SGI® Modular InfiniteStorage™ (MIS) 1.5 Platform User Guide

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Record of Revision

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002	August 2013 Updated to include DC power supply option. Power Supply Alert Email examples added. Minor edits.

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Introduction

This guide describes the features and components of the SGI® Modular InfiniteStorage™ (MIS) platform, version 1.5. With two main configurations possible for the enclosure (storage server or JBOD—Just a Bunch Of Disks) this guide covers the different configurations, their respective components, interface panels, indicator lights and meanings, software, zoning, maintenance, and troubleshooting.

What's New

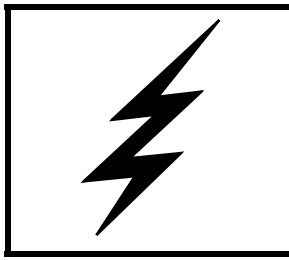
Version 1.5 of the MIS platform features new interior hardware with increased ease-of-use and serviceability, with improved air-flow. This manual details information for the new system, and does not require you to be familiar with version 1.0 machinery.

Audience

This guide is written for owners/users of the MIS platform, version 1.5. It is written with the assumption that the reader has a good working knowledge of computers, servers, networking, hardware, software and RAID arrays.

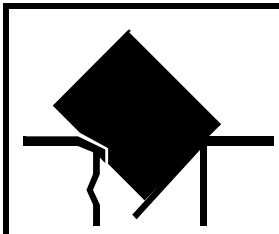
Important Information

The following section details several safety precautions that should be observed at all times. First, a fully loaded MIS platform can weigh up to 220lbs. Second, electricity is a major concern when handling components, especially Electrostatic Discharge (ESD), detailed later in this section. Please read these sections carefully prior to using the MIS platform.



CAUTION

Observe all ESD precautions. Failure to do so can result in damage to the equipment.



CAUTION

Do not apply floor plating over open floor tiles. Unsupported floor plating can collapse under heavy equipment and result in damage to the computer equipment.

Environmental Requirements

The following are the environmental requirements for the MIS platforms.

Operating temperature: **41° to 95° F [5° to 35° C] (up to 5,000 ft. [1,500 m])**
– Derate max temperature (95° F [35° C]) by 1.8° Fahrenheit [1° Celsius] per 1,000 ft. [305 m] of altitude above 5,000 ft. [1525 m])
– Temperature rate of change must not exceed 18° F [10° C] per hour

Operating humidity: **8% to 80% non-condensing**
– Humidity rate of change must not exceed 10% relative humidity per hour

Operating altitude: **up to 10,000 ft. [up to 3,050 m]**

Shipping temperature: **-40° to 140° F [-40° to 60° C]**
– Temperature rate of change must not exceed 36° F [20° C] per hour

Shipping humidity: **10% to 95% non-condensing**

Shipping altitude: **up to 40,000 ft. (up to 12,200 m)**

Storage temperature: **41° F [5° C] to 113° F [45° C]**
– Temperature rate of change must not exceed 36° F [20° C] per hour

Storage humidity: **8% to 80% non-condensing**

Storage altitude: **up to 40,000 ft. [up to 12,200 m]**

Safety Precautions

Do NOT wear loose clothing, such as neckties or unbuttoned shirt sleeves, while working on the unit. These can be pulled into a cooling fan or tangled in cabling.

Remove ALL jewelry and any metal objects from your body, which are excellent electrical conductors. These can harm you and/or cause short circuits if they come into contact with printed circuit boards or powered areas.

Be aware of the locations of the power on/off switch on the chassis as well as the room's emergency power-off switch, disconnection switch or electrical outlet. If an electrical accident occurs, you can then quickly remove power from the system.

Do NOT work alone when working with high voltage components. When working around exposed electrical circuits, another person should be nearby, who is familiar with the power-off controls, to switch off the power if necessary.

Use only one hand when working with powered-on electrical equipment. This is to avoid making a complete circuit, which will cause electrical shock. Use extreme caution when using metal tools, which can easily damage any electrical components or circuit boards with which they come into contact.

Do NOT use mats designed to decrease static electrical discharge. Instead, use rubber mats that have been specifically designed as **electrical insulators**.

The power supply power cords MUST include a grounding plug and MUST be plugged into GROUNDED electrical outlets.

Do NOT attempt to transport/move a fully loaded MIS system! An MIS system can weigh up to 220lbs. when fully loaded. If the system must be moved, first remove the drives from the chassis. When lifting the system, two people (one at each end) should lift slowly with feet spread apart to distribute the weight. Always follow safe lifting practices when moving heavy objects. More information on moving large objects, requiring a two-person team, is available in the

Centers for Disease Control's, "Ergonomic Guidelines for Manual Material Handling" (http://www.cdc.gov/niosh/docs/2007-131/pdfs/2007-131.pdf)

Power should always be disconnected from the system when removing or installing system components that are not hot-swappable. When disconnecting power, you should first do a clean shut down of the operating system, then power down the system, and then unplug all power cords (the unit has more than one power supply cord).

The maximum overcurrent protection shall be 50A per power supply. The overcurrent protection shall be provided by the facility power distribution. All national and local electrical code would apply. Check with your local licensed electrician for details.

The branch current protection shall be provided by customer. All national and local electrical code would apply. Check with your local licensed electrician for details.

ESD Precautions

Caution: Electrostatic Discharge (ESD) is generated by two objects with different electrical charges coming into contact with each other. An electrical discharge is created to neutralize this difference, which can damage electronic components and printed circuit boards.

The following measures are generally sufficient to neutralize this difference before contact is made to protect your equipment from ESD:

- Use a grounded wrist strap designed to prevent static discharge.
- Keep all components and printed circuit boards (PCBs) in their antistatic bags until ready for use.
- Touch a grounded metal object before removing the board from the antistatic bag.
- Do not let components or PCBs come into contact with your clothing, which may retain a charge even if you are wearing a wrist strap.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or contacts.
- When handling chips or modules, avoid touching their pins.
- Put the server board and peripherals back into their antistatic bags when not in use.

- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the server board.

Safety & Emissions

The following is a list of agency approvals for MIS on safety and emissions.

Electromagnetic Compatibility

Table 0-1 lists the region and compliance reference for EMC (Electromagnetic Compatibility) compliance.

Table 0-1 MIS Server Platform Region and EMC Compliance References

Region	Compliance Reference
Australia/ New Zealand	AS/NZS CISPR 22 (Emissions)
USA/Canada	Industry Canada ICES-003 Issue 4 FCC CFR47, Part 15 Subpart B
CENELEC Europe	EN55022 Emissions EN55024 Immunity
International	CISPR 22/ CISPR 24
Japan	VCCI V-3 Certification
Korea	KCC KN22, KN24 Verification
Taiwan	BSMI CNS 13438 Verification
Russia	EAC

Safety Certification

National Recognized Testing Laboratory (NRTL) provides the safety certification for ITE products. NRTL's offer various product markings depending on the type of products being tested and satisfactory tests results. Underwriters Laboratories (UL) and Canadian Standards Association (CSA) are typical (NRTL's) that provides safety certification services for Information

Technology Equipment (ITE). Table 0-2 lists the region and compliance reference for safety compliance.

Table 0-2 MIS Server Platform Region and Functional Safety Listing Mark

Region	Compliance Reference
USA/Canada	CSA 60950-1 / UL60950-1 CAN/CSA STD C22.2 No. 60950-1
IEC (Europe)	IEC60950-1 – CB Certification, CE Mark
Russia	EAC

Chapter Descriptions

Chapter 1, “System Overview,” introduces new features of the MIS 1.5, describes the hardware components of the MIS enclosures, the common modules in unit, and the major differences between the MIS Server platform and MIS JBOD unit. Included at the end of the chapter are a system block diagram and a system layout diagram.

Chapter 2, “System Interfaces,” describes the hardware and software interfaces used to operate the MIS Server and MIS JBOD. This includes the front control panel and proper power on and off of the platforms, server module LEDs, JBOD LEDs, Disk Drive LEDs with bood drive and capacity drive monitoring, AC and DC power supply LEDs and configuring Platform Event Filters using IPMI for power supply monitoring, fan LEDs and the Fan Base Service Page, the BMC Integrated Web Console, and enablining and accessing IPMI.

Chapter 3, “System Software,” covers the software used on the MIS platforms, including installation information for the tools, using the MegaRAID tool, and the available zoning software. In this chapter are step-by-step instructions for Zones 1.3 tool, its features and their function, plus warnings and error codes. Screen shots are given for a walk-through of the step-by-step instructions for zoning. Information on using the CLI Zoning tool 1.4 is also given, though Zones 1.4.2 can handle the zoning of both servers and JBODs at this time. Some considerations for RAID Configurations are given at the end of the chapter.

Chapter 4, “System Maintenance,” describes how to use the BMC for detecting component failures, and service instructions for modules that are customer replaceable units (CRUs). The service instructions include how to move the chassis forward or backwards in the rack, how to remove the case front and rear covers, how to replace a power supply, how to replace a fan

module, how to replace a storage drive in a StorBrick, how to replace a boot drive, and how to install the air ducts to provide proper air flow to the chassis.

Chapter 5, “Troubleshooting,” describes some problem-solving techniques, plus when to contact customer support.

Appendix A, “Technical Specifications,” gives the technical specifications for the MIS enclosures.

Related Publications

The following documents are relevant to the MIS Platform:

- *MegaRAID SAS Software User Guide*, publication number 51530-0x.
- *MegaRAID 6Gb/s SAS RAID Controllers User Guide*, publication number 41450-0x.
- *Intel Server Boards and Server Platforms Server Management Guide*, publication number 37830-002
- *Intel® Remote Management Module 4 and Integrated BMC Web Console User Guide* (pdf) Revision 2.6 (also refer to the **Help** files located within the BMC itself, see Figure 2-17 on page 63)
- Intel’s *System Event Log Troubleshooting Guide for EDSP Platforms Based on Intel Xeon Processor E5 4600/2600/2400/1600/1400 Product Families* (http://download.intel.com/support/motherboards/server/sb/g90620001_s1400_s4600_systemeventlog_troubleshooti.pdf) for translation of the hex codes used in Alert Emails (see Figure 2-24 on page 72)
- Intel’s *Intel Server Board S2600JF, Technical Product Specification*:
- IPMItool comes with Linux. Information on IPMItool can be found through http://support.sgi.com
- IPMIutil is for Windows and is available for download through http://ipmiutil.sourceforge.net/. Information on this tools can be found at http://ipmiutil.sourceforge.net/docs/UserGuide. (SGI does not provide support for Windows, or any Windows utilities.)
- More Information on IPMI can be found through http://www.intel.com/content/www/us/en/servers/ipmi/what-is-ipmi.html and http://en.wikipedia.org/wiki/Intelligent_Platform_Management_Interface

- SGI InfiniteStorage series documentation (http://techpubs.sgi.com)
- Man pages (http://www.linuxmanpages.com/)

Various formats of SGI documentation, release notes, and man pages are available. The SGI Technical Publications Library (http://docs.sgi.com/) contains the most recent and most comprehensive set of online books, release notes, man pages, and other information. Refer to the SGI Supportfolio™ web page for documents which access requires a support contract (as do the MegaRAID books cited above). See “Product Support” on page xxvi. You can also view man pages by typing `man <title>` on a command line in Linux.

Conventions

The following conventions are used throughout this document:

Convention	Meaning
`Command`	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages, and programming language structures.
variable	The italic typeface denotes variable entries and words or concepts being defined. Italic typeface is also used for book titles.
[ ] <..>	Brackets enclose optional portions of a command or directive line.
GUI element	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists.

Product Support

SGI provides a comprehensive product support and maintenance program for its products, as follows:

- If you are in North America, contact the Technical Assistance Center at +1 800 800 4SGI (4744) or contact your authorized service provider.
- If you are outside North America, contact the SGI subsidiary or authorized distributor in your country. International customers can visit http://www.sgi.com/support/ and click

on the “Support Centers” link under the “Online Support” heading for information on how to contact your nearest SGI customer support center.

For Microsoft® products, only Windows® 2008 R2 SP1 is WHQL certified.

Software Downloads

SGI provides the software that has been approved for use on the MIS platforms, including “SGI approved” versions of 3rd party software. These SGI approved versions have been tested for quality assurance and hardware/software/firmware compatibility with the MIS. To obtain software, either contact SGI Customer Support for the most recent approved versions, or download from the Supportfolio web site: http://support.sgi.com (requires Supportfolio account and password for access).

Customers who wish to run Windows buy only the hardware from SGI. The customer is then responsible for operating system installation and configuration, and all support arrangements with Microsoft. Drivers, utilities (including IPMIutil), device manager, etc., and other required software for Windows are not provided by SGI. These must be obtained from the OEM or downloaded from 3rd party sites

CRU/FRU

Some of the components on the MIS platform are customer-replaceable units (CRUs), meaning that these modules were designed to be repaired/replaced by you, the customer. These include fan assemblies, power supplies, storage drives, and boot drives, all of which are hot-swappable. However, many of the other components on the MIS platform should be serviced by SGI field technicians ONLY, so as not to violate the warranty agreement. The components are field-technician replaceable units, or FRUs. It is important to note that our CRUs can be easily installed and replaced by customers, which enables a speedy recovery of proper system operation.

For additional information about CRUs, please see:

- Customer Replaceable Units (CRUs) Installation Policy (http://www.sgi.com/services/support/cru/policy.html)
- Customer Replaceable Units (CRU) and Customer Obligations (http://www.sgi.com/services/support/cru/obligations.html)

Purchasable Support & Maintenance Programs

SGI provides several comprehensive product support and maintenance programs for its products. SGI also offers services to implement and integrate Linux-based applications in your environment.

- Refer to http://www.sgi.com/services/
- If you are in North America, contact the Technical Assistance Center at +1-800-800-4SGI (4744), or contact your authorized service provider.
- If you are outside North America, contact the SGI subsidiary or authorized distributor in your country. See http://www.sgi.com/global/index.html for more information.

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If you have comments about the technical accuracy, content, or organization of this document, please contact SGI. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

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Chapter 1

System Overview

The SGI Modular InfiniteStorage Platform, version 1.5, is a high-density, integrated storage server platform. The MIS 1.5 uses a 4U rackmount system, and can be either a compute and storage server, or “Just a Bunch Of Disks” expansion storage unit (MIS JBOD unit). The MIS Server platform can be single or dual server.

Features of the MIS 1.5 platform include:

- Up to 72 (3.5" or 2.5" 15mm) and a maximum of 144 (2.5" 9.5mm) storage drives in the server platform.
- Up to 81 (3.5" or 2.5" 15mm) and a maximum of 162 (2.5" 9.5mm) storage drives in the JBOD unit.
- All fit in a standard size 4U chassis: height 6.94" (176mm), width 16.9" (429.2mm), depth 36" (914.4mm).
- Storage drives can be 3.5" or 2.5" (15mm or 9.5mm), SAS or SATA, rotational or SSD drives.
- Up to four JBOD units per MIS Server module (requires server module to have 2 JBOD HBAs).

Warning: Rotational SAS drives and rotational SATA drives cannot be included in the same enclosure due to vibration conflicts.

New features of the modular design of the MIS 1.5 platform include:

- Higher capacity fan modules for more efficient cooling.
- Interior foam strips and fan modules maximize air flow and thermal efficiency.
- Server modules feature new CPU air duct for improved thermals.

- Blind mate server modules reduce service actions from four hours to fifteen minutes.
- Point-to-point, straight-through connections to StorBricks take up less space, improve signal quality and air flow.
- Cable-to-PCBA interposers create better signal quality and easier routing.

The MIS Server platform features:

- Up to 2 server modules per platform.
  - Two Intel® Xeon® E5-2600 series processors per server motherboard, S2600JF family.
  - Intel Turbo Boost Technology 2.0 that automatically allows processor cores to run faster than the base operating frequency, if the cores are operating below power, current, and temperature specification limits (< 35ºC ambient).
  - Dual GbE networking onboard.
- Up to 8 DDR3 DIMMs (new: 8 GB, 16 GB, or 32 GB) for a single-server motherboard configuration, and up to 16 DIMMs for a dual-server motherboard configuration.
- Up to 6 HBAs for single servers—these can be full-height (4.25") and half-depth (3.375"), up to 4 externally facing and/or up to 4 internally facing (total external and internal not to exceed 6). For single-server platforms only, optional 4 port[1] 8Gb Fibre Channel PCIe cards.
- Up to 4 HBAs per server module (for up to a total of 8 across both server modules) in a dual server system—these can be half-height (2.12"), half-depth (3.375"), 2 internal max and/or a maximum of 2 external.
- Unique Battery Back-Up PCIe technology allows the optional addition of BBUs without the consumption of any of the available PCIe slots.
- Two boot drive modules per server, with up to two boot drives per module.

Chapter 1: System Overview will first explore “New Hardware Features of MIS 1.5” on page 5 detailing

- the new “Bridge Midplane” on page 5
- and new “SAS Interposers and SAS Midplane” on page 5.

Following is information on the “MIS Enclosure” on page 6 including

[1] The four port card cannot be used in the dual server as it only supports half height cards. The dual server must use the 2 port Fibre Channel card. The four port can be used in the single server.

