

# USER'S GUIDE

# ServeRAID-MR10k

February 2009

IBM P/N: 46M1379

#### Third Edition (February 2009)

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### Preface

This user's guide explains how to install and use the ServeRAID-MR10k SAS/SATA Customized Enabler DIMM product.

#### Audience

This document assumes that the reader is familiar with installing add-in boards to computers.

The people who benefit from this book are:

- End users who need to install the ServeRAID-MR10k SAS/SATA Customized Enabler DIMM
- Engineers and managers who are evaluating BBU products for possible use

#### Organization

This document has the following chapters:

- Chapter 1, Introduction, describes the ServeRAID-MR10k SAS/SATA DIMM and explains how its operates.
- Chapter 2, Installing a ServeRAID-MR10k SAS/SATA DIMM, explains how to install the ServeRAID-MR10k SAS/SATA DIMM.
- Chapter 3, Managing RAID Arrays, explains how to use and monitor the ServeRAID-MR10k SAS/SATA DIMM and how to replace it.
- Chapter 4, Intelligent Transportable Battery Backup Unit Specifications, has complete technical information and specifications for the ServeRAID-MR10k SAS/SATA DIMM.

• Appendix A, **Notices**, contains information about the warranty, patents, license inquiries, and trademarks.

#### **Related Publications**

#### ServeRAID-MR Software User's Guide

IBM Document Number: 46M1381

This document explains how to use the MegaRAID Storage Manager, WebBIOS, and Command Line Interface (CLI) utilities to configure, monitor, and maintain your ServeRAID-MR10 storage adapter and the storage-related devices connected to it.

#### ServeRAID-MR Device Driver Installation User's Guide

IBM Document Number: 46M1382

This document explains how to install the ServeRAID-MR10 device driver for your operating system. The information in this document is independent of the back-end bus and applies to the ServeRAID-MR10k SAS/SATA DIMM.

#### **IBM Systems Safety Notices**

IBM Document Number: G229-9054-01

This book contains safety notices from IBM Systems documentation. The safety notices include danger and caution notices.

#### Notices and Statements in This Document

The caution and danger statements in this document are also in the multilingual *IBM Systems Safety Notices* document, which is on the *ServeRAID-MR Support* CD. Each statement is followed by a reference number that you can use to locate the corresponding statement in your language in the IBM Systems Safety Notices document. The following notices and statements are used in this document:

Note: These notices provide important tips, guidance, or advice.

- Important: These notices provide information or advice that might help you avoid inconvenient or problem situations.
- <u>Attention:</u> These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage might occur.
- <u>CAUTION:</u> These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- DANGER: These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

#### **Revision History**

IBM Document Number	Edition/Date	Remarks
46M1379	Third Edition February 2009	Updated the procedures for monitoring and maintaining the intel- ligent Battery Backup Unit.
43W7850	Second Edition November 2007	Second edition of document.
43W7841	First Edition November 2007	Initial release of document.

#### **IBM Customer Support**

Web site: http://www.ibm.com/systems/support/

#### Safety Instructions

Use the following safety guidelines to help protect your computer system from potential damage and to ensure your own personal safety.

<u>Note:</u> Use the ServeRAID-MR10k DIMM with UL-listed Information Technology Equipment (ITE) products only.



#### DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- Connect power to this unit only with the provided power cord. Do not use the provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
- Connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

- 1. Turn off everything (unless instructed otherwise).
- 2. Remove the power cords from the outlets.
- 3. Remove the signal cables from the connectors.
- 4. Remove all cables from the devices.

To connect:

- 1. Turn off everything (unless instructed otherwise).
- 2. Attach all cables to the devices.
- 3. Attach the signal cables to the connectors.
- 4. Attach the power cords to the outlets.
- 5. Turn on the devices.

(D005)



#### CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

**Protecting against Electrostatic Discharge** – Static electricity can harm delicate components inside your computer. To prevent static damage, discharge static electricity from your body before you touch any of your computer's electronic components, such as the microprocessor. You can do so by touching an unpainted metal surface, such as the metal around the card-slot openings at the back of the computer.

As you continue to work inside the computer, periodically touch an unpainted metal surface to remove any static charge your body may have accumulated. In addition to the preceding precautions, you can also take the following steps to prevent damage from electrostatic discharge:

- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the antistatic packing material until you are ready to install the component in your computer. Just before unwrapping the antistatic packaging, be sure to discharge static electricity from your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components in a static-safe area. If possible, use antistatic floor pads and workbench pads.

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# Chapter 1 Introduction

IBM provides the ServeRAID-MR10k Serial-attached SCSI (SAS)/Serial ATA (SATA) Customized Enabler DIMM for use on the IBM System x3850 M2 and IBM System x3950 M2 servers. The ServeRAID-MR10k SAS/SATA Customized Enable DIMM offers a flexible RAID-on-motherboard (ROMB), direct-attached storage (DAS) solution based on the LSI1078ROC (RAID-on-Chip).

