator ID                   : 63
  Maximum physical devices       : 62
  Concurrent commands supported  : 511
  Slot                           : 6
  Bus                            : 3
  Device                         : 1
  Function                       : 0
  RAID Support                   : Yes
-------------------------------------------------------------
IR Volume information
-------------------------------------------------------------
IR volume 1
  Volume ID                      : 7
  Status of volume               : Okay (OKY)
  RAID level                     : 1
  Size (in MB)                   : 34332
  Physical hard disks (Target ID) : 11 8
```

```
--------------------------------------------------------------
Physical device information
--------------------------------------------------------------
Initiator at ID #63
Target on ID #8
  Device is a Hard disk
  Slot #                          : 2
  Target ID                       : 8
  State                           : Online (ONL)
  Size (in MB)/(in sectors)       : 34732/71132960
  Manufacturer                    : HP
  Model Number                    : DG036A8B5B
  Firmware Revision               : HPD1
  Serial No                       : B2G1P51003CD0501
Target on ID #9
  Device is a Hard disk
  Slot #                          : 3
  Target ID                       : 9
  State                           : Ready (RDY)
  Size (in MB)/(in sectors)       : 34732/71132960
  Manufacturer                    : HP
  Model Number                    : DG036A8B53
  Firmware Revision               : HPD3
  Serial No                       : 3LC00NLK000085159S8A
Target on ID #10
  Device is a Enclosure services device
  Slot #                          : 10
  Target ID                       : 10
  State                           : Standby (SBY)
  Manufacturer                    : HP
  Model Number                    : MSA50  -10D25G1
  Firmware Revision               : 1.20
  Serial No                       :
Target on ID #11
  Device is a Hard disk
  Slot #                          : 1
  Target ID                       : 11
  State                           : Online (ONL)
  Size (in MB)/(in sectors)       : 34732/71132960
  Manufacturer                    : HP
  Model Number                    : DG036A8B53
  Firmware Revision               : HP53
  Serial No                       : 3LC01PSA00008515A1Y7
--------------------------------------------------------------
Enclosure information
--------------------------------------------------------------
Enclosure#                        : 1
  Logical ID                      : 500605b0:0000f5d0
```

```
    Numslots                            : 7
    StartSlot                           : 2
    Start TargetID                      : 0
    Start Bus                           : 0
Enclosure#                              : 2
    Logical ID                          : 500508b3:00a0535c
    Numslots                            : 11
    StartSlot                           : 0
    Start TargetID                      : 0
    Start Bus                           : 0
-----------------------------------------------------------
```

Logical drive status values are as follows:

- Okay (OKY) – Volume is Active and drives are functioning properly. User data is protected if the volume is IM or IME.

- Degraded (DGD) – Volume is Active. User data is not fully protected due to a configuration change or drive failure.

- Rebuilding (RBLD) – Data resync or rebuild may be in progress.

- Inactive, Okay (OKY) – Volume is inactive and drives are functioning properly. User data is protected if the current RAID level is RAID 1 (IM) or RAID 1E (IME).

- Inactive, Degraded (DGD) – Volume is inactive and the user data is not fully protected due to a configuration change or drive failure; a data resync or rebuild may be in progress.

Physical device status values are as follows:

- Online (ONL) – Drive is operational and is part of a logical drive.

- Hot Spare (HSP) – Drive is a hot spare that is available for replacing a failed drive in an array.

- Ready (RDY) – Drive is ready for use as a normal disk drive; or it is available to be assigned to a disk array or hot spare pool.

- Available (AVL) – Drive may or may not be ready, and it is not suitable for inclusion in an array or hot spare pool (i.e., it is not spun up, its block size is incorrect, or its media is removable).

- Failed (FLD) – Drive was part of a logical drive or was a hot spare drive, and it failed. It has been taken offline.

- Standby (SBY) – This status is used to tag all non-hard disk drive devices.

6.3.7   ENABLEIR Command

The ENABLEIR command enables Integrated RAID functionality on an LSI1064/1064E or LSI1068/1068E controller. This is done by clearing the MPI_IOUNITPAGE1_DISABLE_IR bit in the IO Unit 1 MPT Configuration Page.

If there are any existing IM, IME, or IS volumes when this command is run, CFGGEN notifies you via an output message, no action is taken, and CFGGEN returns SUCCESS. If Integrated RAID is already enabled when this command is run, CFGGEN returns SUCCESS.

Command Line –

cfggen <controller #> *enableir*

Parameters –

- <controller #> – Number of the SAS controller targeted by this command.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.8   FORMAT Command

The FORMAT command is used to perform a low-level format of a disk drive. The drive cannot be a hot spare drive or a member of an IM, IME, or IS volume.

Warning: A low-level format erases all data on the hard disk drive. The FORMAT command cannot and should not be interrupted; doing so may result in irreparable damage to the hard disk drive.

Warning messages are displayed during the formatting, unless the *noprompt* option is included on the command line. If you do not quickly respond to a series of prompts, the command is aborted. The answers are case sensitive and must be entered in upper case.

The FORMAT command does not complete and return to a shell prompt until the format operation is complete. This may take a long time for a large disk drive.

Command Line –

cfggen <controller #> *format* <SCSI ID> [*noprompt*]

cfggen <controller #> *format* <enclosure:bay> [*noprompt*]

Parameters –

- <controller #> – Number of the controller targeted by this command.
- <SCSI ID> – SCSI ID of the hard disk drive to be formatted.
- <enclosure:bay> – The *enclosure:bay* value for the disk drive to be formatted. These values can be obtained from the output of the DISPLAY command.
- *noprompt* – Suppresses display of warnings and prompts.

Program Return Value –

0x00 SUCCESS: Command completed successfully.
0x01 FAILURE: Bad command line arguments or operational failure.
0x02 ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.9 HOTSPARE Command

The HOTSPARE command creates a hot spare disk drive, which is added to hot spare pool 0. The number of disk drives in an IM, IME, or IS volume, including the hot spare disk, cannot exceed six for LSI53C1020/1030 controllers or eight for LSI1064/1064E and LSI1068/1068E controllers. Only one hot spare disk can be created.

The capacity of the hot spare disk must be greater than or equal to the capacity of the smallest disk in the logical drive. An easy way to verify this is to use the DISPLAY command.

The following rules must be observed when creating hot spare disks:

1. A hot spare disk cannot be created unless at least one IM or IME volume is already created.

2. For LSI1064/1064E and LSI1068/1068E controllers, CFGGEN does not allow adding a hot spare disk of a type (SAS/SATA) that is different from the disk types in any of the volumes.

Command Line –

cfggen <controller #> *hotspare* <SCSI ID> [*delete*]

cfggen <controller #> *hotspare* <enclosure:bay> [*delete*]

Parameters –

- <controller #> – Number of the SCSI bus or SAS controller targeted by this command.
- <SCSI ID> – SCSI ID of the drive targeted by this command.
- <enclosure:bay> – The *enclosure:bay* value for the disk drive to use for the new hot spare disk. These values can be obtained via the output of the DISPLAY command.
- [*delete*] – Optional delete action to specify that the hot spare drive with <SCSI ID> needs to be deleted.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.10 LIST Command

The LIST command displays a list of all controllers present in the system, along with their corresponding controller #.

Command Line –

cfggen list

Parameters – None

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.11 LOCATE Command

Note: This command is supported only for LSI SAS controllers.

The LOCATE command turns on/off a drive's LED located in a SCSI enclosure processor. This is accomplished by sending a SCSI Enclosure Processor Request message to set or unset the Identify Request flag. The command is valid on drives connected to SES or SAF-TE devices.

Command Line –

cfggen <controller #> *locate* <SCSI ID> <action>

cfggen <controller #> *locate* <enclosure:bay> <action>

Parameters –

- <controller #> – Number of the controller targeted by this command.
- <SCSI ID> – SCSI ID of the hard disk drive.
- <enclosure:bay> – The *enclosure:bay* value for the disk drive. These values can be obtained from the output of the DISPLAY command.
- <action> – {on/off} depending on whether the locate LED lights need to turned on or off.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.12 LOGIR Command

Note: This command is supported only for LSI SAS controllers.

The LOGIR command allows to upload or erase a log of IR events that are stored in the controller. The type of events logged is implementation specific. The IR log entries are read from Log Page 0, as defined in the MPI spec.

Command Line –

cfggen <controller #> *logir* <action> [<filename>] [*noprompt*]

Parameters –

- <controller #> – Number of the controller targeted by this command.

- <action> – {upload/clear} depending on whether the IR events need to be uploaded in a text format or erased from the controller.

- [<filename>] – An optional filename specified to dump the log information in a text format. If no filename is specified, the default filename of `logir.log` is used.

- [*noprompt*] – An optional argument that eliminates the prompt when used with a *clear* action.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.13 SETOFFLINE Command

The SETOFFLINE command makes a physical disk in a volume offline. A physical disk that is taken offline changes its state to Failed (FLD), but the disk is still associated with the volume and therefore cannot be addressed by normal I/O requests. If a new disk replaces an offline disk, the new disk is automatically brought online. Otherwise, the disk remains offline until explicitly brought online by the SETONLINE command.

Command Line –

cfggen <controller #> *setoffline* <SCSI ID>

Parameters –

- <controller #> – Number of the SCSI bus or SAS controller targeted by this command.

- <SCSI ID> – SCSI target ID of the drive targeted by this command.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.14 SETONLINE Command

The SETONLINE command brings a physical disk in a volume online, which is required only after the physical disk has been taken offline by the SETOFFLINE command. When a physical disk is brought online, the IOC synchronizes the volume.

Command Line –

cfggen <controller #> *setonline* <SCSI ID>

Parameters –

- <controller #> – Number of the SCSI bus or SAS controller targeted by this command.

- <SCSI ID> – SCSI target ID of the drive targeted by this command.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

6.3.15 STATUS Command

The STATUS command displays the status of any volume synchronization operation currently in progress on the controller. If no such operation is in progress, CFGGEN displays a message indicating this before it exits. This command adds the flag *Inactive* to the Volume State field, if the controller firmware marks the volume as Inactive.

Command Line –

cfggen <controller #> *status*

Parameters –

- <controller #> – Number of the SCSI bus or SAS controller targeted by this command.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

Sample Output –

Here is an example of the status information returned when a volume resynchronization is in progress:

```
Background command progress status for controller 0...
IR Volume 1
  Current operation                    : Synchronize
  Volume ID                            : 6
  Volume status                        : Enabled
  Volume state                         : Degraded
  Physical disk I/Os                   : Not quiesced
  Volume size (in sectors)             : 70311936
  Number of remaining sectors          : 68250624
  Percentage complete                  : 2.93%
```

Here is an example of the status information returned when no background volume operation is in progress:

```
Background command progress status for controller 0...
IR Volume 1
  Current operation                    : None
  Volume ID                            : 6
  Volume status                        : Enabled
  Volume state                         : Optimal
  Physical disk I/Os                   : Not quiesced
```

The status fields in the data displayed can have the following values:

Current operation – *Synchronize* or *None*
Volume status – *Enabled* or *Disabled*
Volume state – *[Inactive] Optimal*, *Degraded* or *Failed*
Physical disk I/Os – *Quiesced* or *Not quiesced*

6.3.16 VSIME Command

The VSIME command updates the IMEVolumeSettings field for an IME volume type. If no IME volume ID is specified, the IMEVolumeSettings field in Manufacturing Page 4 is updated with the new 8-digit hex value. The new volume settings take effect at the next reboot or IOC reset. If a

valid IME volume ID is specified, the IMEVolumeSettings of only that IME volume is updated and will take effect after the update. (The IMEVolumeSettings field is defined in the MPI spec.)

Command Line –

cfggen <controller #> *vsime* <0x00000000> [<volume id>] [*noprompt*]

Parameters –

- <controller #> – Number of the controller targeted by this command.

- <0x00000000> – An 8-digit hex value to be set in the IMEVolumeSettings field.

- [<volume id>] – An optional volume ID of an existing IME volume where the IMEVolumeSettings field needs to be updated only for this volume. If no volume ID is specified, the IMEVolumeSettings field in Manufacturing Page 4 will be updated.

- [*noprompt*] – An optional argument that suppresses prompts.

Program Return Value –

0x00   SUCCESS: Command completed successfully.
0x01   FAILURE: Bad command line arguments or operational failure.
0x02   ADAPTER_NOT_FOUND: Specified adapter cannot be found.

Chapter 7
SCSI BIOS and Setup Utility

This chapter explains how to use the Fusion-MPT SCSI BIOS and Setup Utility. This chapter contains the following sections:

- Section 7.1, "Overview and Features"
- Section 7.2, "Starting the SCSI BIOS Setup Utility"
- Section 7.3, "Setup Utility Menu Screens"

Caution: The Fusion-MPT SCSI BIOS and firmware should be used *only* with the LSI53C1020-R and LSI53C1030-R host adapters. Before you update the BIOS and firmware, be sure that the host adapter model number ends with -R. *Do not* use this firmware on any LSI2x320 host adapter whose model number does not end with -R, or else you may damage the host adapter!

Caution: Do not use this firmware on any LSI2x320-IS host adapters. These host adapters are made specifically for third party vendors and require vendor specific firmware. Contact the vendor for BIOS/firmware upgrades for these host adapters. If you are not sure of your HBA model number, contact LSI technical support at 1-800-633-4545 or at support@lsil.com.

7.1   Overview and Features

The Fusion-MPT SCSI BIOS is the bootable ROM code that manages SCSI hardware resources. The Fusion-MPT SCSI BIOS integrates with a standard system BIOS to extend the standard disk service routine that is provided through Int13h. During boot time initialization, the SCSI BIOS determines if the system BIOS has already installed other hard disks, such as an IDE drive. If so, the SCSI BIOS maps any SCSI drives that

it finds behind the already-installed drive(s). Otherwise, the Fusion-MPT SCSI BIOS installs drives starting with the system boot drive, and the system boots from a drive controlled by the SCSI BIOS. The Fusion-MPT SCSI BIOS supports the BIOS Boot Specification (BBS).

The SCSI BIOS setup utility enables you to change the default configuration of LSI host adapters. The setup utility is embedded in the Fusion-MPT SCSI BIOS.

The Fusion-MPT SCSI BIOS supports the following features:

- Configuration for up to 256 adapters. Any four adapters can be chosen for Int13 (bootrom) support.
- Message Passing Technology
- SPI-3 Parallel Protocol Request (PPR)
- Domain Validation
- Data transfer rates of up to 320 Mbytes/s (Ultra320 SCSI)

7.1.1 Boot Initialization with BIOS Boot Specification (BBS)

The Fusion-MPT SCSI BIOS supports the BIOS Boot Specification (BBS), which allows you to select a boot device.

To use this feature, the system BIOS must also be compatible with the BBS. If the system supports the BBS, you can use the setup utility to select the boot order and drive order. In the setup utility, the Boot Adapter List menu lists the available boot options. Use that menu to select the device and rearrange the order. Then exit to continue the boot process.

7.1.2 CD-ROM Boot Initialization

The Fusion-MPT SCSI BIOS supports boot initialization from a CD-ROM drive. The types of emulation are:

- No emulation disk
- Floppy 1.2 Mbyte emulation disk
- Floppy 1.44 Mbyte emulation disk
- Floppy 2.88 Mbyte emulation disk
- Hard disk emulation

The type of emulation assigns the drive letter for the CD-ROM. For example, if a 1.44 Mbyte floppy emulation CD is loaded, the CD-ROM drive becomes the designated A: drive, and the existing floppy drive becomes the B: drive.

7.2   Starting the SCSI BIOS Setup Utility

When the SCSI BIOS loads, this message appears briefly:

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

When you see the message, press **Ctrl-C** to start the setup utility. When you press **Ctrl-C**, the message changes to:

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

After a short pause, the Main Menu of the setup utility appears.

These messages may appear during the boot process:

- `Adapter removed from boot order`
  This message appears if an adapter was removed from the system or was relocated behind a PCI bridge. This message is information only. No action is required.

- `Persistent settings INVALID, defaults saved`
  This message is informational only. It appears if none of the information in the NVRAM is valid. This can occur when the BIOS is upgraded, or when some external event has rendered the NVRAM temporarily unreadable. You can either accept the default NVRAM values, or you can re-enter the settings you want in the setup utility.

Important: The SCSI BIOS setup utility is a powerful tool. If, while you are using it, you accidentally disable all of your SCSI controllers, press **Ctrl-E** (or **Ctrl-A** on earlier versions) after memory initialization during reboot. This will allow you to re-enable and reconfigure the controllers.

Note: Some devices detected by the setup utility cannot be controlled by the BIOS. Devices such as tape drives and scanners require a device driver specific to that device. The setup utility can be used to modify the parameters for these devices.

7.3 Setup Utility Menu Screens

All SCSI BIOS setup utility menu screens are partitioned into the following areas, starting at the top of the screen:

- **Header Area**: This area lists static information text, including the product title and version.

- **Menu Area**: This area lists the current screen title and controller information. It provides a cursor for selecting bracketed menu options, such as *<Global Properties>*.

- **Main Area**: This is the area for presenting data. This area has a cursor for item selection, horizontal scrolling, and vertical scrolling. Horizontal and vertical scroll bars appear here, if needed.

- **Footer Area**: This area provides general help information text.

7.3.1 User Input Keys

The general key inputs listed in Table 7.1 are used for all menu screens of the SCSI BIOS setup utility.

Table 7.1   User Input Keys

Key	Definition	Description
F1	Help	Displays context sensitive help for the field in which the cursor is positioned.
F2	Menu	Moves the cursor to the menu selection area, where you can highlight a menu item and press **Enter** to select it.
Arrow Keys	Select Item	Up, down, left, right movement to position the cursor.
Home/End	Select Item	
+/-	Change Item	Items with values in brackets are modifiable. Use the numeric keypad '+' and '-' keys to change a modifiable field to its next relative value.
Esc	Abort/Exit	Aborts the current operation and/or exits the current menu. The user is asked to confirm, if changes have been made.
Enter	Execute Item	Executable items are indicated by highlighted text and a different background color. Press **Enter** to execute the field's associated function. Selections that are not currently permissible are grayed out. Executable items are explained in the menu descriptions below.

7.3.2   Main Menu

When you start the setup utility the Main Menu appears, as shown in Figure 7.1. This menu displays a scrolling list of up to 256 installed LSI PCI to SCSI host adapters and information about each of them.

Figure 7.1   Setup Utility Main Menu

```
LSI Logic MPT SCSI Setup Utility     Version MPTBIOS -x.xx
<Boot Adapter List>   <Global Properties>

LSI Logic Host Bus Adapters
Adapter          PCI  Dev/   Port    IRQ  NVM  Boot  LSI Logic  RAID
                 Bus  Func   Number            Order Control    Status
<1020/1030>      0    20>    E400    10   ---  0     Enabled    --
<1020/1030>      0    21>    E000    12   Yes  1     Enabled    --
<1020/1030>      0    60>    F800     9   Yes  2     Enabled    --
<1020/1030>      0    A0>    E800    11   Yes  3     Enabled    --
```

Use the arrow keys to select an adapter, then press **Enter** to view and modify the properties of the selected adapter (and to access the other menus). After you select an adapter and press **Enter**, the setup utility scans the adapter's SCSI bus and then displays the Adapter Properties menu (see Section 7.3.5, "Adapter Properties Menu").

Table 7.2 describes the Main Menu data fields, reading from left to right.

Table 7.2   Main Menu Field Descriptions

Field	Description
<Boot Adapter List>	Highlight this field and press **Enter** to view the Boot Adapter List menu.
<Global Properties>	Highlight this field and press **Enter** to view the Global Properties menu.
Adapter	The model number of the LSI controller.
PCI Bus	The PCI Bus number assigned by the system BIOS to the adapter. The PCI Bus number can be between 0x00 and 0xFF.
Dev/Func	The PCI Device number and Function number that the system BIOS assigns to the adapter. Bits [7:3] of this 8-bit value designate the PCI Device (0x00–0x1F). Bits [2:0] designate the PCI Function (0–7).
Port Number	The I/O Port Number that the system BIOS assigns to the adapter.
IRQ	The Interrupt Request Line that the system BIOS assigns to the adapter.
NVM	Indicates whether an adapter has nonvolatile memory. The nonvolatile memory stores the adapter's configuration.

Table 7.2   Main Menu Field Descriptions (Cont.)

Field	Description
Boot Order	The relative boot order of an adapter. The BIOS traverses up to four adapters in the specified order in search of bootable media. The possible values are 0, 1, 2, or 3. You use the Boot Adapter List menu to modify this item.
LSI Control	Indicates whether an adapter is eligible for LSI software control (*Enabled*) or is reserved for control by non-LSI software (*Disabled*).
RAID Status	Indicates the status of any arrays defined on the adapter. The possible values include **Optimal**, **Degraded**, **Disabled**, **Quiesced**, **xx% Syncd**, **Inactive**, or **Failed**. A string of dashes indicates that no array exists on the adapter.

7.3.3   Boot Adapter List Menu

The Boot Adapter List menu shows the adapter boot order (0–3) when more than one host adapter is present and lets you change it. The adapter boot order is the order in which adapters will boot when more than one adapter is installed. You can select up to four adapters as bootable. To access this menu, select **Boot Adapter List** on the Main Menu and press **Enter**. Figure 7.2 shows the Boot Adapter List menu.

Figure 7.2   Boot Adapter List Menu