- “Front Grille and Control Panels” on page 8,
- “Rear Panel Components” on page 9,
- and the “Cable Management Arm” on page 12

Next, the “MIS Common Modules” on page 13 are covered, including:

- “Power Supply Modules” on page 13,
- new “Fan Assembly Modules” on page 17,
- and “StorBrick Modules” on page 17.

“MIS Server Platform or JBOD Unit” on page 19, discusses the presence of:

- “Server Module” on page 23, and its available features,
- “Layout of Server CPUs, and PCIe Risers HBAs” on page 25,
- and associated “Boot Drive Module” on page 28,
- or the presence of a ninth StorBrick and “MIS JBOD I/O Module” on page 29.

Finally, a new “System Diagrams” on page 30 shows a logical layout of the chassis components and connections, and its corresponding ”System Layout” in Figure 1-38, shows the physical layout of the chassis and components.

Figure 1-1 SGI Destination Rack (D-Rack)

New Hardware Features of MIS 1.5

Bridge Midplane

The new Bridge Midplane (Figure 1-2) features a power design that allows for blind mate server modules, decreasing service time from four hours to fifteen minutes. Server modules still require a shutdown for servicing to avoid data loss. However, blind mate capabilities allow the server to be serviced without the need to remove cables. Many service issues, now more than before, can be addressed quickly to minimize down-time.

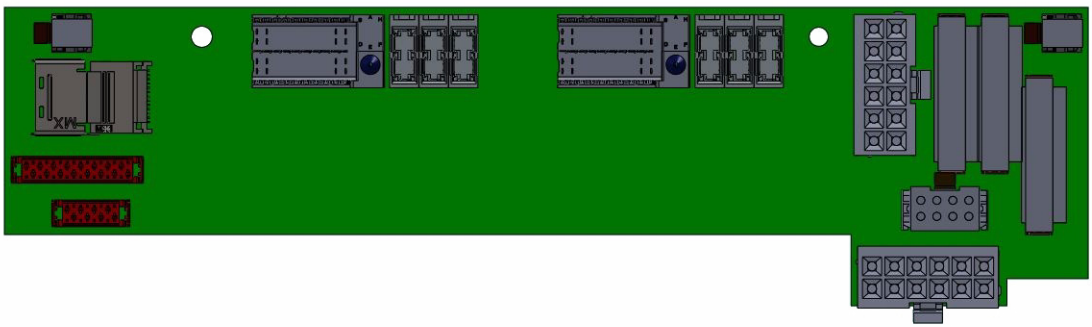


Figure 1-2 Bridge Midplane

SAS Interposers and SAS Midplane

The new SAS Interposers and SAS Midplane work together to provide point-to-point, straight-through connections to StorBricks that take up less space, improve signal quality, and increase air flow through the system. Cable-to-PCBA interposers and flat 3M twin axial cables create better signal quality and easier routing (Figure 1-3).

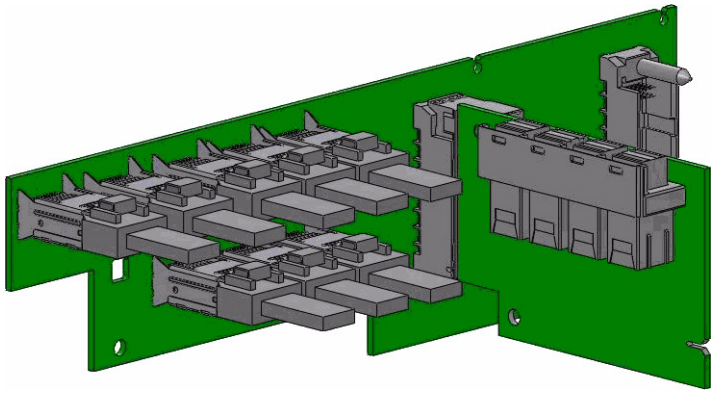


Figure 1-3 SAS Interposers and SAS Midplane

DC Power Supply

New 1100W DC to DC converter power supply option that converts standard telecommunication 48VDC power to the 12V main output for powering intermediate bus architectures (IBA) in high performance and reliability servers, routers, and network switches. Both power supply options meet international safety standards and display the CE-Mark for the European Low Voltage Directive (LVD).

MIS Enclosure

The MIS enclosure, whether it is a server or JBOD, consists of a chassis, case (with front bezel grille, control panel and rear ports).

Figure 1-4 MIS Case and Front Grille

The SGI MIS chassis features a front bezel display with an internal EMI grille (Figure 1-4). The unique bi-directional sliding rail mounts (Figure 1-5) allow the unit to be slid forwards or backwards 20" to access disk drives and other serviceable components. This also makes for an overall safer rack design, as chassis do not need to be extended to their full length to be serviced.

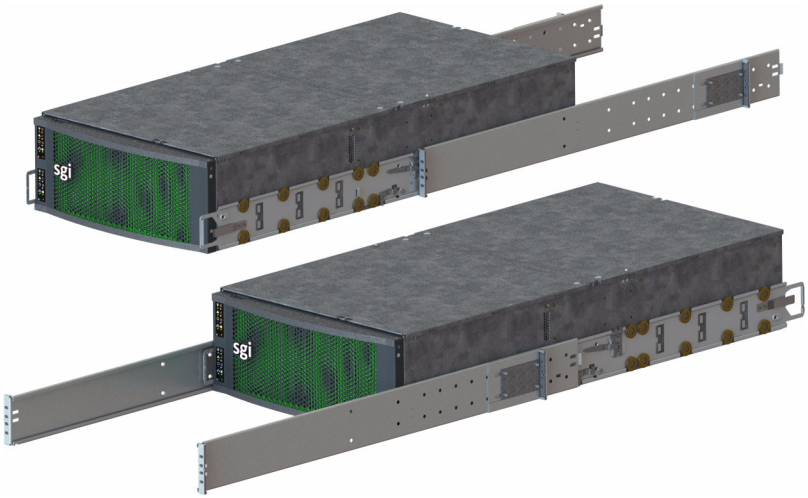


Figure 1-5 New Bi-directional Rolling Rail Mounts

Front Grille and Control Panels

Next to the bezel grille, up to two control panels can be present on the MIS platform, one for each server in the MIS Server platform, or one for each I/O unit on the MIS JBOD. Figure 1-6 shows a single control panel and Figure 1-7 shows two control panels.

Each control panel has a Power LED, Power button, Status LED, Reset Button, Locator LED, Locator button, Network Activity LED, Boot Drive Activity LED, and NMI Reset button (non-functional; not supported). Indicator light meanings and button functions are explained in, “Control Panel” in Chapter 2.

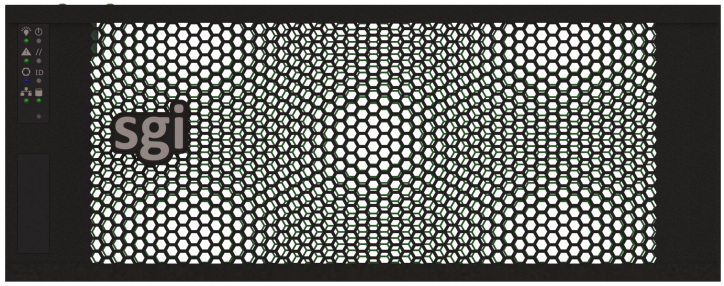


Figure 1-6 Single Control Panel

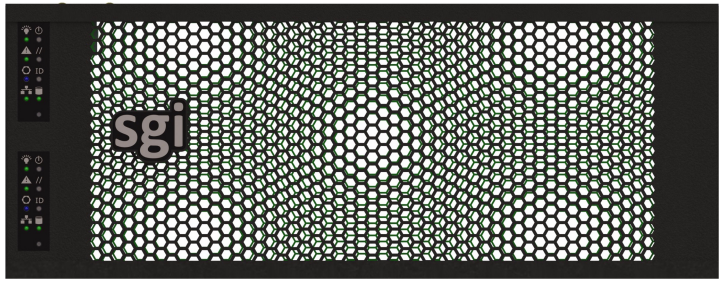


Figure 1-7 Dual Control Panel

Rear Panel Components

The appearance of the rear panel on the MIS chassis will depend on what modules are installed. An MIS platform can have up to four power supplies, each with their own power inputs. They are high-efficiency, hot-swappable power supplies rated at 1100 Watts, AC or DC.

All rear panels feature clearly silk-screened labels next to the port in question. The MIS Server platform (single server) in Figure 1-8, features a single server module with two USB ports, a video port, and two NIC ports. Figure 1-9 show a MIS Server platform with the optional four power supplies. The MIS Server platform (dual server) rear panel as shown in Figure 1-10 has a second server module with its own set of USB ports, video port, and NIC ports. Figure 1-11 shows an MIS Server platform which features dual server construction with only one compute server module installed, and the option to upgrade to include a second compute server module later. Figure 1-12 shows the rear panel of the MIS JBOD with one I/O module and Figure 1-13 shows two, each with four miniSAS, one Ethernet, and one serial port (note that the first I/O module is on the bottom and the second on the top).

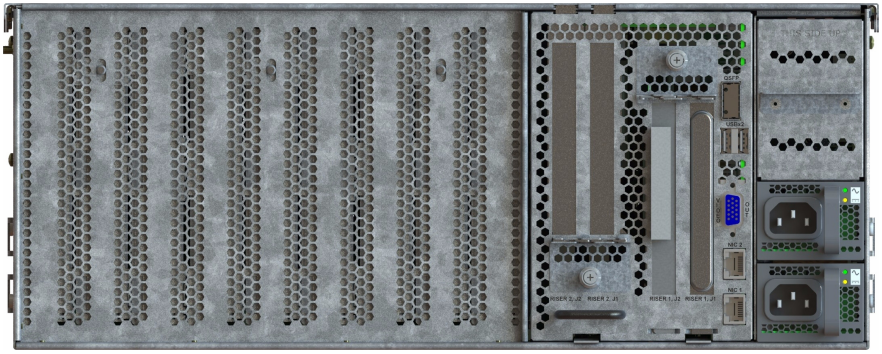


Figure 1-8 Rear View – MIS Single Server Platform

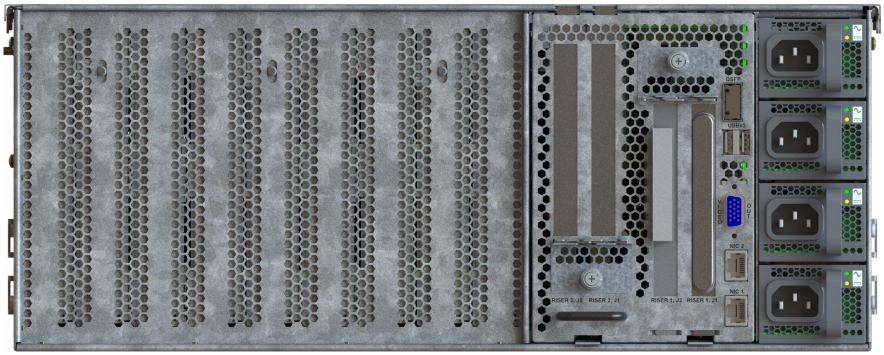


Figure 1-9 Rear View – MIS Single Server Platform (four power supplies)

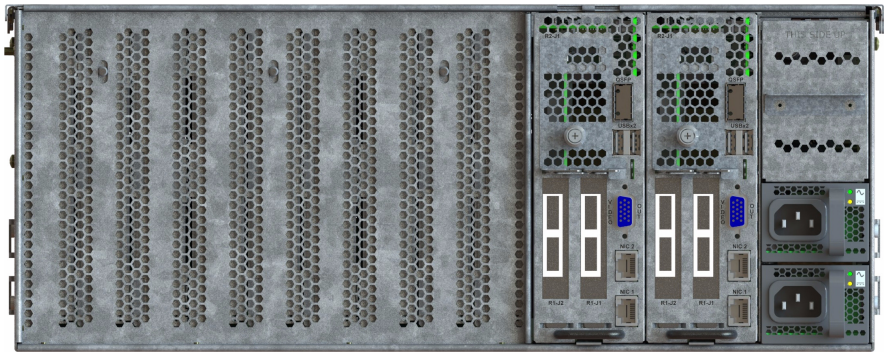


Figure 1-10 Rear View – MIS Dual Server Platform

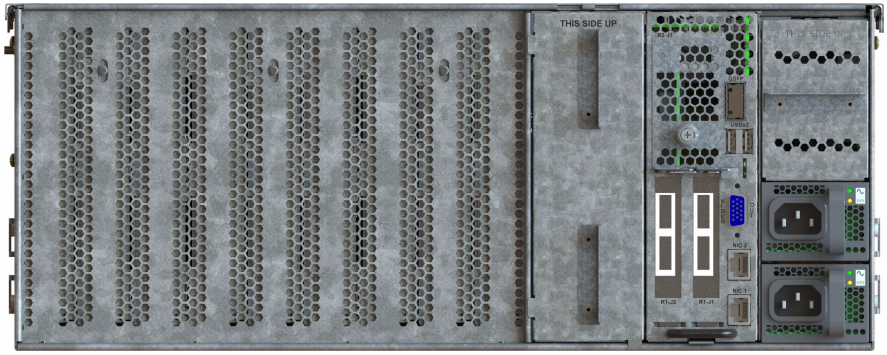


Figure 1-11 Rear View – MIS Dual Server Chassis with Single Compute Server Module Platform

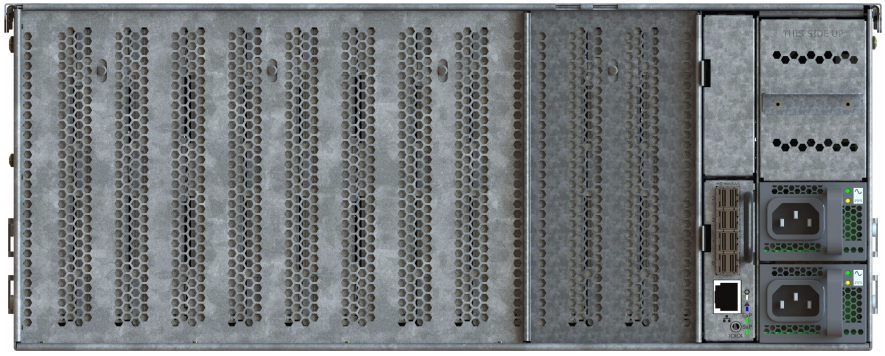


Figure 1-12 Rear View – MIS JBOD Unit (single I/O module)

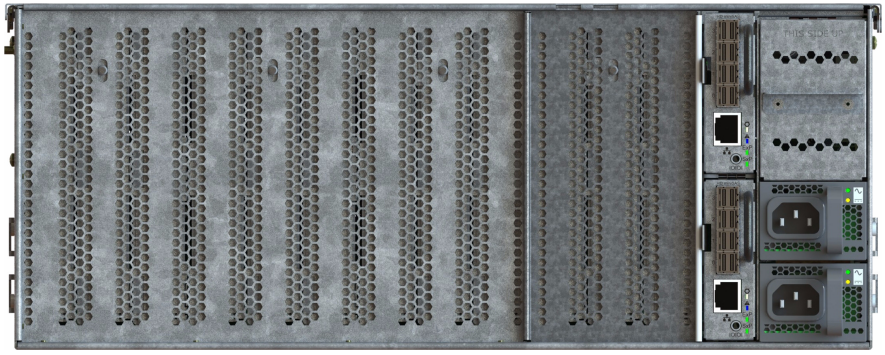


Figure 1-13 Rear View – MIS JBOD Unit (dual I/O modules)

Cable Management Arm

The cable management arm is an optional addition to the MIS chassis that helps keep cables organized in the rack. It attaches to a plate on the rear of the MIS chassis and to the rack in which the chassis is mounted. The cable management arm comes in a length designed for 26" deep racks, such as the D-Rack. It can be shortened to accommodate other rack sizes (Figure 1-14). Instructions on shortening the cable management arm are in Chapter 5, “Troubleshooting.”