You can use the ServeRAID-MR10k DIMM to make the system operate in MegaRAID (MR) mode, which uses the MR stack, and the DIMM management and configuration tools. If the ServeRAID-MR10k DIMM is not installed in the system, the LSI SAS1078 operates in the Integrated RAID (IR) mode, which supports RAID levels 0 and 1.

The ServeRAID-MR10k DIMM consists of two pieces:

- A customized 240-pin DIMM module that contains a RAID key, which contains hardware needed to use advanced MegaRAID features
- A remote intelligent transportable battery backup unit (iTBBU)

The intelligent Transportable Battery Backup Unit (iTBBU) protects the integrity of the cached data on the DIMM by providing backup power if there is a complete AC power failure or a brief power outage.

#### 1.1 Integrated RAID Mode

The Integrated RAID solution simplifies the configuration options and provides firmware support in its host adapters. IBM offers two types of Integrated RAID (IR): Integrated Mirroring (IM), and Integrated Striping (IS).

Integrated RAID supports the following types of RAID configurations:

- Up to ten disks per Integrated Striping volume, with one or two storage volumes per controller. Each controller can support up to 12 volume disks, plus one or two hot spare disks, for a maximum of 14 disks per controller. (Support for this number of disks requires Integrated RAID firmware v1.20.00 or above.)
- Two-disk IM mirrored volumes

Table 1.1 lists the controller and software features for Integrated RAID.

Supported disk types	Serial Attached Storage (SAS) and Serial ATA II (SATA II)
External support	None available
System supported	IBM System x3850 M2 and IBM System x3950 M2
Supported RAID levels	RAID 0, and RAID 1
Maximum number of volumes	Two volumes maximum in a mixture of RAID 0 arrays and RAID 1 arrays
Maximum number of drives supported	Four drives total in two volumes
Virtual disk size limit	20 Tbytes (there is a 64-bit addressing limit)
Supported RAID management utilities	Integrated RAID (IR), CTRL+C, MegaRAID Storage Manager (MSM), and cfggen (command line interface)

Table 1.1 Integrated RAID Functionality

#### 1.2 MegaRAID Mode

The ServeRAID-MR10k DIMM is used to make the LSISAS1078 adapter operate in MR mode. This mode offers the MR stack, and the MR management and configuration tools.

Table 1.2 lists the DIMM features and software features for MR.

Supported disk types	SAS and SATA II (SATA II disks are supported in External Enclosures only)
Systems supported	IBM System x3850 M2 and IBM System x3950 M2
External support	EXP3000 enclosures with cascading up to a maximum of 9 enclosures
Battery backup unit	A chassis-mounted battery, providing 72 hours of backup for one year
Memory Key	Memory Key can be installed on the system board

Table 1.2 MegaRAID Functionality

Connector	Dedicated system connector
Type of connector	256 Mbytes, 72-bit iTBBU with a custom DDR2 connector
Supported RAID levels	RAID 0, 1, 5, 6, 10, 50, and 60
Maximum number of volumes	64
Maximum number of drives supported	116 drives [4 internal drives and 112 external drives in 9 cascaded enclosures]
Virtual disk size limit	20 Tbytes (there is a 64-bit addressing limit)
Supported RAID management utilities	WebBIOS (CTRL-H), MegaRAID Storage Manager (MSM), and MegaCLI (Command Line Interface)

#### Table 1.2 MegaRAID Functionality

#### 1.3 Differences between Integrated RAID and MegaRAID

Table 1.3 shows differences between the Integrated RAID features and the MegaRAID features.

#### Table 1.3 Comparison of Integrated RAID and MegaRAID

	Integrated RAID	MegaRAID
RAID level support	RAID 0 and RAID 1	RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, RAID 50, and RAID 60
Disk access through the operating system	All devices are accessible by the operating system (OS). Member disks are hidden from OS, when added to a virtual disk	All devices are hidden from the OS until they are included in a virtual disk
Stripe size	64 Kbytes	16 Kbytes - 1 Mbyte (you can select the stripe size)

#### 1.4 Battery Backup Functions

Writing a block of data to cache memory is much faster than writing it to a storage device. The ServeRAID-MR10k DIMM then writes the cached data to the storage device when system activity is low or when the cache is getting full. The risk of using write-back cache is that the cached data can be lost if the AC power fails before it has been written to the storage device. This risk factor is eliminated when the ServeRAID-MR10k DIMM has an onboard iBBU. The ServeRAID-MR10k DIMM monitors the voltage level of the DDR2 modules installed on the DIMM. If the voltage drops below a predefined level, the battery backup module switches the memory power source from the DIMM to the battery pack attached to the iBBU. As long as the voltage level stays below the predefined value, the iBBU provides power for memory. If the voltage level returns to an acceptable level, the iBBU switches the power source back to the DIMM, and all incomplete writes to storage devices are completed with no data loss.