```
 LSI Logic MPT SCSI Setup Utility     Version MPTBIOS -x.xx

 Boot Adapter List
 Insert=Add an adapter    Delete=Remove an adapter


         Adapter   PCI   Dev/   Boot   Current  Next
                   Bus   Func   Order  Status   Boot
      <1020/1030    0    60>    [0]    On       [On]
      <1020/1030    0    61>    [1]    On       [On]
      <1020/1030    0    98>    [2]    On       [On]
      <1020/1030    0    A0>    [3]    On       [On]

 Press Insert to select an adapter from this list:
      <1020/1030    0    60>
      <1020/1030    0    61>
      <1020/1030    0    98>
      <1020/1030    0    A0>

```

- To add an adapter to the boot list, press **Insert**. This moves the cursor to the adapter select list in the lower part of the screen. Use the arrow keys to select an adapter and press **Enter** to add it to the end of the Boot Adapter List in the upper part of the screen.

- To remove an adapter from the boot list, select the adapter and press **Delete**.

- To decrease the adapter's relative order in the boot list, select the adapter and press the minus (-) key on the keypad.

- To increase the adapter's relative order in the boot list, press the plus (+) key on the keypad.

Table 7.3 describes the fields in the Boot Adapter List menu.

Table 7.3   Boot Adapter List Field Descriptions

Field	Description
Adapter	The model number of the adapter.
PCI Bus	The PCI Bus number (0x00–0xFF) that the system BIOS assigns to an adapter.
Dev/Func	The PCI Device number and Function number that the system BIOS assigns to the adapter. Bits [7:3] of this 8-bit value designate the PCI Device (0x00–0x1F). Bits [2:0] designate the PCI Function (0–7).
Boot Order	Specifies the relative boot order (0–3) of an adapter. Press '-' to decrease an adapter's relative boot order. Press '+' to increase an adapter's relative boot order.
Current Status	Indicates whether an adapter in the boot list was enabled during the most recent boot. The Fusion-MPT SCSI BIOS ignores disabled adapters and their attached devices, although they are still visible to the setup utility.
Next Boot	Specifies whether to enable an adapter at the next boot. The Fusion-MPT SCSI BIOS ignores disabled adapters and their attached devices, although they are still visible to the setup utility.

7.3.4   Global Properties Menu

The Global Properties menu allows you to set various properties, such as the Display mode and Video mode. To access the Global Properties menu, select **Global Properties** on the Main Menu and press **Enter**. Figure 7.3 shows the Global Properties menu.

Figure 7.3   Global Properties Menu

```
LSI Logic MPT SCSI Setup Utility      Version MPT -x.xx

Global Properties

       Pause When Boot Alert Displayed   [Yes]
       Boot Information Display Mode      [Verbose]
       Negotiate with devices            [Supported]
       Video Mode                        [Color]
       Support Interrupt                 [Hook interrupt, the Default
       Disable Integrated RAID           [No]

       <Restore Defaults>
```

Table 7.4 describes the Global Properties menu fields.

Table 7.4   Global Properties Field Description

Field	Description
Pause When Boot Alert Displayed	Specifies whether the BIOS pauses for user acknowledgement after displaying an alert message during boot. To continue after displaying an alert message, specify *No*. To wait for the user to press a key after displaying a message, specify *Yes*.
Boot Information Display Mode	Specifies how much adapter and device information the BIOS displays during boot. The options are *Terse* (display a minimum amount of information) or *Verbose* (display detailed information).
Negotiate with Devices	Determines whether sync and wide negotiations with a device will occur. The options are: • *All*: Negotiations always take place. • *None:* Negotiations do not take place. • *Supported*: Negotiations take place if the device will be supported as an INT13 device (accessible via boot support).
Video Mode	Specifies the video mode for the setup utility: either **Color** or **Monochrome**. The monochrome setting enhances readability on a monochrome monitor.
Support Interrupt	This option allows you to prevent a hook on INT40, if required. Possible values are: • Hook interrupt (default) • Bypass interrupt hook
Disable Integrated RAID	If **Yes** is selected, the firmware does not to do a bus scan searching for RAID member devices. It also disables configuration of RAID arrays in the BIOS.
<Restore Defaults>	Press **Enter** when this option is selected to restore default settings for the options listed on this menu.

7.3.5 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 access the Adapter Properties menu, select the adapter on the Main Menu and press **Enter**. The setup utility then displays the Adapter Properties menu for the selected adapter. Figure 7.4 shows the Adapter Properties menu.

Figure 7.4   Adapter Properties Menu

```
 LSI Logic MPT SCSI Setup Utility     Version MPTBIOS -x.xx

 Adapter Properties

 Adapter              PCI    Dev/
                      Bus    Func
 1020/1030             0      60

      <Device Properties>
      <RAID Properties>  <Synchronize Whole Mirror>
       Host SCSI ID              [ 7]
       SCSI Bus Scan Order       [Low to High (0..Max)]
       Removable Media Support   [None]
       CHS Mapping               [SCSI Plug and Play Mapping]
       Spinup Delay (Secs)       [ 2]
       Secondary Cluster Server  [No]
       Termination Control       [Auto]
      <Restore Defaults>
```

Table 7.5 describes the fields in the Adapter Properties menu. The Adapter, PCI Bus, and Dev/Func fields are the same as defined for the Boot Adapter List menu (Table 7.3).

Table 7.5   Adapter Properties Field Descriptions

Field	Description
<Device Properties>	Press **Enter** to view and modify device properties for the selected adapter.
<RAID Properties>	Press **Enter** to view, create, delete, or configure RAID arrays for the disk drives connected to this adapter.
<Synchronize Whole Mirror>	If a mirrored volume currently exists, press **Enter** to resynchronize the volume. This copies the data from the primary copy of the mirrored array to the secondary copy.

Table 7.5   Adapter Properties Field Descriptions (Cont.)

Field	Description
Host SCSI ID	Lists the SCSI identifier of the adapter. LSI recommends leaving this field at the default, SCSI ID 7. Note that 8-bit SCSI devices cannot see SCSI identifiers greater than 7.
SCSI Bus Scan Order	Indicates the order in which to scan SCSI identifiers on an adapter. Changing this option affects drive letter assignments if more than one device is attached to an adapter. This might create a conflict with an operating system that automatically assigns drive order.
Removable Media Support	Specifies the removable media support option for the adapter. The possible selections are: • **None**: No removable media support, regardless of whether the drive is selected as first (BBS), or is first in the scan order (non-BBS). • **Boot Drive Only**: Removable media support is enabled only if a removable hard drive is first in the scan order. • **With Media Installed**: Removable media is enabled regardless of the drive ordering.
CHS Mapping	Defines the Cylinder Head Sector (CHS) values mapping method. CHS Mapping allows two settings: • **SCSI Plug and Play Mapping** (default) automatically determines the most efficient and compatible mapping. • **Alternate CHS Mapping** utilizes an alternate method that might be required if a device is moved between adapters from different vendors. These options have no effect after the FDISK command partitions the disk. To change the CHS Mapping on a partitioned disk, use the FDISK command to delete all partitions and reboot the system to clear the memory. Be certain that the correct disk is the target of an FDISK command.
Spinup Delay	Indicates the number of seconds to wait between spin-ups of devices attached to an adapter. Staggered spin-ups balance the electrical current load on the system during boot. The default value is 2 seconds, with choices between 1 and 10 seconds.
Secondary Cluster Server	Specifies whether an adapter has one or more attached devices that are shared with other adapter(s). The possible selections are: • **No**: (Default) The driver is free to perform SCSI bus resets as needed. • **Yes**: The driver avoids SCSI Bus resets as much as possible. Fewer SCSI bus resets means optimized performance in a multi-initiator shared-bus environment. LSI recommends that this field be set to **Yes** in multi-initiator configurations. Microsoft Cluster Server requires a **Yes** value.
Termination Control	Indicates whether an adapter has automatic termination control. • **Auto** (default) indicates that the adapter automatically determines to enable or disable its termination. • **Off** indicates that termination at the adapter is off and that other devices at the ends of the SCSI bus must terminate the bus. If Auto is grayed out, it means that termination is not programmable.
\<Restore Defaults\>	Select this option and press **Enter** to restore the default settings for the parameters listed on this screen.

7.3.6 Device Properties Menu

The Device Properties menu enables you to view and change settings for devices connected to an adapter. To access this menu, select **Device Properties** on the Adapter Properties menu and press **Enter**. Figure 7.5 and Figure 7.6 show the Device Properties menu. Use the scroll controls at the bottom of the screen to scroll left and right in order to view all the properties. Changes made to host adapter settings affect all devices connected to the host adapter.

Figure 7.5   Device Properties Menu: Part 1

```
LSI Logic MPT SCSI Setup Utility     Version MPT -x.xx

 SCSI   Device Identifier     MB/sec  MT/sec Data  Scan   Scan       Dis-
 ID                                          Width Id     LUNs > 0   connect
  0     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
  1     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
  2     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
  3     SEAGATE ST31055N      [160]   [80]   [16]  [Yes]  [Yes]      [On]
  4     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
  5     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
  6     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
  7     1020/1030             [160]   [80]   [16]  [Yes]  [Yes]      [On]
  8     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
  9     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
 10     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
 11     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
 12     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
 13     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
 14     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
 15     -                     [160]   [80]   [16]  [Yes]  [Yes]      [On]
                              << Scroll Indicator               >>
```

Figure 7.6   Device Properties Menu: Part 2

```
 LSI Logic MPT SCSI Setup Utility     Version MPT -x.xx


 SCSI   Device Identifier          SCSI     Queue  Boot     Restore
 ID                                Timeout  Tags   Choice   Defaults
  0     -                          <  10>   [On]   [No]     <Defaults>
  1     -                          <  10>   [On]   [No]     <Defaults>
  2     -                          <  10>   [On]   [No]     <Defaults>
  3     SEAGATE ST31055N           <  10>   [On]   [No]     <Defaults>
  4     -                          <  10>   [On]   [No]     <Defaults>
  5     -                          <  10>   [On]   [No]     <Defaults>
  6     -                          <  10>   [On]   [No]     <Defaults>
  7     1020/1030                  <  10>   [On]   [No]     <Defaults>
  8     -                          <  10>   [On]   [No]     <Defaults>
  9     -                          <  10>   [On]   [No]     <Defaults>
 10     -                          <  10>   [On]   [No]     <Defaults>
 11     -                          <  10>   [On]   [No]     <Defaults>
 12     -                          <  10>   [On]   [No]     <Defaults>
 13     -                          <  10>   [On]   [No]     <Defaults>
 14     -                          <  10>   [On]   [No]     <Defaults>
 15     -                          <  10>   [On]   [No]     <Defaults>
                                   << Scroll Indicator              >>
```

Table 7.6 describes the fields in the Device Properties menu.

Table 7.6   Device Properties Field Description

Field	Description
SCSI ID	The device's SCSI identifier.
Device Identifier	The ASCII device identifier string from the device's Inquiry Data.
MB/sec	Specifies the maximum synchronous data transfer rate in Mbytes/s. You cannot directly edit this field because the Data Width or MT/s fields determine its setting. The default is 320 Mbytes/s.
MT/sec	Indicates the maximum synchronous data transfer rate, in megatransfers per second. The default is 160 MT/sec. Table 7.7 provides more information.
Data Width	Indicates the maximum data width, in bits: either *16* (default) or *8*.
Scan ID	Indicates whether to scan for this SCSI identifier at boot time. The default is *Yes*. Set this option to *No* if there is a device that you do not want to be available to the system. Also, you can decrease boot time by changing this setting to *No* for unused SCSI IDs.

Table 7.6   Device Properties Field Description (Cont.)

Field	Description
Scan LUNs > 0	Indicates whether to scan for LUNs greater than zero for a device. The default is *Yes*. LUN zero is always queried. Set this option to *No* if you have problems with a device that responds to all LUNs whether they are occupied or not. Also, if a SCSI device with multiple LUNs exists on your system but you do not want all of those LUNs to be available to the system, set this option to *No*. This will limit the scan to LUN 0 only.
Disconnect	Indicates whether to allow a device to disconnect during SCSI operations. The default is *On*. Some (mostly newer) devices run faster with disconnect enabled, while some (mostly older) devices run faster with disconnect disabled.
SCSI Timeout	Indicates the maximum amount of time [0 to 255] in seconds to wait for a SCSI operation to complete. The default is 10 seconds. Because time-outs provide a safeguard that allows the system to recover if an operation fails, LSI recommends using a value greater than zero. A value of zero allows unlimited time for an operation to complete and could result in the system hanging. To specify a new timeout value, press **Enter**, type in a value, and press **Enter** again.
Queue Tags	Allows the use of queue tags for a device. The Fusion-MPT SCSI BIOS does not use queue tags. This item specifies queue tag control to higher level device drivers. The default is *On*.
Boot Choice	Indicates if this device can be selected as the boot device. This option is only applicable to devices attached to adapter 0 in the boot list on non-BBS systems. It provides primitive BBS flexibility to non-BBS systems.
Restore Defaults	Highlight this field and press **Enter** to restore default settings for this device.

Table 7.7 provides information on data transfer rates.

Table 7.7   Data Transfer Rate Information

Mega Transfers/s	Data Width = 8 (Mbytes/s)	Data Width = 16 (Mbytes/s)	Synchronous Period (nsec)
0 = Async	0 = Async	0 = Async	0 = Async
5	5	10	200
10	10	20	100
20	20	40	50
40	40	80	25

7.3.7   RAID Properties Menu

The RAID Properties menu initially lists all possible SCSI IDs on the Adapter SCSI Channel. This allows you to select disks to create an array. Figure 7.7 shows an example of the RAID Properties menu.

Figure 7.7   RAID Properties Menu