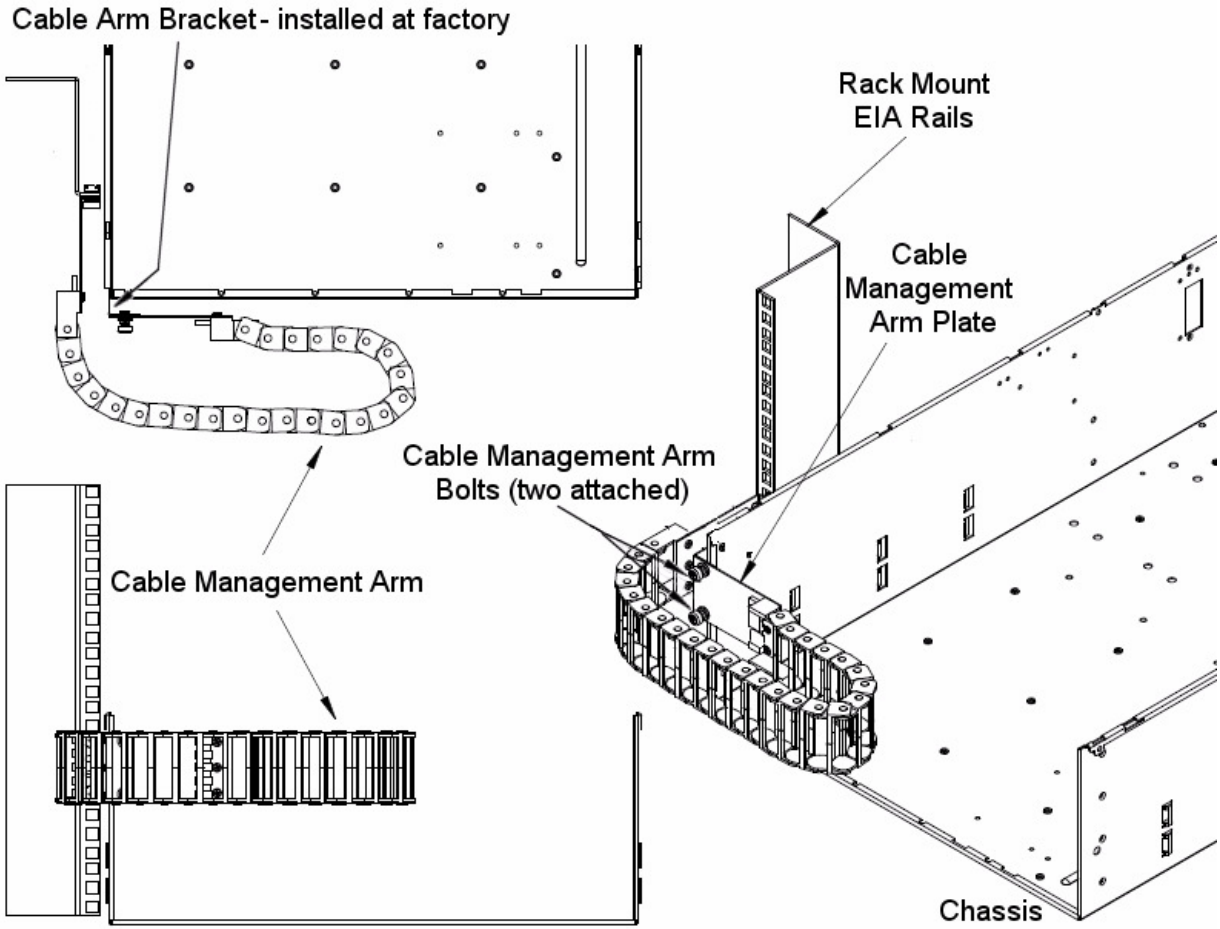


Figure 1-14 Cable Management Arm

MIS Common Modules

This section describes the internal modules of the MIS 1.5 platforms that both the server and JBOD share in common. Designed to deliver a high level of reliability, scalability and manageability, the MIS 1.5 platform continues to make use of modules to contain key components, and now uses interposers, midplanes and bridges to replace a significant number of cables, creating better air flow and thermals throughout the system. Whether the unit is an MIS 1.5 Server or a JBOD, both chassis contain the following hot-swappable modules:

- Two or four power supplies (if four, two are redundant) (Figure 1-15);
- Six (newly-designed, higher-capacity) fan assemblies (Figure 1-17);
- Capacity drives installed in StorBricks (Figure 1-18).

The power supply modules are high-efficiency, hot-swappable, and rated at 1100 Watts; AC Input: 100–240 VAC (50-60Hz), single phase; DC Input: 40–72 VCD. There are six hot-swappable fan modules housing one fan with two counter-rotating impellers. This fan design features easier replacement, and greater speeds of operation for a greater cooling effect. And instead of the conventional disk architecture, the unique StorBrick modules (innovative, highly-dense drive modules used to house drive bays) allow the platform to maximize storage density.

Each MIS Server has eight StorBrick modules, and each MIS JBOD has nine, with the ninth module taking the place of the compute server module. Each StorBrick module holds up to nine 3.5" or 2.5" (15mm), SAS or SATA, rotational or SSD drives, or, using the dual-slot drive option, eighteen 2.5" (9.5mm), SAS or SATA, rotational or SSD drives.

Power Supply Modules

There are two options for the power supply modules. The first is an **1100 Watt AC to DC power factor corrected (PFC) power supply** that converts standard AC mains power into a main output of 12VDC for powering intermediate bus architectures (IBA) in high performance and reliability servers, routers, and network switches. The second option is an **1100W DC to DC converter** that converts standard telecommunication 48VDC power to the 12V main output. Both power supply options meet international safety standards and display the CE-Mark for the European Low Voltage Directive (LVD) .

Two to four power supplies provide power for the SGI MIS Server. Power supplies are configured for N+N support, meaning only two power supplies are used at any given time. The power supplies provide 12V DC main power and 5V DC standby power.

Power supplies are hot-swappable and can be replaced under full load, as long as there are *two or more* functioning power supplies present—this requires the redundant power option be installed, meaning a total of four power supplies installed (two functional, two redundant). The power supplies can be replaced under full load as long as there are three or more functioning power supplies present. Removal of one power supply when there are only two power supplies present will cause an unexpected shut-down that may result in data loss. There are two types of power supplies available for the MIS platform.

AC Input

- Best-in-class, 80 PLUS certified “Platinum” efficiency
- Wide Input voltage range: 90-264VAC
- AC Input with power factor correction
- Always-on 16.5W programmable standby output (3.3/5V)
- Hot Swappable (redundant power configuration only)
- Parallel operation with active digital current sharing
- Full digital controls for improved performance
- High density design: 25.6W/in^3
- Small form factor: 54.4 x 40.0 x 321.5mm
- I^{2}C communication interface for control, programming and monitoring with PSMI and PMBus protocol
- Overtemperature, output overvoltage and overcurrent protection
- 256 bytes of EEPROM for user information
- Two Status LEDs: AC OK and DC OK with fault signaling

DC Input

- Best-in-class, 80 PLUS certified “Platinum” efficiency
- Wide Input voltage range: 45-72VDC
- Standard Telecommunications 48VDC Input
- Always-on 16.5W programmable standby output (3.3/5V)
- Hot Swappable (redundant power configuration only)
- Parallel operation with active digital current sharing

- Full digital controls for improved performance
- High density design: 25.6W/in^3
- Small form factor: 54.4 x 40.0 x 321.5mm
- I^{2}C communication interface for control, programming and monitoring with PSMI and PMBus protocol
- Overtemperature, output overvoltage and overcurrent protection
- 256 bytes of EEPROM for user information
- Two Status LEDs: DC Input OK and Output OK with fault signaling numbered 0-3 from the bottom up, on the rear panel of the enclosure (Figure 1-16).

Warning: Removal of one power supply when there are *only two* power supplies present may cause an unexpected shut-down that may result in data loss.

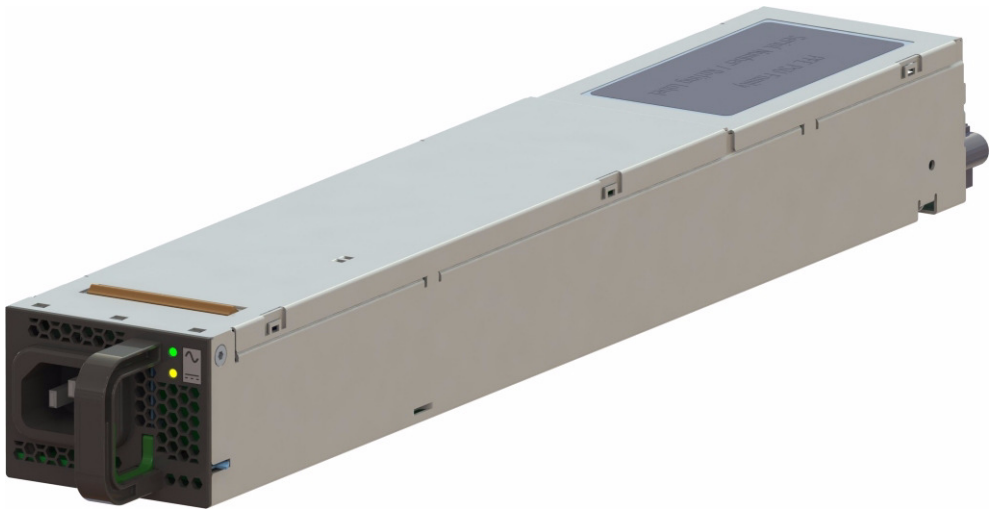


Figure 1-15 Power Supply Module

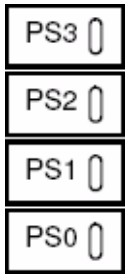


Figure 1-16 Power Supply Numbering

The high efficiency is achieved by using state-of-the-art silicon power devices in conjunction with soft-transition topologies minimizing switching losses and a full digital control scheme. Synchronous rectifiers on the output reduce the losses in the high current output path. The rpm of the internal fan is digitally controlled to keep all components at an optimal operating temperature regardless of the ambient temperature and load conditions. Quick-acting 16-amp input fuses (5 × 20 mm) inside the power supply protect against severe defects (fuses are not accessible from the outside and are therefore not serviceable parts; instead, power supplies are replaced by swapping out the module entirely).

Important: The maximum over current protection is 50A per power supply. The overcurrent protection must be provided by the facility power distribution. All national and local electrical codes apply. Check with your local licensed electrician for details.

Fan Assembly Modules

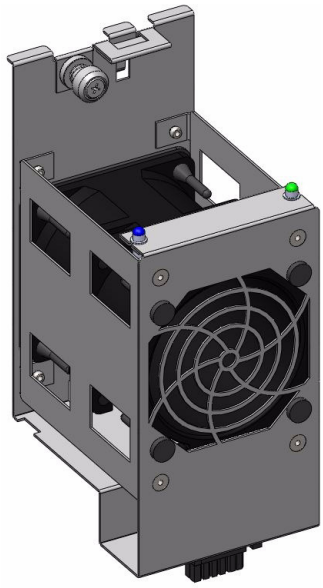


Figure 1-17 Fan Assembly Module (each contains two impellers)

The fan modules of the MIS 1.5 feature a higher capacity fan for better thermal performance. There are six fan assemblies mounted in the middle of the MIS chassis used to cool the system. Each hot-swappable fan assembly contains two impellers. Air flows from the front to the back of the enclosure. The fan baseboard distributes power and control signals to the fan assemblies. Firmware on the fan baseboard monitors the fan speeds and temperatures within the enclosure. Fan speeds are kept at maximum speed to continuously provide optimal cooling for the enclosure.

StorBrick Modules

Each StorBrick Module contains up to nine 3.5" or 2.5" 15mm drives (Figure 1-18), or eighteen 2.5" 9mm drives (Figure 1-21 on page 19), mounted in the StorBrick using proprietary drive carriers (Figure 1-19). A sliding thumb-latch securely fastens the drive carriers in place (Figure 1-20, thumb-latch is pictured in blue, but is grey on the actual product). StorBricks use SAS-2 protocol, which enables the system to use SAS or SATA drives (rotational), or SAS *and* SATA solid-state drives.

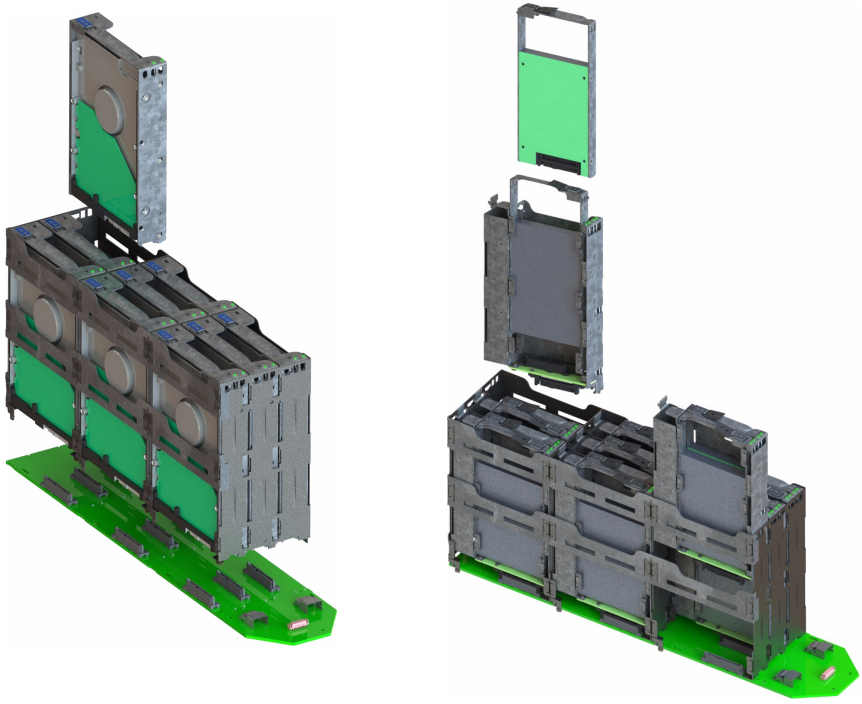


Figure 1-18 StorBrick Modules for 3.5" or 2.5" 15mm Drives (left) and 2.5" 9.5 mm Drives (right)

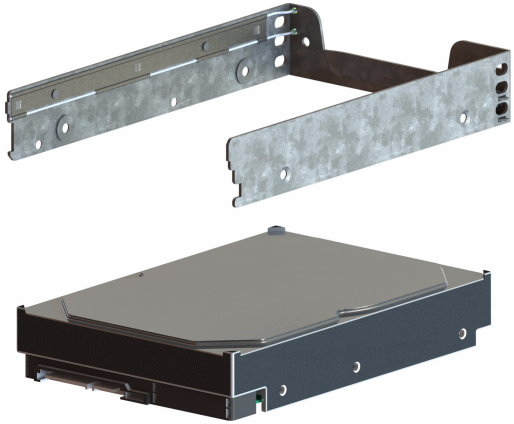


Figure 1-19 3.5" 15mm Drive and Carrier

Figure 1-20 3.5" 15mm Drive Carrier (top view, with thumb latch)

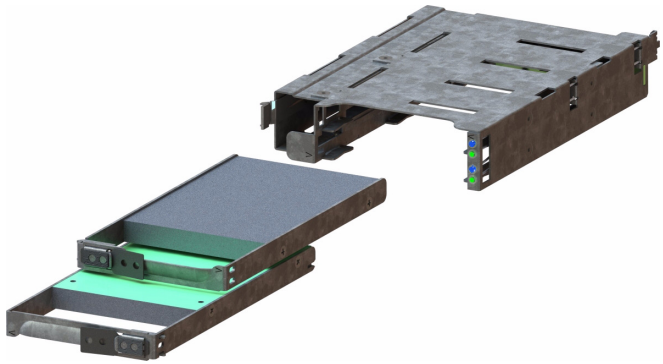


Figure 1-21 Two 2.5" 9.5mm Drives and Carrier

Figure 1-22 2.5" 9.5mm Drive Carrier (isometric view with dual thumb-latches)

MIS Server Platform or JBOD Unit

The key difference between the MIS Server platform and the MIS JBOD unit is the presence of the compute server module (Figure 1-26 or Figure 1-28) and boot drives (Figure 1-32) in the server platform, or a ninth StorBrick (Figure 1-18) and I/O modules (Figure 1-33) and associated midplane (Figure 1-34) in the JBOD.