An *intelligent* BBU has built-in functionality to charge the battery pack automatically and to communicate battery status information such as voltage, temperature, and current, to the host computer system.

A *transportable* BBU can be used to move a RAID DIMM's cached data to a replacement DIMM if that data has not been written to a disk. This could be necessary if, for example, the DIMM fails after an unexpected power failure. After you install the transportable BBU on the new RAID DIMM, it flushes the unwritten data preserved in the cache to the disk through the new DIMM.



#### CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

# Chapter 2 Installing a ServeRAID-MR10k SAS/SATA DIMM

This chapter explains how to install the ServeRAID-MR10k SAS/SATA Customized Enabler DIMM.

Attention: Electrostatic discharge can damage the battery backup unit (BBU) and the DIMM on which it is installed. Always ground yourself and/or use a ground strap before you touch the storage adapter or the BBU. Perform all installation work at an ESD safe workstation that meets the requirements of EIA-625—"Requirements for Handling Electrostatic Discharge Sensitive Devices." Follow the ESD recommended practices in the latest revision of IPC-A-610.

The battery in the iTBBU must charge for at least six hours under normal operating conditions. To protect your data, the firmware changes the Write Policy to *write-through* until the battery unit is sufficiently charged. When the battery unit is charged, the DIMM firmware changes the Write Policy to *write-back* to take advantage of the performance benefits of data caching.

The maximum ambient temperature for battery packs is 0° C to 45° C.

<u>Note:</u> The temperature of the battery pack during fast charge is typically 15–20 degrees higher than the ambient temperature. Therefore, for the fast charge circuit to complete a fast charge cycle, the ambient temperature should be less than 40° C. If the ambient temperature is greater than 40° C, the fast charge cycle could terminate prematurely.

#### 2.1 Installing the ServeRAID-MR10k SAS/SATA DIMM

This section describes the installation of the ServeRAID-MR10k DIMM on the IBM System x3850 M2 and IBM System x3950 M2. The ServeRAID-MR10k DIMM mounts in a DIMM socket on the motherboard. The remote intelligent BBU is mounted in a bracket next to the DIMM.

Figure 2.1 displays the custom 240-pin DDR2 form factor that contains the RAID key. The J1 connector on the back of the DIMM connects by cable to the remote iTBBU.

#### Figure 2.1 DIMM Module



Figure 2.2 displays the remote intelligent transportable battery backup unit that connects by cable to the DIMM module.

#### Figure 2.2 Remote Intelligent Transportable Battery Backup Unit





#### CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

#### 2.1.1 Installing the ServeRAID-MR10k SAS/SATA DIMM

This subsection describe the types of adapters that the server supports and other information that you must consider when you install an adapter:

- Avoid touching the components and gold-edge connectors on the adapter.
- The server scans devices and PCI Express slots to assign system resources in the following order: the integrated Ethernet controller, the integrated SAS controller, and then the PCI Express slots 1 through 7. If you have not changed the default startup sequence, the server starts the devices in the following order: DVD drive, USBattached diskette drive, integrated SAS controller, PCI Express slots 1 through 7, and the integrated Ethernet controller.
  - <u>Note:</u> To change the startup sequence, start the Configuration/Setup Utility program and select Start Options from the main menu.
- The optional ServeRAID-MR10k DIMM can be installed only in its dedicated connector on the I/O board. See the following illustration for the location of the connector on the I/O board. The DIMM is not cabled to the server, and no rerouting of the SAS cables is required.

Section Figure 2.3, "Installation of the ServeRAID-MR10k SAS/SATA DIMM," shows how to install the ServeRAID-MR10k DIMM.

Figure 2.3 Installation of the ServeRAID-MR10k SAS/SATA DIMM



To install the ServeRAID-MR10k DIMM, complete the following steps.

- Step 1. Read the safety information that begins in the preface and the installation guidelines in this section.
- Step 2. Turn off the server and peripheral devices, and disconnect the power cords and all external cables as necessary to replace the device.
- <u>Attention:</u> When you handle static-sensitive devices, take precautions to avoid damage from static electricity.
- Step 3. Remove the server cover.
- Step 4. Remove the divider that contains the battery holder from the server.
- Step 5. Open the retaining clip on each end of the connector.

- Step 6. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the server; then, remove the DIMM from the package.
- Step 7. Turn the DIMM so that the keys align correctly with the slot.
- Step 8. Insert the DIMM into the connector by aligning the edges of the DIMM with the slots at the ends of the connector.
- <u>Attention:</u> Incomplete insertion might cause damage to the server or the DIMM.
- Step 9. Firmly press the DIMM straight down into the connector by applying pressure on both ends simultaneously.

The retaining clips snap into the locked position when the DIMM is seated in the connector.

