



PIKE 2008/IMR

LSISAS RAID card

User Guide



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About this guide

This user guide contains the information you need when installing and configuring the server management board.

How this guide is organized

This guide contains the following parts:

- **Chapter 1: Product introduction**
This chapter offers the PIKE 2008/IMR SAS RAID card features and the new technologies it supports.
- **Chapter 2: RAID configuration**
This chapter provides instructions on setting up, creating, and configuring RAID sets using the available utilities.
- **Chapter 3: Driver installation**
This chapter provides instructions for installing the RAID drivers on different operating systems.

Where to find more information

Refer to the following sources for additional information and for product and software updates.

1. **ASUS websites**
The ASUS website provides updated information on ASUS hardware and software products. Refer to the ASUS contact information.
2. **Optional documentation**
Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

Conventions used in this guide

To make sure that you perform certain tasks properly, take note of the following symbols used throughout this manual.



DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.



CAUTION: Information to prevent damage to the components when trying to complete a task.



IMPORTANT: Instructions that you **MUST** follow to complete a task.



NOTE: Tips and additional information to help you complete a task.

Typography

Bold text

Indicates a menu or an item to select.

Italics

Used to emphasize a word or a phrase.

<Key>

Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.

Example: <Enter> means that you must press the Enter or Return key.

<Key1+Key2+Key3>

If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).

Example: <Ctrl+Alt+Del>

Command

Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.

Example: At the DOS prompt, type the command line:
format a:

PIKE 2008/IMR specifications summary

Controller	LSISAS2008
Interface	ASUS PIKE interface
Ports	8 ports
Support device	SAS/SAS II devices SATA/SATA II/SATA III devices
Data transfer rate	SATA III and SAS II 6Gb/s per PHY
RAID level	RAID 0/RAID 1/RAID 10/RAID 5/RAID 50
OS support*	Windows® XP Professional SP3 Windows® Server 2003 SP2 Enterprise Edition Windows® Server 2003 SP2 Standard Edition Windows® Server 2008 Enterprise Edition SP2 Windows® Server 2008 Enterprise Edition R2 Windows® Server 2008 Standard Edition SP2 Windows® Server 2008 Standard Edition R2 Windows® 7 (Ultimate) Red Hat Enterprise Linux AS 4.8 Red Hat Enterprise Linux AS 5.5 SuSE Linux Enterprise Server 10.3 SuSE Linux Enterprise Server 11.1 Fedora 12 Free BSD 8.1 Cent OS 5.5 ESX4.0 UP1 ESXi4.0
Form factor	6.44 in x 1.57 in (1U compatible)

* The exact OS support would base on the OS support list of the motherboard.

** Specifications are subject to change without notice.

This chapter offers the PIKE 2008/IMR SAS RAID card features and the new technologies it supports.

1 **Product introduction**

1.1 Welcome!

Thank you for buying an ASUS® PIKE 2008/IMR SAS RAID card!

The ASUS PIKE 2008/IMR allows you to create RAID 0, RAID 1, RAID 10, RAID 5, and RAID 50 sets from SATA/SATA II/SATA III/SAS/SAS II hard disk drives connected to the SAS connectors on the motherboard.

Before you start installing the RAID card, check the items in your package with the list below.

1.2 Package contents

Check your package for the following items.

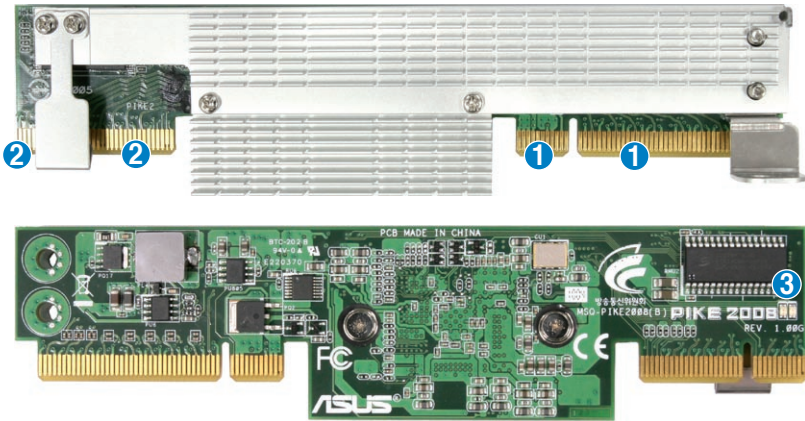
- ASUS PIKE 2008/IMR SAS RAID card
- Support CD
- User guide



If any of the above items is damaged or missing, contact your retailer.

1.3 Card layout

The illustration below shows the major components of the RAID card.



1. ASUS PIKE interface-1: PCI-E x8
2. ASUS PIKE interface-2: 8-port SAS signal with SGPIO interface*
3. SAS RAID card status LED (lights up and blinks to indicate that the card is working normally)



*The SGPIO interface is used for visibility into drive activity, failure and rebuild status, so that users could build high-performance and reliable storage systems. Refer to the motherboard manual for detailed information about using the SGPIO connectors on the motherboard.

1.4 System requirements

Before you install the PIKE 2008/IMR SAS RAID card, check if the system meets the following requirements:

- **Workstation or server motherboard with a PIKE RAID card slot**
- **SAS or SATA hard disk drives**
- **Supporting operating system:**

Windows® and Linux operating systems (refer to website for details)

- **Other requirement:**
 - Appropriate thermal solution
 - Certified power supply module

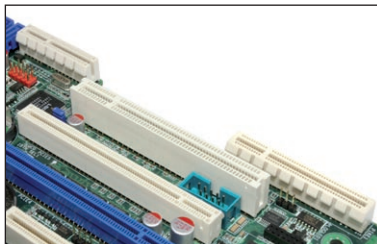
1.5 Card installation

Follow the below instructions to install the RAID card on your motherboard.

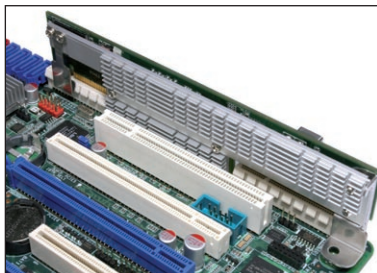
For 2U, 5U, or pedestal server

To install ASUS PIKE 2008/IMR SAS RAID card on a 2U, 5U, or pedestal server

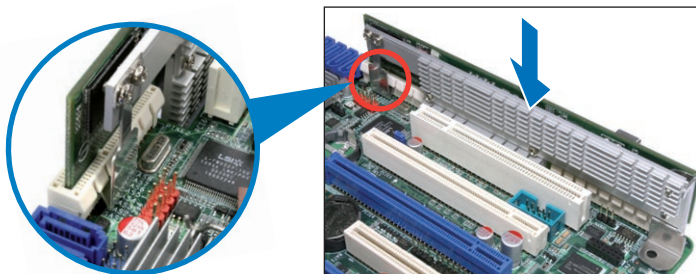
1. Locate the PIKE RAID card slot on the motherboard.



2. Align the golden fingers of the RAID card with the PIKE RAID card slot.



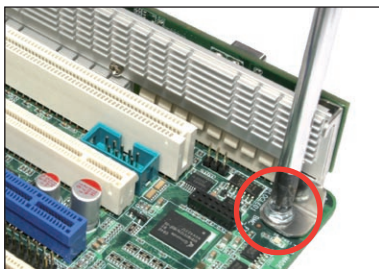
3. Insert the RAID card into the PIKE RAID card slot. Ensure the card is completely inserted into the card slot, and the heatsink latch is completely hooked to the edge of the card slot.



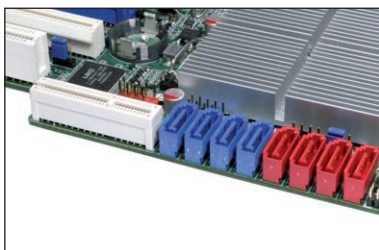
4. Secure the heatsink to the nearest screw hole on the motherboard.



DO NOT overtighten the screw, or the motherboard component can be damaged.

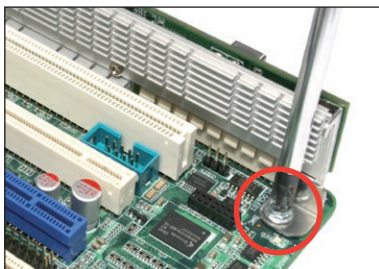


5. Connect the hard disk drives to the SAS connectors on the motherboard.

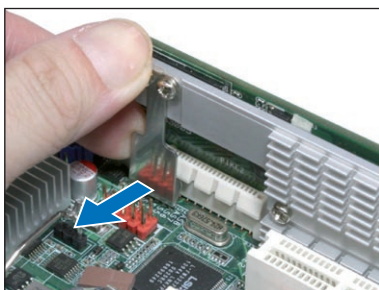


To uninstall ASUS PIKE 2008/IMR SAS RAID card from a 2U, 5U, or pedestal server

1. Disconnect all SAS hard disk drives from the motherboard.
2. Remove the screw that secures the RAID card to the motherboard.



3. Release the heatsink latch from the card slot with a finger, and then remove the RAID card from the slot.



For 1U server

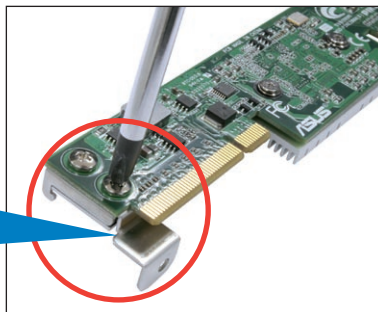
You have to remove the outer heatsink of ASUS PIKE 2008/IMR SAS RAID card to install the card in a 1U server.

To install ASUS PIKE 2008/IMR SAS RAID card on a 1U server

1. Remove the two screws that secure the heatsink bracket on the back of the SAS RAID card.



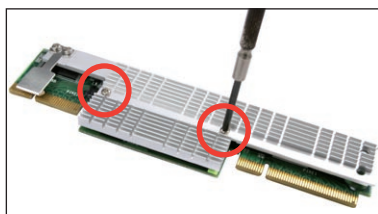
Heatsink bracket



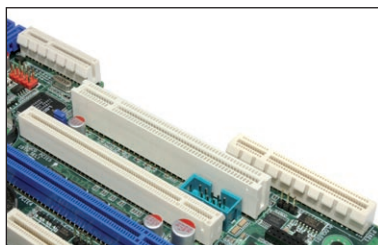
2. Remove the two screws that secure the outer heatsink on the front of the SAS RAID card.



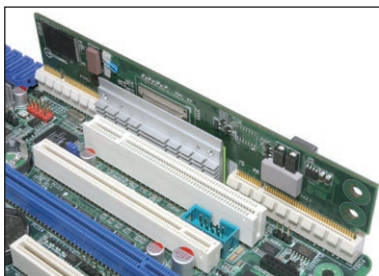
DO NOT remove the inner heatsink from the SAS RAID card.



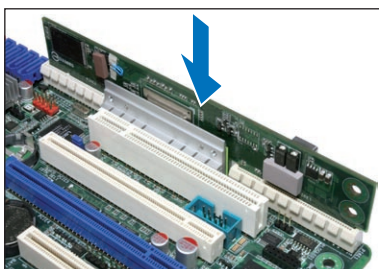
3. Locate the PIKE RAID card slot on the motherboard.



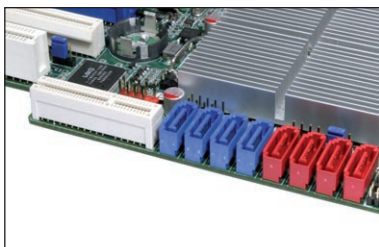
4. Align the golden fingers of the RAID card with the PIKE RAID card slot.



5. Insert the RAID card into the PIKE RAID card slot. Ensure the card is completely inserted into the card slot.



6. Connect the hard disk drives to the SAS connectors on the motherboard.



This image shows a full page of blank, lined paper. It features approximately 20 horizontal grey lines spaced evenly apart, typical of notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines or other markings present.