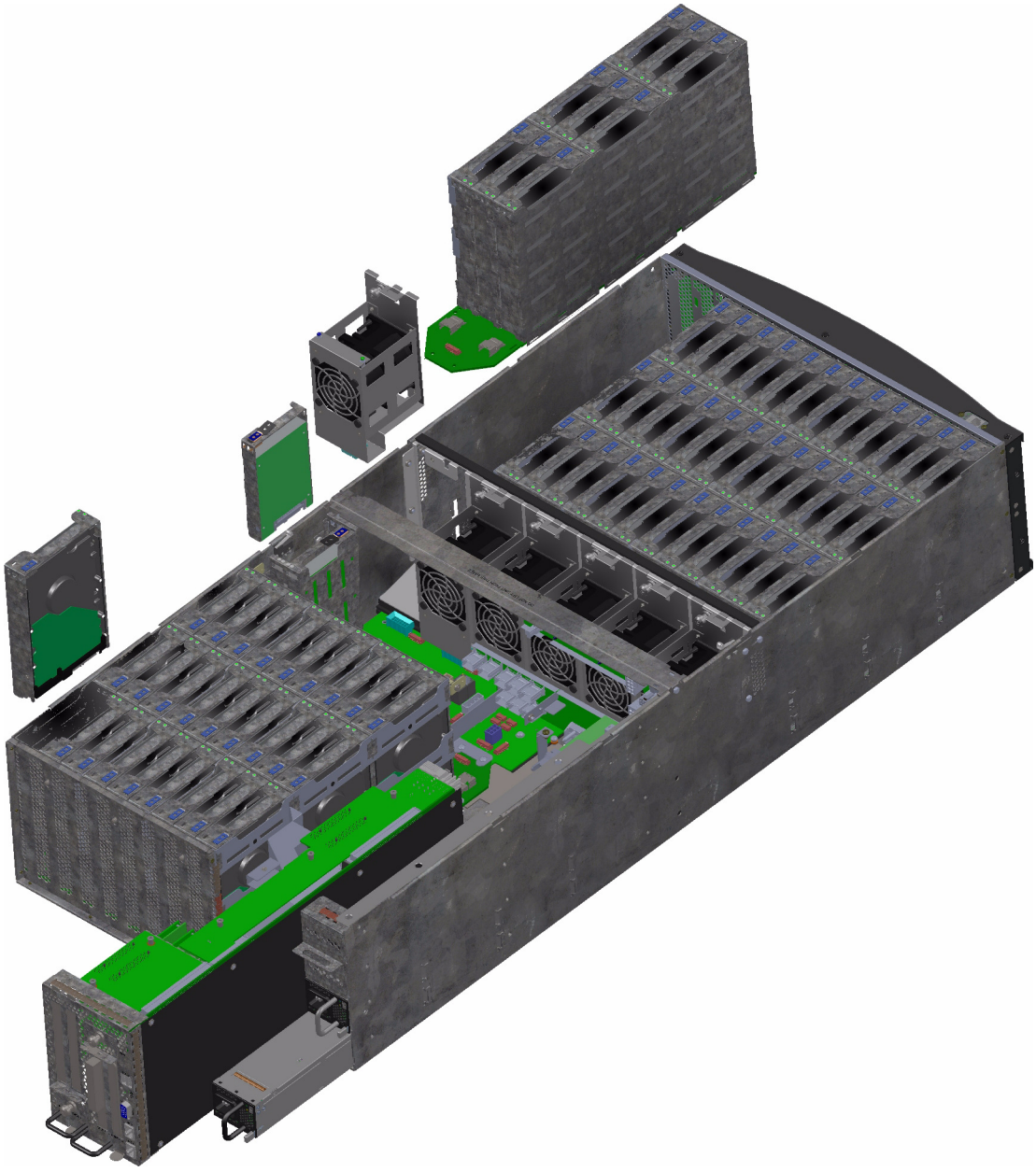


Figure 1-23 MIS 1.5 Single Server Platform

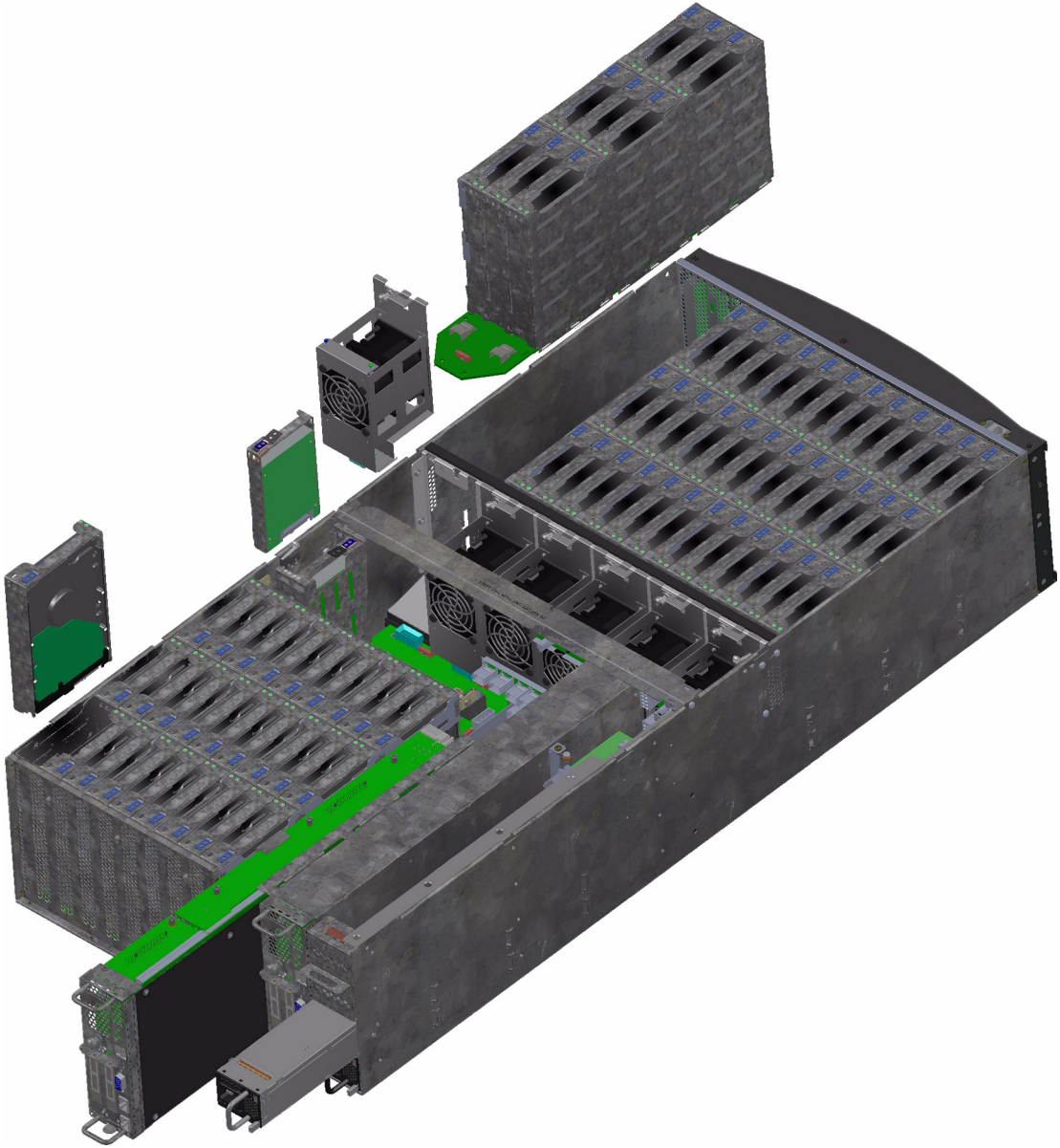


Figure 1-24 MIS 1.5 Dual Server Platform

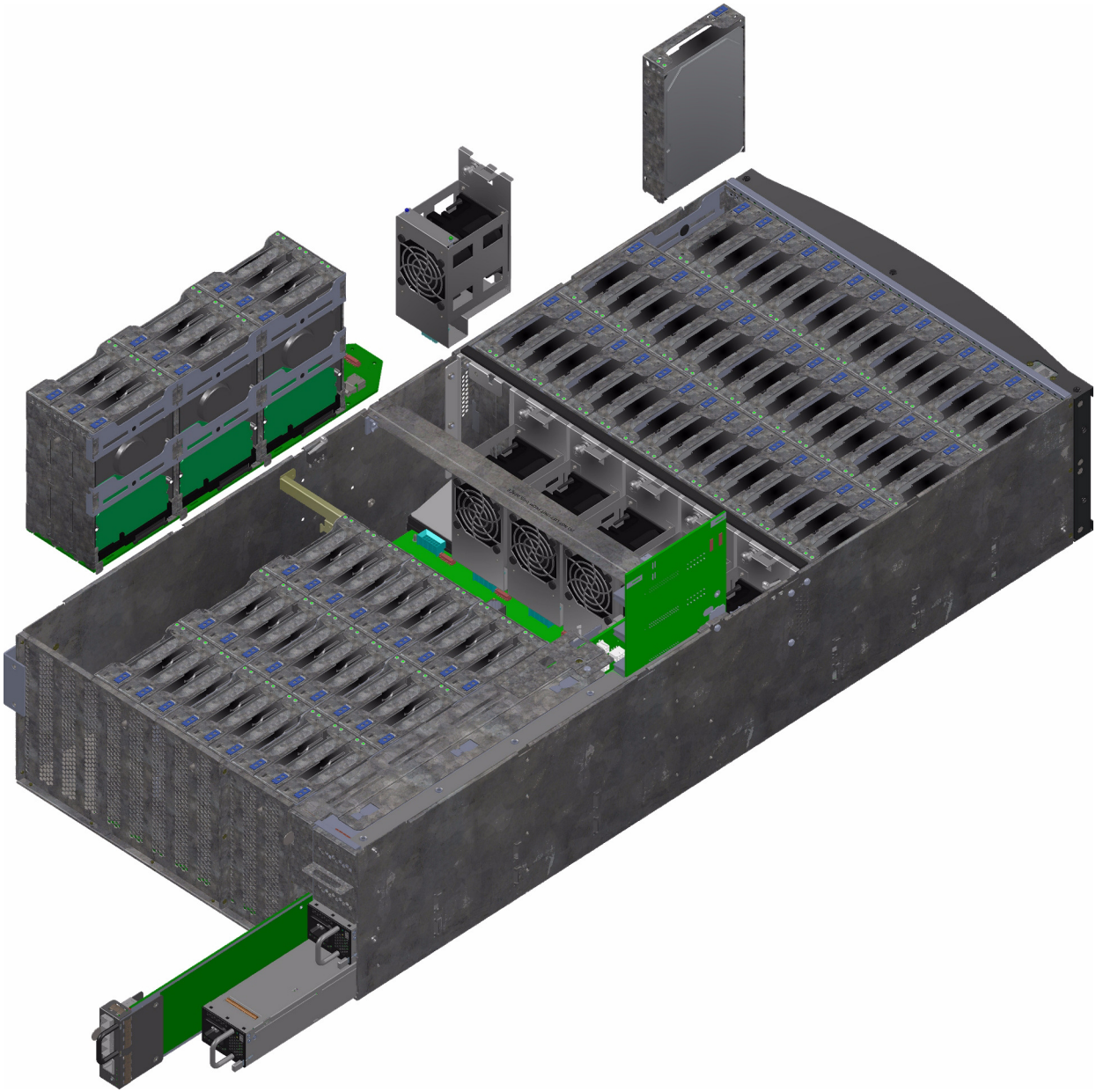


Figure 1-25 MIS 1.5 JBOD Platform

Server Module

The MIS Server platform can be single- or dual-server (Figure 1-26 or Figure 1-28) depending on whether it has one or two compute server modules. Each compute server module can have:

- Two Intel® Xeon® E5-2600 series processors per motherboard,
- Up to 8 DDR3 DIMMs (now 8 GB, 16 GB, or 32 GB) for a single-server board configuration. Up to 16 DIMMs for a dual server module configuration,
- Up to 4 HBAs for single servers—these can be full-height (4.25") and half-depth (3.375"), up to 2 externally and up to 2 internally facing, or up to 4 internally facing. For single-server platforms only, optional 4 port 8Gb Fibre Channel PCIe cards available,
- Up to 4 HBAs per server module (for up to a total of 8 across both server modules) in a dual server system—these can be half-height (2.12"), half-depth (3.375"), 2 internal max and/or a maximum of 2 external. (See Figure 1-30 on page 26),
- Three PCIe riser cards for a single server (dual servers have a mandatory 3 PCIe risers),
- Up to four battery back up units for a single server module. Up to three battery back up units per server module for a dual server platform, for a maximum total of six. (Unique BBU PCIe technology allows the inclusion of BBUs without the consumption of any of the available PCIe slots).

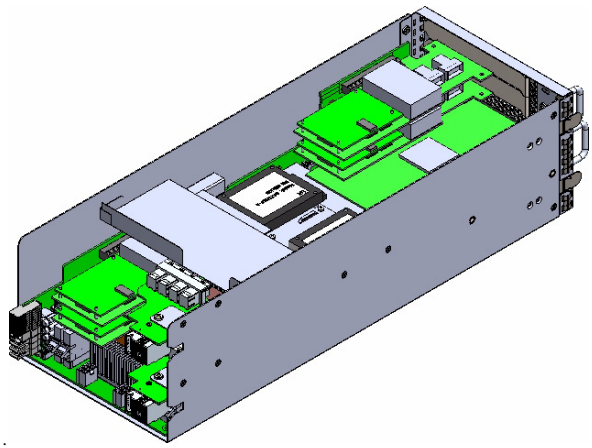


Figure 1-26 MIS Single Server Module

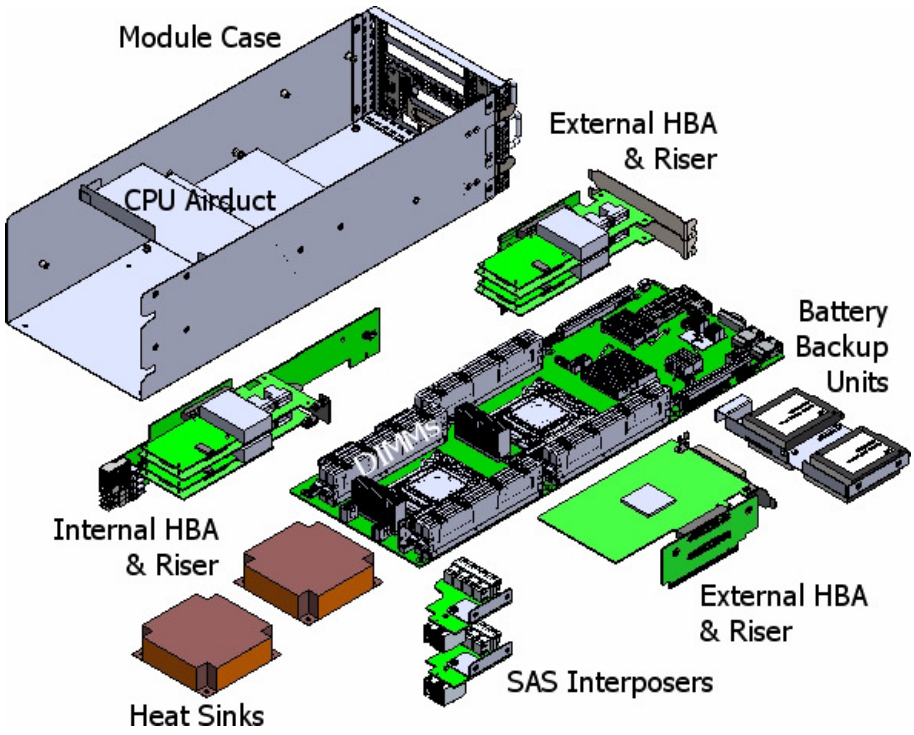


Figure 1-27 Single Server Module – Component View

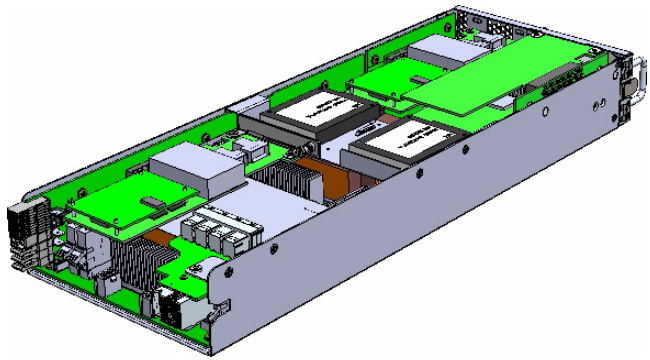


Figure 1-28 MIS Dual Server Module – Half Height

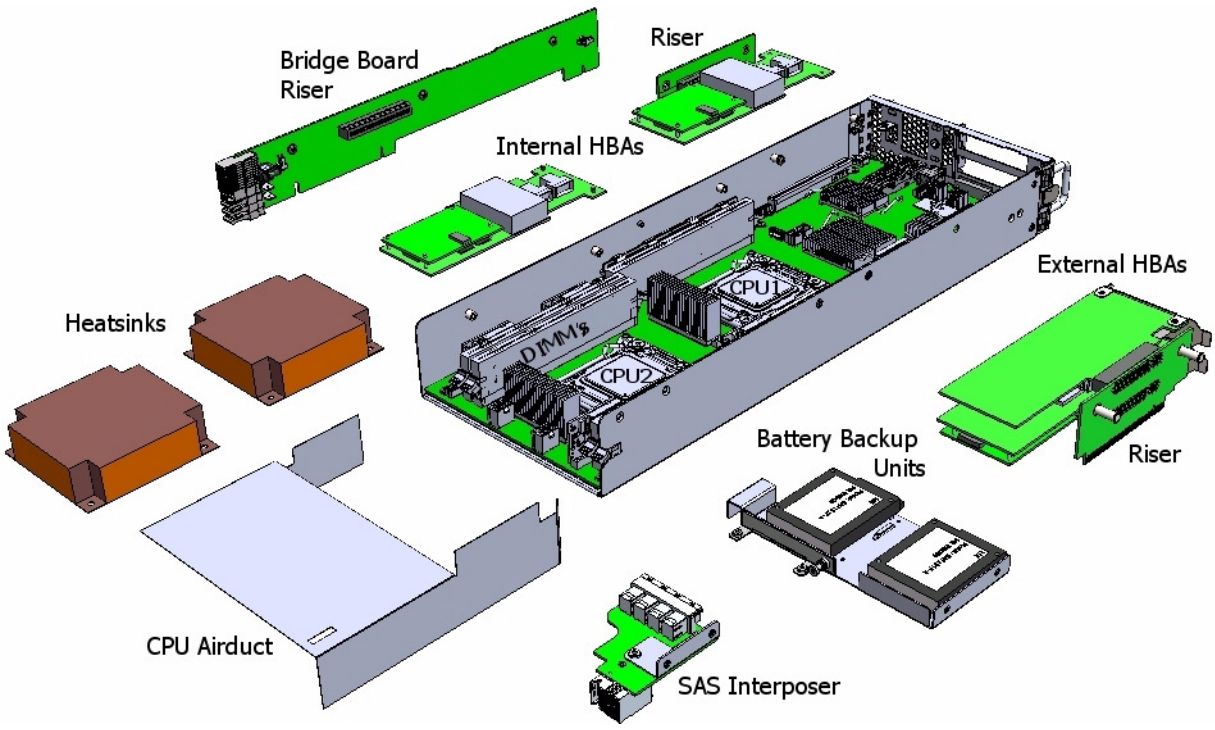


Figure 1-29 Dual Server Module – Component View

Layout of Server CPUs, and PCIe Risers HBAs

Figure 1-30 shows the CPU and riser layout. The first CPU handles Riser 1 and 2. The second CPU manages Riser 3. HBAs populated on Riser 3 are internal facing SAS HBAs only, which connect to the StorBricks (Figure 1-39).