- Step 10. Install the battery in the divider that contains the battery holder.
- Step 11. Install the divider that contains the battery holder in the server.
- Step 12. Route the battery cable through the cable routing guides on the divider to the DIMM.
- Step 13. Insert the battery cable connector into the J1 connector on the backside of the DIMM.

# Chapter 3 Managing RAID Arrays

This chapter explains how to use the ServeRAID-MR10k SAS/SATA Customized Enabler DIMM to migrate configurations from Integrated RAID (IR) to MegaRAID<sup>®</sup> (MR). It explains how to perform an operating system transition. In addition, it describes supported configurations and limitations, and how to import a foreign configuration.

The transition from Integrated RAID to the MR stack is performed while the server is powered off. When the MR stack is enabled by the ServeRAID-MR10k DIMM, the MR stack imports all previously defined IR virtual disks without notification. This import is permanent and cannot be reversed.

Click on the following links to view instructions on how to use the :

- Section 3.1, "Supported Configurations and Limitations"
- Section 3.2, "Importing Integrated RAID Arrays into MegaRAID Using WebBIOS"
- Section 3.3, "Monitoring the iTBBU Using the MegaRAID Configuration Utilities"
- Section 3.4, "Replacing the Battery Backup Unit"

You can use the following management utility programs to import the configuration:

- WebBIOS Configuration Utility (CTRL-H)
- MegaRAID Storage Manager (MSM)
- MegaCLI (Command Line Interface)

<u>Note:</u> For complete information on these utilities, refer to the *ServeRAID-MR Software User's Guide*, IBM Document Number 46M1381.

#### 3.1 Supported Configurations and Limitations

This section describes the types of configurations that are supported by the ServeRAID-MR10k DIMM, which include optimal arrays, multiple disk groups with mixed RAID levels, hotspares, and arrays in optimal, degraded, or rebuild state.

See Section 3.2, "Importing Integrated RAID Arrays into MegaRAID Using WebBIOS" for the procedure for importing the RAID arrays.

There are two optimal sets of RAID arrays that you can import from Integrated RAID to MegaRAID, as shown in Table 3.1. These RAID sets can keep the same RAID levels when they are imported to MegaRAID.

#### Table 3.1 Optimal RAID Array Migration

Integrated RAID Array -> MegaRAID Array
RAID 1 + RAID 1 -> RAID 1 + RAID 1
RAID 0 + RAID 1 -> RAID 0 + RAID 1

There are other RAID array configurations that you can migrate from IR to MR. You can migrate the following types of RAID arrays with mixed RAID levels:

- One 10-drive RAID 0 array + one RAID 1 array + two hotspares
- Two RAID 1 arrays + two hotspares

You can migrate any array in Optimal, Degraded, or Rebuild State. Note that when migrating an Optimal, Degraded, or Rebuilding array, the array will migrate in the same state. The maximum number of hotspares that you can import from IR into MR is two.

# 3.2 Importing Integrated RAID Arrays into MegaRAID Using WebBIOS

The WebBIOS Configuration Utility (CU) is a web-based utility for configuring and managing RAID volumes. Its operation is independent of the operating system because the utility resides in the RAID controller BIOS.

The WebBIOS CU allows you to import a foreign configuration to the DIMM, or to clear the foreign configuration so you can create a new configuration using the physical disks.

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

<u>Note:</u> 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 WebBIOS CU detects a foreign configuration, the Foreign Configuration screen appears, as shown in Figure 3.1.

#### Figure 3.1 WebBIOS Foreign Configuration Screen

MegaRAID BIOS Configuration Utility For	eign C	onfiguratio	n	LSILCER
1 🕶 😫 😢 💡				
2 Foreign Config(s) Found. Want to Impo	rt?			
Select GUID		O FSC	T	
-				
	Gui	dPreview	ClearForeignCfg	Cancel

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

Click **ClearForeignCfg** if you want to clear the configuration and reuse the physical disks.

Click **GUIDPreview** if you want to preview the foreign configuration. The Foreign Configuration Preview screen appears, as shown in Figure 3.2.

# MegaRAID BIOS Configuration Utility Foreign Configuration Preview Istract Image: Second State State

Figure 3.2 Foreign Configuration Preview Screen

The right panel shows the virtual disk properties of the foreign configuration. In this example, there is a RAID 1 virtual disk with 1,000 Mbytes. The left panel shows the physical disks that comprise the foreign configuration.

Click Import to import this foreign configuration and use it on this DIMM.

Click **Cancel** to clear the configuration and reuse the physical disks for another virtual disk.

# 3.3 Monitoring the iTBBU Using the MegaRAID Configuration Utilities

This section describes how you can use the MegaRAID RAID management utilities to monitor the condition of installed iTBBUs. They include the WebBIOS Configuration Utility, MegaCLI, and MegaRAID Storage Manager. You can also use these utilities to set the battery parameters, such as the battery learn cycle.