```
 LSI Logic MPT SCSI Setup Utility     Version MPT -x.xx

 RAID Properties      Array: --   SCSI ID: --   Size(MB): ------

 SCSI   Device Identifier         Array    Hot    Status        Predict   Size
 ID                               Disk?    Spare                Failure   (MB)
  0     SEAGATE ST39103LW   002   [No]     [No]   -----------   ---       8683
  1     SEAGATE ST39103LW   002   [No]     [No]   -----------   ---       8683
  2     SEAGATE ST39103LW   002   [No]     [No]   -----------   ---       8683
  3     -                         [No]     [No]   -----------   ---       ------
  4     -                         [No]     [No]   -----------   ---       ------
  5     -                         [No]     [No]   -----------   ---       ------
  6     -                         [No]     [No]   -----------   ---       ------
  7     1020/1030                 [No]     [No]   -----------   ---       ------
  8     -                         [No]     [No]   -----------   ---       ------
  9     -                         [No]     [No]   -----------   ---       ------
 10     -                         [No]     [No]   -----------   ---       ------
 11     -                         [No]     [No]   -----------   ---       ------
 12     -                         [No]     [No]   -----------   ---       ------
 13     -                         [No]     [No]   -----------   ---       ------
 14     -                         [No]     [No]   -----------   ---       ------
 15     -                         [No]     [No]   -----------   ---       ------
```

Table 7.8 describes the fields in the RAID Properties Menu.

Table 7.8   RAID Properties Field Descriptions

Field	Description
SCSI ID	The SCSI ID for the SCSI device.
Device Identifier	The ASCII device identifier string from the device's Inquiry Data.
Array Disk?	Indicates whether the disk is currently part of an array. If not, the disk can be used to create a new array. From two to six disks can be selected in this column for a new array. (The maximum is five disks if a hot spare disk has also been selected.
Hot Spare	Indicates whether the disk is defined as a hot spare disk. A hot spare disk provides additional protection by automatically replacing an array member disk if it fails.
Status	The status of each physical disk in the array: primary, secondary, hot spare disks, etc.
Predict Failure	This field displays *Yes* if the firmware has determined that the disk is likely to fail in the near future.
Size (MB)	The size of each disk, in Mbytes, if it is not part of an array. If the disk is part of an array, this field shows the amount of the disks's capacity that is used for the array. The later will be smaller because when the array is created the available size is rounded down to factor in disk size variances within same disk class.

7.3.7.1 Array Types

You can use the SCSI BIOS Setup utility to create either mirrored arrays or striped arrays, depending on which type of array the BIOS supports. Mirrored arrays protect against data loss by maintaining two copies of the data. Striped arrays provide faster data I/O but do not protect against data loss. Here are brief descriptions of the array types:

- **Integrated Mirroring (IM)** arrays are simple sector-to-sector physical mirrors of one drive to another drive. Two disk drives are used for IM arrays. An optional hot spare disk can also be added.

- **RAID 1E** arrays use a striped layout in which each stripe unit has a secondary copy stored on a different disk. Three to six disk drives are used for this type of array. (The maximum is five disk drives if a hot spare disk is also defined.)

- **Integrated Striping (IS)** arrays write data across multiple disks instead of onto one disk. This is accomplished by partitioning each disk's storage space into stripes. The stripes are interleaved round-robin across all disks in the array, so that the combined storage space is composed alternately of stripes from each disk. As a result, data can be retrieved faster.

To create a new IM array that mirrors the data already present on one disk drive, select the disk with the data as the first (primary) disk in the array. When you select the first disk, the setup utility prompts you to either **Keep Data** or **Erase Disk**. Press **F3** to keep the existing data. If you are creating a RAID 1E array you cannot keep existing data to mirror. All existing data is erased from all the array disks.

When you have finished with this menu, press **Esc**. If you made changes, such as defining a new array, you will be given the choice of saving or discarding the configuration. When you select **Save** the new array will be created.

7.3.7.2 Creating RAID Arrays

This section explains how to use the SCSI BIOS Setup utility to create RAID arrays. The first subsection explains how to create mirrored (IM and RAID 1E) arrays. The second subsection explains how to create striped (IS) arrays. The version of the BIOS determines which kind of

arrays you can create on the host adapter: some BIOS versions support only mirrored arrays, while others support only striped arrays.

Creating a Mirrored Array –

Follow these steps to create a mirrored (IM or RAID 1E) array:

1. On the RAID Properties menu, highlight the Array Disk field of a disk drive that has the value of *No*, indicating that it is available to use for a new array.

2. Press the + key to change the Array Disk value to *Yes*. A prompt appears asking if the data that is currently on the disk should be retained or deleted.

3. Press **F3** (or **Shift+3**) if you want to create a 2-disk IM array in which the existing data on the first disk is mirrored exactly to the second disk, or do step 4.

4. Press **Del** (or **D**) if you want to create a RAID 1E array with three or more disk drives or if you want to create a 2-disk IM array without retaining the existing data on the first disk. When the warning message appears, press **Del** again.

   In a RAID 1E array the mirrored data is distributed among several disks, so the original data on the first disk cannot be retained.

5. Highlight the Array Disk field for the second array disk and press + to change the Array Disk value to **Yes**. If you are creating an IM array, skip to step 7. If a warning message appears, press **Del**.

   The warning message appears if the BIOS finds a master boot record on the disk.

6. If you are creating a RAID 1E array, select up to five additional disks for the array (or up to four additional disks, if you want to have a hotspare disk).

   A warning message appears if the BIOS finds a master boot record on any of the disks.

7. (Optional) To add a hotspare disk to the array, highlight the Hot Spare field of an unused disk drive and press the + key to change the Hot Spare value to *Yes*.

8. After you have selected all disks for the array, press **Escape**.

9. To create the new array, select **Save Changes**. (Or you can choose to return to the RAID Properties menu without creating the array.)

10. Wait while the new array is created. During this time the processing screen is displayed. When array creation is complete, the RAID Array menu appears.

Creating a Striped Array –

Follow these steps to create a striped (IS) array:

1. On the RAID Properties menu, highlight the Array Disk field of a disk drive that has the value of *No*, indicating that it is available to use for a new array.

2. Press the + key to change the Array Disk value to *Yes*. A warning message appears, informing you that any existing data will be deleted from the disk.

3. Press **Del** (or **D**) to confirm that you want to use this disk for the new array.

4. Highlight the Array Disk field for the second array disk and press + to change the Array Disk value to *Yes*. If a warning message appears, press **Del**.

    The warning message appears if the BIOS finds a master boot record on the disk.

5. Select up to four additional disks for the array.

6. After you have selected all disks for the array, press **Escape**.

7. To create the new array, select **Save Changes**. (Or you can choose to return to the RAID Properties menu without creating the array.)

8. Wait while the new array is created. During this time the processing screen is displayed. When array creation is complete, the RAID Array menu appears.

7.3.7.3   Diagnostics Mode

Before you create an array, press **F4** to display diagnostic codes under the Size column for each disk drive on the system. These codes indicate the reason why the setup utility does not allow you to select some disks for an array. A disk may be disabled for the following reasons:

Table 7.9   Disk Diagnostic Codes

Code	Meaning
1	Problem with reading disk serial number
2	Disk does not support SMART
4	Disk does not support wide data, synchronous mode, or queue tagging
5	User disabled disconnects or queue tags for device (Device Properties)
7	Disk not big enough to mirror primary disk
10	Disk does not have 512-byte sector
11	Incorrect device type
12	Hot Spare selection not big enough to be used as an array disk
13	Maximum disks already specified, or maximum array size would be exceeded

After an array has been created you can use the following commands:

Table 7.10   Array Commands

Command	Description
Delete Array	Deletes the array that is currently displayed on the RAID Properties menu.
Add/Delete Hot Spare	Allows you to add a hot spare drive to an existing volume if no hot spares are already defined. Also allows you to delete a hot spare.
Next Array	This choice is enabled for illegal configuration situation where there is more than one array on this physical adapter. The RAID Properties menu allows display of one array at a time. This choice allows the user to display and operate on next array found.
Activate Array	If there are two arrays on a physical adapter, this option allows the user to tell the RAID firmware which array should be active. Only one array can be active at a time per physical adapter. Activating an array also causes all the remaining arrays found on the physical adapter to be inactivated.

7.3.8   Exiting the SCSI BIOS Setup Utility

Some configuration changes take effect only after the system reboots, so it is important to exit the configuration utility properly. To exit, press **Esc** and respond to the verification prompts. Some configuration changes may be lost if you reboot before properly exiting the setup utility.

Chapter 8
SCSI EFI BIOS and
Setup Utility

This chapter explains how to use the LSI Extended Firmware Interface
(EFI) 1.1 Fusion-MPT SCSI BIOS and Setup Utility. This chapter
contains the following sections:

8.1   Overview and Features

The LSI Extended Firmware Interface (EFI) Fusion-MPT BIOS is a native
IA64 EFI 1.1 Boot Services Driver that provides pre-OS support for the
LSI Fusion-MPT architecture SCSI and Fibre Channel processors. A
Boot Services Driver (BSD) is a BIOS for systems based on Intel
Architecture (IA) and the Extensible Firmware Interface (EFI)
specification.

The BSD integrates with EFI system firmware, extending disk services
by installing Block I/O (LBA) for all devices and SCSI pass-thru interfaces
for supported SCSI devices. When a driver is bound to a controller, it
detects all supported devices. Block I/O interfaces are installed for hard
disk drives, removable media devices, CD-ROM drives, write-once, and
Magneto Optical (MO) drives. Platform firmware can use the driver's
services to boot from any supported device. Normally, the services are
used to copy an OS Loader to boot a system, but the services may also

be used by an application or at the EFI Shell. A SCSI pass-thru interface is installed for all SCSI devices.

The BSD includes an integrated Configuration Protocol that enables you to view and edit static and configurable parameters for supported adapters. The Configuration Protocol is implemented using the EFI Configuration Protocol and can be invoked with the EFI Shell Command drvcfg.

The EFI setup utility enables you to change the default configuration of LSI host adapters. The setup utility is embedded in the EFI Fusion-MPT SCSI BIOS.

The EFI Fusion-MPT BIOS has the following features:

- Supports the LSI LSI53C1020, LSI53C1030, LSIFC919, LSIFC929, LSIFC919X, LSIFC929X and LSIFC929XL controllers.

- Configuration for up to 256 host adapter channels (PCI Function).

- Supports up to 15 SCSI targets per SCSI channel, with 8 LUNs for each target.

- Supports up to (8 buses X 128 targets X 8 LUNs) per Fibre Channel port.

- Provides LBA access to the following device types: hard disk drives, removable media devices, CD-ROM drives, Write-once, and Magneto Optical (MO) drives. Other SCSI devices are detected and supported via SCSI pass-thru. (SCSI pass-thru is not installed for Fibre Channel devices.)

- Supports media removal and media change for removable media device types.

- Supports Fusion-MPT Integrated RAID (IR) on SCSI controllers. This includes I/O and configuration support for Integrated RAID arrays consisting of two to six disks.

- Installs the Driver Binding, Component Name, and Driver Configuration EFI protocols for each driver image.

- Installs the SCSI pass-thru EFI protocol for each supported SCSI Host Adapter channel.

- Installs the Device Path and Block I/O EFI protocols for each supported Target/LUN.

  For details of each protocol implementation, refer to the latest EFI 1.1 specification.

8.2 Installing the Boot Services Driver

The LSI EFI Boot Services Driver conforms to the EFI 1.1 Driver Model specification. Refer to the corresponding EFI 1.1 documentation for further details of this driver model.

Follow these steps to install the EFI Boot Services driver:

1. From the EFI shell, change to the file system that contains the `lsimpt.efi` boot services driver file. This is the same as switching to the desired drive from a DOS prompt.

2. Use the `load lsimpt.efi` command to load the boot services driver.

   The boot services driver detects all compatible LSI Fusion-MPT devices and install the necessary EFI protocols for these devices and any compatible devices attached to the bus.

You can also load the LSI Boot Services Driver from an option ROM on board a PCI card. The corresponding `lsimpt.rom` file would be used in this case. To do this, load the `lsimpt.rom` file onto the flash part using the LSI EFI Flash Utility. Once this is done, if the system supports option ROM loading, the system will install the LSI driver at boot time. Once installed, this form of the driver functions identically to the `.efi` form of the driver.

8.3 Starting the EFI Setup Utility

The EFI setup utility is part of the LSI Boot Services Driver. You can use the setup utility to change the default configuration of your host adapters. You may need to change these default values if there is a conflict between device settings or if you need to optimize system performance in some way.

The setup utility also allows you to view and configure Integrated RAID arrays on host adapters with firmware that supports this feature. To make changes with the setup utility, the system must have one or more installed LSI host adapters with NVRAM to store the changes.

To start the setup utility from the EFI shell, use the `drvcfg` command.

8.4 Setup Utility Menu Screens

All setup utility menu screens are partitioned into the following areas, starting at the top of the screen:

- **Header Area**: This area lists static information text, including the product title and version.

- **Menu Area**: This area lists the current screen title and controller information. It provides a cursor for selecting menu options, such as *<Global Properties>*.

- **Main Area**: This is the area in which data is presented. This area has a cursor for item selection, horizontal scrolling, and vertical scrolling. Horizontal and vertical scroll bars appear here, if needed.

- **Footer Area**: This area provides general help information text.

The general key inputs listed in Table 8.1 are used for all menu screens of the setup utility.

> Note: The setup utility uses several input keys (such as F1, F2, Home, and End) that may not be supported by some terminal emulation programs. Check the documentation for the terminal emulation program to determine which input keys are supported. If problems occur when you try to use any of the Function keys, or the Home/End/PgUp/PgDn keys, use the alternate keys instead, such as Shift+1 in place of F1. Alternate keys are shown in parentheses in the table.

Table 8.1   General Input Keys

Key	Definition	Description
F1 (Shift+1)	Help	Displays context sensitive help for the field in which the cursor is positioned.
F2 (Shift+2)	Menu	Moves the cursor to the menu selection area, where you can highlight a menu item and press **Enter** to select it.
F3 (Shift+3)	Save Existing Data	Used in the RAID properties menu to save existing disk data when creating an Integrated RAID array.
Del (D)	Delete Existing Data	Used in the RAID properties menu to erase existing disk data when creating an Integrated RAID array.

Table 8.1   General Input Keys (Cont.)

Key	Definition	Description
Arrow Keys (H,J,K,L)	Select Item	Up, down, left, right movement to position the cursor.
Home (I) End (O)	Select Item	
+/-	Change Item	Items with values in [ ] brackets are modifiable. Use the numeric keypad '+' and '-' keys to change a modifiable field to its next relative value.
Esc	Abort/Exit	Aborts the current context operation and/or exits the current menu. The user is asked to confirm, if changes have been made.
Enter	Execute <Item>	Executable items are indicated by highlighted text and a different background color. Press **Enter** to execute the field's associated function. Selections that are not currently permissible are grayed out. The menu descriptions below include information on their executable items.

8.4.1   Main Menu

When you start the LSI setup utility, the Main Menu appears, as shown in Figure 8.1. This menu displays a scrolling list of up to 256 installed LSI host adapters and information about each of them.

Figure 8.1   Setup Utility Main Menu

```
 LSI Logic MPT Setup Utility    Version vx.xx


 LSI Logic Host Bus Adapters
 Adapter   PCI PCI PCI  RAID    FW Revision Pro-  LSI      RAID     IRQ
           Bus Dev Fnc  Alert               duct  Control  Status

  53C1030   0   1   0   None    1.03.00.00  IME   Enabled  Optimal  10
  53C1030   0   2   1   -----   1.03.00.00  IME   Enabled  -----    12
  53C1030   0   3   0   -----   1.03.07.00  IO    Enabled  -----     7
  53C1030   0   3   1   -----   1.03.07.00  IO    Enabled  -----     7
  LSI929X   0   5   0   -----   1.01.00.00  FC    Enabled  -----     3
  LSI929X   0   5   1   -----   1.01.00.00  FC    Enabled  -----     3
```

Use the arrow keys to select an adapter, then press **Enter** to view and modify the selected adapter's properties (and to access the other menus). Only adapters on which LSI Control is enabled can be accessed. After you select an adapter and press **Enter**, the setup utility

scans the adapter's bus and the Adapter Properties menu appears (see Section 8.4.2, "Adapter Properties Menu: SCSI Adapters" and Section 8.4.3, "Adapter Properties Menu: FC Adapters."

Table 8.2 describes the Main Menu fields, reading from left to right.

Table 8.2   Main Menu Field Descriptions

Field	Description
Adapter	The model number of the LSI controller.
PCI Bus	The PCI Bus number (0x00–0xFF) that the system BIOS assigns to the adapter.
PCI Dev	The PCI Device number (0x00–0x1F) that the system BIOS assigns to the adapter.
PCI Fnc	The PCI Function number (0–7) that the system BIOS assigns to the adapter.
RAID Alert	None indicates that no alert condition exists. ERROR indicates that an invalid or non-optimal RAID array condition exists. Alert conditions include: • The active array is not optimal and is not synchronizing. • Multiple arrays were detected. If an error exists, you must view the details and resolve it on the RAID Properties menu.
FW Revision	The Fusion-MPT firmware version number.
Product	Indicates the capabilities of the Fusion-MPT firmware. The values are: **IO**: Fusion-MPT firmware has basic Initiator capabilities only. **IME**: Fusion-MPT firmware has Integrated Mirroring Enhanced capability. **IS**: Fusion-MPT firmware has Integrated Striping capability. **IT**: Fusion-MPT firmware has Initiator/Target capability. **T**: Fusion-MPT firmware has Target capability (not supported). **FC**: Fusion-MPT firmware for Fibre Channel.
LSI Control	Indicates whether an adapter is eligible for LSI software control or is reserved for control by non-LSI software. The possible values for this field are: • **Enabled**: You can view and modify settings for the adapter, and the Fusion-MPT EFI driver attempts to control the adapter. • **Disabled**: You can view and modify settings for the adapter, but the LSI EFI driver does not attempt to control the adapter. • **Forbidden**: Access to the controller is forbidden because a different driver is controlling it or because there was an error initializing the adapter. If set to either Enabled or Disabled, you can change the Boot Support Setting in the Adapter Properties menu. The EFI driver must be reloaded before the new setting takes effect.
RAID Status	Indicates the status of any arrays defined on the adapter. The possible values include **Optimal**, **Degraded**, **Disabled**, **Quiesced**, **xx% Syncd**, **Inactive**, or **Failed**. A string of dashes indicates that no array exists on the adapter.
IRQ	Indicates the IRQ line (decimal) for an adapter. The system BIOS assigns this value.

8.4.2 Adapter Properties Menu: SCSI Adapters

The Adapter Properties menu allows you to view and modify adapter settings. It also provides access to an adapter's device settings. To access the Adapter Properties menu, select the adapter on the Main Menu and press **Enter**. Figure 8.2 shows this menu for SCSI adapters.

Figure 8.2   Adapter Properties Menu for SCSI Adapters

```
LSI Logic MPT Setup Utility   Version vx.xx

Adapter Properties

Adapter    PCI    PCI    PCI
           Bus    Dev    Fnc
53C1030     0      3      0

     <Device Properties>
     <RAID Properties>

      Boot Support            [Enabled BIOS & OS]
      Host SCSI ID            [ 7]
      Secondary Cluster Server  [No]
      Termination Control     [Auto]

     <Restore Defaults>
```

Table 8.3 describes the fields of the Adapter Properties menu for SCSI adapters.

Table 8.3   Adapter Properties Field Descriptions: SCSI Adapters

Field	Description
<Device Properties>	Press **Enter** to view and modify device properties.
<RAID Properties>	Press **Enter** to view the RAID Properties menu. This field is grayed out if the adapter's MPT firmware does not support the feature. It is also grayed out if the setup is not compatible with the Integrated Mirroring Enhanced (IME) feature—for example, if an array exists on the other channel of a dual-channel adapter.

Table 8.3   Adapter Properties Field Descriptions: SCSI Adapters (Cont.)

Field	Description
Boot Support	Indicates whether an adapter is enabled for LSI software control or reserved for control by non-LSI software. The possible selections are: • **Enabled BIOS & OS**: (default) Both the BIOS and OS driver will control the adapter. • **Enabled BIOS Only**: The BIOS will control the adapter; OS drivers will not control it. Some OS drivers may not support this setting; for example, there is no means to disable an adapter in a Windows driver. • **Enabled OS Only**: The BIOS will not control the adapter, but the OS driver will control the adapter. • **Disabled**: The BIOS will not control the adapter when loaded. However, the adapter will still be visible through the configuration protocol. Changes in this setting are reflected in the LSI Control field on the Adapter List menu. Changes do not take effect until the system reboots.
Host SCSI ID	The SCSI identifier of the adapter. LSI recommends that you leave this setting at the default, SCSI ID 7.
Secondary Cluster Server	Specifies whether an adapter has one or more attached devices that are shared with other adapter(s). The possible selections are: • **No**: (Default) The driver is free to perform SCSI bus resets as needed. • **Yes**: The driver avoids SCSI Bus resets as much as possible. Fewer SCSI bus resets means optimized performance in a multi-initiator shared-bus environment. LSI recommends that this field be set to **Yes** in multi-initiator configurations. Microsoft Cluster Server requires a **Yes** value.
Termination Control	Indicates whether an adapter has automatic termination control. • **Auto** (default) indicates that the adapter automatically determines to enable or disable its termination. • **Off** indicates that termination at the adapter is off and that other devices at the ends of the SCSI bus must terminate the bus. If Auto is grayed out, it means that termination is not programmable.
<Restore Defaults>	Select this option and press **Enter** to reset the values on this screen to their default settings.

8.4.3   Adapter Properties Menu: FC Adapters

The Adapter Properties menu allows you to view and modify adapter settings. It also gives you access to the adapter's device settings. Figure 8.3 shows the Adapter Properties menu for fibre channel controllers.

Figure 8.3   Adapter Properties Menu for FC Adapters

```
LSI Logic MPT Setup Utility   Version vx.xx

Adapter Properties

Adapter    PCI   PCI   PCI
           Bus   Dev   Fnc
LSIFC929X   0     3     0

     <Device Properties>
     <Persistent IDs>
     Controllers WWNode Name   10012233FCA08BC0
     Controllers WWPort Name   12012233FCA08BC0

      Boot Support              [Enabled BIOS & OS]
      Link Configuration        [Auto]
      Topology Configuration    [Auto]
      Multi-Pathing             [No]
      Persistent ID Type        [WWN]
      Hard ALPA                 [EF]
     <Restore Defaults>
```

Table 8.4 describes the fields in the Adapter Properties menu for FC adapters.

Table 8.4   Adapter Properties Field Descriptions: Fibre Channel Adapters

Field	Description
<Device Properties>	Select this option and press **Enter** to view and modify device properties.
<Persistent IDs>	Select this option and press **Enter** to view the adapter's Persistent ID menu.
Controllers WWNode Name	Displays the 64-bit World Wide node name for this controller
Controllers WWPort Name	Displays the 64-bit World Wide port name for this controller

Table 8.4   Adapter Properties Field Descriptions: Fibre Channel Adapters (Cont.)

Field	Description
Boot Support	Indicates whether an adapter is enabled for LSI software control or whether it is reserved for control by non-LSI software. The possible selections are: • **Enabled BIOS & OS**: (default) Both the BIOS and OS driver will control the adapter. • **Enabled BIOS Only**: The BIOS will control the adapter, but OS drivers will not control it. Some OS drivers may not support this setting; for example, there is no means to disable an adapter in a Windows driver. • **Enabled OS Only**: The BIOS will not control the adapter, but the OS driver will control the adapter. • **Disabled**: The BIOS will not control the adapter when loaded. However, the adapter will still be visible through the configuration protocol. Changes in this setting are reflected in the LSI Control field on the main Adapter List menu. Changes do not take effect until the EFI driver reloads or the system reboots.
Link Configuration	Determines whether the port will set itself to the selected link speed or will auto-negotiate instead. The choices are **1Gig**, **2Gig**, and **Auto** (default). LSI recommends the default setting, unless some attached devices do not support auto-negotiation.
Topology Configuration	Indicates whether the port will default to **N-Port** or **NL-Port** operation, or if it will auto-detect the link topology. (The default is **Auto**.) This option is non-selectable.
Multi-Pathing	Specifies whether all paths to a device are displayed. • **No**: The BIOS display only one port per device found. • **Yes**: The BIOS displays every port found on each device as a separate device in the Device Properties menu.
Persistent ID Type	Specifies which type of persistent ID information is recorded. • **WWN**: All persistent IDs are mapped from WWN to target ID. • **DID**: All persistent IDs are mapped from DID to target ID. **WARNING**: If you changing this value from WWN to DID, or vice versa, all previously set persistent ID information is erased.
Hard ALPA	The Hard ALPA value that you assigned to the controller.
Restore Defaults	Select this option and press **Enter** to restore the default settings for the parameters listed on this screen.

8.4.4   RAID Properties Menu

The RAID Properties menu initially lists all possible SCSI IDs on the RAID adapter SCSI channel. This allows you to select disks on this channel to be members of a mirrored array. Mirroring provides protection against data loss by keeping two copies of the data on separate disks. Figure 8.4 shows the RAID Properties menu.

Figure 8.4   RAID Properties Menu