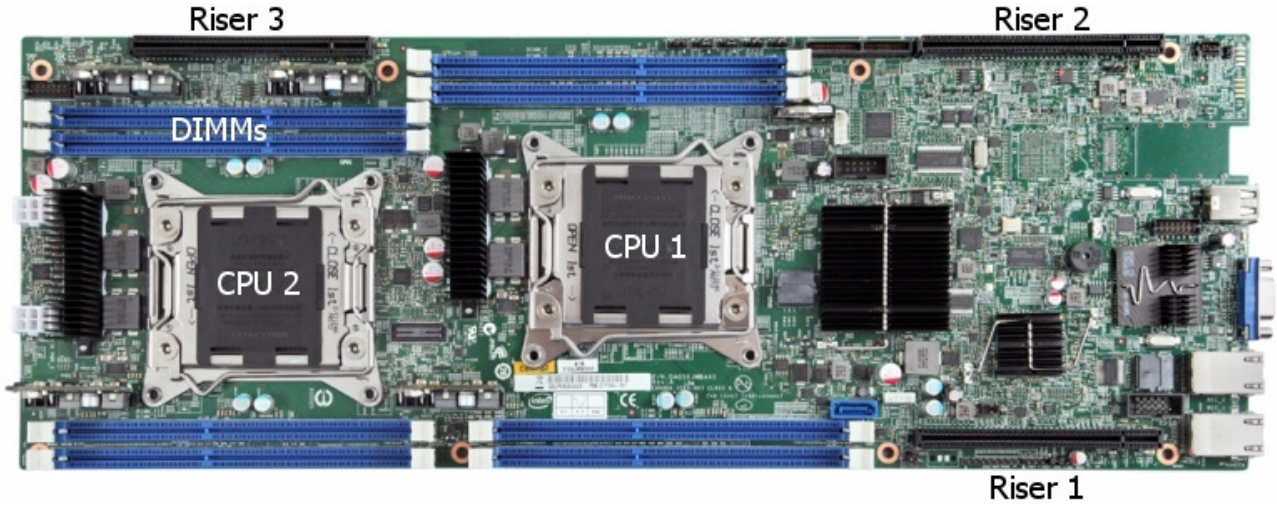


Figure 1-30 CPU and PCIe Riser Layout

Turbo Boost

Mode 1. (Turbo Mode Off) System performance and operation in non-turbo mode and at specific environmental conditions – The Intel CPUs have various power states and thermal protection states built-in that dictate the performance characteristics of an individual socket. The largest impact when operating in a system that was designed to support the TDP power level is the operating temperature of the individual socket and its thermal management device(s) in that specific product for a set of specified environmental conditions. The processors will go into a "throttling" mode whenever the temperature reaches a limit that is coded in to the SKU by Intel. When the Intel CPU invokes this throttling mechanism, the operating frequency of the CPU is reduced and will go through a predefined performance reduction algorithm to attempt to bring the processor back within its thermal operating window. With a MIS operating with turbo mode off at an ambient temperature of 35°C or less, this throttling condition should not exist.

Mode 2. (Turbo Mode On) Enabling Turbo mode will provide the opportunity for the customer to recognize performance improvements by increasing the processor clock speed up to the Turbo limits. It is important to understand that any performance increase is variable and dependent on these environmental variables and the current activity state of the unit. This performance improvement will vary significantly from data center to data center and between specific applications. For a MIS operating with turbo mode enabled at an ambient temperature of 35°C or

less, there may be some very heavy workloads that cause the processor to throttle, but even during this throttling condition, the processor frequency will still be at or above its rated frequency.

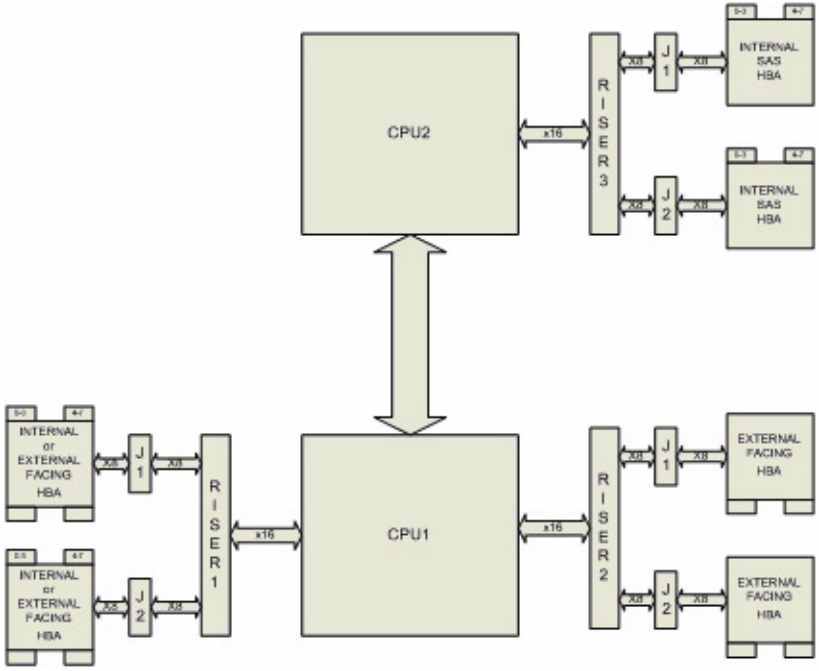


Figure 1-31 CPU Riser and HBA layout

Boot Drive Module

Each MIS Server platform features two boot drives per server module (up to four total – mirrored using LSI software RAID 1). These drives are SAS or SATA, rotational or SSD, used to store server data and the server operating system. Supported operating systems include:

- Red Hat® Enterprise Linux (RHEL) 6.2,
- SUSE LINUX® Enterprise Server 11 SP1,
- VMware® ESXi 5.0, or
- CentOS 6.3 (not shipped with product).

For Microsoft® products, only Windows® 2008 R2 SP1 is WHQL certified. SGI allows using Windows operating systems, but SGI does not support Windows. The customer will have to provide any Microsoft support on the MIS.

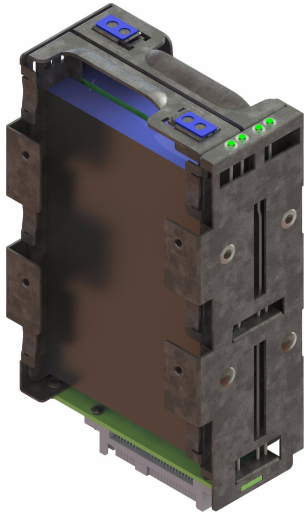


Figure 1-32 Boot Drive Module

For Microsoft® Windows® 2008 R2 SP1, the hardware is WHQL certified and sold as such. Customers who wish to run Windows buy only the hardware from SGI. The customer is then responsible for operating system installation and configuration, and all support arrangements with Microsoft. SGI does not provide technical support for Windows drivers, utilities (including IPMIutil), device manager, etc.

MIS JBOD I/O Module

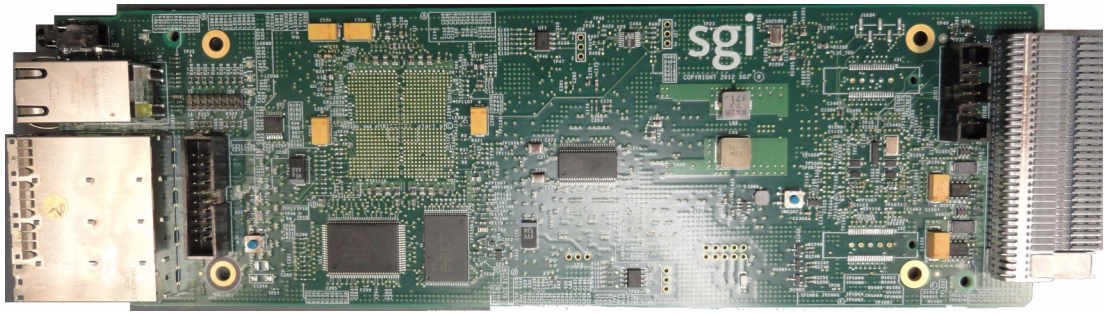


Figure 1-33 I/O Module for MIS JBOD Unit

JBOD I/O modules slide into a midplane (Figure 1-34), which connect to the SAS controllers.

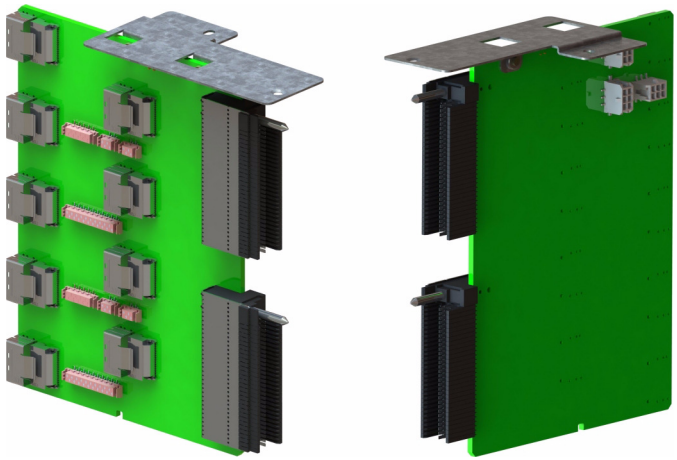


Figure 1-34 MIS JBOD Midplane I/O Connector (right & left views)

Connecting to a JBOD is normally done through a network connection to the JBOD I/O module. A diagram of the JBOD I/O module rear panel shows where you can connect to the module using Ethernet cable (Figure 1-35), HD miniSAS, or a serial connection. The ports labeled 0-3 are the HD miniSAS slots to the host system or other JBODs. There is also a serial port available. The status LEDs include a chassis locator LED, status/alert LED, and network activity lights.

Whether networked to an MIS Server or not, the JBOD I/O requires DHCP for its IP address.

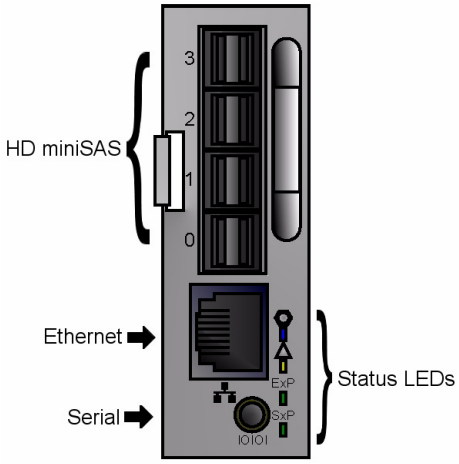


Figure 1-35 JBOD I/O Module Port Diagram

Once assigned a DHCP address, the JBOD I/O modules can be used to access the Fan Base Service page by connecting a server/laptop to the JBOD ethernet port and directing a browser to `<DHCP address>/service.xml`.

System Diagrams

Figure 1-36 shows the system-level block diagram for a fully populated dual-server and Figure 1-37 on page 33 for a fully populated JBOD.

Important: Due to thermal requirements for proper air flow through the system, **drive slots 0, 1, and 2 must always be populated in every StorBrick with drives all the same model and size form factor** (all 3.5" drives, all 2.5"-15mm drives in carriers with adapters, or all 2.5"-9mm drives in carriers with adapters). Additional drives can then be added in groups of 8 for either single- or dual-server platforms, and groups of 9 for the JBOD, starting with slot 3 of StorBrick 0 through StorBrick 7 (or StorBrick 8 for JBODs). The next set of additional drives is added to slot 4 in all the StorBricks, etc.

Figure 1-38 on page 34 is a map of the physical location of the modules, including top and rear views. In the MIS Server 1.5, the server module(s) take(s) the place of the JBOD's 9th StorBrick

and I/O modules. Power supplies remain in the same location regardless of platform type (server or JBOD). Figure 1-39 on page 35 shows the SAS storage topology, PCAs, and cables.

Note: Boot drives CM1-0 and CM1-1 are installed in dual-server platforms only.