#### 3.3.1 Monitoring the iTBBU with the WebBIOS Configuration Utility

You can use the WebBIOS Configuration Utility (CU) to configure drive groups, virtual drives, and backup battery units (BBUs). In addition, you can use the WebBIOS CU to view information about the iTBBU, such as

the voltage, capacity, and temperature. Its operation is independent of the operating system because the utility resides in the MegaRAID BIOS.

Follow these steps to monitor the status of an installed iTBBU with the WebBIOS utility:

- 1. Boot the system.
- 2. Start the WebBIOS CU by pressing CTRL+H when the prompt appears on the screen during boot-up.

The WebBIOS CU main menu screen appears.

3. Click **Controller Properties** on the WebBIOS CU main menu screen.

The first **Controller Properties** screen appears, as shown in Figure 3.3.

	MegaRAID	SAS 8888ELP	EUN Ant
Serial Number	123456	FRU	None
SubVendorID	0x1000	Encryption Capable	No
SubDeviceID	0x1006	NVRAMSize	32 KB
PortCount	8	Memory Size	256 MB
HostInterface	PCIE	Min Stripe Size	8 KB
Firmware Version	1.40.02-0514	Max Stripe Size	1024 KB
FW Package Version	9-1-1-0012	Virtual Drive Count	0
Firmware Time	Aug 29 2008;18:40:33	Drive Count	14
WebBIOS Version	2-2-13-Rel		

Figure 3.3 First Controller Properties Screen

4. Click Next to view the second Controller Properties screen.

The second Controller Properties screen appears, as shown in Figure 3.4. The **Battery Backup** field at the top left of the screen indicates whether the iBBU is present.

Properties				
Battery Backup	Present	Coercion Mode	1GB-way 🔻	
Set Factory Defaults	No 🔻	S.M.A.R.T Polling	300 seconds	
Cluster Mode	Disabled 🔻	Alarm Control	Enabled 🔻	
Rebuild Rate	30	Patrol Read Rate	30	
BGI Rate	30	Cache Flush Interval	4	
CC Rate	30	Spinup Drive Count	2	
Reconstruction Rate	30	Spinup Delay	12	
Controller BIOS	Enabled 🔻	StopOnError	Enabled 🗾	
NCQ	Enabled 🔻	Drive Powersave	Disabled 🔻	
Connector 1	External 🔻	Connector 2	External 🔻	
	👢 Submit	🔉 Reset 🛛 📦 Next		
1 Home			🗼 Back	

Figure 3.4 Second Controller Properties Screen

5. Click the word **Present** in the **Battery Backup** field.

The Battery Module screen appears, as shown in Figure 3.5. This screen contains the following information:

- Battery information
- Design information
- Capacity information
- Auto Learn properties

Battery Type: iTBBU3	DesignInfo
Voltage: 4053 mV	Mfg. Name: ENGENIO
Current: 0	Mfg. Date: 8/25/2006
Temperature: 44 deg.centigrade Status:	Serial No.: <sup>23</sup> FRU: None
gas Gauge Status : Discharging Full Charge Capacity remaining :99% Design Charge Capacity remaining :74% expected margin of error :2%	Design Capacity: 1350 mAh Design Voltage: 3700 mV Device Name: 58_11A Device Chemistry: LION
Capacity Info FullCharge Capacity : 1017 mAh Remaining Capacity : 1002 mAh	Properties         Auto Learn Period(days)       30         Next Learn Time       4/12/2008; 17:18:59         Learn Delay Interval(hrs)       0         Auto Learn Mode       Auto         Image: Solution of the second s
Home VD Progress Info	👘 Back

#### Figure 3.5 Battery Module Screen

Most of the Battery Module properties are view-only and are selfexplanatory.

In the lower right corner of the screen are the Auto Learn options. A *learning cycle* is a battery calibration operation performed by the controller periodically to determine the condition of the battery. You can change the learn delay interval and the auto learn mode.

- Note: LSI recommends leaving the the learn delay interval and the auto learn mode at their default settings.
- Setting the Learn Delay Interval The learn delay interval is the length of the interval between automatic learning cycles. Perform the following steps to change the interval:
- 1. Open the drop-down menu in the Auto Learn Mode field.
- 2. Set the learn mode as Auto (the default).
- 3. Change the number of hours in the Learn Delay Interval field.

You can delay the start of the learn cycles for up to 168 hours (7 days).

- 4. Click Go
- Setting the Learn Mode You can start battery learn cycles manually or automatically. Perform the following steps to choose the learn mode:
- 1. Open the drop-down menu in the Auto Learn Mode field.
- 2. Set the learn mode as Auto (the default ) or Manual.
- 3. Click Go.
  - Note: LSI recommends 30 days for the interval between cycles.
  - <u>Note:</u> When you replace the iBBU, the charge cycle counter is reset automatically.

#### 3.3.2 Monitoring the iBBU with the MegaCLI Utility

You can use the MegaCLI commands in this section to monitor the iBBU and to select the settings for BBU-related options.