```
 LSI Logic MPT Setup Utility    Version vx.xx

 RAID Properties      Array: --   SCSI ID: --    Size(MB): ------

 SCSI   Device Identifier        Array   Hot     Status         Predict   Size
 ID                              Disk?   Spare                  Failure   (MB)
  0     SEAGATE ST39103LW   002  [No]    [No]    -----------    ---       8683
  1     SEAGATE ST39103LW   002  [No]    [No]    -----------    ---       8683
  2     SEAGATE ST39103LW   002  [No]    [No]    -----------    ---       8683
  3     -                        [No]    [No]    -----------    ---       ------
  4     -                        [No]    [No]    -----------    ---       ------
  5     -                        [No]    [No]    -----------    ---       ------
  6     -                        [No]    [No]    -----------    ---       ------
  7     LSI1030                  [No]    [No]    -----------    ---       ------
  8     -                        [No]    [No]    -----------    ---       ------
  9     -                        [No]    [No]    -----------    ---       ------
 10     -                        [No]    [No]    -----------    ---       ------
 11     -                        [No]    [No]    -----------    ---       ------
 12     -                        [No]    [No]    -----------    ---       ------
 13     -                        [No]    [No]    -----------    ---       ------
 14     -                        [No]    [No]    -----------    ---       ------
 15     -                        [No]    [No]    -----------    ---       ------
```

Table 8.5 describes the fields in the RAID Properties menu.

Table 8.5   RAID Properties Field Descriptions

Field	Description
Array	Indicates the array configuration: • **Integrated Mirroring (IM)** is a sector-to-sector physical mirror of one drive to another drive. IM arrays have two members (plus an optional hot spare drive). • **RAID 1E** is a combination of striping and mirroring in which each stripe unit has a secondary copy stored on a different disk. RAID 1E arrays can have from 3 to 6 disk drives (including an optional hot spare disk). • **Integrated Striping (IS)** is a striped configuration with no mirroring of any kind. IS arrays can have 2 to 6 active disks in the array. The firmware that supports IM and RAID 1E configurations does not support IS, and IS firmware does not support IM/RAID 1E configurations.
SCSI ID	(*In the upper right of the screen*) The SCSI ID of the RAID array.
Size (MB)	The size of the array, in megabytes.
SCSI ID	(*In the left column of the screen*) The SCSI ID of each device on this SCSI channel.
Device Identifier	The ASCII device identifier string from the device's Inquiry Data.

Table 8.5   RAID Properties Field Descriptions (Cont.)

Field	Description
Array Disk	Indicates if the disk drive is part of an array. If **Yes**, it is; if **No**, it is not. The field is grayed out if any of the following is true: • The disk drive does not meet the minimum requirements for use in a RAID array. • The disk drive is not large enough to mirror existing data. • The disk drive has been configured as a hot spare. • The array already has the maximum number of disk drives.
Hot Spare	Indicates if the disk drive is a hot spare for a RAID array. If **Yes**, it is; if **No**, it is not. IM and RAID 1E arrays can have one optional hot spare each. Hot spares can be created when the array is created or can be added later. RAID 1E arrays with a hot spare disk can have a maximum of 5 disk drive members, plus the hot spare drive. The Hot Spare field is grayed out if any of the following is true: • The disk drive does not meet the minimum requirements for use in a RAID array. • The disk drive is not large enough to mirror existing data on the primary drive. • Integrated Striping firmware is being used. (IS arrays cannot use hot spares.)
Status	Current status of disks that are part of a RAID array. Table 8.6 lists the possible entries.
Predict Failure	Indicates whether SMART is predicting that the disk drive will fail.
Size (MB)	Indicates the size of the disk drive, in megabytes. If the disk drive is part of a 2-disk array, this field indicates the size of the array, not the size of the individual disk. If the disk drive is part of an array with 3 or more disk drives, this field indicates the size that the disk makes up within the array.

Table 8.6 shows the possible values for the Status field.

Table 8.6   Status Field Definitions

Status	Definition
Ok	Disk is online and fully functional
Missing	Disk is not responding
Failed	Disk has failed
Initing	Disk is initializing
CfgOffline	Disk is offline at host's request
UserFailed	Disk is marked failed at host's request
Offline	Disk is offline for some other reason
Inactive	Disk has been set inactive
Out of Sync	Data on disk is not synchronized with the rest of the array
Primary	Disk is the primary disk for a 2-disk mirrored array and is OK
Secondary	Disk is the secondary disk for a 2-disk mirrored array and is OK

Table 8.6   Status Field Definitions (Cont.)

Status	Definition
Incompatbl	Device is not compatible for use as part of a RAID Array
Too Small	Disk is too small to mirror existing data
Max # Dsks	Maximum # of disks allowed for this type of array has been reached
Not Valid	Disk does not support SMART and cannot be used in a RAID array
Qtag/Dis	Device has Qtags or Disconnects Disabled

8.5   Creating RAID Arrays

This section explains how to use the Setup utility to create RAID arrays. The first subsection explains how to create mirrored (IM and RAID 1E) arrays. The second subsection explains how to create striped (IS) arrays. Here are brief descriptions of the different types of arrays:

• **Integrated Mirroring (IM)** arrays are simple sector-to-sector physical mirrors of one drive to another drive. Two disk drives are used for IM arrays. An optional hot spare disk can also be added.

• **RAID 1E** arrays use a striped layout in which each stripe unit has a secondary copy stored on a different disk. Three to six disk drives are used for this type of array. (The maximum is five disk drives if a hot spare disk is also defined.)

• **Integrated Striping (IS)** arrays write data across multiple disks instead of onto one disk. This is accomplished by partitioning each disk's storage space into stripes. The stripes are interleaved round-robin across all disks in the array, so that the combined storage space is composed alternately of stripes from each disk. As a result, data can be retrieved faster.

The version of the BIOS determines which kind of arrays you can create on the host adapter: some BIOS versions support only mirrored arrays, while others support only striped arrays.

8.5.1   Creating a Mirrored Array

Follow these steps to create a mirrored (IM or RAID 1E) array:

1. On the RAID Properties menu, highlight the Array Disk field of a disk drive that has the value of *No*, indicating that it is available to use for a new array.

2. Press the + key to change the Array Disk value to *Yes*. A prompt appears asking if the data that is currently on the disk should be retained or deleted.

3. Press **F3** (or **Shift+3**) if you want to create a 2-disk IM array in which the existing data on the first disk is mirrored exactly to the second disk, or do step 4.

4. Press **Del** (or **D**) if you want to create a RAID 1E array with three or more disk drives or if you want to create a 2-disk IM array without retaining the existing data on the first disk. When the warning message appears, press **Del** again.

   In a RAID 1E array the mirrored data is distributed among several disks, so the original data on the first disk cannot be retained.

5. Highlight the Array Disk field for the second array disk and press + to change the Array Disk value to **Yes**. If you are creating an IM array, skip to step 7. If a warning message appears, press **Del**.

   The warning message appears if the BIOS finds a master boot record on the disk.

6. If you are creating a RAID 1E array, select up to five additional disks for the array (or up to four additional disks, if you want to have a hotspare disk).

   A warning message appears if the BIOS finds a master boot record on any of the disks.

7. (Optional) To add a hotspare disk to the array, highlight the Hot Spare field of an unused disk drive and press the + key to change the Hot Spare value to *Yes*.

8. After you have selected all disks for the array, press **Escape**.

9. To create the new array, select **Save Changes**. (Or you can choose to return to the RAID Properties menu without creating the array.)

10. Wait while the new array is created. During this time the processing screen is displayed. When array creation is complete, the RAID Array menu appears, as shown in Figure 8.5.

8.5.2 Creating a Striped Array

Follow these steps to create a striped (IS) array:

1. On the RAID Properties menu, highlight the Array Disk field of a disk drive that has the value of *No*, indicating that it is available to use for a new array.

2. Press the + key to change the Array Disk value to *Yes*. A warning message appears, informing you that any existing data will be deleted from the disk.

3. Press **Del** (or **D**) to confirm that you want to use this disk for the new array.

4. Highlight the Array Disk field for the second array disk and press + to change the Array Disk value to *Yes*. If a warning message appears, press **Del**.

   The warning message appears if the BIOS finds a master boot record on the disk.

5. Select up to four additional disks for the array.

6. After you have selected all disks for the array, press **Escape**.

7. To create the new array, select **Save Changes**. (Or you can choose to return to the RAID Properties menu without creating the array.)

8. Wait while the new array is created. During this time the processing screen is displayed. When array creation is complete, the RAID Array menu appears, as shown in Figure 8.5.

Figure 8.5   RAID Array Menu

```
 LSI Logic MPT Setup Utility   Version vx.xx

 RAID Array  1 of 1

 SCSI  Size     Status     Modify     Sync     Activate     Delete     Next
 ID    (MB)                                                            Array

  1    26097    Optimal   <Modify>   <Sync>   <Activate>   <Delete>  <Next>


 =============================================================================
 Disks in array:  LSILOGIC      IS10000

 SCSI  Device Identifier         Array   Hot    Status        Predict   Size
 ID                              Disk?   Spare                Failure   (MB)
  1     SEAGATE ST39103LW  002   Yes     No     Ok            No        8699
  2     SEAGATE ST39103LW  002   Yes     No     Ok            No        8699
  4     SEAGATE ST39103LW  002   Yes     No     Ok            No        8699
```

Table 8.5 describes the fields in the top part of the RAID Array menu.

Table 8.7   RAID Array Setup Field Descriptions

Field	Description
SCSI ID	The SCSI ID of the RAID array.
Size (MB)	The size of the array, in megabytes.
Status	The status of the RAID array (Optimal, Degraded, Disabled, Quiesced, xx% Syncd, Failed, Inactive).
Device Identifier	The ASCII device identifier string extracted from the device's Inquiry Data.
<Modify>	Select this field and press **Enter** to modify array configuration. This field is grayed out under the following conditions: • The array is inactive • The array is at its maximum number of devices and does not contain a Hot Spare • An IS array is displayed. Since IS doesn't support hot spares, no modifications can be made.
<Sync>	Select this field and press **Enter** to synchronize the RAID array. This field is grayed out under the following conditions: • The array is inactive • The array does not need to be resynchronized • The adapter's MPT FW does not support the feature • An IS array is displayed. IS arrays do not require synchronization.

Table 8.7   RAID Array Setup Field Descriptions (Cont.)

Field	Description
<Activate>	Select this field and press **Enter** to activate a RAID array. This field is grayed out if there is currently an active RAID array on the adapter. If there are multiple inactive arrays on a physical adapter, this option allows you to tell the RAID firmware which array to make active.
<Delete>	Select this field and press **Enter** to delete the currently displayed RAID array.
<Next Array>	Select this field and press **Enter** to access the next array of a multi-array configuration. This field is grayed out if there is only one RAID array. This choice is enabled for an illegal configuration situation where there is more than one array on this physical adapter. The RAID Properties menu allows display of one array at a time. This choice allows you to display and operate on the next array found.

8.5.3   SCSI Device Properties

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

Changing a setting for the host device (for example, SCSI ID 7) changes the setting for all devices. Since there are too many fields to fit on one screen, you must scroll left and right by clicking on the scroll indicators at the bottom of the screen. Figure 8.6, Figure 8.7, and Figure 8.8 show the three parts of the Device Properties menu.

Figure 8.6 SCSI Device Properties: Part 1

```
LSI Logic MPT Setup Utility   Version vx.xx

Device Properties
SCSI  Device Identifier    MB/Sec  MT/Sec Data   Scan   Scan      Dis-
ID                                        Width  Id     LUNs > 0  connect
 0    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
 1    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
 2    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
 3    SEAGATE ST31055N     160     [80]  [16]   [Yes]  [Yes]    [On]
 4    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
 5    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
 6    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
 7    53C1030              320    [160]  [16]   [Yes]  [Yes]    [On]
 8    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
 9    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
10    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
11    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
12    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
13    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
14    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
15    -                    320    [160]  [16]   [Yes]  [Yes]    [On]
                                  << Scroll Indicator              >>
```

Figure 8.7 SCSI Device Properties: Part 2

```
LSI Logic MPT Setup Utility   Version vx.xx

 Device Properties
SCSI  Device Identifier           SCSI     Queue  Format
ID                                Timeout  Tags
 0    -                           <  10>   [On]   <Format>
 1    -                           <  10>   [On]   <Format>
 2    -                           <  10>   [On]   <Format>
 3    SEAGATE ST31055N            <  10>   [On]   <Format>
 4    -                           <  10>   [On]   <Format>
 5    -                           <  10>   [On]   <Format>
 6    -                           <  10>   [On]   <Format>
 7    53C1030                     <  10>   [On]   <Format>
 8    -                           <  10>   [On]   <Format>
 9    -                           <  10>   [On]   <Format>
10    -                           <  10>   [On]   <Format>
11    -                           <  10>   [On]   <Format>
12    -                           <  10>   [On]   <Format>
13    -                           <  10>   [On]   <Format>
14    -                           <  10>   [On]   <Format>
15    -                           <  10>   [On]   <Format>
                                  << Scroll Indicator              >>
```

Figure 8.8   SCSI Device Properties: Part 3

```
 LSI Logic MPT Setup Utility   Version vx.xx
 Device Properties
 SCSI  Device Identifier              Verify    Restore
 ID                                             Defaults
  0    -                          <Verify>  <Defaults>
  1    -                          <Verify>  <Defaults>
  2                               <Verify>  <Defaults>
  3    SEAGATE ST31055N           <Verify>  <Defaults>
  4    -                          <Verify>  <Defaults>
  5    -                          <Verify>  <Defaults>
  6    -                          <Verify>  <Defaults>
  7    53C1010-33                 <Verify>  <Defaults>
  8    -                          <Verify>  <Defaults>
  9    -                          <Verify>  <Defaults>
 10    -                          <Verify>  <Defaults>
 11    -                          <Verify>  <Defaults>
 12    -                          <Verify>  <Defaults>
 13    -                          <Verify>  <Defaults>
 14    -                          <Verify>  <Defaults>
 15    -                          <Verify>  <Defaults>
                               << Scroll Indicator            >>
```

Table 8.8 describes the fields in the Device Properties menu.

Table 8.8   SCSI Device Properties Field Descriptions

Field	Description
SCSI ID	The SCSI ID of the SCSI device.
Device Identifier	The ASCII device identifier string from the device's Inquiry Data.
MB/sec	Maximum synchronous data transfer rate, in megabytes per second. Values range from 0 (async/narrow) to 320 (default) for Ultra 320. You cannot change the value in this field, but it is updated when the Data Width or MT/sec fields are changed.
MT/sec	Maximum synchronous data transfer rate, in megatransfers per second. See Table 8.9 for details.
Data width	Maximum data width, in bits: either 16 (default) or 8.
Scan ID	Indicates whether to scan for this SCSI identifier at boot time. The default is *Yes*. Set this option to *No* if there is a device that you do not want to be available to the system. Also, you can decrease boot time by changing this setting to *No* for unused SCSI IDs.

Table 8.8   SCSI Device Properties Field Descriptions (Cont.)

Field	Description
Scan LUNs > 0	Indicates whether to scan for LUNs greater than zero for a device. The default is *Yes*. LUN zero is always queried. Set this option to *No* if you have problems with a device that responds to all LUNs whether they are occupied or not. Also, if a SCSI device with multiple LUNs exists on your system but you do not want all of those LUNs to be available to the system, set this option to *No*. This will limit the scan to LUN 0 only.
Disconnect	Indicates whether to allow a device to disconnect during SCSI operations. The default is *On*. Some (mostly newer) devices run faster with disconnect enabled, while some (mostly older) devices run faster with disconnect disabled. This field cannot be modified for Integrated Raid arrays.
SCSI Timeout	Indicates the maximum amount of time [0 to 255] in seconds to wait for a SCSI operation to complete. The default is *10 seconds*. Because time-outs provide a safeguard that allows the system to recover if an operation fails, LSI recommends using a value greater than zero. A value of zero allows unlimited time for an operation to complete and could result in the system hanging. To specify a new timeout value, press **Enter**, type in a value, and press **Enter** again.
Queue Tags	Allows the use of queue tags for a device. The Fusion-MPT SCSI BIOS does not use queue tags. This item specifies queue tag control to higher level device drivers. The default for this field is *On*.
Format	Press **Enter** to low-level format the device. If enabled, this option allows low-level formatting on a disk drive. Low-level formatting completely and irreversibly erases all data on the drive. You cannot select this field for Integrated Raid arrays. Formatting defaults the drive to a 512-byte sector size, even if the drive was previously formatted to another sector size.
Verify	Highlight this field and press **Enter** to verify all sectors on the device and to reassign defective Logical Block Addresses (LBAs). You cannot select this field for Integrated Raid arrays.
Restore Defaults	Highlight this field and press **Enter** to restore default settings for this device.

Table 8.9   Data Transfer Rate Information

Megatransfers/s	Data Width = 8 (MB/s)	Data Width = 16 (MB/s)	Sync Period (nsec)
0 = Async	0 = Async	0 = Async	0 = Async
5	5	10	200
10	10	20	100
20	20	40	50
40	40	80	25
80	80	160	12.5
160 (Default)	160	320	6.25

8.5.4 Fibre Channel Device Properties

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

Since there are too many fields to fit on one screen, you must scroll left and right by clicking on the scroll indicators at the bottom of the screen. Figure 8.9 and Figure 8.10 show the two segments of the Device Properties menu.

Figure 8.9   Fibre Channel Device Properties: Part 1

```
LSI Logic MPT Setup Utility    Version vx.xx

 Device Properties
 SCSI   Device Identifier           World Wide Name               DID
 ID
  0     -
  1     -
  2     -
  3     SEAGATE ST31055N    2000FCBA0023FF44:2100FCBA0023FF44    0000E4
  4     -
  5     -
  6     -
  7     -
  8     -
  9     -
 10     -
 11     -
 12     -
 13     -
 14     -
 15     LSIFC919X
                                 << Scroll Indicator              >>
```

Figure 8.10 Fibre Channel Device Properties: Part 2

```
 LSI Logic MPT Setup Utility   Version vx.xx

 Device Properties
 SCSI  Device Identifier   DID                 Format          Verify
 ID
  0    –                                     <Format>        <Verify>
  1    –                                     <Format>        <Verify>
  2    –                                     <Format>        <Verify>
  3    SEAGATE ST31055N    0000E4            <Format>        <Verify>
  4    –                                     <Format>        <Verify>
  5    –                                     <Format>        <Verify>
  6    –                                     <Format>        <Verify>
  7    –                                     <Format>        <Verify>
  8    –                                     <Format>        <Verify>
  9    –                                     <Format>        <Verify>
 10    –                                     <Format>        <Verify>
 11    –                                     <Format>        <Verify>
 12    –                                     <Format>        <Verify>
 13    –                                     <Format>        <Verify>
 14    –                                     <Format>        <Verify>
 15    LSIFC919X           0000EF            <Format>        <Verify>
                                   << Scroll Indicator                >>
```

Table 8.10 describes the fields in the Fibre Channel Device Properties menu.

Table 8.10   Fibre Channel Device Properties Field Descriptions

Field	Description
SCSI ID	The SCSI ID of the SCSI device.
Device Identifier	The ASCII device identifier string from the device's Inquiry Data.
World Wide Name	The full World Wide Name of the device.
DID	The Destination Identifier for the device.
Format	Press **Enter** to low-level format the device. If enabled, this option allows low-level formatting on a disk drive. Low-level formatting completely and irreversibly erases all data on the drive. You cannot select this field for Integrated Raid arrays. Formatting defaults the drive to a 512-byte sector size, even if the drive was previously formatted to another sector size.
Verify	Highlight this field and press **Enter** to verify all sectors on the device and to reassign defective Logical Block Addresses (LBAs). You cannot select this field for Integrated Raid arrays.

8.5.5 Persistent IDs Menu

The Persistent IDs menu allows you to view and modify Persistent ID mappings for fibre channel devices connected to fibre channel controllers. To view all the options, scroll left and right by clicking on the scroll indicators at the bottom of the screen. Figure 8.11 through Figure 8.15 show the fields of the Persistent IDs menu:

Figure 8.11 Persistent IDs Menu: Part 1

```
LSI Logic MPT Setup Utility   Version vx.xx

 Persistent IDs for adapter LSIFC929   Pci Bus 02  Device 00  Function 01
                                                   Scan   Scan
 Loc Typ WWN (or DID)                      Bus   TID   ID    LUNS >0
  0   -                                    [--]  [---]  [---]  [---]
  1   -                                    [--]  [---]  [---]  [---]
  2   -                                    [--]  [---]  [---]  [---]
  3   WWN  2000FCBA0023FF44:2100FCBA0023FF44 [ 0] [107]  [Yes]  [Yes]
  4   -                                    [--]  [---]  [---]  [---]
  5   -                                    [--]  [---]  [---]  [---]
  6   -                                    [--]  [---]  [---]  [---]
  7   -                                    [--]  [---]  [---]  [---]
  8   -                                    [--]  [---]  [---]  [---]
  9   -                                    [--]  [---]  [---]  [---]
 10   -                                    [--]  [---]  [---]  [---]
 11   -                                    [--]  [---]  [---]  [---]
 12   -                                    [--]  [---]  [---]  [---]
 13   -                                    [--]  [---]  [---]  [---]
 14   -                                    [--]  [---]  [---]  [---]
 15   -                                    [--]  [---]  [---]  [---]
                          << Scroll Indicator          >>
```

Figure 8.12 Persistent IDs Menu: Part 2

```
LSI Logic MPT Setup Utility   Version vx.xx

 Persistent IDs for adapter LSIFC929   Pci Bus 02  Device 00  Function 01

 Loc Typ WWN (or DID)                        Bus    TID
  0   -                                      [--]  [---] <Erase> <Restore>
  1   -                                      [--]  [---] <Erase> <Restore>
  2   -                                      [--]  [---] <Erase> <Restore>
  3  WWN  2000FCBA0023FF44:2100FCBA0023FF44  [ 0]  [107] <Erase> <Restore>
  4   -                                      [--]  [---] <Erase> <Restore>
  5   -                                      [--]  [---] <Erase> <Restore>
  6   -                                      [--]  [---] <Erase> <Restore>
  7   -                                      [--]  [---] <Erase> <Restore>
  8   -                                      [--]  [---] <Erase> <Restore>
  9   -                                      [--]  [---] <Erase> <Restore>
 10   -                                      [--]  [---] <Erase> <Restore>
 11   -                                      [--]  [---] <Erase> <Restore>
 12   -                                      [--]  [---] <Erase> <Restore>
 13   -                                      [--]  [---] <Erase> <Restore>
 14   -                                      [--]  [---] <Erase> <Restore>
 15   -                                      [--]  [---] <Erase> <Restore>
                              << Scroll Indicator            >>
```

Figure 8.13 Persistent IDs Menu: Part 3