This chapter provides instructions on setting up, creating, and configuring RAID sets using the available utilities.

2 RAID configuration

2.1 Setting up RAID

The RAID card supports RAID 0, RAID 1, RAID 10, RAID 5, and RAID 50.

2.1.1 RAID definitions

RAID 0 (*Data striping*) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of at least two new identical hard disk drives is required for this setup.

RAID 1 (*Data mirroring*) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 10 is a striped configuration with RAID 1 segments whose segments are RAID 1 arrays. This configuration has the same fault tolerance as RAID 1, and has the same overhead for fault-tolerance as mirroring alone. RAID 10 achieves high input/output rates by striping RAID 1 segments. In some instances, a RAID 10 configuration can sustain multiple simultaneous drive failure. A minimum of four hard disk drives is required for this setup.

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

RAID 50 is a combination of RAID 0 and RAID 5. It uses distributed parity and disk striping and works best with data that requires high reliability, high request rates, high data transfers, and medium-to-large capacity.



- Having RAID 0 and RAID 5 virtual disks in the same physical array is not recommended. If a drive in the physical array has to be rebuilt, the RAID 0 virtual disk will cause a failure during the rebuild.
- If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support CD to a floppy disk before you install an operating system to the selected hard disk drive.

2.1.2 Installing hard disk drives

The RAID card supports SAS for RAID set configuration. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install SAS hard disks for RAID configuration:

1. Install the SAS hard disks into the drive bays following the instructions in the system user guide.
2. Connect a SAS signal cable to the signal connector at the back of each drive and to the SAS connector on the motherboard.
3. Connect a power cable to the power connector on each drive.

2.2 LSI WebBIOS Configuration Utility

The LSI WebBIOS Configuration Utility (CU) is an integrated RAID solution that allows you to create RAID 0, 1, 10, 5, and 50 sets from SATA/SATA II/SATA III/SAS/SAS II hard disk drives supported by the LSI SAS 2008 controller.

You can also use the WebBIOS CU to do the following tasks:

- Create drive groups and virtual drives for storage configurations
- Delete virtual drives
- Detect configuration mismatches
- Import a foreign configuration
- Display controller, virtual drive, drive, and change parameters.
- Scan devices connected to the controller
- Initialize virtual drives
- Check configurations for data consistency
- Create a CacheCade™ configuration



-
- You may use disks of different sizes; however, the size of the smallest disk determines the "logical" size of each member disk.
 - DO NOT combine Serial ATA and SAS disk drives in one volume.
 - The RAID setup screens shown in this section are for reference only and may not exactly match the items on your screen due to the controller version difference.
-

2.2.1 Starting the WebBIOS CU

Follow these steps to start the WebBIOS CU and access the main screen.

1. Turn on the system after installing all SAS hard disk drives.
2. During POST, press <Ctrl+H> when the following screen appears



Press <Ctrl+Y> for Preboot CLI: this option is for advanced debug only!

```
LSI MegaRAID SAS-MFI BIOS
Version 4.15.00 (Build June 03, 2010)
Copyright(C) 2010 LSI Corporation
HA -0 (Bus 4 Dev 0) LSI MegaRAID ROMB
FW package: 20.7.1-0016

Battery Status: Not present

PCI SLOT  ID  LUN  VENDOR  PRODUCT  REVISION
-----  --  ---  -
5          0  0      LSI      LSI MegaRAID ROMB
5          0  0      ATA      Hitachi HDS72161  AB3A
5          0  0      ATA      Hitachi HDS72161  AB3A
5          0  0      ATA      Hitachi HDS72161  AB3A
5          0  0      ATA      Hitachi HDS72161  AB3A

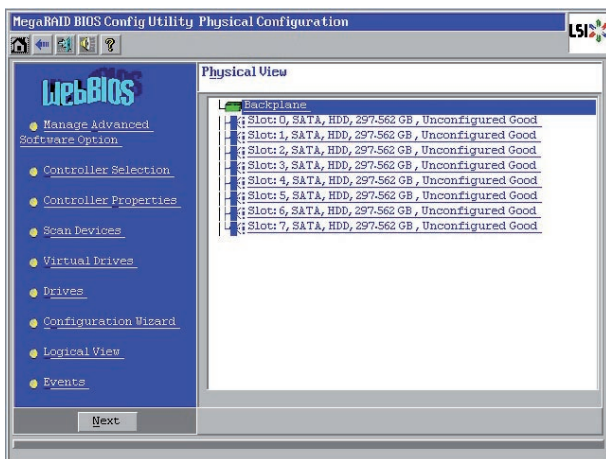
3 JBOD(s) found on the host adapter.
3 JBOD(s) handled by BIOS

0 Virtual Drive(s) found on the host adapter.

0 Virtual Drive(s) handled by BIOS
Press <Ctrl><H> for WebBIOS or press <Ctrl><Y> for Preboot CLI
```






3. The Adapter Selection screen appears. If the system has multiple SAS adapters, select an adapter.
4. Click **Start** to continue. The main WebBIOS CU screen appears.

2.2.2 WebBIOS CU main screen options



This is the Physical View screen which displays the drives that are connected to the controller. To toggle between the physical view and logical view of the storage devices connected to the controller, click **Physical View** or **Logical View** in the menu on the left. When the Logical View screen is displayed, you can see all the virtual drives that are configured on this controller.

WebBIOS CU Toolbar Icons

Icon	Description
	Click this icon to return to the main screen from any other WebBIOS CU screen.
	Click this icon to return to the previous screen that you were viewing.
	Click this icon to exit the WebBIOS CU program.
	Click this icon to turn off the sound on the onboard controller alarm.
	Click this icon to display information about the WebBIOS CU version, bus number, and device number.

Here is a description of the options listed on the left of the main WebBIOS CU screen:

- **Manage Advanced Software Option:** Select this to allow you to enable the special functionality or features that may not be available in the standard configuration of the controller.
- **Controller Selection:** Select this to view the Adapter Selection screen, where you can select a different SAS adapter. You can then view information about the controller and the devices connected to it, or create a new configuration on the controller.
- **Controller Properties:** Select this to view the properties of the currently selected SAS controller.
- **Scan Devices:** Select this to have the WebBIOS CU re-scan the physical and virtual drives for any changes in the drive status or the physical configuration. The WebBIOS CU displays the results of the scan in the physical and virtual drive descriptions.
- **Virtual Drives:** Select this to view the Virtual Drives screen, where you can change and view virtual drive properties, initialize drives, and perform other tasks.
- **Drives:** Select this to view the Drives screen, where you can view drive properties, and perform other tasks.
- **Configuration Wizard:** Select this to start the Configuration Wizard and create a new storage configuration, clear a configuration, or add a configuration.
- **Physical View/Logical View:** Select this to toggle between the Physical View and Logical View screens.
- **Events:** Select this to view system events in the Event Information screen.
- **Exit:** Select this to exit the WebBIOS CU and continue with system boot.

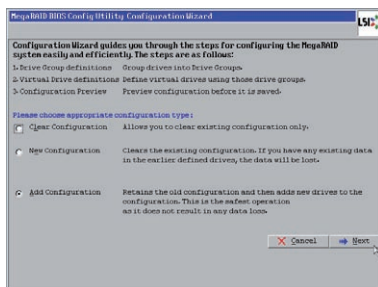
2.2.3 Creating a Storage Configuration

This section explains how to use the WebBIOS CU Configuration Wizard to configure RAID arrays and virtual drives.

Selecting the Configuration with the Configuration Wizard

Follow these steps to start the Configuration Wizard, and select a configuration option and mode:

1. Click **Configuration Wizard** on the WebBIOS main screen. The first Configuration Wizard screen appears, as shown in the right figure.
2. Select a configuration option.



If you choose the first or second option, all existing data in the configuration will be deleted. Make a backup of any data that you want to keep before choosing these options.

- **Clear Configuration:** Clears the existing configuration.
 - **New Configuration:** Clears the existing configuration and lets you create a new configuration.
 - **Add Configuration:** Retains the existing storage configuration and adds new drives to it (this does not cause any data loss).
3. Click **Next**. A dialog box warns that you will lose data if you select Clear Configuration or New Configuration.
 4. On the next screen, select a configuration mode:
 - **Manual Configuration:** Allows you to control all attributes of the new storage configuration.
 - **Automatic Configuration:** Automatically creates an optimal RAID configuration.
- If you select **Automatic Configuration**, you can choose the redundancy mode:
- **Redundancy when possible:** Automatically creates an optimal RAID configuration, providing data redundancy.
 - **No Redundancy:** Automatically creates a non-redundant RAID 0 configuration.
5. Click **Next** to continue.

Using Automatic Configuration

Follow these instructions to create a configuration with automatic configuration, either with or without redundancy:

1. When WebBIOS displays the proposed new configuration, review the information on the screen, and click **Accept** to accept it. (Or click **Back** to go back and change the configuration.)
 - **RAID 0:** If you selected **Automatic Configuration** and **No Redundancy**, WebBIOS creates a RAID 0 configuration.
 - **RAID 1:** If you selected **Automatic Configuration** and **Redundancy when possible**, WebBIOS creates a RAID 1 configuration if only two disk drives are available.
 - **RAID 5:** If you selected **Automatic Configuration** and **Redundancy when possible**, WebBIOS creates a RAID 5 configuration if three or more disk drives are available.
2. Click **Yes** when you are prompted to save the configuration.
3. Click **Yes** when you are prompted to initialize the new virtual drive(s).
WebBIOS CU begins a background initialization of the virtual drives.

Using Manual Configuration: RAID 0

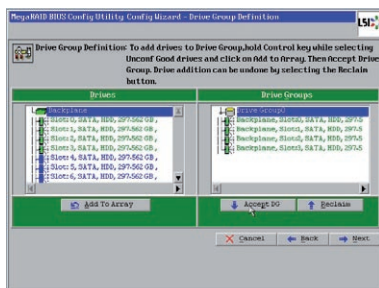
RAID 0 provides drive striping across all drives in the RAID drive group. RAID 0 does not provide any data redundancy but does offer excellent performance. RAID 0 is ideal for applications that require high bandwidth but do not require fault tolerance. RAID 0 also denotes an independent or single drive.



RAID level 0 is not fault-tolerant. If a drive in a RAID 0 drive group fails, the whole virtual drive (all drives associated with the virtual drive) fails.

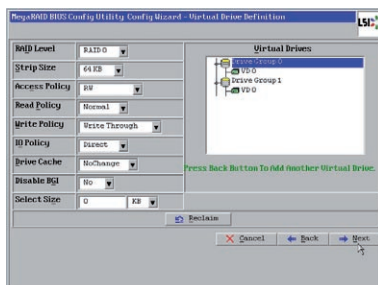
When you select **Manual Configuration** and click **Next**, the Drive Group Definition screen appears. You use this screen to select drives to create drive groups.

1. Hold <Ctrl> while selecting two or more ready drives in the Drives panel on the left until you have selected all desired drives for the drive group.
2. Click **Add To Array** to move the drives to a proposed drive group configuration in the Drive Groups panel on the right, as shown in the right figure.



If you need to undo the changes, click the **Reclaim** button.

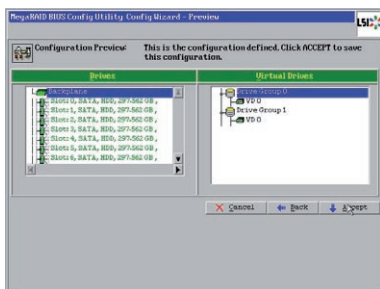
- When you have finished selecting drives for the drive group, click **Accept DG**.
- Click **Next**. The Span Definition screen appears. Select one of the available drive groups, and then click **Add to SPAN**.
- When finish, click **Next**. The Virtual Drive Definition screen appears, as shown in the right figure. You use this screen to select the RAID level, strip size, read policy, and other attributes for the new virtual drives.
- Change the virtual drive options from the defaults listed on the screen as needed.