#### 3.3.2.1 Display BBU Information

Use the command in Table 3.2 to display complete information about the BBU for the selected controller(s).

#### Table 3.2 Display BBU Information

Convention	MegaCli -AdpBbuCmd -aN -a0,1,2 -aALL
Description	Displays complete information about the BBU, such as status, capacity information, design information, and properties.

#### 3.3.2.2 Display BBU Status Information

Use the command in Table 3.3 to display complete information about the status of the BBU, such as temperature and voltage, for the selected controller(s).

#### Table 3.3 Display BBU Status Information

Convention MegaCli -AdpBbuCmd -GetBbuStatus -aN|-a0,1,2|-aALL

#### Table 3.3 Display BBU Status Information

Description	Displays complete information about the BBU status, such as the temperature and voltage. The information displays in the following formats: <b>BBU Status for Adapter: xx</b> Battery Type: XXXXX(string) Voltage: xx mV Current: xx mA Temperature: xx C° Firmware Status: xx Battery state: xx <b>Gas Gauge Status:</b> Fully Discharged: Yes/No Fully Charged: Yes/No Discharging: Yes/No Initialized: Yes/No Remaining Capacity Alarm: Yes/No Discharge Terminated: Yes/No Over Temperature: Yes/No Charging Terminated: Yes/No Over Charged: Yes/No Additional status information displays differently for iBBU <sup>™</sup> and BBU. <b>For iBBU:</b> Relative State of Charge: xx Charger System State: xx Charging Current: xx mA Absolute State of Charge: xx% Max Error: xx%
	Absolute State of Charge: xx% For BBU: Belative State of Charge: xx
	Charger Status: xx Remaining Capacity: xx mAh Full Charge Capacity: mAh isSOHGood: Yes/No

#### 3.3.2.3 Display BBU Capacity

Use the command in Table 3.4 to display the BBU capacity for the selected controller(s).

#### Table 3.4 Display BBU Capacity Information

Convention MegaCli -AdpBbuCmd -GetBbuCapacityInfo -aN|-a0,1,2|-aALL

#### Table 3.4 Display BBU Capacity Information (Cont.)

Description Displays BBU capacity information. The information displays in the following format: BBU Capacity Info for Adapter: x Relative State of Charge: xx% Absolute State of Charge: xx% Remaining Capacity: xx mAh Full Charge Capacity: xx mAh Run Time to Empty: xxx Min Average Time to Empty: xxx Min Average Time to Full: xxx Min Cycle Count: xx Max Error: xx%

#### 3.3.2.4 Display BBU Design Parameters

Use the command in Table 3.5 to display BBU design parameters for the selected controller(s).

#### Table 3.5 Display BBU Design Parameters

**Convention** MeqaCli -AdpBbuCmd -GetBbuDesiqnInfo -aN|-a0,1,2|-aALL

Description Displays information about the BBU design parameters. The information displays in the following formats: BBU Design Info for Adapter: x Date of Manufacture: mm/dd, yyyy Design Capacity: xxx mAh Design Voltage: mV Serial Number: 0xhhhh Pack Stat Configuration: 0xhhhh Manufacture Name: XXXXXX(String) Device Name: XXXXXX(String) Device Chemistry: XXXXXX(String)

#### 3.3.2.5 Display Current BBU Properties

Use the command in Table 3.6 to display the current BBU properties for the selected controller(s).

#### Table 3.6 Display Current BBU Properties

**Convention** MegaCli -AdpBbuCmd -GetBbuProperties -aN|-a0,1,2|-aALL

#### Table 3.6 Display Current BBU Properties (Cont.)

Description Displays current properties of the BBU. The information displays in the following formats: BBU Properties for Adapter: x Auto Learn Period: xxx Sec Next Learn Time: xxxx Sec Learn Delay Interval: xx Hours Auto-Learn Mode: Warn via Event/Disabled/Enabled

#### 3.3.2.6 Start BBU Learning Cycle

Use the command in Table 3.7 to start the BBU learning cycle on the selected controller(s). A learning cycle is a battery calibration operation performed by the controller periodically (approximately every three months) to determine the condition of the battery.

#### Table 3.7 Start BBU Learning Cycle

Convention	MegaCli -AdpBbuCmd -BbuLearn -aN -a0,1,2 -aALL
Description	Starts the learning cycle on the BBU. No parameter is needed for this option.

#### 3.3.2.7 Place Battery in Low-Power Storage Mode

Use the command in Table 3.8 to place the battery into Low-Power Storage mode on the selected controller(s). This saves battery power consumption.

#### Table 3.8 Place Battery in Low-Power Storage Mode

Convention	MegaCli -AdpBbuCmd -BbuMfgSleep -aN -a0,1,2 -aALL
Description	Places the battery in Low-Power Storage mode. The battery automatically exits this state after 5 seconds.