```
LSI Logic MPT Setup Utility   Version vx.xx

 Persistent IDs for adapter LSIFC929   Pci Bus 02  Device 00  Function 01

 Loc Typ WWN (or DID)                        Bus    TID
  0   -                                      [--]  [---] <Add DID>
  1   -                                      [--]  [---] <Add DID>
  2   -                                      [--]  [---] <Add DID>
  3  WWN  2000FCBA0023FF44:2100FCBA0023FF44  [ 0]  [107] <Add DID>
  4   -                                      [--]  [---] <Add DID>
  5   -                                      [--]  [---] <Add DID>
  6   -                                      [--]  [---] <Add DID>
  7   -                                      [--]  [---] <Add DID>
  8   -                                      [--]  [---] <Add DID>
  9   -                                      [--]  [---] <Add DID>
 10   -                                      [--]  [---] <Add DID>
 11   -                                      [--]  [---] <Add DID>
 12   -                                      [--]  [---] <Add DID>
 13   -                                      [--]  [---] <Add DID>
 14   -                                      [--]  [---] <Add DID>
 15   -                                      [--]  [---] <Add DID>
                              << Scroll Indicator            >>
```

Figure 8.14 Persistent IDs Menu: Part 4

```
LSI Logic MPT Setup Utility    Version vx.xx

 Persistent IDs for adapter LSIFC929   Pci Bus 02  Device 00  Function 01

Loc Typ WWN (or DID)                       Bus    TID
 0   -                                     [--]  [---] <Add WWN>
 1   -                                     [--]  [---] <Add WWN>
 2   -                                     [--]  [---] <Add WWN>
 3   WWN   2000FCBA0023FF44:2100FCBA0023FF44 [ 0]  [107] <Add WWN>
 4   -                                     [--]  [---] <Add WWN>
 5   -                                     [--]  [---] <Add WWN>
 6   -                                     [--]  [---] <Add WWN>
 7   -                                     [--]  [---] <Add WWN>
 8   -                                     [--]  [---] <Add WWN>
 9   -                                     [--]  [---] <Add WWN>
10   -                                     [--]  [---] <Add WWN>
11   -                                     [--]  [---] <Add WWN>
12   -                                     [--]  [---] <Add WWN>
13   -                                     [--]  [---] <Add WWN>
14   -                                     [--]  [---] <Add WWN>
15   -                                     [--]  [---] <Add WWN>
                              << Scroll Indicator          >>
```

Figure 8.15 Persistent IDs Menu: Part 5

```
 LSI Logic MPT Setup Utility    Version vx.xx

 Persistent IDs for adapter LSIFC929   Pci Bus 02  Device 00  Function 01

Loc Typ WWN (or DID)                       Bus    TID
 0   -                                     [--]  [---] <Defaults>
 1   -                                     [--]  [---] <Defaults>
 2   -                                     [--]  [---] <Defaults>
 3   WWN   2000FCBA0023FF44:2100FCBA0023FF44 [ 0]  [107] <Defaults>
 4   -                                     [--]  [---] <Defaults>
 5   -                                     [--]  [---] <Defaults>
 6   -                                     [--]  [---] <Defaults>
 7   -                                     [--]  [---] <Defaults>
 8   -                                     [--]  [---] <Defaults>
 9   -                                     [--]  [---] <Defaults>
10   -                                     [--]  [---] <Defaults>
11   -                                     [--]  [---] <Defaults>
12   -                                     [--]  [---] <Defaults>
13   -                                     [--]  [---] <Defaults>
14   -                                     [--]  [---] <Defaults>
15   -                                     [--]  [---] <Defaults>
                              << Scroll Indicator          >>
```

describes the fields in the Persistent IDs menu.

Table 8.11   Persistent IDs Field Descriptions

Field	Description
Loc	Location index into the persistent ID storage area.
Typ	Indicates whether the entry specifies a valid WWN or DID number.
WWN (or DID)	Allows you to enter a valid WWN or DID number for the device. To do this, move the cursor to this field and press **Enter**. You can then enter a hexadecimal value that designates the WWN or DID value. • For WWN values, enter the World Wide Node Name first, press **Enter**, and then enter the World Wide Port Name. Press **Enter** again to save the value. • For DID values, enter the entire value at once. Press **Enter** at any time to save the value. If you enter an incorrect value, use the **<Erase>** option to remove the value.
Bus	The SCSI bus number reserved for the entry (0–7). The max bus value is limited by the amount of memory on the controller.
TID	The SCSI target ID reserved for the entry. (0–127)
Scan ID	Indicates whether to scan for this SCSI identifier at boot time. The default is *Yes*. Set this option to *No* if there is a device that you do not want to be available to the system. Also, you can decrease boot time by changing this setting to *No* for unused SCSI IDs.
Scan LUNS > 0	Indicates whether to scan for LUNs greater than zero for a device. The default is *Yes*. LUN zero is always queried. Set this option to *No* if you have problems with a device that responds to all LUNs whether they are occupied or not. Also, if a device with multiple LUNs exists on your system but you do not want all of those LUNs to be available to the system, set this option to *No*. This will limit the scan to LUN 0 only.
<Erase>	Press **Enter** to invalidate the persistent ID entry.
<Restore>	Press **Enter** to restore the persistent ID entry. This should only be used on entries that had previous valid information. If no entry was previously stored at this location, the restored entry will have unknown settings.
<Add DID>	Press **Enter** to enter a new persistent ID mapping DID to TID. At the prompt, enter the DID and press **Enter** to save it. This option is available only if the adapter's PidType is set to DID.
<Add WWN>	Press **Enter** to enter a new persistent ID mapping WWN to TID. At the prompt, enter the 16 characters of the node name and press **Enter** to save it. Then enter the 16 characters of the port name. Press **Enter** to save the entry. This option is available only if the adapter's PidType is set to WWN.
<Defaults>	Press **Enter** to restore the settings of the persistent ID entry to their default values.

8.6   Exiting the SCSI Setup Utility

Because some changes only take effect after the system reboots, it is important to exit the setup utility properly. To exit, press **Esc** and respond to the verification prompts. Some changes might be lost if you reboot before properly exiting the setup utility.

8.7   SCSI Pass-Thru Protocol

The LSI EFI 1.1 Boot Services Driver Provides support for the EFI 1.1 SCSI pass-thru protocol. The LSI Driver implements this protocol according to the EFI 1.1 specification. Refer to the appropriate EFI 1.1 documents for details and usage information. SCSI pass-thru protocol is installed on SCSI Host Bus adapters only. It is not supported on fibre channel controllers.

SCSI EFI BIOS and Setup Utility

Chapter 9
Fusion-MPT SAS BIOS
and Setup Utility

This chapter explains how to use the LSI Fusion-MPT Serial Attached SCSI (SAS) BIOS and Setup Utility. This chapter contains the following sections:

-
-
-
-

9.1 Overview and Features

The Fusion-MPT SAS BIOS is the bootable ROM code that manages SAS hardware resources. It is specific to a family of LSI Fusion-MPT SAS controllers or processors. The Fusion-MPT SAS BIOS integrates with a standard system BIOS, extending the standard disk service routine provided through Int13h.

During the boot time initialization, the SAS BIOS determines if the system BIOS has already installed other hard disks, such as an IDE drive. If such drives are already installed, the SAS BIOS maps any SAS or SATA drives it finds behind these drives. Otherwise, the SAS BIOS installs drives starting with the system boot drive. In this case, the system boots from a drive controlled by the SAS BIOS. The LSI SAS BIOS supports the BIOS Boot Specification (BBS).

The SAS BIOS Setup Utility enables you to change the default configuration of LSI host adapters. The setup utility is embedded in the SAS BIOS.

The Fusion-MPT SAS BIOS features include the following:

- Configuration for up to 256 adapters. Any four can be chosen for INT13 (bootrom) support
- Support for Message Passing Technology
- Support for the LSI53C1064, LSI53C1066, and LSI53C1068 devices
- Support for SAS and SATA devices
- Support for Integrated RAID initialization (with proper firmware)

9.1.1 Boot Initialization with BIOS Boot Specification (BBS)

The Fusion-MPT SAS BIOS supports 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 the system supports the BBS, you can use the system BIOS setup menu to select the boot order and drive order. In the system BIOS setup, the Boot Connection Devices menu lists the available boot options. Use that menu to select the device and rearrange the order. Then exit to continue the boot process.

9.1.2 CD-ROM Boot Initialization

The Fusion-MPT SAS BIOS supports boot initialization from a CD-ROM drive. The types of emulation are:

- No emulation disk
- Floppy 1.2 Mbyte emulation disk
- Floppy 1.44 Mbyte emulation disk
- Floppy 2.88 Mbyte emulation disk
- Hard disk emulation

The type of emulation assigns the drive letter for the CD-ROM. For example, if a 1.44 Mbyte floppy emulation CD is loaded, the CD-ROM drive becomes the designated A: drive, and the existing floppy drive becomes the B: drive.

9.2   Starting the SAS BIOS Setup Utility

If you have SAS BIOS version 6.xx, and it includes the Fusion-MPT SAS BIOS setup utility, you can use the setup utility to change the default configuration of the SAS host adapters. (The SAS BIOS version number appears on the monitor during bootup.) You may need to change these default values if there is a conflict between device settings or if you need to optimize system performance. If the utility is available, the following message appears during bootup:

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

When you see this message, press **Ctrl-C** to start the setup utility. When you press **Ctrl-C**, the message changes to:

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

After a short pause, the Adapter List menu appears.

These messages may appear during the boot process:

- `Adapter removed from boot order!`
  This message appears when an adapter was removed from the system or was relocated behind a PCI bridge. The message is informational only.

- `Adapter configuration may have changed, reconfiguration is suggested!`
  This message is informational only. It appears if none of the information in the NVRAM is valid. This can occur when the BIOS is upgraded, or when some external event has rendered the NVRAM temporarily unreadable. You can either accept the default NVRAM values, or you can re-enter the settings you want in the setup utility.

- `Updating Adapter List!`
  This message appears when fewer than four adapters are in the boot order and more adapters exist than are shown.

Important: The SAS BIOS Setup Utility is a powerful tool. If, while using it, you somehow disable all of the controllers, press **Ctrl-E** (or **Ctrl-A** on earlier versions) after memory initialization during reboot. This will allow you to re-enable and reconfigure the controllers.

> Note: Some devices detected by the setup utility cannot be controlled by the SAS BIOS. Devices such as tape drives and scanners require a device driver specific to that device. However, the SAS BIOS setup utility can be used to modify parameters for these devices.

9.3 Setup Utility Menu Screens

All SAS BIOS setup utility menu screens are partitioned into the following areas, starting at the top of the screen:

- **Header Area**: This area lists static information text, including the product title and version.

- **Menu Area**: This area lists the current screen title and controller information. It provides a cursor for selecting bracketed menu options, such as *<Global Properties>*.

- **Main Area**: This is the area for presenting data. This area has a cursor for item selection, horizontal scrolling, and vertical scrolling. Horizontal and vertical scroll bars appear here, if needed.

- **Footer Area**: This area provides general help information text.

9.3.1 User Input Keys

The general key inputs listed in Table 9.1 are used for all menu screens of the setup utility:

Table 9.1   General Input Keys

Key	Definition	Description
F1	Help	Displays context sensitive help for the field in which the cursor is positioned.
Arrow Keys	Select Item	Up, down, left, right movement to position the cursor.
Home/End	Select Item	
+/-	Change Item	Items with values in [ ] brackets are modifiable. Use the numeric keypad '+' and '-' keys to change a modifiable field to its next relative value.

Table 9.1   General Input Keys (Cont.)

Key	Definition	Description
Esc	Abort/Exit	Aborts the current operation and/or exits the current screen. The user is asked to confirm, if changes have been made.
Enter	Execute <Item>	Executable items are indicated by highlighted text and a different background color. Press **Enter** to execute the field's associated function. Selections that are not currently permissible are grayed out. The menu descriptions below include information on their executable items.

9.3.2   Adapter List Menu

When you start the setup utility the Adapter List menu appears, as shown in Figure 9.1. This menu displays a scrolling list of up to 256 installed LSI SAS host adapters and information about each of them.

Figure 9.1   Adapter List Menu

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Adapter List  Global Properties


Adapter      PCI  PCI  PCI  PCI      FW Revision        Status       Boot
             Bus  Dev  Fnc  Slot                                     Order
SAS1068       0    2    0    1       0.03.23.00-IT      Enabled       0
SAS1068       0    3    0    2       0.03.23.00-IR      Enabled       1
SAS1068E      1    6    0    3       0.03.23.00-IR      Enabled
SAS1064E      2    A    0    4       0.03.23.00-IT      Disabled



Esc = Exit Menu        F1/Shift+1 = Help
Alt+N = Global Properties  -/+ = Alter Boot Order  Ins/Del = Alter Boot List
```

Use the arrow keys to select an adapter, then press **Enter** to view and modify the properties of the selected adapter (and to access the other menus). After you select an adapter and press **Enter**, the setup utility scans the adapter's devices and the Adapter Properties menu appears. (See Section 9.3.4, "Adapter Properties Menu.")

To change the Adapter boot order, use the -, +, Ins, and Del keys while on the Boot Order field. Press **Ins** or **Del** to add an adapter to or remove an adapter from the boot order. Press the **-** and **+** keys to change an adapter's position in the boot order. If you make changes to the boot order, the setup utility prompts you to save the changes before you exit the menu.

From the Adapter List menu, you can press **Alt+N** to access the Global Properties menu. See Section 9.3.3, "Global Properties Menu."

Table 9.2 describes the Adapter List menu data fields, reading from left to right.

Table 9.2   Adapter List Field Descriptions

Field	Description
Adapter	The model number of the LSI controller.
PCI Bus	The PCI Bus number (0x00–0xFF) that the system BIOS assigns to the adapter.
PCI Dev	The PCI Device number (0x00–0x1F, 0–31 decimal) that the system BIOS assigns to an adapter.
PCI Fnc	The PCI Function number (0x00–0x7, 0–7) that the system BIOS assigns to an adapter.
PCI Slot	The PCI slot in which the controller is installed.
FW Revision	The Fusion-MPT Firmware version and type (IR or IT).
Status	Indicates whether an adapter is eligible for LSI software control, or whether it is reserved for control by non-LSI software: • **Enabled:** The BIOS is either currently controlling the adapter or will attempt to control the adapter upon reload. • **Disabled:** The BIOS is either not controlling the adapter or will discontinue control of the adapter upon reload. Whether Enabled or Disabled, the user can still view and modify settings for the adapter. The Boot Support setting in the Adapter Properties menu can be used to change the status of this setting. The system must be rebooted in order for a new Boot Support setting to take effect.
Boot Order	The order in which adapters will boot when the system has more than one adapter. Up to four of the total adapters in a system may be selected as bootable. To add an adapter to the boot list, press **Insert** while on the Boot Order field. To remove an adapter from the boot list, press **Delete** while on the desired adapter's Boot Order field. Press the **-** or **+** keys to change the adapter's position in the boot order.

9.3.3   Global Properties Menu

The Global Properties menu allows you to change global scope settings, such as the boot information display mode. To access the Global Properties menu, press **Alt+N** while on the Adapter List menu. To return to the Adapter List from Global Properties, press **Alt+N** again.

Figure 9.2 shows the Global Properties menu:

Figure 9.2   Global Properties Menu

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Adapter List   Global Properties


      Pause When Boot Alert Displayed   [Yes]
      Boot Information Display Mode     [Display adapters & installed devices]
      Support Interrupt                 [Hook interrupt, the Default]

      Restore Defaults


 Esc = Exit Menu        F1/Shift+1 = Help
 Alt+N = Adapter List
```

Table 9.3 describes the Global Properties menu fields.

Table 9.3   Global Properties Field Descriptions

Field	Description
Pause When Boot Alert Displayed	Specifies whether the CU pauses for user acknowledgement after displaying an alert message during boot. To continue after displaying an alert message, specify *No*. To wait for the user to press any key after displaying a message, specify *Yes*.
Boot Information Display Mode	Specifies how much adapter and device information the BIOS displays during boot. Possible values are: • Display adapters only • Display adapters and all devices • Display minimal information • Display adapters & installed devices
Support Interrupt	Allows you to prevent a hook on Int40, if required. Possible values are: • Hook interrupt (default) • Bypass interrupt hook
<Restore Defaults>	Press **Enter** when this option is selected to restore default settings for the options listed on this menu.

9.3.4   Adapter Properties Menu

The Adapter Properties menu allows you to view and modify adapter settings. It also provides access to all other menus. Figure 9.3 shows the Adapter Properties menu:

Figure 9.3   Adapter Properties Menu

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Adapter Properties -- SAS1068

      Adapter                      SAS1068
      PCI Slot                     03
      PCI Address(Bus/Dev/Func)    03:00:00
      MPT Firmware Revision        00.03.23.00-IT
      SAS Address                  500605B0:0000C580
      Status                       Enabled
      Boot Order                   1
      Boot Support                 [Enabled BIOS & OS]

      RAID Properties

      SAS Topology

      Advanced Adapter Properties

Esc = Exit Menu       F1/Shift+1 = Help
Enter = Select Item   -/+ = Change Item
```

Table 9.4 describes the Adapter Properties menu fields.

Table 9.4   Adapter Properties Field Descriptions

Field	Description
Adapter	The model number of the LSI controller.
PCI Slot	The PCI slot in which the controller is located.
PCI Address	The PCI address that the system BIOS assigns to the adapter. The Bus value has the range 0x00–0xFF (0–255 decimal). Device value has the range 0x00–0x1F (0–31 decimal). Function has the range 0x00–0x7 (0–7 decimal).
MPT Firmware Revision	The Fusion-MPT firmware version and type (IR or IT).
SAS Address	The SAS address assigned to this adapter.
Status	Indicates whether the controller BIOS is enabled or disabled. • **Enabled:** The BIOS is either currently controlling the adapter or will attempt to control the adapter upon reload. • **Disabled:** The BIOS is either not controlling the adapter or will discontinue control of the adapter upon reload. Whether Enabled or Disabled, you can still view and modify adapter settings. Use the Boot Support setting in the Adapter Properties menu to change this setting. The system must be rebooted in order for a new Boot Support setting to take effect.

Table 9.4   Adapter Properties Field Descriptions (Cont.)

Field	Description
Boot Order	The order in which adapters will boot when the system has more than one adapter. Up to four installed adapters may be selected as bootable.
Boot Support	Indicates whether an adapter is eligible for LSI software control or whether it is reserved for control by non-LSI software. The options are: • **Enabled BIOS & OS (default):** Both the BIOS and OS driver will control the adapter. • **Enabled BIOS Only:** The BIOS will control the adapter; OS drivers will not control it. Some OS drivers do not support this setting. For example, there is no way to disable an adapter in a Windows driver. • **Enabled OS Only:** The BIOS will not control the adapter; the OS driver will control the adapter. • **Disabled:** The BIOS will not control the adapter when loaded. However, the adapter will still be visible through the Configuration Protocol. Changes to this setting are reflected in the Status field on the main Adapter List menu. The new setting does not take effect until the system is rebooted.
RAID Properties SAS Topology Advanced Adapter Properties	Select a field and press **Enter** to access these menus.

9.3.5   SAS Topology Menu

The SAS Topology menu shows the properties of Adapters, PHYs, attached devices, expanders, and enclosures. The SAS Topology menu presents a view of the adapter's SAS hierarchy, as shown in Figure 9.4. You can scroll right to view additional information about the devices (see Figure 9.5 and Figure 9.6).