Here are brief explanations of the virtual drive options:

- **RAID Level:** The drop-down menu lists the possible RAID levels for the virtual drive. Select RAID 0.
- **Strip Size:** The strip size specifies the size of the segment written to each disk in a RAID configuration. You can set the strip size up to 64 KB. A larger strip size produces higher read performance. If your computer regularly performs random read requests, choose a smaller strip size. The default is 64 KB.
- **Access Policy:** Select the type of data access that is allowed for this virtual drive:
 - ◊ **RW:** Allow read/write access. This is the default.
 - ◊ **Read Only:** Allow read-only access.
 - ◊ **Blocked:** Do not allow access.
- **Read Policy:** Specify the read policy for this virtual drive:
 - ◊ **Normal:** This disables the read ahead capability. This is the default.
- **Write Policy:** Specify the write policy for this virtual drive:
 - ◊ **Write Through:** In Writethrough mode the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default.
- **IO Policy:** The IO Policy applies to reads on a specific virtual drive. It does not affect the read ahead cache.
 - ◊ **Direct:** In direct I/O mode, reads are not buffered in cache memory. Data is transferred to the cache and the host concurrently. If the same data block is read again, it comes from cache memory. This is the default.

- **Drive Cache:** Specify the drive cache policy:
 - ◊ **NoChange:** Leave the current drive cache policy unchanged. This is the default.
 - ◊ **Enable:** Enable the drive cache.
 - ◊ **Disable:** Disable the drive cache.
 - **Disable BGI:** Specify the background initialization status:
 - ◊ **No:** Leave background initialization enabled. This means that a new configuration can be initialized in the background while you use WebBIOS to do other configuration tasks. This is the default.
 - ◊ **Yes:** Select Yes if you do not want to allow background initializations for configurations on this controller.
 - **Select Size:** Specify the size of the virtual drive in megabytes. Normally, this would be the full size for RAID 0 shown in the Configuration panel on the right. You may specify a smaller size if you want to create other virtual drives on the same drive group.
7. Click **Accept** to accept the changes to the virtual drive definition, or click **Reclaim** to return to the previous settings.
 8. Click **Yes** to confirm to select the Write Through mode.
 9. Click **Next** when you are finished defining virtual drives. The configuration preview screen appears, as shown in the right figure.
 10. Check the information in the configuration preview.
 11. If the virtual drive configuration is acceptable, click **Accept** to save the configuration. Otherwise, click **Back** to return to the previous screens and change the configuration.
 12. If you accept the configuration, click **Yes** at the prompt to save the configuration.
 13. Click **Yes** at the prompt to start initialization.



Using Manual Configuration: RAID 1

In RAID 1, the RAID controller duplicates all data from one drive to a second drive. RAID 1 provides complete data redundancy, but at the cost of doubling the required data storage capacity. It is appropriate for small databases or any other environment that requires fault tolerance but small capacity.

When you select **Manual Configuration** and click **Next**, the Drive Group Definition screen appears. You use this screen to select drives to create drive groups.

1. Hold <Ctrl> while selecting two ready drives in the Drives panel on the left.
2. Click **Add to Array** to move the drives to a proposed drive group configuration in the Drive Groups panel on the right.
If you need to undo the changes, click the **Reclaim** button.
3. When you have finished selecting drives for the drive group, click **Accept DG**.
4. Click **Next**. The Span Definition screen appears. Select one of the available drive groups, and then click **Add to SPAN**.
5. When finish, click **Next**. The Virtual Drive Definition screen appears. You use this screen to select the RAID level, strip size, read policy, and other attributes for the new virtual drives.
6. Change the virtual drive options from the defaults listed on the screen as needed.

Here are brief explanations of the virtual drive options:

- **RAID Level:** The drop-down menu lists the possible RAID levels for the virtual drive. Select RAID 1.
- **Strip Size:** The strip size specifies the size of the segment written to each disk in a RAID configuration. You can set the strip size up to 64 KB. A larger strip size produces higher read performance. If your computer regularly performs random read requests, choose a smaller strip size. The default is 64 KB.
- **Access Policy:** Select the type of data access that is allowed for this virtual drive:
 - ◊ **RW:** Allow read/write access. This is the default.
 - ◊ **Read Only:** Allow read-only access.
 - ◊ **Blocked:** Do not allow access.
- **Read Policy:** Specify the read policy for this virtual drive:
 - ◊ **Normal:** This disables the read ahead capability. This is the default.
- **Write Policy:** Specify the write policy for this virtual drive:
 - ◊ **Write Through:** In Writethrough mode the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default.

- **IO Policy:** The IO Policy applies to reads on a specific virtual drive. It does not affect the read ahead cache.
 - ◊ **Direct:** In Direct I/O mode, reads are not buffered in cache memory. Data is transferred to the cache and the host concurrently. If the same data block is read again, it comes from cache memory. This is the default.
 - **Drive Cache:** Specify the drive cache policy:
 - ◊ **NoChange:** Leave the current drive cache policy unchanged. This is the default.
 - ◊ **Enable:** Enable the drive cache.
 - ◊ **Disable:** Disable the drive cache.
 - **Disable BGI:** Specify the background initialization status:
 - ◊ **No:** Leave background initialization enabled. This means that a new configuration can be initialized in the background while you use WebBIOS to do other configuration tasks. This is the default.
 - ◊ **Yes:** Select Yes if you do not want to allow background initializations for configurations on this controller.
 - **Select Size:** Specify the size of the virtual disk in megabytes. Normally, this would be the full size for RAID 1 shown in the Configuration Panel on the right. You may specify a smaller size if you want to create other virtual disks on the same disk group.
7. Click **Accept** to accept the changes to the virtual drive definition, or click **Reclaim** to return to the previous settings.
 8. Click **Yes** to confirm to select the Write Through mode.
 9. Click **Next** when you are finished defining virtual disks. The configuration preview screen appears.
 10. Check the information in the configuration preview.
 11. If the virtual drive configuration is acceptable, click **Accept** to save the configuration. Otherwise, click **Back** to return to the previous screens and change the configuration.
 12. If you accept the configuration, click **Yes** at the prompt to save the configuration.
 13. Click **Yes** at the prompt to start initialization.

Using Manual Configuration: RAID 5

RAID 5 uses drive striping at the block level and parity. In RAID 5, the parity information is written to all drives. It is best suited for networks that perform a lot of small input/output (I/O) transactions simultaneously. RAID 5 provides data redundancy, high read rates, and good performance in most environments. It also provides redundancy with lowest loss of capacity.

RAID 5 provides high data throughput. RAID 5 is useful for transaction processing applications because each drive can read and write independently. If a drive fails, the RAID controller uses the parity drive to recreate all missing information. You can use RAID 5 for office automation and online customer service that require fault tolerance. In addition, RAID 5 is good for any application that has high read request rates but low write request rates.

When you select **Manual Configuration** and click **Next**, the Drive Group Definition screen appears. You use this screen to select drives to create drive groups.

1. Hold <Ctrl> while you select at least three ready drives in the Drives panel on the left.
2. Click **Add To Array** to move the drives to a proposed drive group configuration in the Drive Groups panel on the right.
If you need to undo the changes, click the **Reclaim** button.
3. When you have finished selecting drives for the drive group, click **Accept DG**.
4. Click **Next**. The Span Definition screen appears. Select one of the available drive groups, and then click **Add to SPAN**.
5. When finish, click **Next**. The Virtual Drive Definition screen appears. You use this screen to select the RAID level, strip size, read policy, and other attributes for the new virtual drives.
6. Change the virtual drive options from the defaults listed on the screen as needed.

Here are brief explanations of the virtual disk options:

- **RAID Level:** The drop-down menu lists the possible RAID levels for the virtual drive. Select RAID 5.
- **Strip Size:** The strip size specifies the size of the segment written to each disk in a RAID configuration. You can set the strip size up to 64 KB. A larger strip size produces higher read performance. If your computer regularly performs random read requests, choose a smaller strip size. The default is 64 KB.
- **Access Policy:** Select the type of data access that is allowed for this virtual disk:
 - ◊ **RW:** Allow read/write access. This is the default.
 - ◊ **Read Only:** Allow read-only access.
 - ◊ **Blocked:** Do not allow access.

- **Read Policy:** Specify the read policy for this virtual drive:
 - ◊ **Normal:** This disables the read ahead capability. This is the default.
 - **Write Policy:** Specify the write policy for this virtual drive:
 - ◊ **Write Through:** In Writethrough mode the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default.
 - **IO Policy:** The IO Policy applies to reads on a specific virtual drive. It does not affect the read ahead cache.
 - ◊ **Direct:** In Direct I/O mode, reads are not buffered in cache memory. Data is transferred to the cache and the host concurrently. If the same data block is read again, it comes from cache memory. This is the default.
 - **Drive Cache:** Specify the drive cache policy:
 - ◊ **NoChange:** Leave the current drive cache policy unchanged. This is the default.
 - ◊ **Enable:** Enable the drive cache.
 - ◊ **Disable:** Disable the drive cache.
 - **Disable BGI:** Specify the background initialization status:
 - ◊ **No:** Leave background initialization enabled. This means that a new configuration can be initialized in the background while you use WebBIOS to do other configuration tasks. This is the default.
 - ◊ **Yes:** Select Yes if you do not want to allow background initializations for configurations on this controller.
 - **Select Size:** Specify the size of the virtual drive in megabytes. Normally, this would be the full size for RAID 5 shown in the Configuration panel on the right. You may specify a smaller size if you want to create other virtual drives on the same drive group.
7. Click **Accept** to accept the changes to the virtual drive definition, or click **Reclaim** to return to the previous settings.
 8. Click **Yes** to confirm to select the Write Through mode.
 9. Click **Next** when you are finished defining virtual drives. The configuration preview screen appears.
 10. Check the information in the configuration preview.
 11. If the virtual drive configuration is acceptable, click **Accept** to save the configuration. Otherwise, click **Back** to return to the previous screens and change the configuration.
 12. If you accept the configuration, click **Yes** at the prompt to save the configuration.
 13. Click **Yes** at the prompt to start initialization.

Using Manual Configuration: RAID 10

RAID 10, a combination of RAID 1 and RAID 0, has mirrored drives. It breaks up data into smaller blocks, then stripes the blocks of data to each RAID 1 drive group. Each RAID 1 drive group then duplicates its data to its other drive. The size of each block is determined by the strip size parameter. RAID 10 can sustain one drive failure in each array while maintaining data integrity.

RAID 10 provides both high data transfer rates and complete data redundancy. It works best for data storage that must have 100 percent redundancy of RAID 1 (mirrored drive groups) and that also needs the enhanced I/O performance of RAID 0 (striped drive groups); it works well for medium-sized databases or any environment that requires a higher degree of fault tolerance and moderate to medium capacity.

When you select **Manual Configuration** and click **Next**, the Drive Group Definition screen appears.

You use the Drive Group Definition screen to select drives to create drive groups.

1. Hold <Ctrl> while selecting two ready drives in the Drives panel on the left.
2. Click **Add to Array** to move the drives to a proposed two-drive drive group configuration in the Drive Groups panel on the right.

If you need to undo the changes, click the **Reclaim** button.

3. Click **Accept DG** to create a RAID 1 drive group.
An icon for the next drive group displays in the right panel.
4. Click on the icon for the next drive group to select it.
5. Hold <Ctrl> while selecting two more ready drives in the Drives panel to create a second RAID 1 drive group with two drives.
6. Click **Add To Array** to move the drives to a second two-drive drive group configuration in the Drive Groups panel.

If you need to undo the changes, click the **Reclaim** button.

7. Repeat the previous three steps until you have selected all the drives you want for the drive groups.
8. After you finish selecting drives for the drive groups, select each drive group and click **Accept DG** for each.
9. Click **Next**. The Span Definition screen appears. This screen displays the drive group holes you can select to add to a span.