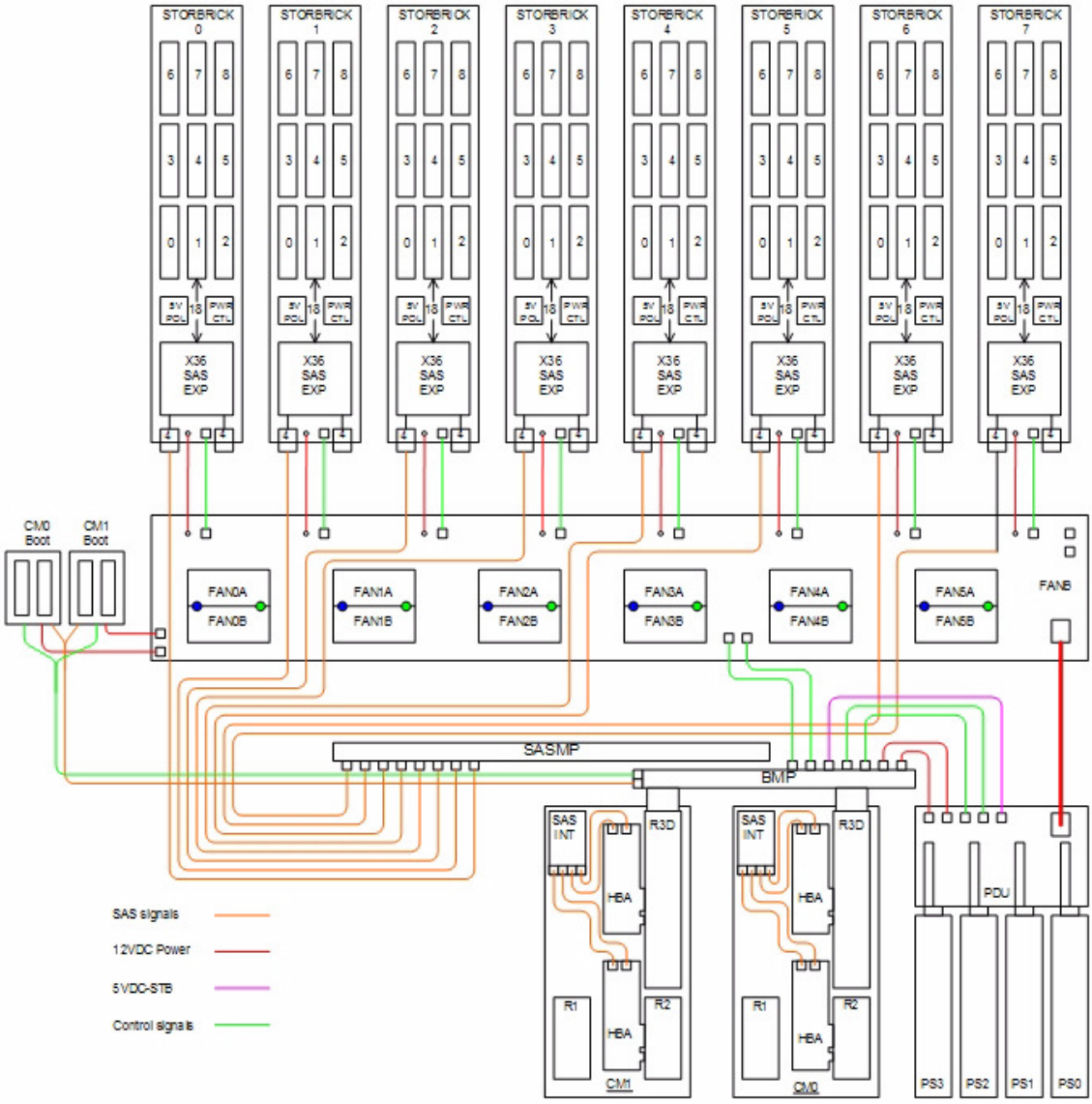


Figure 1-36 System-Level Block Diagram – Server

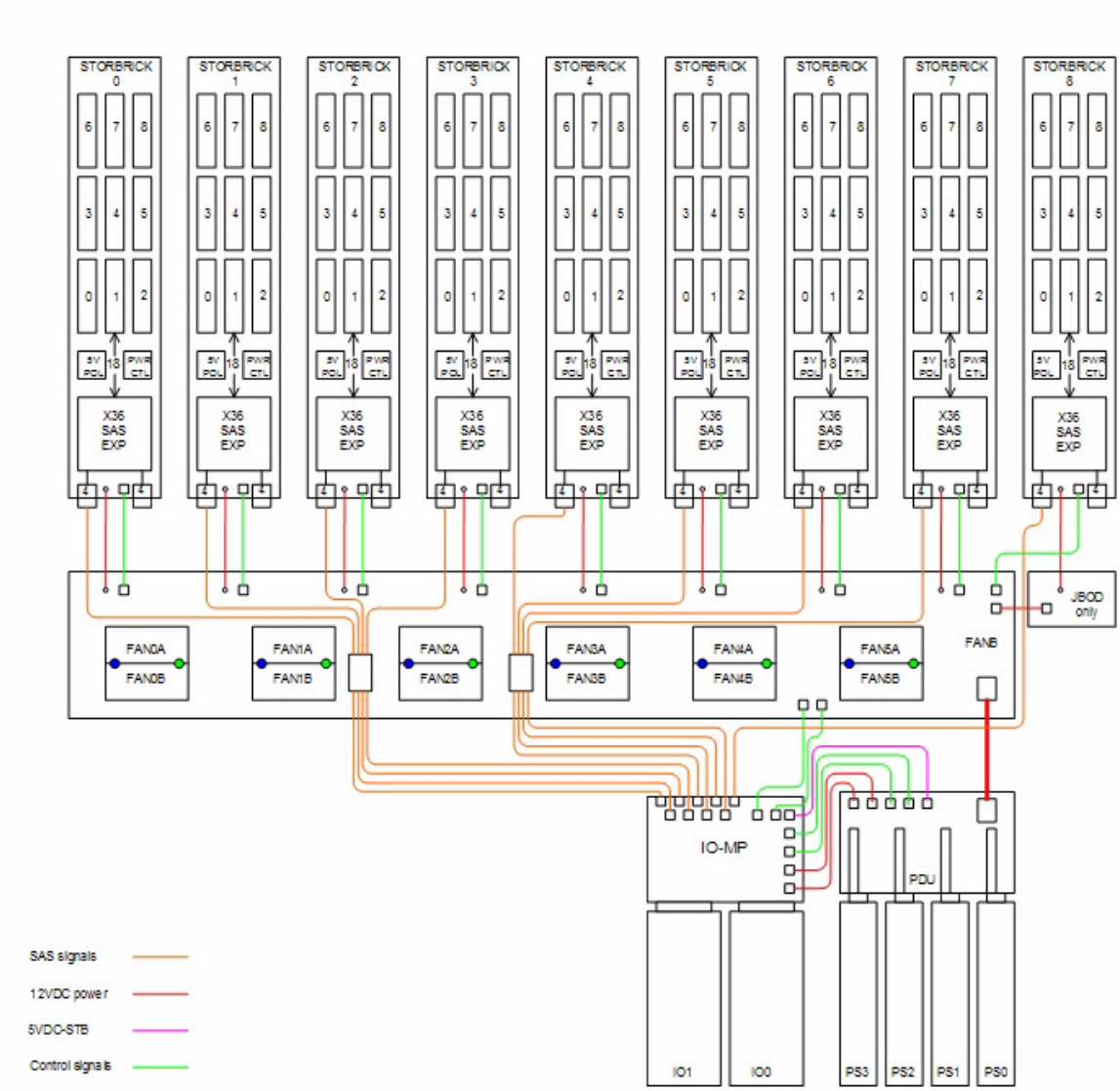


Figure 1-37 System-Level Block Diagram – JBOD

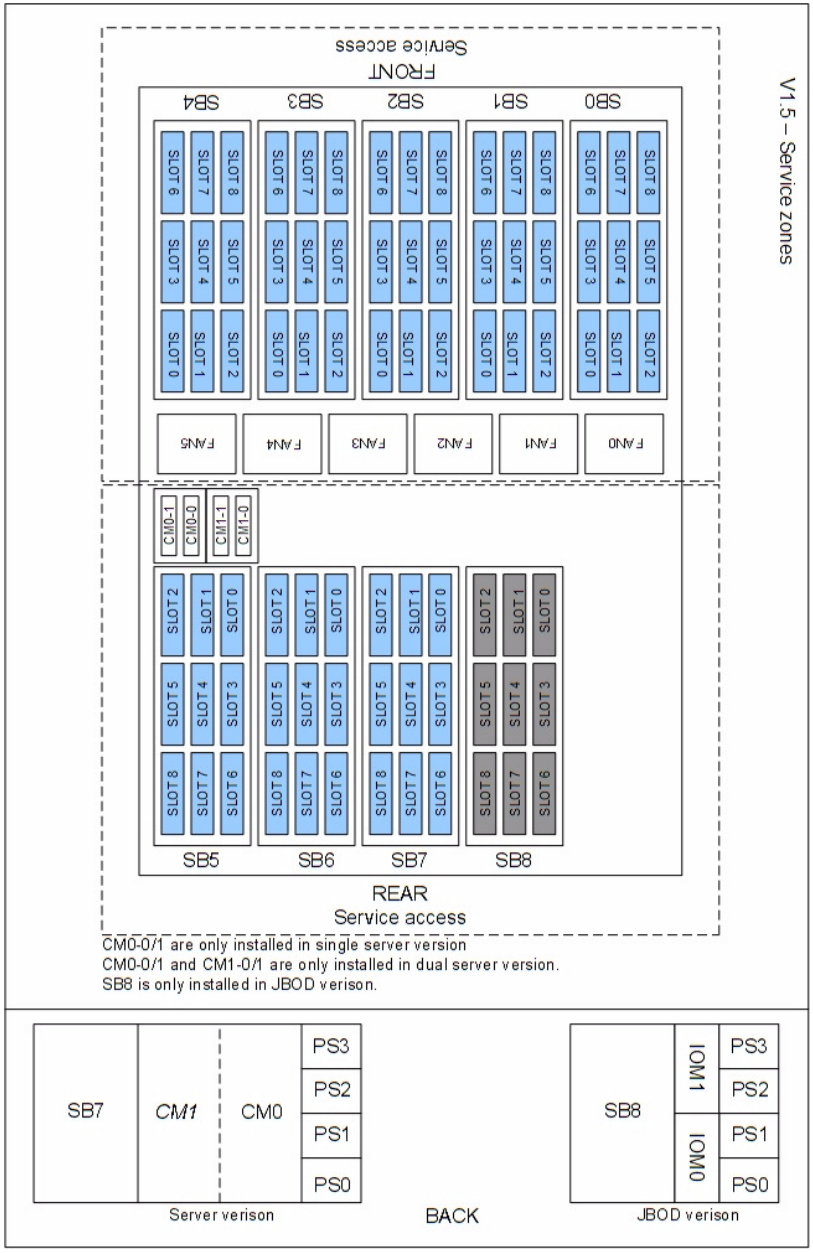


Figure 1-38 System Layout

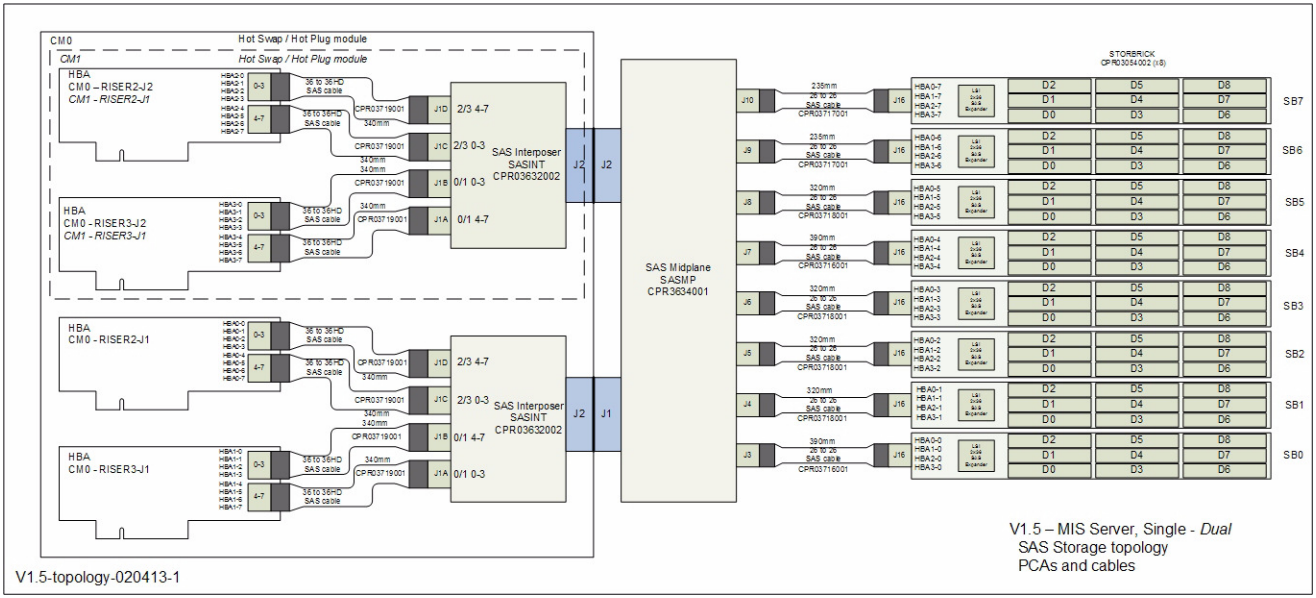


Figure 1-39 SAS Storage Topology, PCAs, and Cables

Chapter 2

System Interfaces

This chapter describes the hardware and software interfaces of the MIS platforms. Both the MIS Server platform and MIS JBOD storage unit have a front control panel, disk drive LED codes, and power supply LED codes. The control panel lights and buttons have different meanings and functions, depending on whether the machine is the MIS Server platform or MIS JBOD unit. The disk drive LED codes and power supply LED codes remain the same whether the system is a server platform or JBOD unit. Additionally, there are programs used to initialize and monitor the MIS machines. This chapter details the hardware interfaces, their functions and indications, as well as the Baseboard Management Controllers (BMC) Web Console. These programs provide power management features, environmental monitoring, etc.

- "Control Panel" on page 39
    - "Powering On an MIS Platform" on page 41
    - "Turning Off an MIS Platform" on page 42
    - "MIS JBOD vs. Server Control Panel" on page 40
- "Server Module LEDs" on page 43
- "JBOD LEDs" on page 46
- "Disk Drive LEDs" on page 46
    - "Boot Drive Monitoring" on page 47
    - "Capacity Drive Monitoring" on page 50
    - "Monitoring RAID Cards and Battery Back-up Units" on page 52
- "AC Power Supply LEDs" on page 53
- "DC Power Supply LEDs" on page 55
- "Power Supply Monitoring" on page 55

        - "Requirements" on page 56
        - "Viewing Existing Filters" on page 56
        - "Setting Filters" on page 57
        - "Clearing Filters" on page 57
- "Fan LEDs," "Fan Monitoring," and "Fan Base Service Page" on page 58
- "MIS-S9D Proprietary Network Interface" on page 60
- "BMC Integrated Web Console" on page 61
        - "Setting the BMC IP Address" on page 62
        - "Setting Up User Accounts for the BMC" on page 63
        - "Server Health" on page 64
        - "Configuration Tab" on page 68
        - "Server Power Control" on page 73
- "Intelligent Management Platform Interface (IPMI 2.0)" on page 75
        - "Enabling IPMI on a Linux System" on page 76
        - "Accessing IPMI on a Linux System" on page 77

Control Panel

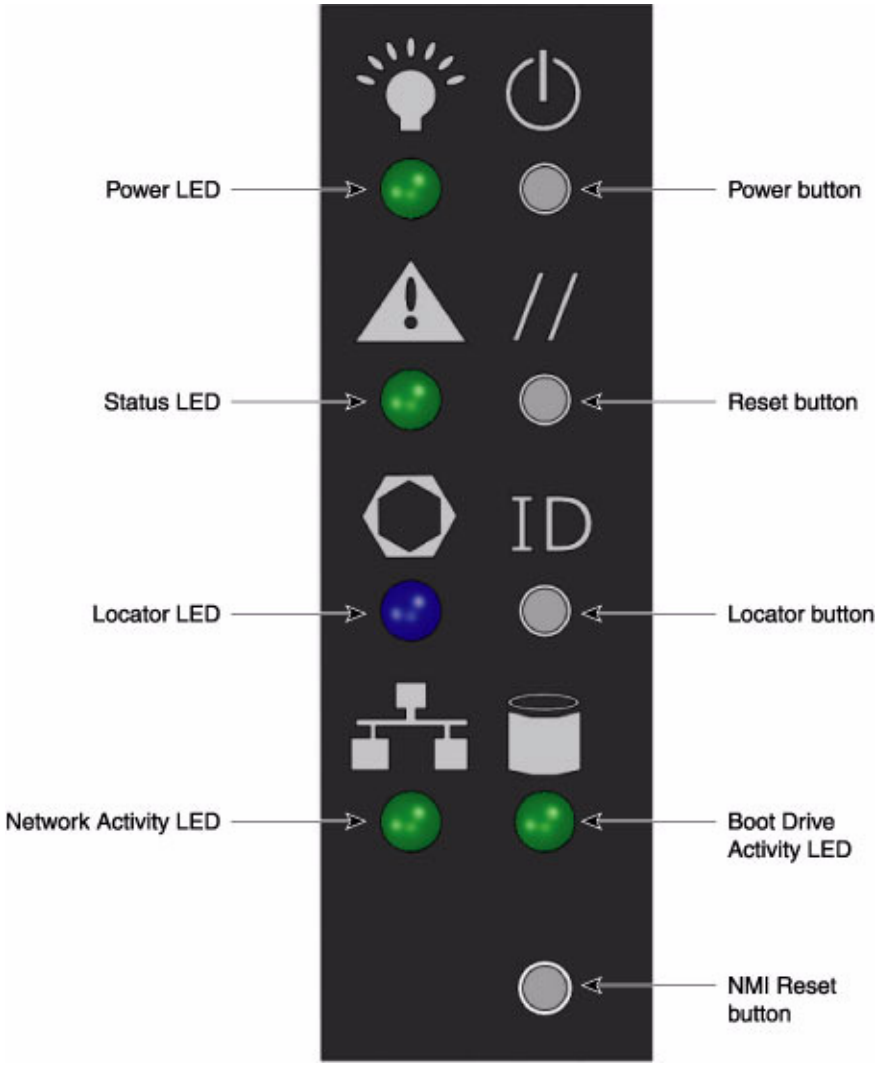


Figure 2-1 MIS Control Panel

The control panel (Figure 2-1) interface consists of five indicator lights and four buttons. The NMI Reset button (Non-Maskable Interrupt) is not supported and is non-functional.

MIS JBOD vs. Server Control Panel

The control panel (Figure 2-1) for the MIS JBOD is exactly the same as the MIS Server Platform. However, since there is no boot drive module in a JBOD, the Boot Drive Activity LED, located next to the Network Activity LED, is present but inactive.

Important: When there are *two* I/O modules in a JBOD, the top control panel connects to the bottom I/O module, and the bottom control panel accesses the top I/O module.

Table 2-1 MIS Control Panel Buttons and LEDs

LED/Button	Description
Power LED	Green LED lit means power is on.
Power button	If the system is off, pushing this button powers on the system. If the operating system is running, pushing this button shuts down the operating system and powers off the system gracefully. If the operating system is hung, holding the button down for 10 seconds or more will power off the system for a hard reset. **Important:** The power button DOES NOT completely turn off the system power, 5V standby power is active **whenever the system is plugged in.**
Status LED	This indicator will be lit whenever there is power available to the power supplies, whether the unit is on or off. Green means the system is in good working order. Yellow indicates a problem with the system, and service is required.
Reset button	The service reset button. When pushed, this button causes the server to reboot and, if the problem is cleared by the reset, returns the Status LED to green.
Locator LED	Blue LED is lit on the front and the back to help locate the unit in a rack or bay.

Table 2-1 MIS Control Panel Buttons and LEDs **(continued)**

LED/Button	Description

Locator button	The Locator LED will be lit blue when the Locator button is pushed. There is a corresponding LED on the back of the server that will be blue. When the Locator button is pushed again, the LED will go off. This function may also be activated remotely using the Intel BMC Web Console and pressing the virtual button (“Virtual Front Panel” on page 75), or using the Linux IPMItool:
	`-H <ip address> -P <password> -U <user> chassis identify`
	and to turn off:
	`-H <ip address> -P <password> -U <user> chassis identify off`
	Note: Requires configuration of BMC user accounts, “Setting Up User Accounts for the BMC” on page 63

NIC Activity LED	The green LED will be lit when there is a link to the network and active (blink) whenever there is any network traffic occurring on the baseboard NIC ports.
Boot Drive LED	The LED is lit whenever the boot drives are being accessed.
NMI Reset button	Not supported, non-functional.

Powering On an MIS Platform

To power-on an MIS Server platform, hold down the power button firmly until the fans spin up and the hardware lights come on. This will initialize the machine’s BMC, BIOS, and start internal diagnostics, including hardware status, RAID Volume information, missing hardware alerts (e.g., missing batteries), and missing configuration alerts. This process will be repeated for each expander in the machine, and finally (if conditions allow), the machine’s operating system will load and welcome/login screen appear.

The front panel LED blinks for 30-60 seconds upon startup while the baseboard management controller (BMC) is initializing. If not, then the BMC is not functioning, and try to gather system event log (SEL) information for investigation (see “Event Log” on page 66 for more information.). Additionaly, if the machine is powering on and there is a fault (e.g., the machine was in the middle of a rebuild when the power was cut, a degraded RAID set is in the system, battery is exhausted, etc.), these warnings will appear during Power-On Self-Test (POST).