Figure 9.4   SAS Topology Menu: Part 1

```
LSI Logic MPT Setup Utility     v6.xx.xx.xx
SAS Topology -- SAS1068

                    Device Identifier              Discovery      Device
SAS1068(03:03:00)                                  Status         Info
  -PHY 0            FUJITSU MAV2036RC               Good           SAS
  -PHY 1
  -PHY 2
  -PHY 3            SEGATE ST936701SS               Good           SAS
  -PHY 4
  -PHY 5            LSILOGICSASx12 A.0              Good           Expander
    -PHY 0          SAS1068(03:03:00)
    -PHY 1
    -PHY 2
    -PHY 3          ATA  Maxtor 6y080M0  1EW0                      SATA
    -PHY 4
    -PHY 5
    -PHY 6
    -PHY 7
    -PHY 8
    -PHY 9
    -PHY 10
    -PHY 11
  -PHY 7

 Esc=Exit    F1/Shift+1=Help    Alt+M = More Keys
 Alt+D= Device Properties  Alt+E= Expander Properties
```

To expand the SAS Topology display, select an expander or enclosure
and press **Enter** to display all its PHYs/devices/bays. To collapse the
display, press **Enter** again.

While the cursor is on the Device Identifier:

- Press **Alt+E** to access a specific Expander Properties menu or press
  Alt+D to access a specific Device Properties menu.

- Press **Enter** while on an expander or enclosure to expand or
  collapse the display.

- Press **Enter** while on a device to activate locate LED.

At any time, press **C** to clear Device Mappings for non-present devices.
Scroll the cursor to the right to display further information, as shown in
Figure 9.5 and Figure 9.6:

Figure 9.5   SAS Topology Menu: Part 2

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
SAS Topology -- SAS1068

                    Device Identifier        Negotiated Link Maximum Link
SAS1068(03:03:00)                            Speed (Gbps)    Speed (Gbps)
  -PHY 0              FUJITSU MAV2036RC       3.0             3.0
  -PHY 1                                      Unknown          3.0
  -PHY 2                                      Unknown         3.0
  -PHY 3              SEGATE ST936701SS       3.0             3.0
  -PHY 4                                      Unknown         3.0
  -PHY 5              LSILOGICSASx12 A.0      3.0             3.0
    -PHY 0            SAS1068(03:03:00)       3.0             3.0
    -PHY 1                                    Unknown         3.0
    -PHY 2                                    Unknown         3.0
    -PHY 3            ATA   Maxtor 6y080M0  1EW0 1.5          3.0
    -PHY 4                                    Unknown         3.0
    -PHY 5                                    Unknown         3.0
    -PHY 6                                    Unknown         3.0
    -PHY 7                                    Unknown         3.0
    -PHY 8                                    Unknown         3.0
    -PHY 9                                    Unknown         3.0
    -PHY 10                                   Unknown         3.0
    -PHY 11                                   Unknown         3.0
  -PHY 7                                      Unknown         3.0

 Esc=Exit    F1/Shift+1=Help    Alt+M = More Keys
 Alt+D= Device Properties  Alt+E= Expander Properties
```

Figure 9.6   SAS Topology Menu: Part 3

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
SAS Topology -- SAS1068

                    Device Identifier            Target        Initiator
SAS1068(03:03:00)                                Capabilities  Capabilities
  -PHY 0             FUJITSU MAV2036RC           SSP
  -PHY 1
  -PHY 2
  -PHY 3             SEGATE ST936701SS           SSP
  -PHY 4
  -PHY 5             LSILOGICSASx12 A.0          SMP
    -PHY 0           SAS1068(03:03:00)                          SATA,SMP,STP,SSP
    -PHY 1
    -PHY 2
    -PHY 3           ATA  Maxtor 6y080M0  1EW0   SATA
    -PHY 4
    -PHY 5
    -PHY 6
    -PHY 7
    -PHY 8
    -PHY 9
    -PHY 10
    -PHY 11
  -PHY 7


 Esc=Exit    F1/Shift+1=Help    Alt+M = More Keys
 Alt+D= Device Properties  Alt+E= Expander Properties
```

Table 9.5 describes the SAS Topology menu fields.

Table 9.5   SAS Topology Field Descriptions

Field	Description
Device Identifier	The ASCII device identifier string from the device's inquiry data.
Discovery Status	The status of SAS topology discovery on this direct attached PHY or on an expander. This field is only an indicator of an error being encountered. For specific details and the error value, see the Expander Properties page for expanders and the PHY Properties page for direct attach PHYs.
Device Info	Indicates if a device is SAS or SATA, and if the device has been selected as the boot device.
Negotiated Link Speed	The negotiated link speed for this PHY, in Gbits/s. This field also indicates if the PHY has been disabled.
Maximum Link Speed	The maximum hardware link rate possible for this PHY, in Gbits/s.

Table 9.5   SAS Topology Field Descriptions (Cont.)

Field	Description
Target Capabilities	The target capabilities for this device. The possible values are as follows: • **SATA:** Serial ATA Protocol • **SSP:** Serial SCSI Protocol • **STP:** Serial ATA Tunneling Protocol • **SMP:** Serial Management Protocol
Initiator Capabilities	The initiator capabilities for this device. The possible values are as follows: • **SATA:** Serial ATA Protocol • **SSP:** Serial SCSI Protocol • **STP:** Serial ATA Tunneling Protocol • **SMP:** Serial Management Protocol

9.3.6   Expander Properties Menu

The Expander Properties menu displays information about a specific expander, as shown in Figure 9.7. To access this menu, press **Alt+E** on the SAS Topology menu when the cursor is on the Device Identifier field of an expander.

Figure 9.7   Expander Properties Menu

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Expander Properties -- SAS1068



     Device Identifier                    LSILOGICSASx12 A.0
     Number of Phys                       0C
     SAS Address                          500605B0:00001290
     SAS Level                            01
     Configurable Routing Table           Yes
     Expander Change Count                001C
     Maximum Route Indexes per Phy        0090
     Expander Target Capabilities         SMP
     Expander Initiator Capabilities      None
     Discovery Status                     00000000




 Esc=Exit    F1/Shift+1=Help
```

Table 9.6 describes the Expander Properties menu fields.

Table 9.6   Expander Properties Field Descriptions

Field	Description
Device Identifier	The ASCII device identifier string extracted from the device's inquiry data.
Number of Phys	The number of PHYs on this expander.
SAS Address	The SAS address of this expander.
SAS Level	The SAS level of the expander.
Configurable Routing Table	Indicates whether the expander has a configurable routing table.
Expander Change Count	The current number of BROADCAST(CHANGE) primitives initiated by this expander.
Maximum Route Indexes Per PHY	The maximum route indexes per PHY available in this expander.
Expander Target Capabilities	The target capabilities for this expander. The possible values are as follows: **SSP:** Serial SCSI Protocol **STP:** Serial ATA Tunneling Protocol **SMP:** Serial Management Protocol
Expander Initiator Capabilities	The initiator capabilities for this expander. The possible values are as follows: **SSP:** Serial SCSI Protocol **STP:** Serial ATA Tunneling Protocol **SMP:** Serial Management Protocol
Discovery Status	A 32-bit hexadecimal value indicating the discovery status for the PHY or expander. Currently defined values are: • Discovery Completed Successfully 0x00000000 • Loop Detected 0x00000001 • Unaddressable Device Exists 0x00000002 • Multiple Ports 0x00000004 • Expander Error 0x00000008 • SMP Timeout 0x00000010 • Out of Route Entries 0x00000020 • SMP Response Index Does Not Exist 0x00000040 • SMP Response Function Failed 0x00000080 • SMP CRC Error 0x00000100

9.3.7   Device Properties Menu

The Device Properties menu displays information about a specific device, as shown in Figure 9.8. To access this menu, press **Alt+D** on the SAS Topology menu when the cursor is on the Device Identifier field of a device. Press **Alt+N** or **Alt+P** at any time while on this menu to cycle to the next or previous device.

Figure 9.8   Device Properties Menu

```
 LSI Logic MPT Setup Utility    v6.xx.xx.xx
 Device Properties -- SAS1068


      Device Identifier                     SEAGATE ST936701SS  B828
      Scan Order                            3
      Slot Number                           4
      Device Information                    SAS
      SAS Address                           5000C500:001009E1
      Serial Number                         3LC0093N0000H4442MHE

      Format

      Verify


  Esc=Exit    F1/Shift+1=Help
  Alt+N = Next Device     Alt+P = Previous Device    Enter = Select Item
```

Table 9.7 describes the Device Properties menu fields.

Table 9.7   Device Properties Field Descriptions

Field	Description
Device Identifier	The ASCII device identifier string from the device's inquiry data.
Scan Order	The scan order for this device. This is the equivalent of a SCSI ID in parallel SCSI.
Slot Number	The bay or slot where the device is physically located.
Device Information	Indicates if the device is SAS or SATA.
SAS Address	The SAS address of this device.
Serial Number	The serial number of this device.
Format	Highlight this entry and press **Enter** to access the low-level format screen for the device (see Section 9.3.8, "Format and Verify Screens"). If enabled, this option allows low-level formatting of a disk drive. Low-level formatting completely and irreversibly erases all data from the drive. **Note:** Low-level formatting defaults the drive to a 512-byte sector size, even if it was previously formatted to another sector size.
Verify	Highlight this entry and press **Enter** to access the Verify All Sectors screen. From this screen you can start a verify of all sectors on the device (see Section 9.3.8, "Format and Verify Screens"). If needed, you can reassign defective Logical Block Addresses (LBAs), as described in the text following Table 9.8.

9.3.8 Format and Verify Screens

The Device Format and Device Verify screens have similar layouts. To access them, press **Enter** on the appropriate field on the Device Properties screen. These screens include an Elapsed Time and status bar, which begins incrementing when the operation is started and which shows the current progress of the operation. Figure 9.9 shows the Device Format screen.

Figure 9.9   Device Format Screen

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Device Format -- SAS1068

     Device Identifier                    SEAGATE ST936701SS  B828
     SAS Address                          5000C500:001009E1
     Serial Number                        3LC0093N0000H4442MHE

     WARNING!  Format will change the sector size to 512 bytes.
     Format will permanently erase all data on this device!
     Format may take hours to complete and cannot be stopped.
     Press the 'F' key to begin format or any other key to exit.



     Elapsed Time:     00:00:00

     Percent
     Complete   0%                                           100%
               --------------------------------------------------


               --------------------------------------------------


 Esc=Exit   F1/Shift+1=Help
```

When the Device Format screen appears, press the **F** key to begin the format.

Warning: Once a format has begun, it cannot be stopped or cancelled

Figure 9.10 shows the Device Verify screen:

Figure 9.10 Device Verify Screen

```
 LSI Logic MPT Setup Utility    v6.xx.xx.xx
 Device Verify -- SAS1068

       Device Identifier                      SEAGATE ST936701SS  B828
       SAS Address                            5000C500:001009E1
       Serial Number                          3LC0093N0000H4442MHE

       All sectors on the device will be verified
       Press Enter to continue or any other key to cancel



       Elapsed Time:      00:00:00

       Percent
       Complete   0%                                            100%
                  --------------------------------------------------


                  --------------------------------------------------


  Esc=Exit  F1/Shift+1=Help
```

When the Device Verify screen appears, press **Enter** to begin the verify process. You may press **Esc** at any time to cancel the verify process. Table 9.8 describes the Format and Verify fields.

Table 9.8   Format and Verify Field Descriptions

Field	Description
Device Identifier	The ASCII device identifier string from the device's inquiry data.
SAS Address	The SAS address of this device.
Serial Number	The serial number of this device.
Elapsed Time	The total time elapsed since the Format or Verify operation started.
Percent Complete	Graphical status bar showing the current completion status of the operation.

If the LBAs can be reassigned, or need to be reassigned, the following prompt appears:

```
Reassign the block?
(Yes, No, All, nonE, Cancel)
```

The reassignment options are as follows:

- **Yes:** Reassign only this block. If another block needs to be reassigned in the future, display the prompt again.

- **No:** Do not reassign this block. If another block needs to be reassigned in the future, display the prompt again.

- **All:** Reassign the current block, and automatically reassign other blocks that needs it, without displaying the prompt again.

- **nonE:** Do not reassign the current block or automatically reassign any other blocks that need it. Do not display the prompt again.

- **Cancel:** Do not reassign anything, and stop the Verify process.

9.3.9 Advanced Adapter Properties Menu

The Advanced Adapter Properties menu allows you to view and modify infrequently accessed adapter settings. Figure 9.11 shows this menu.

Figure 9.11 Advanced Adapter Properties Menu

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Advanced Adapter Properties -- SAS1068

     IRQ                         0B
     NVM                         Yes
     IO Port Address             9000
     Chip Revision ID            00

     Spinup Delay (Secs)         [ 2]
     CHS Mapping                 [SCSI Plug and Play Mapping]

     Link Error            Threshold        Threshold
     Settings              Count            Time(Secs)
     Invalid DWORDs          0                0
     Loss of DWORD Sync      0                0
     Running Disparity Errors 0               0
     PHY Reset Errors        0                0

     Advanced Device Properties
     PHY Properties

     Restore Defaults

 Esc=Exit  F1/Shift+1=Help
 Enter = Select Item   -/+ = Change Item
```

The Advanced Adapter Properties menu provides access to advanced Device Properties and PHY Properties. To modify the Link Error Settings Threshold Count and Threshold Time, press **Enter** while the cursor is on the desired field and enter the new value. Table 9.9 describes the Advanced Adapter Properties menu fields.

Table 9.9   Advanced Adapter Properties Field Descriptions

Field	Description
IRQ	The Interrupt Request Line used by the adapter. The system BIOS assigns this value.
NVM	Indicates whether an adapter has non-volatile memory (NVM) associated with it. An adapter's configuration is stored in its associated NVM.
IO Port Address	The I/O Port Address used to communicate with the adapter. The system BIOS assigns this number.
Chip Revision ID	The Revision ID of this adapter.
Spinup Delay	The number of seconds to wait between spinups of devices attached to this adapter. Staggered spinups balance the total electrical current load on the system during boot. The default value is 2 seconds, with choices between 1 and 10 seconds.
CHS Mapping	Defines how the Cylinder Head Sector values are mapped onto a disk that does not have pre-existing partition information. CHS Mapping allows two settings: • **SCSI Plug and Play Mapping** (default) automatically determines the most efficient and compatible mapping. • **Alternate CHS Mapping** utilizes an alternate, possibly less efficient, mapping that may be required if a device is moved between adapters from different vendors. **Note:** Neither of these options has any effect after a disk has been partitioned using the FDISK command. To change the CHS Mapping on a partitioned disk, use the FDISK command to delete all partitions. Then reboot the system to clear memory. Otherwise, the old partitioning data will be reused.
Link Error Settings	The Link Error Settings are as follows: • **Invalid DWORDs:** The number of invalid dwords that have been received, outside of PHY reset sequences, since the last PHY Link Error Reset. • **Loss of DWORD Sync:** The number of times, since the last PHY Link Error Reset, that dword synchronization was lost and the link reset sequence occurred. • **Running Disparity Errors:** The number of dwords with running disparity errors that have been received, outside of PHY reset sequences, since the last PHY Link Error Reset. • **PHY Reset Errors:** The number of times the PHY reset sequence has failed, since the last PHY Link Error Reset.
Threshold Count	Link error count threshold values. When a *Link Error Count* exceeds a *Threshold Count* within the *Threshold Time (secs)* the Fusion-MPT firmware may reduce the link rate. Press **Enter** on any of these fields to modify the value.

Table 9.9   Advanced Adapter Properties Field Descriptions (Cont.)

Field	Description
Threshold Time (secs)	Time, in seconds, over which to apply the *Threshold Count*. When a *Link Error Count* exceeds a *Threshold Count* within the *Threshold Time (secs)* the Fusion-MPT firmware may reduce the link rate. Press **Enter** on any of these fields to modify the value.
Advanced Device Properties	Press **Enter** to view and modify Advanced Device Properties (see Section 9.3.10, "Advanced Device Properties Menu").
PHY Properties	Press **Enter** to view and modify PHY properties (see Section 9.3.11, "PHY Properties Menu").
Restore Defaults	Press **Enter** to restore the default values for all items on this screen.

9.3.10 Advanced Device Properties Menu

The Advanced Device Properties menu allows you to view and modify infrequently accessed device settings. Figure 9.12 shows this menu:

Figure 9.12 Advanced Device Properties Menu

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Advanced Device Properties -- SAS1068

     Maximum INT 13 devices for this adapter        24
     Maximum Target Spinups                         10

     IO Timeout for Block Devices                   10
     IO Timeout for Block Devices(Removable)        10
     IO Timeout for Sequential Devices              10
     IO Timeout for Other Devices                   10

     LUNs to Scan for Block Devices                 All
     LUNs to Scan for Block Devices(Removable)      All
     LUNs to Scan for Sequential Devices            All
     LUNs to Scan for Other Devices                 All

     Removable Media Support                        [None]

     Restore Defaults


 Esc=Exit  F1/Shift+1=Help
 Enter = Select Item   -/+ = Change Item
```

Table 9.10 describes the Advanced Device Properties menu fields.

Table 9.10   Advanced Device Properties Field Descriptions

Field	Description
Maximum INT 13h Devices for this adapter	The maximum number of devices attached to the adapter for which to install a pre-OS I/O interface. The specified number of devices in the adapter's device scan order list will have an I/O interface installed. (An installed I/O interface is defined as Int13H.) X86 platforms allow a maximum of 24 Int13h devices per system. Therefore, fewer than the specified number of Int13h devices may be installed. The default for X86 is 24 devices, with a range of 0–24 allowed.
Maximum Target Spinups	The maximum number of targets that can simultaneously spin up. The IOC must delay by the time indicated in the spin-up delay field before it starts spin-up of the next set of targets. A value of 0 in this field is treated the same as a value of 1.
IO Timeout for Block Devices	The time, in seconds, (0–999, 0 = no-timeout) that the host uses to timeout I/Os for the following devices with non-removable media: • SCSI Device Type 00h - Direct Access • SCSI Device Type 04h - Write Once • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access
IO Timeout for Block Devices (Removable)	The time, in seconds, (0–999, 0 = no-timeout) that the host uses to timeout I/Os for the following devices with removable media: • SCSI Device Type 00h - Direct Access • SCSI Device Type 04h - Write Once • SCSI Device Type 05h - CD-ROM • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access
IO Timeout for Sequential Devices	The time, in seconds, (0–999, 0 = no-timeout) that the host uses to timeout I/Os for the following devices: • SCSI Device Type 01h - Sequential Access
IO Timeout for Other Devices	The time, in seconds, (0–999, 0 = no-timeout) that the host uses to timeout I/Os for devices other than the following: • SCSI Device Type 00h - Direct Access • SCSI Device Type 01h - Sequential Access • SCSI Device Type 04h - Write Once • SCSI Device Type 05h - CD-ROM • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access
LUNs to Scan for Block Devices	Controls LUN scans for the following devices with non-removable media: • SCSI Device Type 00h - Direct Access • SCSI Device Type 04h - Write Once • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access **LUN 0 Only:** Scan only LUN 0. **All:** Scan all LUNs.

Table 9.10   Advanced Device Properties Field Descriptions (Cont.)

Field	Description
LUNs to Scan for Block Devices (Removable)	Controls LUN scans for the following devices with removable media: • SCSI Device Type 00h - Direct Access • SCSI Device Type 04h - Write Once • SCSI Device Type 05h - CD-ROM • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access. **LUN 0 Only:** Scan only LUN 0. **All:** Scan all LUNs.
LUNs to Scan for Sequential Devices	Controls LUN scans for the following devices: • SCSI Device Type 01h - Sequential Access. **LUN 0 Only:** Scan only LUN 0. **All:** Scan all LUNs.
LUNs to Scan for Other Devices	Controls LUN scans for all devices other than the following: • SCSI Device Type 00h - Direct Access • SCSI Device Type 01h - Sequential Access • SCSI Device Type 04h - Write Once • SCSI Device Type 05h - CD-ROM • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access. **LUN 0 Only:** Scan only LUN 0. **All:** Scan all LUNs.
Removable Media Support	• **None:** Install no Int13H interface for any Direct Access removable media devices. • **Boot Device Only:** Install Int13H interface for a Direct Access removable media device if, and only if, media is present in the device at the time of BIOS initialization and either: *BBS System:* The device is selected as the boot device. (Refer to the BIOS Boot Specification for a description of BBS.) *Non-BBS System:* The device is set up as the boot device. The adapter to which the device is connected is specified as the first adapter (i.e., 0) in the Boot Adapter List. The device is specified as the first device in the adapter's device scan order list. • **With Media Installed:** Install Int13H interfaces for Direct Access Removable Media devices if media is present in the device at the time of BIOS initialization.
Restore Defaults	Press **Enter** to restore the default values for all items on this screen.

9.3.11 PHY Properties Menu

The PHY Properties menu allows you to view and modify PHY-specific settings. Figure 9.13 shows this menu.