Select one of the available drive groups, and then click **Add to SPAN**.

10. Under the heading Array With Free Space, hold <Ctrl> while selecting a drive group with two drives, and click **Add to SPAN**.

The drive group you select displays in the right frame under the heading Span.

11. Hold <Ctrl> while selecting a second drive group with two drives, and click **Add to SPAN**.
Both drive groups display in the right frame under Span.
12. If there are additional drive groups with two drives each, you can add them to the virtual drive.
13. When finish, click **Next**. The Virtual Drive Definition screen appears.
You use this screen to select the RAID level, strip size, read policy, and other attributes for the new virtual drives.
14. Hold <Ctrl> while selecting two drive groups with two drives in the Configuration panel on the right.



The WebBIOS Configuration Utility displays the maximum available capacity while creating the RAID 10 drive group. In version 1.03 of the utility, the maximum size of the RAID 10 drive group is the sum total of the two RAID 1 drive groups. In version 1.1, the maximum size is the size of the smaller drive group multiplied by two.

15. Change the virtual drive options from the defaults listed on the screen as needed.

Here are brief explanations of the virtual drive options:

- **RAID Level:** The drop-down menu lists the possible RAID levels for the virtual drive. Select RAID 10.
- **Strip Size:** The strip size specifies the size of the segment written to each disk in a RAID configuration. You can set the strip size up to 64 KB. A larger strip size produces higher read performance. If your computer regularly performs random read requests, choose a smaller strip size. The default is 64 KB.
- **Access Policy:** Select the type of data access that is allowed for this virtual drive:
 - ◊ **RW:** Allow read/write access.
 - ◊ **Read Only:** Allow read-only access. This is the default.
 - ◊ **Blocked:** Do not allow access.
- **Read Policy:** Specify the read policy for this virtual drive:
 - ◊ **Normal:** This disables the read ahead capability. This is the default.
- **Write Policy:** Specify the write policy for this virtual drive:
 - ◊ **Write Through:** In Writethrough mode the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default.

- **IO Policy:** The IO Policy applies to reads on a specific virtual drive. It does not affect the read ahead cache.
 - ◊ **Direct:** In Direct I/O mode, reads are not buffered in cache memory. Data is transferred to the cache and the host concurrently. If the same data block is read again, it comes from cache memory. This is the default.
 - **Drive Cache:** Specify the drive cache policy:
 - ◊ **NoChange:** Leave the current drive cache policy unchanged. This is the default.
 - ◊ **Enable:** Enable the drive cache.
 - ◊ **Disable:** Disable the drive cache.
 - **Disable BGI:** Specify the background initialization status:
 - ◊ **No:** Leave background initialization enabled. This means that a new configuration can be initialized in the background while you use WebBIOS to do other configuration tasks. This is the default.
 - ◊ **Yes:** Select Yes if you do not want to allow background initializations for configurations on this controller.
 - **Select Size:** Specify the size of the virtual drive in megabytes. Normally, this would be the full size for RAID 10 shown in the Configuration Panel on the right. You may specify a smaller size if you want to create other virtual drives on the same drive group.
16. Click **Accept** to accept the changes to the virtual drive definition, or click **Reclaim** to to undo the changes.
 17. Click **Yes** to confirm to select the Write Through mode.
 18. When you are finished defining virtual drives, click **Next**. The configuration preview screen appears.
 19. Check the information in the configuration preview.
 20. If the virtual drive configuration is acceptable, click **Accept** to save the configuration. Otherwise, click **Cancel** to end the operation and return to the WebBIOS main menu, or click **Back** to return to the previous screens and change the configuration.
 21. If you accept the configuration, click **Yes** at the prompt to save the configuration.
 22. Click **Yes** at the prompt to start initialization.

Using Manual Configuration: RAID 50

RAID 50 provides the features of both RAID 0 and RAID 5. RAID 50 uses both distributed parity and drive striping across multiple drive groups. It provides high data throughput, data redundancy, and very good performance. It is best implemented on two RAID 5 drive groups with data striped across both drive groups. Though multiple drive failures can be tolerated, only one drive failure can be tolerated in each RAID 5 level drive group.

RAID 50 is appropriate when used with data that requires high reliability, high request rates, high data transfer, and medium to large capacity.

When you select **Manual Configuration** and click **Next**, the Drive Group Definition screen appears. You use this screen to select drives to create drive groups.

1. Hold <Ctrl> while selecting at least three ready drives in the Drives panel on the left.
2. Click **Add To Array** to move the drives to a proposed drive group configuration in the Drive Groups panel on the right.
If you need to undo the changes, click the **Reclaim** button.
3. Click **Accept DG** to create a RAID 5 drive group.
An icon for a second drive group displays in the right panel.
4. Click on the icon for the second drive group to select it.
5. Hold <Ctrl> while selecting at least three more ready drives in the Drives panel to create a second drive group.
6. Click **Add To Array** to move the drives to a proposed drive group configuration in the Drive Groups panel on the right.
If you need to undo the changes, click the **Reclaim** button.
7. After you finish selecting drives for the drive groups, select each drive group and click **Accept DG** for each.
8. Click **Next**. The Span Definition screen appears. This screen displays the drive group holes you can select to add to a span.
9. Under the heading Array With Free Space, hold <Ctrl> while selecting a drive group of three or more drives, and click **Add to SPAN**.
The drive group you select displays in the right frame under the heading Span.
10. Hold <Ctrl> while selecting a second drive group of three or more drives, and click **Add to SPAN**.
Both drive groups display in the right frame under Span.
11. When finish, click **Next**. The Virtual Drive Definition screen appears. You use this screen to select the RAID level, strip size, read policy, and other attributes for the new virtual drive(s).

12. Hold <Ctrl> while selecting two drive groups with three or more drives each in the Configuration panel on the right.
13. Change the virtual drive options from the defaults listed on the screen as needed.

Here are brief explanations of the virtual drive options:

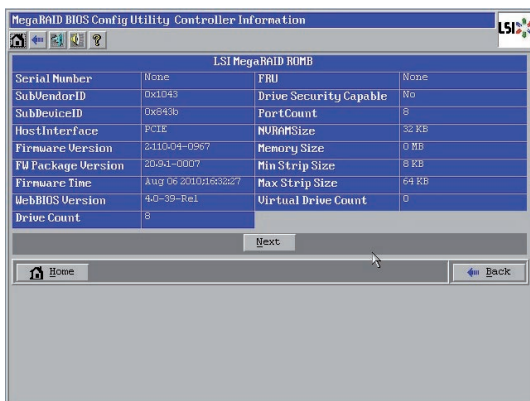
- **RAID Level:** The drop-down menu lists the possible RAID levels for the virtual drive. Select RAID 50.
- **Strip Size:** The strip size specifies the size of the segment written to each disk in a RAID configuration. You can set the strip size up to 64 KB. A larger strip size produces higher read performance. If your computer regularly performs random read requests, choose a smaller strip size. The default is 64 KB.
- **Access Policy:** Select the type of data access that is allowed for this virtual drive:
 - ◊ **RW:** Allow read/write access.
 - ◊ **Read Only:** Allow read-only access. This is the default.
 - ◊ **Blocked:** Do not allow access.
- **Read Policy:** Specify the read policy for this virtual drive:
 - ◊ **Normal:** This disables the read ahead capability. This is the default.
- **Write Policy:** Specify the write policy for this virtual drive:
 - ◊ **Write Through:** In Writethrough mode the controller sends a data transfer completion signal to the host when the disk subsystem has received all the data in a transaction. This is the default.
- **IO Policy:** The IO Policy applies to reads on a specific virtual drive. It does not affect the read ahead cache.
 - ◊ **Direct:** In Direct I/O mode, reads are not buffered in cache memory. Data is transferred to the cache and the host concurrently. If the same data block is read again, it comes from cache memory. This is the default.
- **Drive Cache:** Specify the drive cache policy:
 - ◊ **NoChange:** Leave the current drive cache policy unchanged. This is the default.
 - ◊ **Enable:** Enable the drive cache.
 - ◊ **Disable:** Disable the drive cache.

- **Disable BGI:** Specify the background initialization status:
 - ◊ **No:** Leave background initialization enabled. This means that a new configuration can be initialized in the background while you use WebBIOS to do other configuration tasks. This is the default.
 - ◊ **Yes:** Select Yes if you do not want to allow background initializations for configurations on this controller.
 - **Select Size:** Specify the size of the virtual drive in megabytes. Normally, this would be the full size for RAID 50 shown in the Configuration Panel on the right. You may specify a smaller size if you want to create other virtual drives on the same drive group.
14. Click **Accept** to accept the changes to the virtual drive definition, or click **Reclaim** to undo the changes.
 15. Click **Yes** to confirm to select the Write Through mode.
 16. Click **Next** when you are finished defining virtual drives. The configuration preview screen appears.
 17. Check the information in the configuration preview.
 18. If the virtual drive configuration is acceptable, click **Accept** to save the configuration. Otherwise, click **Cancel** to end the operation and return to the WebBIOS main menu, or click **Back** to return to the previous screens and change the configuration.
 19. If you accept the configuration, click **Yes** at the prompt to save the configuration.
 20. Click **Yes** at the prompt to start initialization.

2.2.4 Viewing and Changing Device Properties

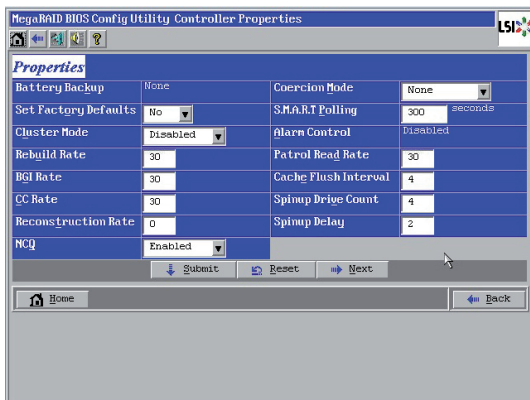
This section explains how you can use the WebBIOS CU to view and change the properties for controllers, virtual drives, and drives.

WebBIOS allows you to view information for the LSI SAS controller. To view the properties for the controller, click **Controller Properties** on the main WebBIOS screen. There are three Controller Properties screens. The following figure shows the first screen.

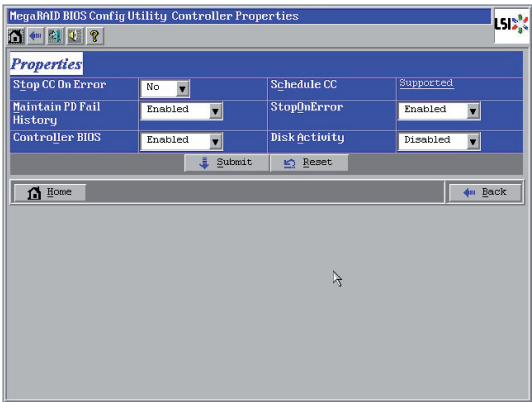


The information on this screen is read-only and cannot be modified directly. Most of this information is self-explanatory. The screen lists the number of virtual drives that are already defined on this controller, plus the number of drives connected to the controller.

Click **Next** to view the second Controller Properties screen, as shown in the following figure.



Click **Next** to view the third Controller Properties screen, as shown in the following figure.



The following table describes the entries/options listed on the second and third Controller Properties screen. We recommend that you leave these options at their default settings to achieve the best performance, unless you have a specific reason for changing them.