When the MIS Server is first powered on, it gives you the option to press **F2** to enter the BIOS, **F6** to enter the Boot Menu (to change how the system boots), or **F12** for a Network Boot (what's also known as PXE or "pixie boot").

If the platform is an MIS dual-server and both servers are powered down, performing the above steps only powers on the server with which you are working. Though the fans and drives will be powered on, the second server will remain powered off until the second server is powered on, then all power will be turned on.

For a JBOD unit, the power button on the front panel will turn on the power to that I/O module. If a second module is installed and powered off, it will remain off until it too, is powered on.

Using IPMItool

Note: The Linux IPMI Service must be enabled and running. See "Intelligent Management Platform Interface (IPMI 2.0)" on page 75.

First, verify that the power cables are properly connected to the system. Use the IPMItool `power on` command to power up the server.

On a local server: `# ipmitool power on`
For a remote server: `# ipmitool -H <host> -U <user> -P <pswd> power on`
For example: `# ipmitool -H 137.8.64.3 -U admin -P Password01 power on`
where the host IP address is `137.8.64.3`, the user is `admin` with the password: `Password01`.

Turning Off an MIS Platform

There are different ways to shut down an MIS machine. The preferred method is to go into the machine's operating system and select **Shut Down**. This will prompt the user to enter a password before allowing the shut-down process. Other ways to power off the machine include:

- Using the Operating System GUI power-off button at the console screen.
- When logged in via an ssh session and executing an IPMItool `power off` command.
- Using the remote console screen GUI power-off button, if a keyboard/video monitor/mouse (KVM) RMM4 session is established through the BMC.
- Using the MIS-S9D Proprietary Network Interface, connecting to the Fan Base Service Page and using the **Shutdown** button.

If the platform is an MIS dual-server and **both** servers are powered up, performing the above steps **only** powers off the server with which you are working. The fans, drives and second server will remain powered on until the second server is powered off, then all power (but standby) will be turned off.

For a JBOD Unit, the power button on the front panel will turn off the power to that I/O module. If a second module is installed and powered on, it, the fans and the drives will remain on until it, too, is powered off.

One additional way to shut down the platform is to hold down the **Power** button on the front of the unit (Figure 2-1) until the machine powers off. However, this forces the machine off and does not allow the machine to go through normal shut-down procedures, requiring a recovery process at start-up.

To shut down using IPMItool, use the following commands:
On a local server: `# ipmitool power on`
For a remote server: `# ipmitool -H <host> -U <user> -P <pswd> power off`
For example: `# ipmitool -H 137.8.64.3 -U admin -P Password01 power off`
where the host IP address is `137.8.64.3`, the user is `admin` with the password: `Password01`.

If power is lost from outside the machine (power outage), the machine will recognize the loss of power and execute an emergency shutdown procedure. If there is a battery back-up unit installed, it will protect integrity of cache in the event of power or server failure.

Server Module LEDs

On the back panel of the server module are three sets of LED indicator lights, not including any indicator lights that may exist on external HBAs. From the top down, these sets of LEDs include 8 internal Power-On Self-Test (POST) Code Diagnostic LEDs (labeled 1-8, Figure 2-2), bi-colored System Status and blue ID LEDs (A & B, respectively, Figure 2-2), and two NIC ports, each with a green Link LED and bi-colored Activity Rate LED (Figure 2-3).

See *Intel Server Board S2600JF, Technical Product Specification*, page 170, for more information on what each POST LED pattern indicates.

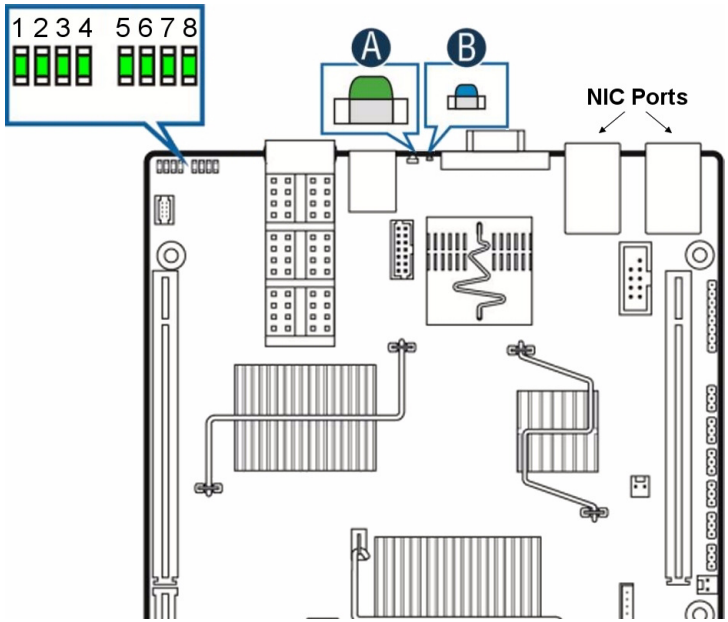


Figure 2-2 BIOS POST Code and System LEDs

Table 2-2 System Status LED Meanings

LED/Button	Status	Description
Green Solid	Okay	– System ready.
Green Blink	Degraded	– Unable to use all installed memory when more than one DIMM is installed – PCIe correctable link errors – CPU disabled – Non-critical threshold crossed (temperature, voltage, power) – Battery failure
Amber Blink	Non-Fatal	– PCIe uncorrectable link errors – Critical threshold crossed (temperature, voltage, power)

Table 2-2 System Status LED Meanings

LED/Button	Status	Description
Amber Solid	Fatal	– DIMM failure, no good memory is present – Run-time memory uncorrectable error – CPU configuration error (e.g., processor stepping mismatch), overtemperature – Power fault, insufficient power, not enough power supplies present
Off	Not Ready	– Main power off

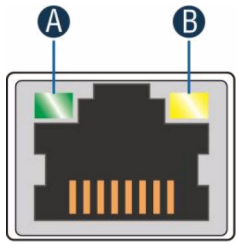


Figure 2-3 NIC Port LEDs

Table 2-3 NIC Port LED meanings

LED/Button	Description	NIC State
Green LED (A)	On	Active connection
	Blinking	Send/Receive activity
Green/Amber (B)	Off	10 Mbps
	Amber	100 Mbps
	Green	1000 Mbps

JBOD LEDs

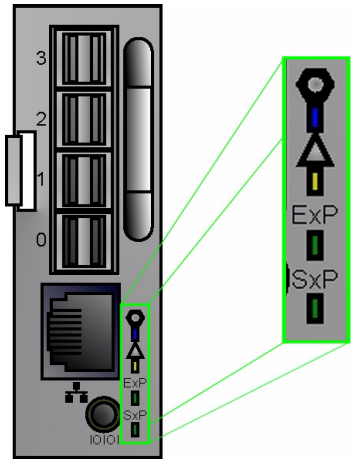


Figure 2-4 JBOD I/O Panel LEDs

On the back panel of the JBOD I/O Module are four LEDs. The top is a blue ID LED labeled with a circle in a hexagram, next is a bi-colored Status LED, **ExP** (SAS activity of the expander on the StorBricks), and **SxP** (SAS activity of the targed SMP for the expander on the StorBricks) activity lights. The blue ID LED can be toggled on/off/blink by using the CLI Zoning Tool (see "`20) Change state of JBOD-IO ID LED - off, on blink`" in Chapter 3 for more information).

Disk Drive LEDs

Figure 2-5 shows the disk drive LEDs, a blue ID LED and bi-colored Status LED.

Figure 2-5 Disk Drive LEDs

Table 2-4 describes the meaning of disk drive LEDs.

Table 2-4 Disk Drive LEDs

Status LED	Blue LED	Description
Off	Off	Drive is off and can be removed.
Green	Off	Drive is on.
Yellow	Off	Service required.
Off/Green/Yellow	On	Indicates drive location.

Drive Monitoring

Capacity drive monitoring can be performed by MegaRAID Storage Manager. Boot drive monitoring, since it is not a part of the StorBricks, is monitored using **M**ultiple **D**evices **Adm**inistration tool: `mdadm`. By default, if the MIS platform comes with a factory-installed operating system, boot drives are mirrored using RAID 1 and capacity drives are shipped with RAID 6. For those MIS Servers not shipped with an OS, RSTe must be enabled in the BIOS to allow boot drive mirroring and hot-swappable capabilities.

The following sections explains how to use the MegaRAID Storage Manager software to monitor the status of capacity drives and the `mdstat` command to monitor boot drives (Windows 2008 uses the Windows System Resource Manager to enable email alerts, see *KB Article cc732728* for more information).

The MegaRAID Storage Manager software does a background check every hour to verify if the controller and the system time are in synch. If the time difference between the controller and the system is more than 90 seconds, the MegaRAID Storage Manager software synchronizes the time so that the controller time and the system time are in synch. `mdadm` polls the md arrays every 60 seconds (default value). This can be adjusted using the `-d` mode and entering in a value of seconds, though it is recommended that you keep the default value and only adjust this time for troubleshooting.

Boot Drive Monitoring

Issue a `#cat /proc/mdstat` command to see current status (`stat`) of of the multiple devices (`md`) attached to the processor (`proc`).

Boot drive status is indicated by either a `U` for up or _ for down. In the following example, everything is normal (`[UU]`), and `md127` is the container for `md125` and `md126`.

```
# cat /proc/mdstat
Personalities : [raid1] [raid0] [raid10] [raid6] [raid5] [raid4]
md125 : active raid1 sdb[1] sdc[0]
      111357952 blocks super external:/md127/0 [2/2] [UU]

md126 : active raid1 sdb[1] sdc[0]
      5556224 blocks super external:/md127/1 [2/2] [UU]

md127 : inactive sdc[1](S) sdb[0](S)
      6306 blocks super external:imsm
```

In the next example below, a drive has failed. Notice that `sdc[0]` is now missing from `md125`, `md126` (their numbers changing from `[2/2]` to `[2/1]`), and the container `md127`. Additionally, a failed drive is indicated in the notation `[U_]`.

```
# cat /proc/mdstat
Personalities : [raid1] [raid0] [raid10] [raid6] [raid5] [raid4]
md125 : active raid1 sdb[1]
      111357952 blocks super external:/md127/0 [2/1] [U_]

md126 : active raid1 sdb[1]
      5556224 blocks super external:/md127/1 [2/1] [U_]

md127 : inactive sdb[0](S)
      3153 blocks super external:imsm
```

To enable monitoring of the boot drives, the following usage of the mode `--monitor` is employed:

```
mdadm --monitor <raiddevice> [options] <devices>
```

This usage causes `mdadm` to periodically poll a number of `md` arrays and to report on any events noticed. If any devices are listed on the command line, `mdadm` will only monitor those devices, otherwise, all arrays will be monitored. Further, adding `--scan` causes the operation to be applied to all arrays listed in `/proc/mdstat`. If `--scan` is given, then an email address **must** be specified on the command line. If `--scan` is given and an email address is *not* available, then `mdadm` will not monitor anything. Without `--scan`, `mdadm` will continue monitoring as long as something was found to monitor.

The result of monitoring the arrays is the generation of events. These events are passed to a given email address using the option `-m=<email address>` or `--mail=<email address>`. If no email is given, then each event is reported to `stdout`.

The `-t` or `--test` option generates a **TestMessage** alert for every array found at startup. This alert gets mailed and passed to the alert program. This can be used for testing that alert message to get through successfully.

The different events are listed in Table 2-5 below.

Table 2-5 Events

Tag	Description
DeviceDisappeared	An `md` array which previously was configured appears to no longer be configured.
RebuildStarted	An `md` array started reconstruction.
Rebuild##	Where **##** is 20, 40, 60, or 80, this indicates that rebuild has passed that many percentage of the total.
RebuildFinished	An `md` array that was rebuilding, isn't any more, either because it finished normally or was aborted.
Fail	An active component device of an array has been marked as faulty.
NewArray	A new `md` array has been detected in the `/proc/mdstat` file.
DegradedArray	A newly noticed array appears to be degraded. This message is not generated when mdadm notices a drive failure which causes degradation, but only when `mdadm` notices that an array is degraded when it first sees the array.
TestMessage	An array was found at startup, and the `--test` option was given.

Only **Fail**, **DegradedArray**, and **TestMessage** cause email to be sent. Each event has an associated array device (e.g., `/dev/md1`) and possibly a second device. For **Fail**, the second device is the relevant component device. Use the command `mdadm --help` or `mdadm <option> --help` for more information on `mdadm` or the `mdadm` options, respectively.

Capacity Drive Monitoring

MegaRAID Storage Manager reports capacity drive failures, RAID card failures, and Battery Back-up Units. When devices automatically go from an optimal state to a different state, such as a drive failure, the MegaRAID Storage Manager software gets those events from the controller and gives a notification using different alert delivery methods. A pop-up notification is started automatically when you login to the operating system (Figure 2-6).

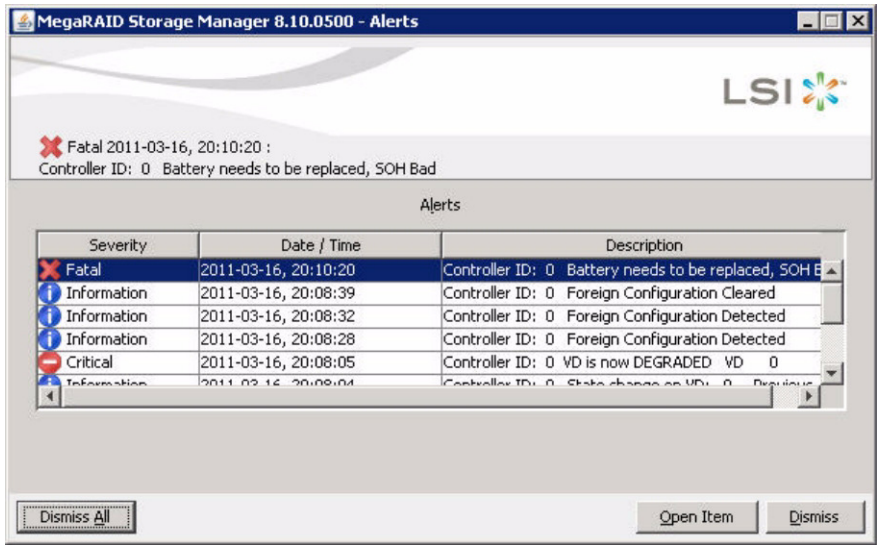


Figure 2-6 MegaRAID Storage Manager – Alerts Pop-up Window

To receive email alerts for capacity drive failures, from the main screen select **Tools** and **Configure Alerts**. In the **Configure Alerts** window, the **Alert Settings** tab allows you edit the alert delivery method for different severity levels by clicking the **Edit** button, or change the method of delivery and/or severity level for each individual event using the **Change Individual Events...** button (Figure 2-7).

Note: The **Save Backup...** button and **Load Backup...** buttons are used to save/load the *entire* alerts configuration to/from an `.xml` backup file, not just the settings for the tab with which you are working.

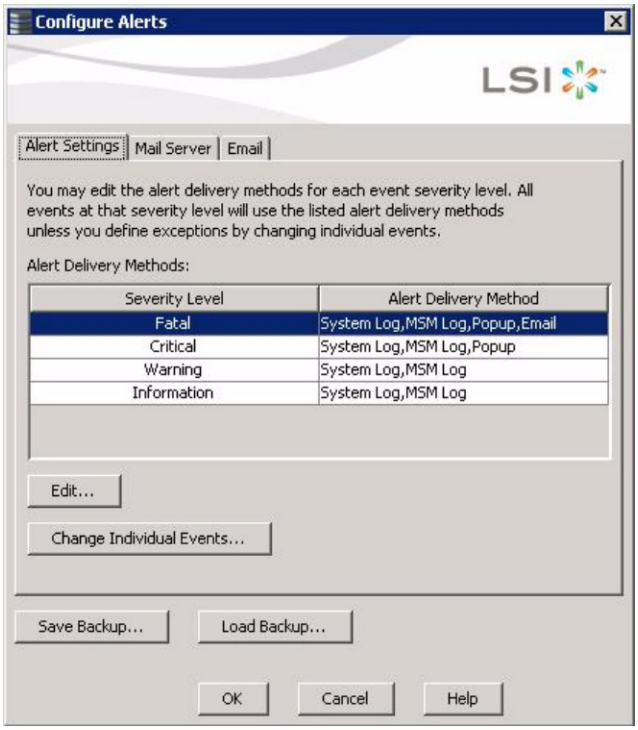


Figure 2-7 MegaRAID Storage Manager – Configure Alerts Window

Important: Whenever you load a saved backup file, all unsaved changes made in the current session will be lost.

The **Mail Server** tab is where to enter the *sender* email address for alerts, the SMTP server name or IP address of the mail server to send the alerts, and user name and password fields (filled only when the SMTP server requires authentication, Figure 2-8).

Figure 2-8 MegaRAID Storage Manager – Mail Server Tab

The **Email** tab is where you to add/remove email addresses for recipients of alert notifications (Figure 2-9). To configure an email account to receive alerts, enter the email address you want to add in the **New recipient email address** field and click **Add**. The email address should appear in the **Recipient email addresses** pane.