Figure 9.13 Phy Properties Menu

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
PHY Properties -- SAS1068

     PHY                    0 (1st of 8 PHYs)
     SAS Port               0
     Link Status            Enabled, 3.0Gbps
     Discovery Status       00000000

     Device Identifier      SEAGATE ST9367091SS    B828
     Scan Order             0
     Device Information     SAS
     SAS Address            5000C500:001009E1

     Link Error             Link Error      Threshold      Threshold
     Settings               Count           Count          Time(secs)
     Invalid DWORDs         0               0              0
     Loss of DWORD Sync     0               0              0
     Running Disparity Errors0              0              0
     PHY Reset Errors       0               0              0
     Reset Link Error Counts

 Esc=Exit  F1/Shift+1=Help
 Enter = Select Item   -/+ = Change Item
```

Note that the Link Error Settings values on this menu only display the current values for this PHY and cannot be modified. To modify the Threshold values, return to the Advanced Adapter Properties menu. Table 9.11 describes the PHY Properties menu fields.

Table 9.11   PHY Properties Field Descriptions

Field	Description
PHY	The PHY number for which this information applies.
SAS Port	The associated SAS Port (0 to N), as configured on this adapter.
Link Status	The PHY link status. Possible values are: • Enabled, Unknown Link Rate • PHY Disabled • Enabled, negotiation failed • Enabled, SATA OOB Complete • Enabled, 1.5 Gbps • Enabled, 3.0 Gbps
Discovery Status	A 32-bit hexadecimal value indicating the discovery status for the PHY or expander. Currently defined values are: • Discovery Completed Successfully 0x00000000 • Loop Detected 0x00000001 • Unaddressable Device Exists 0x00000002 • Multiple Ports 0x00000004 • Expander Error 0x00000008 • SMP Timeout 0x00000010 • Out of Route Entries 0x00000020 • SMP Response Index Does Not Exist 0x00000040 • SMP Response Function Failed 0x00000080 • SMP CRC Error 0x00000100
Device Identifier	The ASCII device identifier string from the device's inquiry data.
Scan Order	The scan order for this device. This is the equivalent of a SCSI ID for parallel SCSI.
Device Information	Indicates if a device is SAS or SATA.
SAS Address	The SAS address of this device.
Link Error Settings	The Link Error Settings are as follows: • **Invalid DWORDs:** The number of invalid dwords that have been received, outside of PHY reset sequences, since the last PHY Link Error Reset. The count stops when it reaches the maximum value. • **Loss of DWORD Sync:** The number of times, since the last PHY Link Error Reset, that dword synchronization was lost and the link reset sequence occurred. The count stops when it reaches the maximum value. • **Running Disparity Errors:** The number of dwords with running disparity errors that have been received, outside of PHY reset sequences, since the last PHY Link Error Reset. The count stops when it reaches the maximum value. • **PHY Reset Errors:** The number of times the PHY reset sequence has failed, since the last PHY Link Error Reset. The count stops when it reaches the maximum value.

Table 9.11   PHY Properties Field Descriptions (Cont.)

Field	Description
Link Error Count	Actual link error count values since the last PHY Link Error Reset. The counts stop when they reach their maximum value.
Threshold Count	Link error count threshold values. When a *Link Error Count* exceeds a *Threshold Count* within the *Threshold Time (secs)*, the Fusion-MPT firmware may reduce the link rate.
Threshold Time (secs)	Time, in seconds, over which to apply *Threshold Count*. When a *Link Error Count* exceeds a *Threshold Count* within the *Threshold Time (secs)*, the Fusion-MPT firmware may reduce the link rate.

Reset Link Error Counts	Press **Enter** to reset the Link Error Counts for this PHY or for all PHYs. This operation issues a PHY Link Error Reset - SAS IO Unit Control Request Message.0.
	When you press **Enter**, the following prompt appears:
	    Are you sure you want to reset Phy error counts?
	    Reset error counts for this Phy only
	    Reset error counts for all Phys
	    Cancel

9.3.12 Integrated RAID Configuration and Management Screens

Integrated RAID configuration and management involves many screens, all of which are accessed by selecting **RAID Properties** on the Adapter Properties menu.

- If no RAID volumes are currently configured, you are asked to create a RAID volume.

- If at least one RAID volume is currently configured, you are shown the current volume(s) for management purposes.

The screens in the RAID configuration and management area are:

- Select New Array Type

- Create New Array

- View Array

- Manage Array

9.3.12.1 Select New Array Type

The Select New Array Type screen is shown in Figure 9.14. The screen text explains the two array type options that are available when you start

creating a new array. To begin the process, you highlight one of the options and press **Enter**. (See Section 9.4, "Performing Configuration Tasks," for detailed instructions on creating arrays and other tasks.)

Figure 9.14 Select New Array Type Screen

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Select New Array Type -- SAS1068

     Create IM Volume         Create Integrated Mirror Array of 2
                              disks plus an optional hot spare. Data
                              on the primary disk may be migrated.

     Create IS Volume         Create Integrated Striping array of
                              2 to 8 disks.
                              ALL DATA on array disks will be DELETED!


Esc = Exit Menu        F1/Shift+1 = Help
Enter = Choose array type to create     Esc = Return to Adapter Properties
```

9.3.12.2   Create New Array

The Create New Array screen appears after you select an array type. This screen enables you to select disks for a new array. Figure 9.15 shows the Create New Array screen.

Figure 9.15 Create New Array Screen

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Create New Array -- SAS1068

  Array Type:                      IM
  Array Size(MB)                   34332

Slot  Device Identifier            RAID   Hot    Drive      Pred  Size
Num                                Disk   Spr    Status     Fail  (MB)
  1    MAXTOR ATLAS15K2_36SAS BG34  [Yes]  [No]   Primary    ---   35074
  2    MAXTOR ATLAS15K2_36SAS BG34  [Yes]  [No]   Secondary  ---   35074
  8    MAXTOR ATLAS15K2_36SAS BG34  [No]   [Yes]  Hot Spare  ---   35074
 11    MAXTOR ATLAS15K2_36SAS BG34  [No]   [No]   Max Dsks   ---   35074



Esc = Exit Menu        F1/Shift+1 = Help
Space/+/- = Select disk for array or hot spare    C = Create array
```

See Section 9.4, "Performing Configuration Tasks," for detailed instructions on creating IM or IS arrays.

After you select disks for the new array, you press **C** to confirm that you want to create it. You are then prompted to save changes, which starts the creation of the array. After the array is created, you are returned to the Adapter Properties menu. Table 9.12 describes the Create New Array fields.

Table 9.12 Create New Array Field Descriptions

Field	Description
Array Type	The type of array being created: IM or IS.
Array Size	The size of the array, in Mbytes.
Slot Num	The order in which disk drives are scanned.
Device Identifier	The device identifier of the disk drive.
RAID Disk	Specifies whether the disk is part of a RAID array (Yes or No). This field is grayed out under the following conditions: • The disk does not meet the minimum requirements for use in a RAID array. • The disk is not large enough to mirror existing data on the primary drive. • This disk has been selected as the Hot Spare for the RAID array.
Hot Spr	Specifies whether the disk is a Hot Spare for a RAID array (Yes or No). IM arrays can optionally have one Hot Spare. You can define a Hot Spare when you create an IM array or at a later time. This field is grayed out under the following conditions: • The disk does not meet the minimum requirements for use in a RAID array. • The array already has a Hot Spare. • The array has the maximum number of disks. • The disk isn't large enough to mirror existing data on the primary disk. • Integrated Striping firmware is used. (Striped arrays do not support Hot Spares.)

Table 9.12   Create New Array Field Descriptions (Cont.)

Field	Description
Drive Status	The possible drive statuses are as follows: • **Ok:** Disk is online and fully functional • **Missing:** Disk is not responding • **Failed:** Disk has failed • **Initing:** Disk is initializing • **CfgOffln:** Disk is offline at host's request • **UserFail:** Disk is marked failed at host's request • **Offline:** Disk is offline for some other reason • **Inactive:** Disk has been set inactive • **Not Syncd:** Data on disk is not synchronized with the rest of the array • **Primary:** Disk is the primary disk for a 2-disk mirror and is OK • **Secondary:** Disk is the secondary disk for a 2-disk mirror and is OK • **Wrg Type:** Device is not compatible for use as part of a RAID array • **Too Small:** Disk is too small to mirror existing data • **Max Dsks:** Maximum # of disks allowed for this type of array reached, or Maximum # of total IR disks on a controller reached • **No SMART:** Disk doesn't support SMART, cannot be used in an array • **Wrg Intfc:** Device interface (SAS/SATA) differs from existing IR disks
Pred Fail	Indicates whether SMART is predicting device failure (Yes or No).
Size(MB)	The size of the device, in megabytes. If the device is part of a two-disk array, this field reflects the size of the array, not the size of the individual disk. If the device is part of an array of three or more disks, this field is the size that the disk makes up within the array. **Note:** When creating a striped array, the usable size of the array is determined by the number of drives, multiplied by the size of the smallest drive in the array. In arrays consisting of different sized drives, excess space on larger drives is unusable.

9.3.12.3   View Array

The View Array screen allows you to view the current array configuration, as shown in Figure 9.16.

If multiple arrays are defined, press **Alt+N** to view the next array. Press **C** to start creating a new array.

Figure 9.16   View Array Screen

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
View Array -- SAS1068

     Array                     1 of 1
     Identifier                LSILOGICLogical Volume  3000
     Type                      IM
     Scan Order                1
     Size(MB)                  34332
     Status                    Optimal

     Manage Array

Slot  Device Identifier               RAID   Hot    Drive      Pred  Size
Num                                   Disk   Spr    Status     Fail  (MB)
  1    MAXTOR ATLAS15K2_36SAS BG34     Yes    No     Primary    No    35074
  2    MAXTOR ATLAS15K2_36SAS BG34     Yes    No     Secondary  No    35074
  8    MAXTOR ATLAS15K2_36SAS BG34     No     Yes    Hot Spare  No    35074


Esc = Exit Menu      F1/Shift+1 = Help
Enter=Select Item  Alt+N=Next Array  C=Create an array
```

Table 9.13 describes the View Array screen fields.

Table 9.13   View Array Field Descriptions

Field	Description
Array	The number of the array.
Identifier	The identifier of the array.
Type	The RAID type of the array (IM or IS).
Scan Order	The scan order of the array.
Size (MB)	The size of the array.
Status	The status of the array.
The definitions of *Slot Num*, *Device Identifier*, and the other fields are the same as for the Create New Array screen.	

9.3.12.4   Manage Array

The Manage Array screen is used to manage the current array, as shown in Figure 9.17. If you select **Manage Hot Spare**, the utility displays a hot spare management screen that has the same layout as the Create New Array screen. If you select **Synchronize Array**, **Activate Array**, or **Delete**

Array, you are prompted to confirm the choice by pressing **Y** for yes or **N** for no. These tasks are explained in Section 9.4, "Performing Configuration Tasks."

Figure 9.17 Manage Array Screen

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx
Manage Array -- SAS1068

     Identifier                 LSILOGICLogical Volume  3000
     Type                       IM
     Scan Order                 1
     Size(MB)                   34332
     Status                     Optimal

     Manage Hot Spare

     Synchronize Array

     Activate Array

     Delete Array


Esc = Exit Menu      F1/Shift+1 = Help
Enter = Choose array type to create    Esc = Return to Adapter Properties
```

The field descriptions for the Manage Array screen are the same as for the View Array screen.

9.3.13 Exit Screen

It is important to exit the setup utility properly, because some changes take effect only when you exit. From the Adapter List, press the **Esc** key to exit. The Exit screen appears, as shown in Figure 9.18. A similar screen appears when you exit most other screens, and it can be used to save settings.

Figure 9.18 Exit Screen

```
LSI Logic MPT Setup Utility    v6.xx.xx.xx



                   Are you sure you want to exit?
                    Cancel Exit
                    Save changes and reboot
                    Discard changes and reboot
                    Exit the Configuration Utility and Reboot




  Esc=Exit Menu     F1/Shift+1=Help
```

9.4   Performing Configuration Tasks

This section explains how to use the setup utility to perform the following configuration tasks:

- Section 9.4.1, "Creating an Integrated Striping Volume"

- Section 9.4.2, "Creating an Integrated Mirroring Volume"

- Section 9.4.3, "Creating a Second RAID Volume"

- Section 9.4.4, "Viewing RAID Volume Properties"

- Section 9.4.5, "Adding or Deleting a Hot Spare"

- Section 9.4.6, "Synchronizing an Array"

- Section 9.4.7, "Activating an Array"

- Section 9.4.8, "Deleting an Array"

- Section 9.4.9, "Locating a Disk Drive"

- Section 9.4.10, "Selecting a Boot Disk"

9.4.1   Creating an Integrated Striping Volume

An Integrated Striping (IS) volume (also called RAID 0) breaks up data into smaller segments, then stripes the segments across each drive in the array. IS volumes do not provide any data redundancy (you cannot

Performing Configuration Tasks 9-31

create hot spares for IS volumes), but they offer the best performance of any RAID configuration. Follow these steps to create an IS volume on an adapter that does not currently have a configured volume.

1. On the Adapter List menu, highlight an adapter and press **Enter**. The Adapter Properties menu appears.

2. Highlight **RAID Properties** and press **Enter**. The Select New Array Type screen appears.

3. Highlight **Create IS Volume** and press **Enter**. The Create New Array screen appears, listing the disks that can are available for a new array.

4. Move the cursor to the *RAID Disk* column of a disk drive that you want to add to the array. Press the + key to change *No* to *Yes* for this drive.

5. Select from one to seven additional disk drives for the IS array. As you add disks, the Array Size field at the top of the screen changes to show the size of the new volume.

    All disks in the array must be either SATA (with extended command set support) or SAS (with SMART support). Disks must have 512-byte blocks and must not have removable media.

6. When you have added all the disk drives to the array, press **C** and then select **Save changes then exit this menu** to commit the changes. The setup utility will pause while the array is created.

    Note: You cannot change the number of disks in the array after you create it.

9.4.2   Creating an Integrated Mirroring Volume

An Integrated Mirroring (IM) volume (also called RAID 1) duplicates all data from one drive to a second drive. Integrated Mirroring provides complete data redundancy, but at the cost of doubling the required data storage capacity. You can optionally add a hot spare disk to provide even more data security. Follow these steps to create an IM volume on an adapter that does not currently have a configured volume.

1. On the Adapter List menu, highlight an adapter and press **Enter**. The Adapter Properties menu appears.

2. Highlight **RAID Properties** and press **Enter**. The Select New Array Type screen appears.

3. Highlight **Create IM Volume** and press **Enter**. The Create New Array screen appears, listing the disks that can are available for a new array.

4. Move the cursor to the *RAID Disk* column of a disk drive that you want to add to the array. Press the + key to change *No* to *Yes* for this drive.

   When the first disk is added, you are prompted to keep the existing data on the disk or to overwrite it.

5. Press **M** to keep the existing data on the first disk or press **D** to overwrite it. If you keep the existing data, this data will be mirrored onto the second disk of the new array. Data on the second disk will be deleted.

6. Select a second disk drives for the IM array.

   All disks in the array must be either SATA (with extended command set support) or SAS (with SMART support). Disks must have 512-byte blocks and must not have removable media.

7. (optional) Add a hot spare to the volume by moving the cursor to the *Hot Spr* column and pressing the + key.

   The hot spare is a global hot spare, meaning that only one hot spare is allowed for all arrays created on the adapter. A hot spare will only protect an array using the same kind of drives (SAS or SATA).

8. When you have selected all the disk drives for the array, press **C** and then select **Save changes then exit this menu** to commit the changes. The setup utility will pause while the array is created.

9.4.3 Creating a Second RAID Volume

LSI SAS controllers support two active RAID volumes. If one volume is already configured, follow these steps to add a second volume:

1. Select an adapter from the Adapter List. Select the **RAID Properties** option.

   This will display the current volume.

2. Press **C** to create a new volume.

3. Continue with the procedures in Section 9.4.1, "Creating an Integrated Striping Volume," or Section 9.4.2, "Creating an Integrated Mirroring Volume," to create a second IS or IM volume.

9.4.4 Viewing RAID Volume Properties

Follow these steps to view the properties of RAID volumes:

1. Select an adapter from the Adapter List. Select the **RAID Properties** option.

   The properties of the current volume are displayed.

2. If more than one volume is configured, press **Alt+N** to view the next one.

3. To manage the current array, highlight **Manage Array** and press **Enter**.

9.4.5 Adding or Deleting a Hot Spare

Follow these steps to add a hot spare to an IM volume:

1. On the Manage Array screen, highlight **Manage Hot Spare** and press **Enter**. The Manage Hot Spare screen appears.

2. Move the cursor to the *Hot Spr* column of the disk drive you want to use for a hot spare. Press the + key to change *No* to *Yes* for this drive.

3. After you select the hot spare disk, press **C**.

4. Select **Save changes then exit this menu** to commit the changes.

   The setup utility will pause while the hot spare is being added.

Follow these steps to delete a hot spare from an IM volume:

1. On the Manage Array screen, highlight **Manage Hot Spare** and press **Enter**. The Manage Hot Spare screen appears.

2. Move the cursor to the *Hot Spr* column of the hot spare disk that you want to delete. Press the + key to change *Yes* to *No* for this drive.

3. After you delete the hot spare, press **C**.

4. Select **Save changes then exit this menu** to commit the changes.

   The setup utility will pause while the hot spare is being removed.

9.4.6 Synchronizing an Array

Synchronizing an array means that the firmware makes sure that the data on the secondary disk of an IM array matches (is synchronized with) the data on the primary disk. Follow these steps to synchronize an IM array:

1. On the Manage Array screen, highlight **Synchronize Array** and press **Enter**.

2. Press **Y** to start the synchronization, or **N** to cancel it.

9.4.7 Activating an Array

An array can become inactive if, for example, it is removed from one controller or computer and moved to another one. The *Activate Array* option allows you to reactivate an inactive array that has been added to a system. This option is available only when the selected array is currently inactive. Follow these steps to activate an array.

1. On the Manage Array screen, highlight **Activate Array** and press **Enter**.

2. Press **Y** to proceed with the activation, or press **N** to abandon it.

   After a pause, the array will become active.

9.4.8 Deleting an Array

Caution: Before deleting an array, be sure to back up all data on the array that you want to keep.

Follow these steps to delete a selected array:

1. On the Manage Array screen, highlight **Delete Array** and press **Enter**.

2. Press **Y** to delete the array, or press **N** to abandon the deletion.

   After a pause, the firmware deletes the array.

   Note: An array cannot be recovered after it has been deleted. When an IM array is deleted, the data is preserved on the primary disk. The master boot records (MBR) of the other disk in the array are deleted. When an IS array is deleted, the master boot records of all disks are deleted.

9.4.9 Locating a Disk Drive

There are several ways to physically locate a disk drive, assuming that the firmware is correctly configured and the drives/enclosure support disk location.

- During array creation, when the *Raid Disk* property for a disk is set to **Yes**, the LED on the disk blinks.

- You can also locate disks from the SAS Topology menu. Move the cursor to highlight the disk and press **Enter**. The LED on the disk remains activate until the next key is pressed.

9.4.10 Selecting a Boot Disk

You can select a boot disk in the SAS Topology menu. This disk is then moved to scan ID 0 on the next boot, and remains at this position. This makes it easy to set BIOS boot device options and to keep the boot device constant during device additions and removals. There can be only one boot disk.

Follow these steps to select a boot disk:

1. Highlight an adapter on the Adapter List menu and press **Enter**.

2. On the Adapter Properties menu, select **SAS Topology** and press **Enter**.

   The current topology is displayed. If boot device selection is supported, the bottom of the screen lists the Alt+B option. This is the key for toggling the boot device. If a device is currently configured as the boot device, the Device Info column on the SAS Topology menu will display the word *Boot*.

3. To select a boot disk, move the cursor to the disk and press **Alt+B**.

4. To remove the boot designator, move the cursor down to the current boot disk and press **Alt+B**. This controller will no longer have a disk designated as boot.

5. To change the boot disk, move the cursor to the new boot disk and press **Alt+B**. The boot designator will move to this disk.

Chapter 10
Fibre Channel BIOS
and Configuration
Utility

This chapter explains how to use the LSI Fibre Channel BIOS and Configuration Utility (CU), version 2.xx.xx. This chapter contains the following sections:

- Section 10.1, "Overview and Features"
- Section 10.2, "Starting the FC BIOS Configuration Utility"
- Section 10.3, "Configuration Utility Menu Screens"
- Section 10.4, "Exiting the Fibre Channel Configuration Utility"

10.1 Overview and Features

The LSI Fibre Channel BIOS is the bootable ROM code that manages Fibre Channel hardware resources. It is specific to a family of LSI FC controllers or processors, such as the LSI40929 processors. The LSI BIOS integrates with a standard system BIOS, extending the standard disk service routine provided through INT13h.

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

The Fibre Channel BIOS Configuration Utility (CU) enables you to change the default configuration of LSI Fibre Channel host adapters. The CU is embedded in the Fibre Channel BIOS.

The LSI FC BIOS features include the following:

- Configuration for up to 256 adapters. Any four adapters can be chosen for Int13 (bootrom) support.

- Automatic Int13 drive mapping for Fibre Channel drives.

- Support for all LSI Fibre Channel devices

- Shared user interface with the LSI SCSI BIOS and Configuration Utility

10.1.1 Boot Initialization with BIOS Boot Specification (BBS)

The LSI FC BIOS supports 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 the system supports the BBS, you can use the system BIOS setup menu to select the boot order and drive order. In the system BIOS setup, the Boot Connection Devices menu lists the available boot options. Use that menu to select the device and rearrange the order. Then exit to continue the boot process.

10.1.2 CD-ROM Boot Initialization

The FC BIOS supports boot initialization from a CD-ROM drive. The types of emulation are:

- No emulation disk

- Floppy 1.2 Mbyte emulation disk

- Floppy 1.44 Mbyte emulation disk

- Floppy 2.88 Mbyte emulation disk

- Hard disk emulation

The type of emulation assigns the drive letter for the CD-ROM. For example, if a 1.44 Mbyte floppy emulation CD is loaded, the CD-ROM drive becomes the designated A: drive, and the existing floppy drive becomes the B: drive.

10.2 Starting the FC BIOS Configuration Utility

When the FC BIOS loads, this message appears briefly on the monitor:

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

When you see the message, press **Ctrl-C** to start the CU. When you press **Ctrl-C**, the message changes to:

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

After a short pause, the Main menu of the CU appears. These messages may appear during the boot process:

- `Adapter removed from boot order`
  This message appears if an adapter has been removed from the system or has been relocated behind a PCI bridge. The message is informational only. No user action is required.

- `Configuration data invalid, saving default configuration!`
  This message is informational only. It appears if none of the information in the NVRAM is valid. This can occur when the BIOS is upgraded, or when some external event has rendered the NVRAM temporarily unreadable. You can either accept the default NVRAM values, or you can re-enter the settings you want in the CU.

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

Important: The FC BIOS Configuration Utility is a powerful tool. If, while you are using it, you accidentally disable all of your controllers, press **Ctrl-E** (or **Ctrl-A** for earlier versions) after memory initialization during reboot. This will allow you to re-enable and reconfigure the controllers.

After a short pause, the Main menu of the CU appears.

Note: Some devices detected by the Configuration Utility cannot be controlled by the BIOS. Devices such as tape drives and scanners require a device driver specific to that device. The CU can be used to modify parameters for these devices.

10.3 Configuration Utility Menu Screens

All FC BIOS Configuration Utility menu screens are partitioned into the following areas, starting at the top of the screen:

- **Header Area**: This area lists static information text, including the product title and version.

- **Menu Area**: This area lists the current screen title and controller information. It provides a cursor for selecting bracketed menu options, such as *<Global Properties>*.

- **Main Area**: This is the area for presenting data. This area has a cursor for item selection, horizontal scrolling, and vertical scrolling. Horizontal and vertical scroll bars appear here, if needed.

- **Footer Area**: This area provides general help information text.

10.3.1 User Input Keys

The general key inputs listed in Table 10.1 are used for all menu screens of the FC BIOS CU.

Table 10.1   User Input Keys

Key	Definition	Description
F1	Help	Displays context sensitive help for the field in which the cursor is positioned.
F2	Menu	Moves the cursor to the menu selection area, where you can highlight a menu item and press **Enter** to select it.
Arrow Keys	Select Item	Up, down, left, right movement to position the cursor.
Home/End	Select Item	
+/-	Change Item	Items with values in brackets are modifiable. Use the numeric keypad '+' and '-' to change a modifiable field to its next relative value.

Table 10.1   User Input Keys (Cont.)

Key	Definition	Description
Esc	Abort/Exit	Aborts the current operation and/or exits the current screen. The user is asked to confirm, if changes have been made.
Enter	Execute Item	Executable items are indicated by highlighted text and a different background color. Press **Enter** to execute the field's associated function. Selections that are not currently permissible are grayed out. The menu descriptions below include information on their executable items.

10.3.2 Main Menu

When you start the CU, the Main Menu appears, as shown in Figure 10.1. This menu displays a scrolling list of up to 256 installed LSI host adapters and information about each of them.

Figure 10.1 FC BIOS CU Main Menu