Controller Properties Menu Options

Option	Description
Set Factory Defaults	Use this option to load the default MegaRAID® WebBIOS CU settings. The default is [No].
Cluster Mode	Use this option to enable or disable Cluster mode. The default is [Disabled]. A cluster is a grouping of independent servers that can access the same data storage and provide services to a common set of clients. When Cluster mode is disabled, the system operates in Standard mode.
Rebuild Rate	Use this option to select the rebuild rate for drives connected to the selected controller. The default is 30 percent. The rebuild rate is the percentage of system resources dedicated to rebuilding a failed drive. The higher the number, the more system resources devoted to a rebuild.
BGI Rate	Use this option to select the amount of system resources dedicated to background initialization of virtual drives connected to the selected controller. The default is 30 percent.
CC Rate	Use this option to select the amount of system resources dedicated to consistency checks of virtual drives connected to the selected controller. The default is 30 percent.
Reconstruction Rate	Use this option to select the amount of system resources dedicated to reconstruction of drives connected to the selected controller. The default is 30 percent.
NCQ	Native Command Queuing (NCQ) gives an individual drive the ability to optimize the order in which it executes the read and write commands. The default is [Enabled].
Coercion Mode	Drive coercion is a tool for forcing drives of varying capacities to the same size so they can be used in a drive group. The coercion mode options are None, 128MB-way, and 1GB-way. The default is None.
S.M.A.R.T. Polling	This option determines how frequently the controller polls for drives reporting a Predictive Drive Failure (S.M.A.R.T. error). The default is 300 seconds (5 minutes).

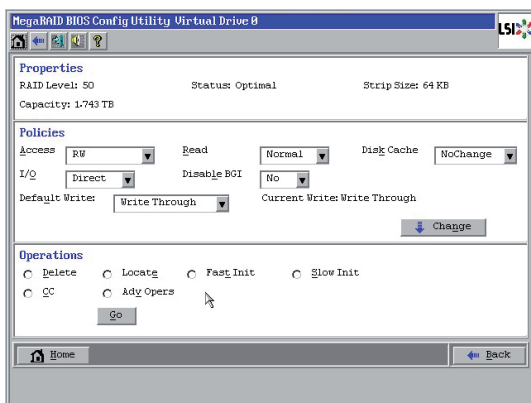
Controller Properties Menu Options (Cont.)

Option	Description
Alarm Control	Select this option to enable, disable, or silence the onboard alarm tone generator on the controller. The default is [Disabled].
Patrol Read Rate	Use this option to select the rate for patrol reads for drives connected to the selected controller. The default is 30 percent. The patrol read rate is the percentage of system resources dedicated to running a patrol read.
Cache Flush Interval	Use this option to control the interval (in seconds) at which the contents of the onboard data cache are flushed. The default is 4 seconds.
Spinup Drive Count	Use this option to control the number of drives that spin up simultaneously. The default is 4 drives.
Spinup Delay	Use this option to control the interval (in seconds) between spinup of drives connected to this controller. The delay prevents a drain on the system's power supply that would occur if all drives spun up at the same time. The default is 2 seconds.
Stop CC On Error	Use this option if you want to stop a consistency check when the controller BIOS encounters an error. The default is No.
Maintain PD Fail History	Use this option to maintain the history of all drive failures. The default is Enabled.
Controller BIOS	Use this option to enable or disable the BIOS for the selected controller. The default is Enabled. If the boot device is on the selected controller, the BIOS must be enabled. Otherwise, the BIOS should be disabled or it might not be possible to use a boot device elsewhere.
Schedule CC	"Supported" will be displayed if the controller supports consistency check schedule.
StopOnError	Enable this option if you want the boot process to stop when the controller BIOS encounters an error during boot-up. The default is [Enabled].
Disk Activity	Enable this option if you want to locate a particular disk. This disk can be identified with a continuous blinking of green activity LED. This works only if the disks are installed in an enclosure. The default is [Disabled].

If you make changes to the options on this screen, click **Submit** to register them. If you change your mind, click **Reset** to return the options to their default values.

Viewing and Changing Virtual Drive Properties

Access the Virtual Drive screen by clicking a virtual drive icon in the right panel on the WebBIOS CU main screen. The following figure shows the Virtual Drive screen.



The Properties panel of this screen displays the virtual drive's RAID level, state, capacity, and strip size.

The Policies panel lists the virtual drive policies that were defined when the storage configuration was created. To change any of these policies, make a selection from the drop-down menu and click **Change**.

The Operations panel lists operations that can be performed on the virtual drive. To perform an operation, select it and click **Go**. Then choose from the following options:

- Select **Delete** to delete this virtual drive.
- Select **Locate** to make the LEDs flash on the drives used by this virtual drive. This works only if the drives are installed in a drive enclosure that supports SATFE.
- Select **Fast** or **Slow** to initialize this virtual drive. A fast initialization quickly writes zeroes to the first and last 10-MB regions of the new virtual drive and then completes the initialization in the background. A slow initialization is not complete until the entire virtual drive has been initialized with zeroes. It is seldom necessary to use this option, because the virtual drive was already initialized when you created it.



Before you run an initialization, back up any data on the virtual drive that you want to save. All data on the virtual drive is lost when you initialize it.

- Select **CC** to run a consistency check on this virtual drive.



Before you change a virtual drive configuration, back up any data on the virtual drive that you want to save.

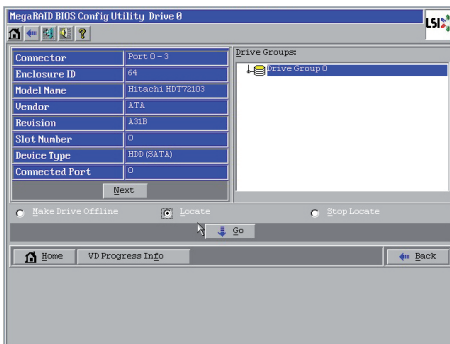
Viewing Drive Properties

The Drives screen displays the properties of a selected drive and also enables you to perform operations on the drive.

There are two ways to access the Drive screen:

- On the main menu screen, click on a drive in the right panel under the heading **Physical Drives**.
- On the main menu screen, click on **Physical Drives** in the left panel to display the Physical Drive screen. Then click on a drive in the right panel. Click on the **Properties** button, and click **Go**. The properties for the selected drive displays.

The below figure shows the Drive screen.



The drive properties are view-only and are self-explanatory. Note that the properties include the state of the drive. The operations listed at the bottom of the screen vary depending on the state of the drive. After you select an operation, click **Go** to start the operation.

- Select **Make Drive Offline** if you want to force the drive offline.



If you force offline a good drive that is part of a redundant drive group with a hot spare, the drive will rebuild to the hot spare drive. The drive you forced offline will go into the **Unconfigured Bad** state. Access the BIOS utility to set the drive to the **Unconfigured Good** state.

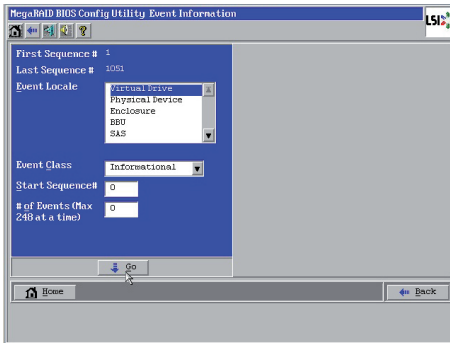
- Select **Locate** to make the LED flash on the drive. This works only if the drive is installed in a drive enclosure.
- Select **Stop Locate** to disable the LED flash on the drive.

If the drive state is Unconfigured Good, four additional operations appear on this screen:

- Select **Make Global HSP** to make a global hot spare, available to all of the virtual drives.
- Select **Enclosure Affinity** so if there are drive failures present on a split backplane configuration, then the hot spare will be used first on the backplane side that it resides in.
- Select **Make Unconf Bad** to make the drive state to become Unconfigured Bad.
- Select **Prepare Removal** to prepare the drive for removal from the enclosure.

2.2.5 Viewing System Event Information

The SAS controller firmware monitors the activity and performance of all storage configurations and devices in the system. When an event occurs (such as the creation of a new virtual drive or the removal of a drive) an event message is generated and is stored in the controller NVRAM. You can use the WebBIOS CU to view these event messages. To do this, click **Events** on the main WebBIOS CU screen. The Event Information screen appears, as shown in the following figure.



The right side of the screen is blank until you select an event to view. The First Sequence and Last Sequence fields in the upper left of the screen show you how many event entries are currently stored.

To view event information, follow these steps:

1. Select an Event Locale from the menu. For example, select **Enclosure** to view events relating to the drive enclosure.
2. Select an Event Class: [Informational], [Warning], [Critical], [Fatal], or [Dead].
3. Enter a Start Sequence number, between the First Sequence and Last Sequence numbers. The higher the number, the more recent the event.
4. Enter the Number of events of this type that you want to view, and click **Go**. The first event in the sequence appears in the right panel.
5. Click **Next** or **Prev** to page forward or backward through the sequence of events.
6. If you want, select different event criteria in the left panel, and click **Go** again to view a different sequence of events.

Each event entry includes a timestamp and a description to help you determine when the event occurred and what it was.

2.2.6 Managing Configurations

This section includes information about maintaining and managing storage configurations.

Running a Consistency Check

You should periodically run a consistency check on fault-tolerant virtual drives. A consistency check verifies that the redundancy data is correct and available for RAID 1, RAID 5, and RAID 10 arrays. To do this, follow these steps:

1. On the main WebBIOS CU screen, select a virtual drive.
2. When the Virtual Drive screen appears, select **CC** in the lower left panel, and click **Go**.
3. Click **Yes** to continue. The consistency check begins.

If the WebBIOS CU finds a difference between the data and the parity value on the redundant drive group, it assumes that the data is accurate and automatically corrects the parity value. Be sure to back up the data before running a consistency check if you think the data may be corrupted.

Deleting a Virtual Drive

You can delete any virtual drive on the controller if you want to reuse that space for a new virtual drive. The WebBIOS CU provides a list of configurable drive groups where there is a space to configure. If multiple virtual drives are defined on a single drive group, you can delete a virtual drive without deleting the whole drive group.



Back up any data that you want to keep before you delete the virtual drive.

To delete a virtual drive, follow these steps:

1. On the main WebBIOS CU screen, select a virtual drive.
2. When the Virtual Drive screen appears, select **Delete** in the bottom panel under the heading Operations, and click **Go**.
3. When the message appears, confirm that you want to delete the virtual drive.

Importing or Clearing a Foreign Configuration

A **foreign configuration** is a storage configuration that already exists on a replacement set of drives that you install in a computer system. In addition, if one or more drives are removed from a configuration, by a cable pull or drive removal, for example, the configuration on those drives is considered a foreign configuration by the RAID controller.

The WebBIOS CU allows you to import the foreign configuration to the RAID controller, or to clear the configuration so you can create a new configuration using these drives.



When you create a new configuration, the WebBIOS CU shows only the unconfigured drives. Drives that have existing configurations, including foreign configurations, will not appear. To use drives with existing configurations, you must first clear the configuration on those drives.

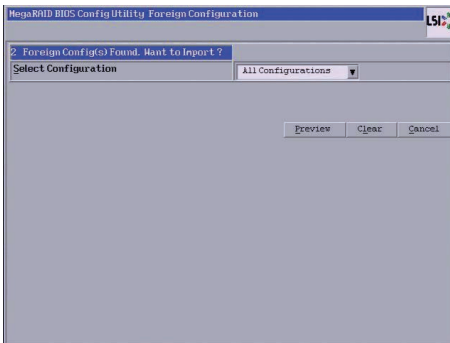
If a foreign configuration is detected during POST, press <C> when the following screen appears.

```
Foreign configuration(s) found on adapter
Press any key to continue or 'C' to load the configuration utility,
or 'F' to import foreign configuration(s) and continue.
```

When the following screen appears, press <Ctrl+H> to enter the WebBIOS CU.

```
1 Virtual Drive(s) handled by BIOS
Press <Ctrl><H> for WebBIOS or press <Ctrl><Y> for Preboot CLI
```

If WebBIOS CU detects a foreign configuration, the following screen appears when enter the WebBIOS CU.