#### 3.3.2.8 Set BBU Properties

Use the command in Table 3.9 to set the BBU properties on the selected controller(s) after reading from the file.

#### Table 3.9 Set BBU Properties

**Convention** MegaCli -AdpBbuCmd -SetBbuProperties -f<fileName> -aN|-a0,1,2|-aALL

#### Table 3.9 Set BBU Properties (Cont.)

Description	Sets the BBU properties on the selected controller(s) after reading from the file. The information displays in the following formats: autoLearnPeriod = 1800Sec nextLearnTime = 12345678Sec Seconds past 1/1/2000 learnDelayInterval = 24hours Not greater than 7 days autoLearnMode = 0 0 - Enabled, 1 - Disabled, 2 - WarnViaEvent.
	1. NOTE: You can change only two of these parameters, learnDelayInterval and autoLearnMode.

#### 3.3.3 Monitoring the iBBU with the MegaRAID Storage Manager

When MegaRAID Storage Manager software is running, you can monitor the status of all of the BBUs connected to controllers in the server. If a BBU is operating normally, the icon looks like this: If it has failed, a red dot appears next to the icon.

To show the properties for a BBU, perform the following steps:

- 1. Click the **Physical** tab to open the physical view.
- 2. Select the BBU icon in the left panel.
- 3. Click the **Properties** tab.

The BBU properties, such as the battery type, temperature, and voltage, appear, as shown in Figure 3.6.

ile (	Operations Group Operations Log Tools He	elp				
						LSI
Physica	al Logical					
	Slot: 1, SAS, 68.36 GB, Online		Properties Operations			
	Slot: 2, SAS, 68.36 GB, Unine	5pa	Battery Type	ITBBU	Average Time to Empty	65535 min
	Slot: 5, SAS, 68.36 GB, Unconfigured G	00	Auto Learn Period	30Days	Average Time to Full	65535 min
	Slot: 7, SAS, 68.36 GB, Unconfigured G	00	Next Learn Cycle	Oct 18 2008 15:47:41	Cycle Count	36
	Slot: 9, SAS, 68.36 GB, Unconfigured G	oo Go	Relative State of Charge	99 %	Maximum Error Margin	2 %
	Slot: 11, SAS, 68.36 GB, Unconfigured Slot: 12, SAS, 68.36 GB, Unconfigured	Go Go	Absolute State of Charge	45 %	Temperature	28.0 Degree C
	Slot: 13, SAS, 68.36 GB, Unconfigured Slot: 14, SAS, 68.36 GB, Unconfigured	Go Go	Remaining Capacity	612 mAh	Voltage	3841 mV
	Slot: 15, SAS, 68.36 GB, Unconfigured	Go Go	Full Capacity	621 mAh	Current	0 mA
	Slot: 17, SAS, 68.36 GB, Unconfigured	Go Go	Run time to Empty	65535 min	Automatic learn cycles:	Enabled
	Slot: 19, SAS, 68.36 GB, Unconfigured Slot: 20, SAS, 68.36 GB, Unconfigured	Go Go				
	Slot: 21, SAS, 68.36 GB, Unconfigured	Go Go				
	Slot: 23, SAS, 68.36 GB, Unconfigured Slot: 24, SAS, 68.36 GB, Unconfigured	Go Go				
ι	Battery Backup Unit	~				
		<u>&gt;</u>				
		110382				
ID (2)	Error Level Date / Time	Descri	ption	Time 2000 00 10 10	-00-00 10//0 Count	
63 62	3 [Unromationj2008-09-19] Istudisz [Controller ID: 0 Time established since power on: Time 2008-09-19,18:00:32 10663 Seconds 2 Traformation 2008-09-19 17:38:15 Controller ID: 0 State change PD = Extended April-12 Provides = Official Current Ford					
51	Information2006 07 F2 Prototo      Distribution      Distributiion      Distribution     Distributiion      D			ured Good		
50	[Information 2008-09-19, 17:38:15	Control	er ID: 0 State change: PD	= External A Port:1:5 Previous	= Online Current = Unconfig	ured Good
9	[Information 2008-09-19, 17:38:15	Control	er ID: 0 State change: PD	= External A Port:1:4 Previous	= Online Current = Unconfig	ured Good
158 [Information 2008-09-19, 17:38:15 Controller ID: 0 Deleted VD: 1				Ś		
7	[Information 2008-09-19, 17:15:57	Control	er ID: 0 Controller properties ch	hanged		
play	ing log from server					
		_				

#### Figure 3.6 Battery Backup Unit Information

The BBU properties include the following:

- The number of times the BBU has been recharged (Cycle Count)
- The full capacity of the BBU, plus the percentage of its current state of charge, and the estimated time until it will be depleted
- The current BBU temperature, voltage, current, and remaining capacity
- If the battery is charging, the estimated time until it is fully charged

#### 3.3.3.1 Battery Learn Cycle

Learn Cycle is a battery calibration operation performed by the controller periodically to determine the condition of the battery. You can start battery learn cycles manually or automatically. To choose automatic

battery learn cycles, enable automatic learn cycles. To choose manual battery learn cycles, disable automatic learn cycles.