```
LSI Logic PCI Configuration Utility Version FC MPTBIOS-x.xx
<Boot Adapter List>  <Global Properties>


LSI Logic Host Bus Adapters
Adapter          PCI   Dev/   Port    IRQ  NVM  Boot   LSI Logic
                 Bus   Func   Number            Order  Control
<LSIFC929X         0    60>   F600      5  Yes  2      Enabled
<LSIxxxxxx         0    88>   F400     10  Yes  0      Disabled
<LSIxxxxxx         0    90>   F800      9  Yes  1      Enabled
<LSIxxxxxx         0    A0>   E800     11  Yes  3      Enabled
```

Use the arrow keys to select an adapter, then press **Enter** to view and modify the selected adapter's properties (and to access the other menus). After you select an adapter and press **Enter**, the CU scans the FC link bus and the Adapter Properties menu appears (see Section 10.3.5, "Adapter Properties Menu").

Table 10.2 describes the Main Menu fields.

Table 10.2 Main Menu Field Descriptions

Field	Description
<Boot Adapter List>	Highlight this field and press **Enter** to view the Boot Adapter List menu.
<Global Properties>	Highlight this field and press **Enter** to view the Global Properties menu.
Adapter	The model number of the LSI controller.
PCI Bus	The PCI Bus number (0x00–0xFF) that the system BIOS assigns to the adapter.
PCI Dev/Func	The PCI Device/Function that the system BIOS assigns to an adapter. Bits [7:3] indicate the Device number (0x00–0x1F). Bits [2:0] indicate the Function number (0–7).
Port Number	The I/O Port Number that the system BIOS assigns to this adapter.
IRQ	The Interrupt Request Line that the system BIOS assigns to this adapter.
NVM	Indicates whether the adapter has non-volatile memory (NVM) associated with it. An adapter's configuration is stored in its associated NVM.
Boot Order	Indicates the relative boot order (0 to 3) of an adapter. The LSI FC BIOS traverses up to four adapters in the specified order in search of bootable media. You can modify the boot order on the Boot Adapter List menu, which you can access by selecting the option in the upper left hand corner of the menu.
LSI Control	Indicates whether an adapter is eligible for LSI software control or is reserved for control by non-LSI software. The possible values for this field are: • **Enabled**: You can view and modify settings for the adapter, and the Fusion-MPT driver attempts to control the adapter. • **Disabled**: You can view and modify settings for the adapter, but the Fusion-MPT driver does not attempt to control the adapter. • **Forbidden**: Access to the controller is forbidden because a different driver is controlling it or because there was an error initializing the adapter. If set to either Enabled or Disabled, you can change the Boot Support Setting in the Adapter Properties menu. The driver must be reloaded before the new setting takes effect.

10.3.3 Boot Adapter List Menu

The Boot Adapter List menu displays the adapter boot order (0–3) and allows you to change it. The adapter boot order specifies the order in which adapters will boot when more than one LSI adapter is installed. You can select up to four of the total adapters in a system as bootable. To access this menu, select **Boot Adapter List** on the Main Menu and press **Enter**.

Figure 10.2 shows the Boot Adapter List menu.

Figure 10.2 Boot Adapter List Menu

```
 LSI Logic PCI Configuration Utility Version FC MPTBIOS-x.xx

 Boot Adapter List
 Insert=Add an adapter    Delete=Remove an adapter

          Adapter      PCI   Dev/    Boot    Current  Next
                       Bus   Func    Order   Status   Boot
        LSIFC929X       0    60      [0]     On       [On]
        LSIxxxxxx       0    90      [1]     Off      [Off]
        LSIxxxxxx       0    98      [2]     On       [On]
        LSIxxxxxx       0    A0      [3]     On       [On]

 Press Insert to select an adapter from this list:
        <LSIFC929X      0    60>
        <LSIxxxxxx      0    90>
        <LSIxxxxxx      0    98>
        <LSIxxxxxx      0    A0>
```

- To add an adapter to the boot list, press **Insert**. This moves the cursor to the adapter select list in the lower part of the screen. Use the arrow keys to select an adapter and press **Enter** to add it to the end of the Boot Adapter List in the upper part of the screen.

- To remove an adapter from the boot list, select the adapter and press **Delete**.

- To decrease the adapter's relative order in the boot list, select the adapter and press the minus (-) key on the keypad.

- To increase the adapter's relative order in the boot list, press the plus (+) key on the keypad.

Table 10.3 describes the fields of the Boot Adapter List menu.

Table 10.3   Boot Adapter List Field Descriptions

Field	Description
Adapter	The model number of the adapter. To invoke the Adapter Properties menu for an adapter, select an adapter and press **Enter**.
PCI Bus	The PCI Bus number (0x00–0xFF) that the system BIOS assigns to an adapter.
PCI Dev/Func	The PCI Device/Function that the system BIOS assigns to an adapter. Bits [7:3] indicate the Device number (0x00–0x1F). Bits [2:0] indicate the Function number (0–7).

Table 10.3   Boot Adapter List Field Descriptions (Cont.)

Field	Description
Host SCSI ID	The SCSI identifier of an adapter. LSI recommends that you leave this setting at the default, SCSI ID 7.
Boot Order	Specifies the relative boot order (0 to 3) of an adapter. Press '-' to decrease an adapter's relative boot order. Press '+' to increase an adapter's relative boot order.
Current Status	Indicates whether an adapter in the boot list was enabled during the most recent boot. The LSI FC BIOS ignores disabled adapters and their attached devices, although they are still visible to the Configuration Utility.
Next Boot	Specifies whether to enable an adapter at the next boot. The LSI FC BIOS ignores disabled adapters and their attached devices, although they are still visible to the Configuration Utility.

10.3.4 Global Properties

The Global Properties menu allows you to set various properties, such as the Display mode and Video mode. To access the Global Properties menu, select **Global Properties** on the Main Menu and press **Enter**. Figure 10.3 shows the Global Properties menu.

Figure 10.3 Global Properties Menu

```
LSI Logic PCI Configuration Utility Version FC MPTBIOS-x.xx

Global Properties

        Pause When Boot Alert Displayed  [Yes]
        Boot Information Display Mode     [Verbose]
        Video Mode                        [Color]
        Support Interrupt                 [Hook interrupt, the Default

        <Restore Defaults>
```

Table 10.4 describes the Global Properties menu fields.

Table 10.4   Global Properties Field Descriptions

Field	Description
Pause When Boot Alert Displayed	Specifies whether the CU pauses for user acknowledgement after displaying an alert message during boot. To continue after displaying an alert message, specify *No*. To wait for the user to press any key after displaying a message, specify *Yes*.
Boot Information Display Mode	Specifies how much adapter and device information the BIOS displays during boot. The options are *Terse* (display a minimum amount of information) or *Verbose* (display detailed information).

Table 10.4   Global Properties Field Descriptions (Cont.)

Field	Description
Video Mode	Specifies the default video mode for the CU. You can set the Video Mode to either *Color* or *Monochrome*. The monochrome setting enhances readability on a monochrome monitor.
Support Interrupt	Allows the ability to stop the system from hanging on Int40.
<Restore Defaults>	Press **Enter** when this option is selected to restore default settings for the options listed on this menu.

10.3.5 Adapter Properties Menu

The Adapter Properties menu allows you to view and modify adapter settings. It also gives you access to the adapter's device settings. Figure 10.4 shows the Adapter Properties menu.

Figure 10.4 Adapter Properties Menu

```
LSI Logic PCI Configuration Utility Version  FC MPTBIOS-x.xx

Adapter Properties

Adapter     PCI  Dev/
            Bus  Func
LSIFC929     0    60

     <Device Properties>
     <Persistent IDs>
     Controllers WWPort Name   XXXXXXXXXXXXXXXX
     Controllers WWNode Name   XXXXXXXXXXXXXXXX
     Removable Media Support   [None]
     Link Configuration        [Auto]
     Topology Configuration    [Auto]
     Multi-Pathing             [No]
     Persistent ID Type        [WWN]
```

Table 10.5 describes the fields in the Adapter Properties menu. The Adapter, PCI Bus, and Dev/Func fields at the top of the screen are the same as defined for the Boot Adapter List menu (Table 10.3).

Table 10.5   Adapter Properties Field Descriptions

Field	Description
<Device Properties>	Press **Enter** to view and modify device properties.
<Persistent IDs>	Press **Enter** to view the adapter's Persistent ID menu.

Table 10.5   Adapter Properties Field Descriptions (Cont.)

Field	Description
Controllers WWPort Name	Displays the 64-bit World Wide port name for this controller.
Controllers WWNode Name	Displays the 64-bit World Wide node name for this controller.
Removable Media Support	Specifies the removable media support option for the adapter. The possible selections are: • **None**: No removable media support, regardless of whether the drive is selected as first (BBS), or is first in the scan order (non-BBS). • **Boot Drive Only**: Removable media support is enabled only if a removable hard drive is first in the scan order. • **With Media Installed**: Removable media is enabled regardless of the drive ordering.
Link Configuration	Determines whether the port will set itself to the selected link speed or will auto-negotiate instead. The choices are **1Gig**, **2Gig**, and **Auto** (default). LSI recommends the default setting, unless some attached devices do not support auto-negotiation.
Topology Configuration	Indicates whether the port will default to **N-Port** or **NL-Port** operation, or if it will auto-detect the link topology. (The default is **Auto**.) This option is non-selectable.
Multi-Pathing	Specifies whether all paths to a device are displayed. • **No**: The BIOS display only one port per device found. • **Yes**: The BIOS displays every port found on each device as a separate device in the Device Properties menu.
Persistent ID Type	Specifies which type of persistent ID information is recorded. • **WWN**: All persistent IDs are mapped from WWN to target ID. • **DID**: All persistent IDs are mapped from DID to target ID. **WARNING**: If you changing this value from WWN to DID, or vice versa, all previously set persistent ID information is erased.

10.3.6 Device Properties Menu

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

Since there are too many fields to fit on one screen, you must scroll left and right by clicking on the scroll indicators at the bottom of the screen. Figure 10.5 shows the Device Properties menu.

Figure 10.5 Device Properties Menu

```
 LSI Logic PCI Configuration Utility Version FC MPTBIOS-x.xx


 TID  Device Identifier  World-Wide Name                      DID  Format  Verify

  0   SEAGATE ST31055FC  2000002037B9CD84:2100002037B9CD84    E4
  1   -                  --------------------------------     -   <Format><Verify>
  2   -                  --------------------------------     -   <Format><Verify>
  3   -                  --------------------------------     -   <Format><Verify>
  4   -                  --------------------------------     -   <Format><Verify>
  5   -                  --------------------------------     -   <Format><Verify>
  6   -                  --------------------------------     -   <Format><Verify>
  7   -                  --------------------------------     -   <Format><Verify>
  8   -                  --------------------------------     -   <Format><Verify>
  9   -                  --------------------------------     -   <Format><Verify>
 10   -                  --------------------------------     -   <Format><Verify>
 11   -                  --------------------------------     -   <Format><Verify>
 12   -                  --------------------------------     -   <Format><Verify>
 13   -                  --------------------------------     -   <Format><Verify>
 14   -                  --------------------------------     -   <Format><Verify>
 15   LSIFC929           200000A0B8040B24:100000A0B8040B24    EF  <Format><Verify>
                              << Scroll Indicator                  >>
```

Table 10.6 describes the fields in the Fibre Channel Device Properties menu.

Table 10.6   Fibre Channel Device Properties Field Descriptions

Field	Description
TID	The device's Target Identifier. For Fibre Channel, all target devices are assigned a logical SCSI Bus and Target ID.
Device Identifier	The ASCII device identifier string from the device's Inquiry Data.
World Wide Name	The full World Wide Name of the device.
DID	The Destination Identifier for the device.
Format	Press **Enter** to low-level format the disk drive (if the feature is enabled). Low-level formatting completely and irreversibly erases all data on the drive. Formatting defaults the drive to a 512-byte sector size, even if it was previously formatted to another sector size.
Verify	Highlight this field and press **Enter** to verify all sectors on the device and to reassign defective Logical Block Addresses (LBAs).

10.3.7 Persistent IDs Menu

The Persistent IDs menu allows you to view and modify Persistent ID mappings for Fibre Channel devices. These mappings are used to fix the mapping between a WWN or DID and a target identifier. Figure 10.6 shows the Persistent IDs menu.

Note: The figure is a composite screen shot, showing all the options. Not all the options can actually be displayed on one screen, however. To view all the options, select the left and right scroll indicators at the bottom of the screen.

Figure 10.6 Persistent IDs Menu

```
LSI Logic PCI Configuration Utility Version FC MPTBIOS-x.xx

<Previous Page>  <Next Page>

Persistent IDs for adapter LSIFC929X  Pci Bus  0  Func 60

                         Scan  Scan   Boot

 Loc Typ  DID Bus TID  ID    LUNs>0 Choice

   0 DID  E4  0   [ 1] [Yes] [Yes]  [No] <Erase><Restore><Add DID><Add WWN><Defaults>
   1 DID  E2  0   [ 2] [Yes] [Yes]  [Yes]<Erase><Restore><Add DID><Add WWN><Defaults>
   2 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
   3 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
   4 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
   5 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
   6 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
   7 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
   8 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
   9 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
  10 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
  11 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
  12 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
  13 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
  14 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
  15 ---      --  [--] [---] [---]  [---]<Erase><Restore><Add DID><Add WWN><Defaults>
  <<                          Scroll Indicator                              >>
```

describes the fields in the Persistent IDs menu.

Table 10.7   Persistent IDs Field Descriptions

Field	Description
<Previous Page>	Press **Enter** to display the previous 16 persistent ID locations. If you made a change to the current 16 locations, you will be prompted to confirm or discard the changes before switching pages. The number of available locations is dependent on the host adapter model.
<Next Page>	Press **Enter** to display the next 16 persistent ID locations. If you made a change to the current 16 locations, you will be prompted to confirm or discard the changes before switching pages.
Loc	Location index into the persistent ID storage area.
Typ	Indicates whether the entry specifies a valid WWN or DID number.
DID (or WWN)	Displays the saved DID (or WWN) that will be mapped to the specified bus/TID combination.
Bus	The logical bus assigned to the DID or WWN.
TID	The target ID assigned to the DID or WWN. Values can be in the range of 0–14. No duplication of values is permitted between different persistent ID locations.
Scan ID	Indicates whether to scan for this device at boot time. The default is *Yes*. Set this option to *No* if there is a device that you do not want to be available to the system. Also, you can decrease boot time by changing this setting to *No* for unused SCSI IDs.
Scan LUNS > 0	Indicates whether to scan for LUNs greater than zero for a device. The default is *Yes*. LUN zero is always queried. Set this option to *No* if you have problems with a device that responds to all LUNs whether they are occupied or not. Also, if a device with multiple LUNs exists on your system but you do not want all of those LUNs to be available to the system, set this option to *No*. This will limit the scan to LUN 0 only.
Boot Choice	Indicates whether this device may possibly be selected as the boot device. This option is only applicable to devices attached to adapter number zero (in the boot list) on non-BBS systems. It provides primitive BBS flexibility to non-BBS systems.
<Erase>	Press **Enter** to invalidate the persistent ID entry.
<Restore>	Press **Enter** to restore the persistent ID entry. This should only be used on entries that had previous valid information. If no entry was previously stored at this location, the restored entry will have unknown settings.
<Add DID>	Press **Enter** to enter a new persistent ID mapping DID to TID. At the prompt, enter the DID and press **Enter** to save it. This option is available only if the adapter's PidType is set to DID.
<Add WWN>	Press **Enter** to enter a new persistent ID mapping WWN to TID. At the prompt, enter the 16 characters of the node name and press **Enter** to save it. Then enter the 16 characters of the port name. Press **Enter** to save the entry. This option is available only if the adapter's PidType is set to WWN.
<Defaults>	Press **Enter** to restore the settings of the persistent ID entry to their default values.

10.4 Exiting the Fibre Channel Configuration Utility

Some configuration changes take effect only after the system reboots. Therefore, it is important to exit the configuration utility properly. To exit, press **Esc** and respond to the verification prompts. Some changes might be lost if you reboot before properly exiting the CU.

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