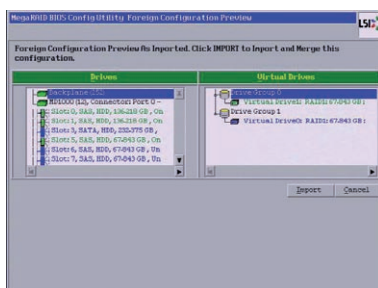
Follow these steps to import or clear a foreign configuration:

1. Click the drop-down list to show the configurations.
The GUID (Global Unique Identifier) entries on the drop-down list are OEM names and will vary from one installation to another.

2. Select a configuration or **All Configurations**.

3. Perform one of the following steps:

- Click **Preview** to preview the foreign configurations. The Foreign Configuration Preview screen appears, as shown in the right figure.
- Click **Clear** to clear the foreign configurations and reuse the drives for another virtual drive.



If you click **Cancel**, it cancels the importation or preview of the foreign configuration.

The right panel shows the virtual drive properties of the foreign configuration. In this example, there are two RAID1 virtual drives with 67.843GB each. The left panel shows the drives in the foreign configuration.

4. Click **Import** to import this foreign configuration(s) and use it on this controller.

Foreign Configurations in Cable Pull and Disk Removal Scenarios

If one or more drives are removed from a configuration, by a cable pull or drive removal, for example, the configuration on those drives is considered a foreign configuration by the RAID controller.

Use the **Foreign Configuration Preview** screen to import or clear the foreign configuration in each case.

The following scenarios can occur with cable pulls or physical drive removals.



If you want to import the foreign configuration in any of the following scenarios, you should have all the drives in the enclosure before you perform the import operation.

1. Scenario #1: If all of the drives in a configuration are removed and re-inserted, the controller considers the drives to have foreign configurations.

Import or clear the foreign configuration. If you select **Import**, automatic rebuilds will occur in redundant virtual drives.



Start a consistency check immediately after the rebuild is complete to ensure data integrity for the virtual drives.

2. Scenario #2: If some of the drives in a configuration are removed and re-inserted, the controller considers the drives to have foreign configurations.

Import or clear the foreign configuration. If you select **Import**, automatic rebuilds will occur in redundant virtual drives.



Start a consistency check immediately after the rebuild is complete to ensure data integrity for the virtual drives.

3. Scenario #3: If all the drives in a virtual drive are removed, but at different times, and re-inserted, the controller considers the drives to have foreign configurations.

Import or clear the foreign configuration. If you select **Import**, all drives that were pulled **before** the virtual drive became offline will be imported and then automatically rebuilt. Automatic rebuilds will occur in redundant virtual drives.

4. Scenario #4: If the drives in a non-redundant virtual drive are removed, the controller considers the drives to have foreign configurations.

Import or clear the foreign configuration. No rebuilds will occur after the import operation because there is no redundant data to rebuild the drives with.

2.3 MegaRAID Storage Manager

MegaRAID Storage Manager software enables you to configure, monitor, and maintain storage configurations on LSI SAS controllers. The MegaRAID Storage Manager graphical user interface (GUI) makes it easy for you to create and manage storage configurations.

2.3.1 Hardware and Software Requirements

The hardware requirements for MegaRAID Storage Manager software are as follows:

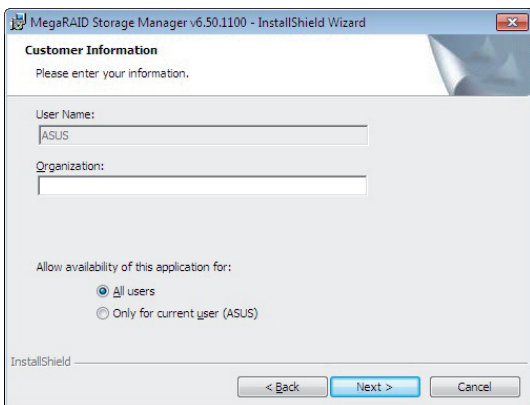
- PC-compatible computer with an IA-32 (32-bit) Intel Architecture processor or an EM64T (64-bit) processor and at least 128 Mbytes of system memory (256 Mbytes recommended)
- Disk drive with at least 50 Mbytes available free space

Refer to your server documentation and to the operating system documentation for more information on hardware and operating system requirements.

2.3.2 Installing MegaRAID Storage Manager Software on Microsoft Windows OS

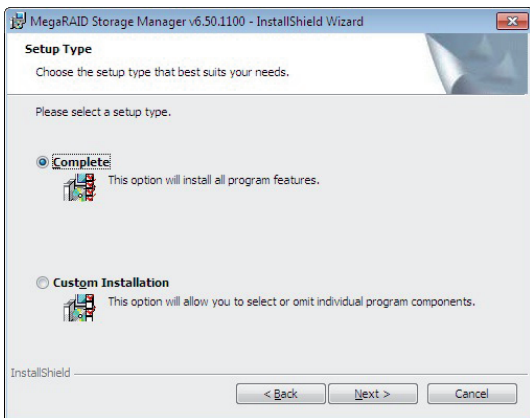
Follow these steps if you need to install MegaRAID Storage Manager software on a system running Microsoft Windows OS:

1. Insert the MegaRAID Storage Manager software installation CD in the CD-ROM drive.
If necessary, find and double-click the setup.exe file to start the installation program.
2. When the Welcome screen appears, click **Next**.
If MegaRAID Storage Manager software is already installed on this system, the Program Maintenance screen appears. Read the screen text and select **Modify, Repair, or Remove**.
3. When the next screen appears, read and accept the user license, and click **Next**.
The Customer Information screen appears, as shown in the following figure.



4. Enter your user name and organization name. In the bottom part of the screen, select an installation option:
 - If you select **All users**, any user with administrative privileges can use this version of MegaRAID Storage Manager software to view or change storage configurations.
 - If you select **Only for current user**, the MegaRAID Storage Manager shortcuts and associated icons will be available only to the user with this user name.
5. Click **Next** to continue.
6. On the next screen, accept the default Destination Folder, or click **Change** to select a different destination folder. Click **Next** to continue.

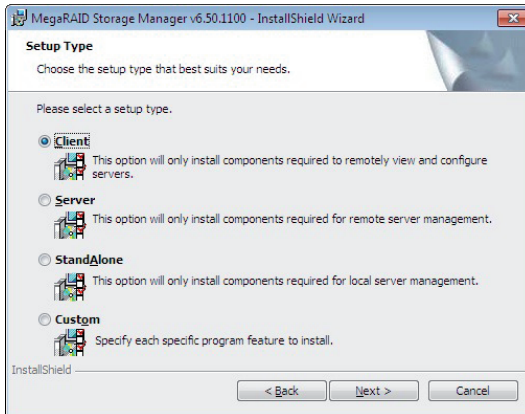
The Setup Type screen appears, as shown in the following figure.



7. Select one of the Setup options. The options are fully explained in the screen text.
 - Normally, you would select **Complete** if you are installing MegaRAID Storage Manager software on a server.
 - Select **Custom Installation** if you want to select individual program components.
8. Click **Next** to continue.

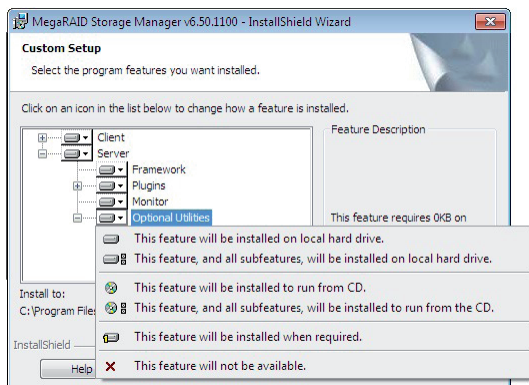
If you selected **Custom Installation** as your setup option, the second Setup Type screen appears, as shown in the following figure.

If you select **Complete** as your setup option, the Installation Wizard is ready to install MSM. To begin installation, click on **Install** on the next screen that appears.



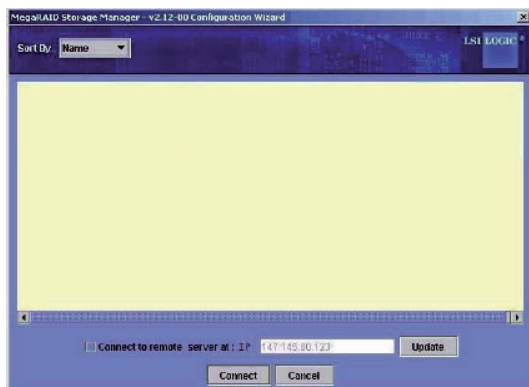
9. Select one of the custom setup options. The options are fully explained in the screen text.
 - Select **Client** if you are installing MegaRAID Storage Manager software on a PC that will be used to view and configure servers over a network. To begin installation, click on **Install** on the next screen that appears.
 - Select **Server** to install only those components required for remote server management. To begin installation, click on **Install** on the next screen that appears.
 - Select **StandAlone** if you will use MegaRAID Storage Manager software to create and manage storage configurations on a standalone workstation. To begin installation, click on **Install** on the next screen that appears.
 - Select **Custom** if you want to specify individual program features to install.

If you select **Custom**, a window listing the installation features appears, as shown in the following figure. Select the features you want on this screen.



10. Click **Next** to proceed.
11. Click **Install** to install the program.
12. When the final Configuration Wizard screen appears, click **Finish**.

If you select **Client** installation for a PC used to monitor servers, and if there are no available servers with a registered framework on the local subnet (that is, servers with a complete installation of MegaRAID Storage Manager software), the server screen will appear, as shown in the following figure. The server screen will not list any servers. You can use this screen to manage systems remotely.



2.3.3 Installing MegaRAID Storage Manager Software for Linux

Follow these steps if you need to install MegaRAID Storage Manager software on a system running Red Hat Linux or SUSE Linux:

1. Copy the **MSM_linux_installer...tar.gz** file to a temporary folder.
2. Untar the **MSM_linux_installer...tar.gz** file using the following command:
tar -zxvf MSM_linux_installer...tar.gz
A new **disk** directory is created.
3. Go to the new **disk** directory.
4. In the **disk** directory, find and read the **readme.txt** file.
5. To start the installation, enter the following command:
cd /disk; ./install.sh -a

If you select **Client** installation for a PC used to monitor servers, and if there are no available servers with a registered framework on the local subnet (that is, servers with a complete installation of MegaRAID Storage Manager software), the server screen appears. The server screen does not list any servers. You can use this screen to manage systems remotely.

2.3.4 Linux Error Messages

The following messages may appear while you are installing MegaRAID Storage Manager software on a Linux system:

- **More than one copy of MegaRAID Storage Manager software has been installed.**

This message indicates that the user has installed more than one copy of MegaRAID Storage Manager software. (This can be done by using the rpm-force command to install the rpm file directly, which is not recommended, instead of using the install.sh file.) In such cases, the user must uninstall all the rpm files manually before installing MegaRAID Storage Manager software with the procedure listed previously.

- **The version is already installed.**

This message indicates that the version of MegaRAID Storage Manager software you are trying to install is already installed on the system.

- **The installed version is newer.**

This message indicates that a version of MegaRAID Storage Manager software is already installed on the system, and it is a newer version than the version you are trying to install.

- **Exiting installation.**

This is the message that appears when the installation is complete.

- **RPM installation failed.**

This message indicates that the installation failed for some reason. Additional message text explains the cause of the failure.