If you enable automatic learn cyles, you can delay the start of the learn cycles for up to 168 hours (7 days). If you disable automatic learn cycles, you can start the learn cycles manually, and you can choose to receive a reminder to start a manual learn cycle.

#### 3.3.3.2 Setting Learn Cycle Properties

To set the learn cycle properties, perform the following steps:

- 1. Click the **Physical** tab to open the physical view.
- 2. Select the BBU icon in the left panel.
- 3. Click the **Operations** tab.

The BBU operations appear, as shown in Figure 3.7.





#### 4. Select Set Learn Cycle Properties.

The options appear in the right frame.

5. To enable automatic learn cycles, click **Enable automatic learn** cycles and click **Go**.

You can delay the start of the next learn cycle by up to 7 days (168 hours) using the **Delay next learn cycle** field.

6. To disable automatic learn cycles, click **Disable automatic learn** cycles and click **Go**.

You can start the learn cycles manually. In addition, you can check the box next to the field **Remind me when to start a learn cycle** to receive a reminder to start a manual learn cycle.

#### 3.3.3.3 Starting a Learn Cycle Manually

To start the learn cycle properties manually, perform the following steps:

- 1. Click the **Physical** tab to open the physical view.
- 2. Select the BBU icon in the left panel.
- 3. Click the **Operations** tab.

The BBU operations appear, as shown in Figure 3.7.

4. Click Start Learn Cycle and click Go.

Another method to use the BBU operations is to right-click the BBU icon to open the operations menu and select **Start Learn Cycle**.

#### 3.4 Replacing the Battery Backup Unit

For optimal performance, replace the battery backup unit once a year. Refer to the *Warranty and Support Information* document for the replacement battery part number.

When you install a new iBBU, the battery recharge cycle counter for the iBBU is automatically set to zero. For instructions on installing the iBBU, see Section 2.1, "Installing the ServeRAID-MR10k SAS/SATA DIMM."



#### CAUTION:

The battery is a lithium ion battery. To avoid possible explosion, do not burn. Exchange only with the IBM-approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C007)

# Chapter 4 Intelligent Transportable Battery Backup Unit Specifications

This chapter includes technical information and specifications for the ServeRAID-MR10k SAS/SATA Customized Enabler DIMM. The second section lists information about battery life and data retention time. Click on the following links to access detailed iTBBU specifications:

- Section 4.1, "ServeRAID-MR10k iTBBU Specifications"
- Section 4.2, "Battery Life and Data Retention Time"

#### 4.1 ServeRAID-MR10k iTBBU Specifications

The following specifications apply to the ServeRAID-MR10k iTBBU:

- Battery type: LiON, Li-Poly cell
- Battery operating ambient temperature: 10-45 °C
- Humidity (storage and operating): 20% to 80% non-condensing
- Battery storage temperature: Depends on storage time, as follows:
  - < 30 days: 0-50 °C
  - 30-90 days: 0-40 °C
  - > 90 days: 0-30 °C

#### Table 4.1 Specifications

	ServeRAID-MR10k
Fast Charge Rate	500 mAH
Trickle Charge Rate	N/A
Battery Pack	1 cell
Mechanical	2.611" x 2.122"
Battery Capacity	1350 mAH

	ServeRAID-MR10k
Charge Circuitry Card	Yes
Memory Technology	DDR2 SDRAM (1.8V)
Battery Fast Charge Time	~3 hours
Socket Type	N/A
Module Support	DDR2
Cache Memory Size Supported	256 MB
Memory Bus Speed	667 MHz
Memory Bus Width	Maximum 72 bit
Error Correcting Capability (ECC)	N/A
Auxiliary	Yes

Table 4.1 Specifications

#### 4.2 Battery Life and Data Retention Time

The RAID utilities display a counter showing the number of times the ServeRAID-MR10k DIMM iTBBU has been recharged. When you install a new iBBU, the battery recharge cycle counter for the iBBU is automatically set to zero. For instructions on installing the iBBU, see Section 2.1, "Installing the ServeRAID-MR10k SAS/SATA DIMM." For optimal performance, replace the battery pack on the iTBBU once a year.

The data retention times shown in Table 4.2 are approximate. They can vary based on a number of factors, including the following:

- Capacity of the battery pack and the battery load
- Ambient temperature
- Age of the battery and number of discharge cycles it has been through
- Number of DIMMs installed and the number of chips on the DIMMs
- Dynamic random access memory (DRAM) size

 Table 4.2
 Reference Data Retention Times

BBU Name	Data Retention Times
ServeRAID-MR10k	72 hours for 256 Mbytes, using five 32 Mx16 parts DDR2 (low power)

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