2.3.5 Starting MegaRAID Storage Manager Software

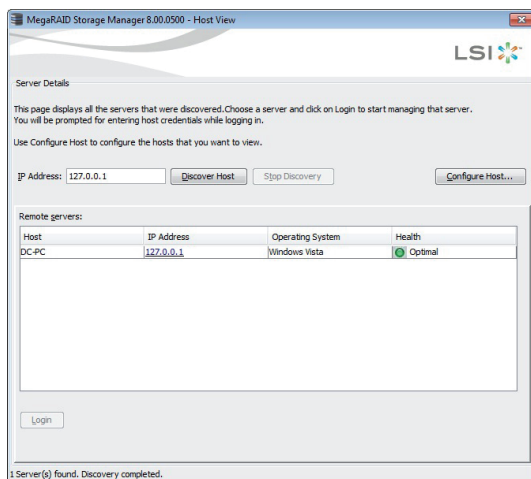
Follow these steps to start MegaRAID Storage Manager software and view the main window:

1. Start the program using the method required for your operating system environment:
 - To start MegaRAID Storage Manager software on a Microsoft Windows system, select **Start > All Programs > MegaRAID Storage Manager > StartupUI**, or double-click the MegaRAID Storage Manager shortcut on the desktop.



If a warning appears stating that Windows Firewall has blocked some features of the program, click **Unblock** to allow MegaRAID Storage Manager software to start. (The Windows Firewall sometimes blocks the operation of programs that use Java.)

- To start MegaRAID Storage Manager software on a Red Hat Linux system, select **Applications > System Tools > MegaRAID Storage Manager StartupUI**.
 - To start MegaRAID Storage Manager software on a SUSE SLES system, select **Start > System > More Programs > MegaRAID Storage Manager**.
2. When the program starts, the select server window appears, as shown in the following figure.



If the circle in Health column of the corresponding server is orange instead of green, it means that the server is running in a degraded state—for example, because a drive used in a virtual drive has failed. If the circle is red, the storage configuration in the server has failed.

You can click **Configure Host** if you want to select the display preferences for the server. You can choose to display only the local server, systems from a list, or display all of the systems in the network of the local server.

3. Double-click the icon of the server that you want to access. The server login window appears, as shown in the following figure.



4. Select an access mode from the drop-down menu.
 - Select **Full Access** if you need to both view the current configuration and change the configuration.
 - Select **View Only** if you need to only view and monitor the configuration.
5. Enter your user name and password, and click **Login**.

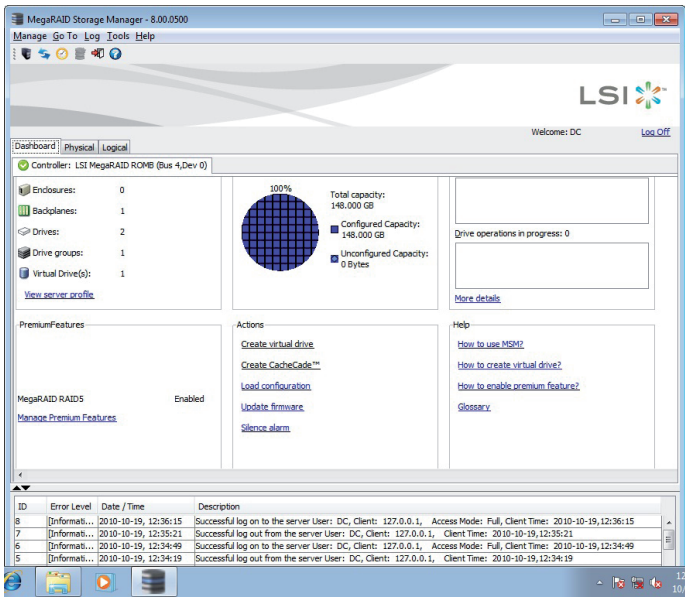


If the computer is networked, this is the login to the computer itself, not the network login.

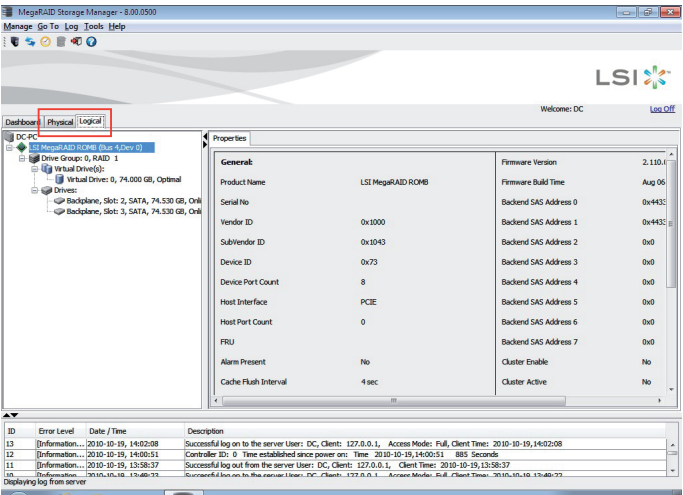
You must enter the root/administrator user name and password to use Full Access mode. If your user name and password are correct for the Login mode you have chosen, the main MegaRAID Storage Manager window appears.

2.3.6 MegaRAID Storage Manager Window

After you log in, the dashboard view provides an overview of the system and covers the properties of the virtual drives and the physical drives, total capacity, configured capacity, unconfigured capacity, background operations in progress, MegaRAID Storage Manager features and their status (enabled or disabled), and actions you can perform, such as creating a virtual drive and updating the firmware, as shown in the following figure.



You can click the Physical tab to view the drives connected to the controller or Logical tab to view the virtual drives connected to the controller.



The following icons in the left panel represent the controllers, drives, and other devices:

- System
- Controller
- Slot for a drive
- Drive group
- Virtual drive

A red circle to the right of an icon indicates that the device has failed. For example, this icon indicates that a drive has failed:

A yellow circle to the right of an icon indicates that a device is running in a degraded state. For example, this icon indicates that a virtual drive is running in a degraded state because a drive has failed:

Properties View Panel

The right panel of the MegaRAID Storage Manager window has the **Properties** tab that displays information about the selected device. For example, if a controller icon is selected in the left panel, the Properties tab lists information such as the controller name, NVRAM size, and device port count.

Event Log Panel

The lower part of the MegaRAID Storage Manager window displays the system event log entries. New event log entries appear during the session. Each entry has an ID, a timestamp and date, an error level indicating the severity of the event, and a brief description of the event.

Menu Bar

Here are brief descriptions of the main selections on the MegaRAID Storage Manager menu bar.

Manage Menu

The **Manage** menu has an **Exit** option for exiting from the MegaRAID Storage Manager software. It also has a **Refresh** option for updating the display in the MegaRAID Storage Manager window. (Refresh is seldom required; the display normally updates automatically.)

The **Manage** menu options also include **Check Consistency**, **Initialize**, and **Show Progress**.

Go To Menu

The **Go To** menu is available when a controller, physical drive, or virtual disk is selected in the MegaRAID Storage Manager window. The **Go To** menu options vary depending on what type of device is selected in the left panel of the MegaRAID Storage Manager window. For example, the **Scan Foreign Configuration** option is available only when a controller is selected. The options also vary depending on the current state of the selected device. For example, if you select an offline physical drive, the **Make Drive Online** option will be available in the **Go To** menu.

Log Menu

The Log menu includes options for saving and clearing the message log.

Tools Menu

On the Tools menu you can select **Configure Alerts** to access the Event Configuration Notification screen, which you can use to set the alert delivery rules, event severity levels, exceptions, and email settings.

Help Menu

On the Help menu you can select **Help > Contents** to view the MegaRAID Storage Manager online help file. You can select **Help > About MegaRAID Storage Manager** to view version information for the MegaRAID Storage Manager software.



- When you use the MegaRAID Storage Manager online help, you may see a warning message that Internet Explorer has restricted the file from showing active content. If this warning appears, click on the active content warning bar and enable the active content.
- If you are using the Linux operating system, you must install Firefox® or Mozilla® for the MegaRAID Storage Manager online help to display.

This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across its entire width, providing a guide for handwriting or typing. The paper itself is a clean, off-white color.

This chapter provides instructions for installing the RAID drivers on different operating systems.

3 Driver installation

3.1 RAID driver installation

After creating the RAID sets for your server system, you are now ready to install an operating system to the independent hard disk drive or bootable array. This part provides instructions on how to install or update the RAID card drivers.



The RAID card driver might be included in the Linux OS installation CD, and could be loaded automatically during OS installation. However, we recommend using the RAID driver packaged in the RAID card support CD for better reliability.

3.1.1 Creating a RAID driver disk

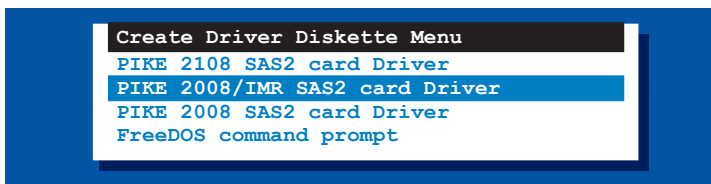


You may have to use another system to create the RAID driver disk from the RAID card support CD or from the Internet.

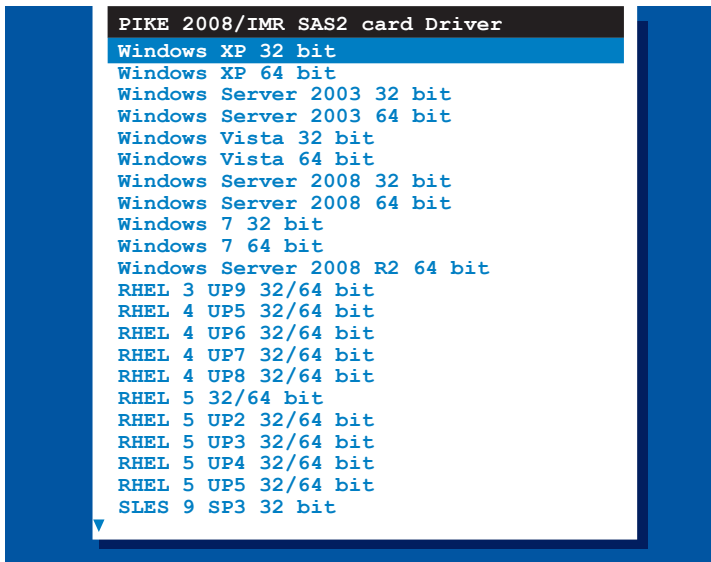
A floppy disk with the RAID driver is required when installing Windows® Server 2003 or Linux operating system on a hard disk drive that is included in a RAID set. You can create a RAID driver disk in DOS (using the Makedisk application in the support CD).

To create a RAID driver disk in DOS environment:

1. Place the RAID card support CD in the optical drive.
2. Restart the computer, then enter the BIOS Setup.
3. Select the optical drive as the first boot priority to boot from the support CD. Save your changes, then exit the BIOS Setup.
4. Restart the computer.
5. The Makedisk menu appears. Select **PIKE 2008/IMR SAS2 card Driver**, and press <Enter> to enter the submenu.



6. Use the arrow keys to select the type of RAID driver disk you want to create.



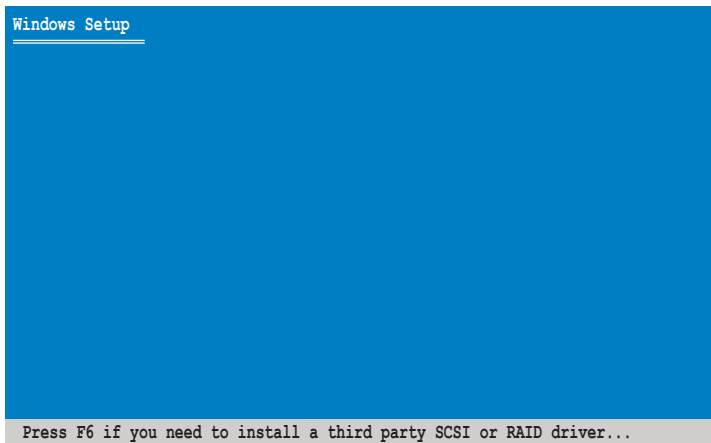
7. Place a blank, high-density floppy disk to the floppy disk drive.
8. Press <Enter>.
9. Follow screen instructions to create the driver disk.

3.1.2 Windows® Server 2003 OS

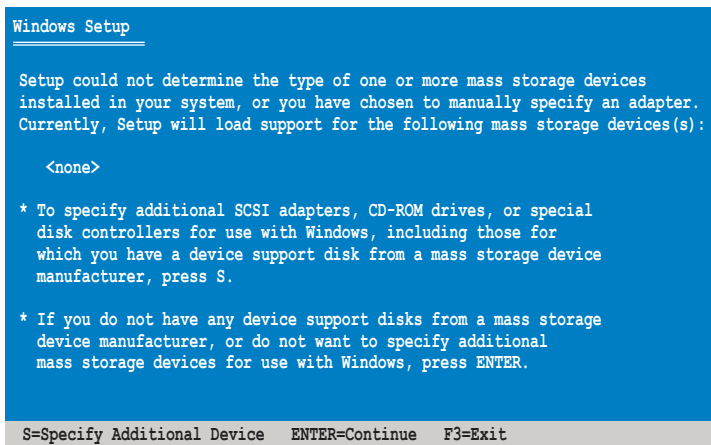
During Windows® Server 2003 OS installation

To install the RAID card driver when installing Windows® Server 2003 OS:

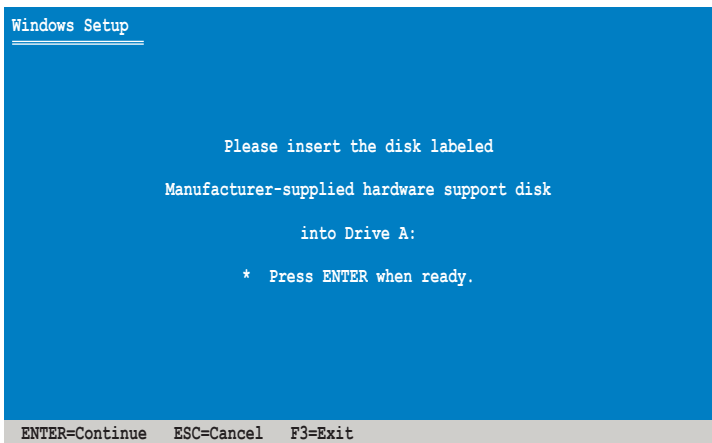
1. Boot the computer using the Windows® Server 2003 OS installation CD. The **Windows® Setup** starts.
2. Press <F6> when the message “Press F6 if you need to install a third party SCSI or RAID driver...” appears at the bottom of the screen.



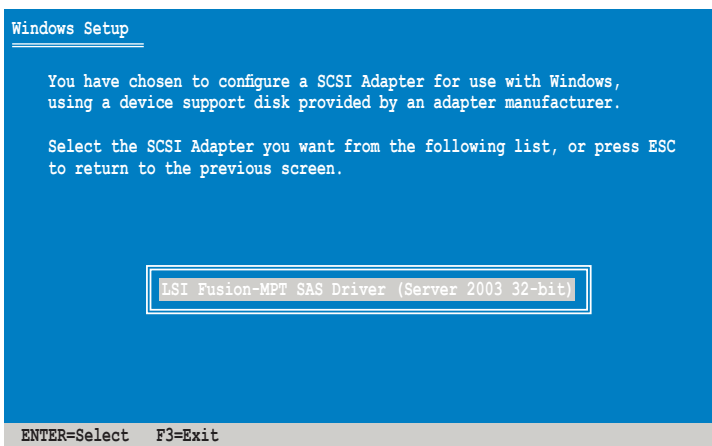
3. The next screen appears. Press <S> to specify an additional device.



4. Insert the RAID driver disk you created earlier to the floppy disk drive, then press <Enter>.



5. Select **LSI Fusion-MPT SAS Driver (Server 2003 32-bit)**, then press <Enter>.



6. The Windows® Setup loads the RAID card drivers from the RAID driver disk. When next screen appears, press <Enter> to continue installation.
7. Setup then proceeds with the OS installation. Follow screen instructions to continue.

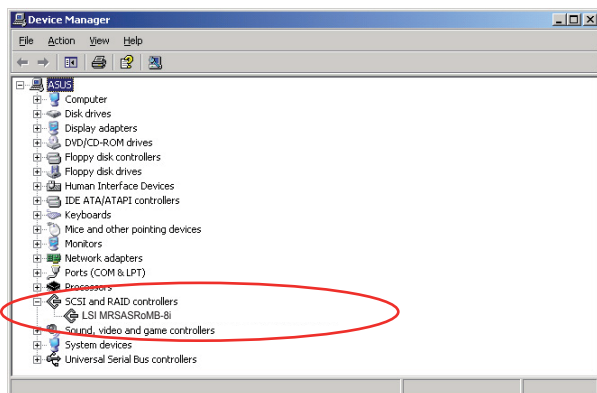
After Windows® Server 2003 OS installation

To update the RAID card driver after installing Windows® Server 2003 OS:

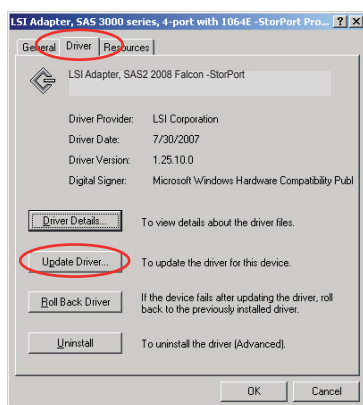
1. Right-click the **My Computer** icon on the desktop and select **Properties** from the menu.
2. Click the **Hardware** tab on the top, then click the **Device Manager** button.
3. Double-click the **LSI MRSASRoMB-8i** item.



The controller name differs according to the installed SAS RAID card.



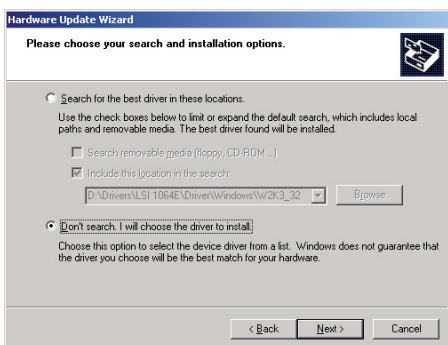
4. Click the **Driver** tab on the top, then click **Update Driver**.



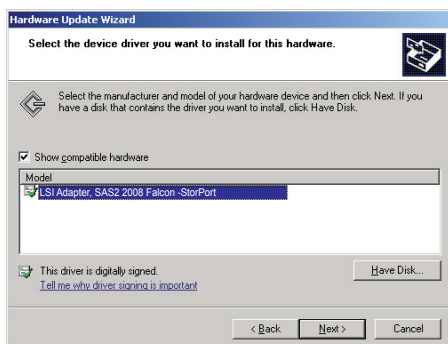
5. Toggle **Install from a list or specific location (Advanced)**, then click **Next** to continue.



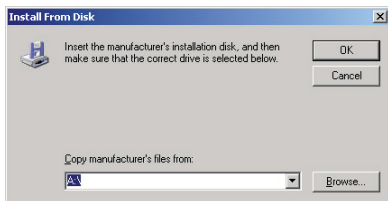
6. Toggle **Don't search. I will choose the driver to install**, then click **Next** to continue.



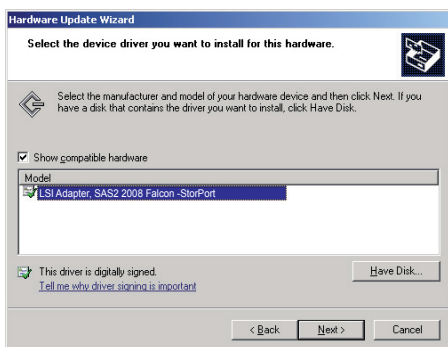
7. Insert the RAID driver disk you created earlier to the floppy disk drive.
8. Highlight **LSI Adapter, SAS2 2008 Falcon -StorPort**, then click **Have Disk**.



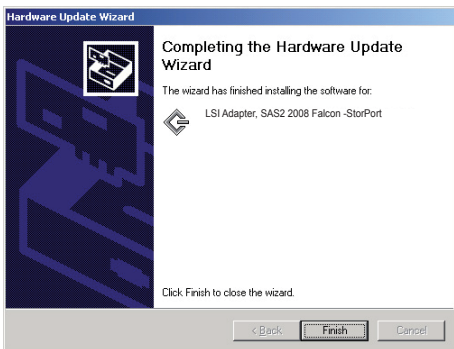
9. Select from the drop-down menu and locate the driver.



10. Click **Next** to start updating the driver.



11. After completing driver update, click **Finish** to close the wizard.



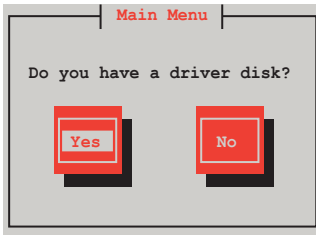
3.1.3 Red Hat® Enterprise Linux OS 5

To install the RAID card driver when installing Red Hat® Enterprise OS:

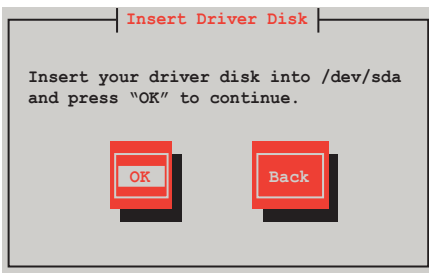
1. Boot the system from the Red Hat® OS installation CD.
2. At the `boot:`, type `linux dd`, then press <Enter>.

```
- To install or upgrade in graphical mode, press the <ENTER> key.  
- To install or upgrade in text mode, type: linux text <ENTER>.  
- Use the function keys listed below for more information.  
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]  
boot: linux dd
```

3. Select **Yes** using the <Tab> key when asked if you have the driver disk, then press <Enter>.

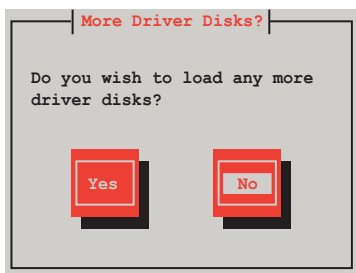


4. Insert the Red Hat® Enterprise RAID driver disk to the USB floppy disk drive, select **OK**, then press <Enter>.

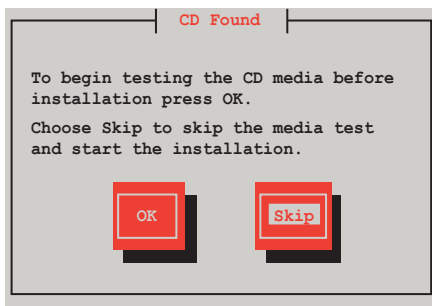


The drivers for the RAID card are installed to the system.

- When asked if you will load additional RAID controller drivers, select **No**, then press <Enter>.



- Select **Skip** and press <Enter> to continue.



- Follow the screen instructions to continue the OS installation.

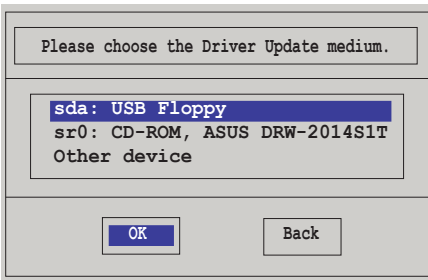
3.1.4 SUSE Linux OS 11

To install the RAID card driver when installing SUSE Linux Enterprise Server OS:

1. Boot the system from the SUSE OS installation CD.
2. Use the arrow keys to select **Installation** from the **Boot Options** menu.



3. Press <F6>, then select **Yes** from the menu. Press <Enter>.
4. Insert the RAID driver disk to the USB floppy disk drive. Ensure that **Installation** from the **Boot Options** menu is selected, then press <Enter>.
5. When below screen appears, select the USB floppy disk drive (sdx) as the driver update medium. Select **OK**, then press <Enter>.



The drivers for the RAID controller are installed to the system.

[illegible]