Once the changes to the **Mail Server** tab and **Email** tabs have been made, click the **Test** button to make sure your configuration is correct. If satisfied, click **OK**.

Monitoring RAID Cards and Battery Back-up Units

If the componant failing is a MegaRAID card or Battery Back-UP unit on a MegaRAID card, by default, fatal events in MegaRAID Storage Manager are displayed as email notifications. Based on your configuration, the email notification, besides the event's description, also contains system information and the controller's image details. Using this additional information, you can find out the system and the controller on which the fatal error occurred. For more information on

configuring MegaRAID Storage Manager alerts, see Chapter 10 in LSI's *MegaRAID SAS Software User's Guide*.

Figure 2-9 MegaRAID Storage Manager – Email Tab

AC Power Supply LEDs

There are two LEDs located on the face plate of the power supply, one green on top for AC power, and one bi-color yellow/green below indicating DC power (Figure 2-10). Table 2-6 describes the function of the power supply LEDs

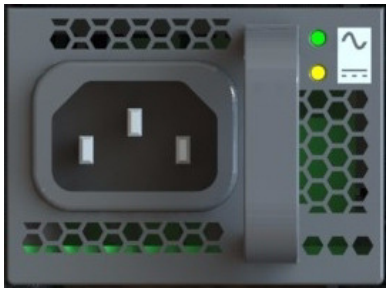


Figure 2-10 AC Power Supply LED

Table 2-6 Power Supply LEDs

LED Signaling	Operating Condition
AC Solid Green	AC Line within range
AC Off	AC Line UV condition
DC Blinking Yellow (1:1)	PSON High
DC Blinking Yellow/Green (1:2)	Hot-Standby Mode
DC Solid Yellow	V_1 or V_{SB} out of regulation, Over Temperature shutdown, Output over voltage shutdown (V_1 or V_{SB}), Output over current shutdown(V_1 or V_{SB}), Fan error
DC Blinking Yellow/Green (2:1)	Over temperature warning
DC Blinking Yellow/Green (1:1)	Minor fan regulation error (>5%, <15%)

DC Power Supply LEDs

There are two LEDs located on the face plate of the DC power supply, one red on top for DC Input OK, and one bi-color yellow/green below indicating Output OK (Figure 2-10). Table 2-7 describes the function of the DC power supply LEDs.

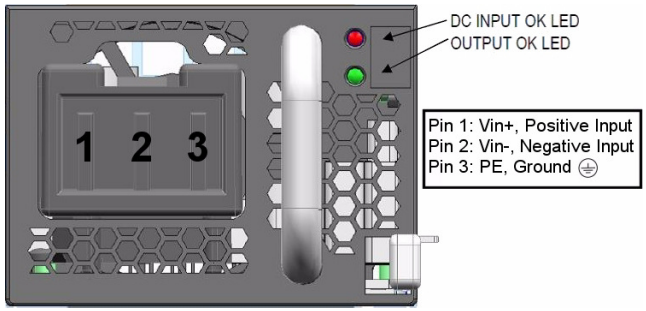


Figure 2-11 DC Power Supply LEDs and Pins

Table 2-7 DC Power Supply LEDs

LED Signaling	Operating Condition
DC Input OK Solid Green	DC Input within range
DC Input OK Off	DC Input UV
Output OK Blinking Yellow (1:1)	PSON High
Output OK Blinking Yellow/Green (1:2)	Hot-Standby Mode
Output OK Solid Yellow	V_1 or V_{SB} out of regulation, Over-temperature shutdown, Output over-voltage shutdown, Output over-current shutdown, Fan error (>15%)
Output OK Blinking Yellow/Green (2:1)	Over temperature warning
Output OK Blinking Yellow/Green (1:1)	Minor fan regulation error (>5%, <15%)

Power Supply Monitoring

The fan base firmware will monitor all Power Supply Units (PSUs) installed in the system and generate SEL entries regardless of whether or not the alerts are enabled. This functionality cannot be turned off. To receive alerts, in addition to these instructions for entering new filters, correct configuration of the Intel BMC must also be performed. This can be done via the Intel Integrated BMC Web Console (see “Configuration Tab” on page 68). Specific instructions for the BMC configuration is not included here because it is site specific. Command strings are IPMI commands (`IPMItool` is a Linux-based utility, Windows uses `IPMIutil`).

When the fan base firmware monitors the PSU it sends alerts to the BMC. This alone does not send the email. You will need to set up the BMC Web Console to have those emails delivered, and set platform event filters (PEF) 19 and 20. The S2600JF motherboard allows 20 platform event filters to be set. Intel uses the first 13. Setting filters 19 and 20 configures the BMC to realize that when a PSU alert comes in, an email should be sent.

PEF 5 sets the alert for PSU failure detected, and PSU predictive failure. A SEL entry will be recorded on both assertion and deassertion. An *alert* will only be sent when *asserted*. This filter is configured by Intel.

PEF 19 sets the alert for PSU input lost (AC/DC). A SEL entry will be recorded on both assertion and deassertion. An *alert* will only be sent when *asserted*.

PEF 20 sets the alert for PSU presence detected. A SEL entry will be recorded on both assertion and deassertion. An *alert* will only be sent when *deasserted*. These filters are configured by SGI.

Note: Error messages for power supplies may say “AC power lost” even when the power supply is a DC power supply.

Requirements

- fanbase_release_01.04.a.01 or later
- Shackleford_EFI_BMC-1.17.4151_BIOS-01.08.0003_ME-02.01.07.112_FRUSDR-1.10.02 or later
- IPMItool for Linux enabled (see “Enabling IPMI on a Linux System” on page 76) or IPMIutil for Windows (IPMItool available through SGI’s support website at http://support.sgi.com, Windows instructions not given here. Refer to http://ipmiutil.sourceforge.net/.)

Viewing Existing Filters

Example using IPMItool to read filter 19:

```
ipmitool [-I lanplus -H <BMC_IP_ADDRESS> -U <BMC_USERNAME> -P
<BMC_PASSWORD>] raw 0x04 0x13 0x06 0x13 0x00
```

Example using ipmitool to read filter 20:

```
ipmitool [-I lanplus -H <BMC_IP_ADDRESS> -U <BMC_USERNAME> -P
<BMC_PASSWORD>] raw 0x04 0x13 0x06 0x14 0x00
```

Example using ipmitool to read all filters:

```
ipmitool [-I lanplus -H <BMC_IP_ADDRESS> -U <BMC_USERNAME> -P
<BMC_PASSWORD>] pef list
```

Setting Filters

Example using IPMItool to set filter 19:

```
ipmitool [-I lanplus -H <BMC_IP_ADDRESS> -U <BMC_USERNAME> -P
<BMC_PASSWORD>] raw 0x04 0x12 0x06 0x13 0xC0 0x01 0x01 0x00 0xFF
0xFF 0x08 0xFF 0x6F 0x08 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00
```

Example using IPMItool to set filter 20:

```
ipmitool [-I lanplus -H <BMC_IP_ADDRESS> -U <BMC_USERNAME> -P
<BMC_PASSWORD>] raw 0x04 0x12 0x06 0x14 0xC0 0x01 0x01 0x00 0xFF
0xFF 0x08 0xFF 0xEF 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00
```

Clearing Filters

Example using IPMItool to clear filter 19:

```
ipmitool [-I lanplus -H <BMC_IP_ADDRESS> -U <BMC_USERNAME> -P
<BMC_PASSWORD>] raw 0x04 0x12 0x06 0x13 0x00 0x00 0x00 0x00 0x00
0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00
```

Example using IPMItool to clear filter 20:

```
ipmitool [-I lanplus -H <BMC_IP_ADDRESS> -U <BMC_USERNAME> -P
<BMC_PASSWORD>] raw 0x04 0x12 0x06 0x14 0x00 0x00 0x00 0x00 0x00
```

```
0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0x00 0x00
```

Fan LEDs

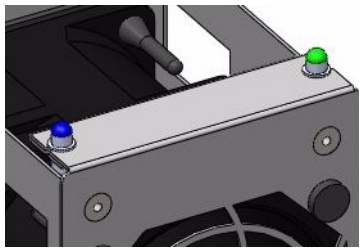


Figure 2-12 Fan Module LEDs

Like drives, fans also have a green/amber status LED and a blue locator LED. The green LED will be lit when a fan is operating normally. An amber LED will be lit if the fan is in fault. The locator LED is lit automatically when fans are set in a “Safe to Service” mode.

Fan Monitoring

Monitoring of the fan modules is done through the Fan Base Service page. Alert emails for fan failures is done using the preconfigured Platform Event Filters designated by Intel (see “Select Events” on page 70) through the BMC.

Using the Fan Base Service Page, failed fans can be set in a “Safe to Service” mode, a step necessary before changing out a fan module.

Fan Base Service Page

The fan baseboard is a circuit board at the heart of the chassis design. As such, it can be used to monitor hardware and issue commands to the hardware without having to use an operating system or even a server module (which is why it is useful for JBODs). The Fan Base Service Page is the customer interface for the fan baseboard, and can be accessed by connecting through the **MIS-S9D Proprietary Ethernet** port (Figure 2-15) and pointing a browser to:

`192.168.0.3/service.xml`. This page can also be reached through the JBOD I/O module ethernet port, using its DHCP address: `<DHCP address>/service.xml`.

The Fan Base Service Page layout is based on a top-down view of a chassis, which is why there are different layouts for the server and JBOD versions of the page. Notably, the server page features boot drives and server modules (Figure 2-13), where the JBOD page has a 9th StorBrick with capacity drives and JBOD I/O modules (Figure 2-14).

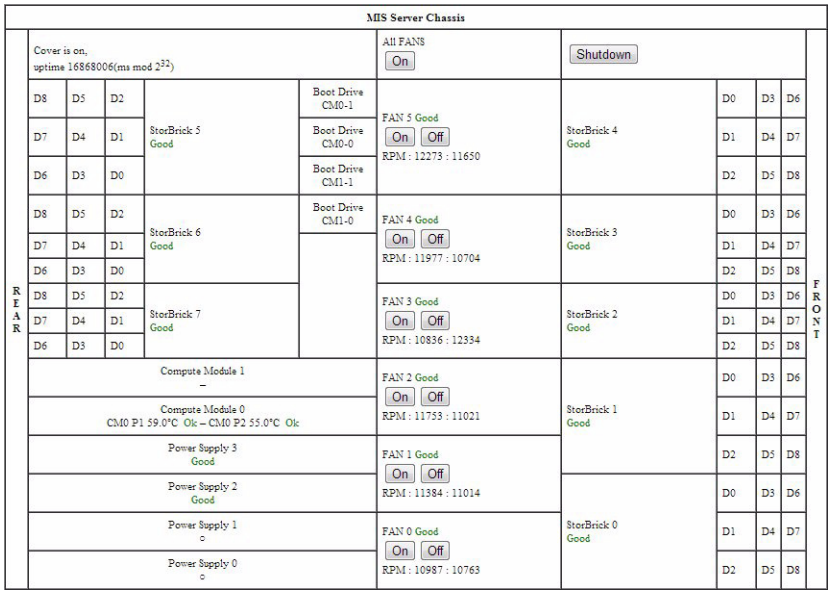


Figure 2-13 Fan Base Service Page (Server)

From here you can view StorBrick status, power supply status, fan status, and set fans in a "**Safe to Service**" mode (i.e., off) for maintenance (see "Replacing a Fan Module" on page 158).

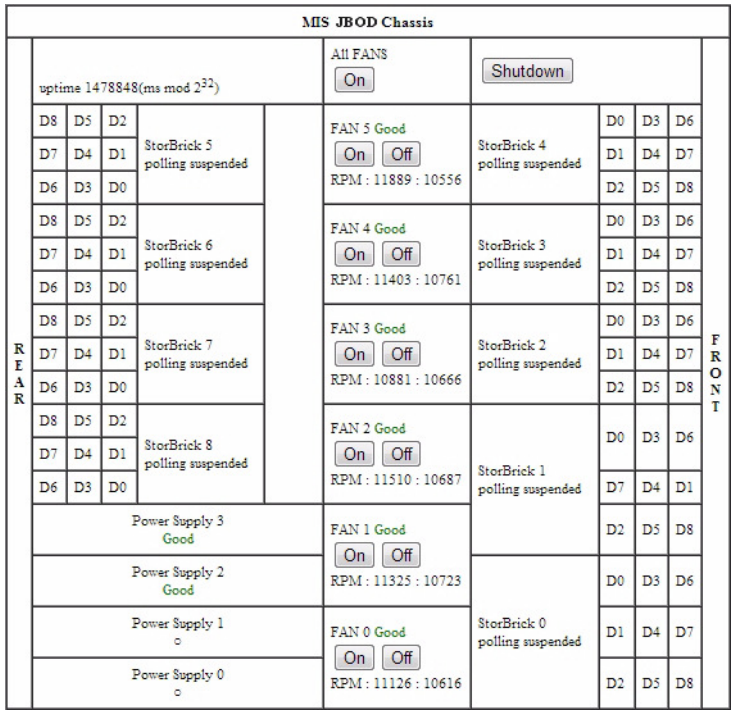


Figure 2-14 MIS JBOD Service Page

MIS-S9D Proprietary Network Interface

The MIS-S9D interface is to be used when accessing the fan base for servicing, or when zoning (see “CLI Zoning Tool, version 1.4” on page 120). It is located at the front of the chassis at the upper right corner (Figure 2-15). The chassis must be slid out forward at least one inch in order to connect a network cable. (See “Sliding the Chassis Forward/Backwards” on page 140.)

Figure 2-15 MIS-S9D Proprietary Network Interface

Ensure the MIS system is powered on. Use an Ethernet cable to connect a server/laptop. The network port connected to the server/laptop must be set to `192.168.0.xxx` (`10` will do). The static IP address of the fan base is set to `192.168.0.3`. Verify connectivity to the fan base with a `ping` command to from the server/laptop (it is okay to receive duplicate responses from a single `ping`).

If there is no response, check the laptop/server's settings and ensure the IPv4 network settings have been set to use the `192.168.0.xxx` IP address and **not** to obtain an IP address automatically (it's okay to use the default subnet mask of `255.255.255.0`). If this does not resolve the problem, it may be necessary to power-cycle the MIS Server or JBOD.

BMC Integrated Web Console

The BMC Integrated Web Console is a web-based program provided by Intel, and is used to give general system information such as system diagnostics, server health, environmental reporting, and event logs. Additionally, the BMC-IWC provides a remote virtual control panel for the MIS Server, allowing for remote locating and reboot.

For more information, see the **Help** files within the BMC, or view the platform management documentation for the Intel S2600JF motherboard online: *Intel® Remote Management Module 4 and Integrated BMC Web Console User Guide* (pdf).

Note: This section gives you a description of BMC Web Console pages that **differ** from the Intel documentation, or otherwise require more attention.

Setting the BMC IP Address

The BMC shares NIC 1 in a server module with the operating system. To access the BMC via IPMItool on a remote system or via the Integrated BMC Web Console, you must configure the BMC with its own IP address. The BMC is configured to obtain an IP address through DHCP by default.

1. The BMC IP Address is set during POST, by pressing **F2** to go into the BIOS.

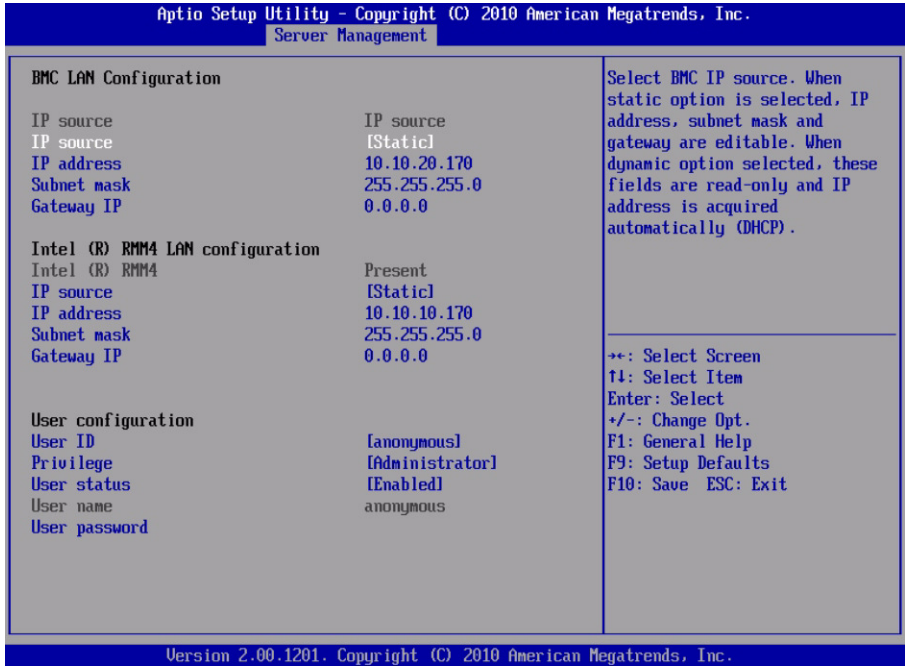


Figure 2-16 BIOS Server Management Tab

2. Next, navigate to the **Server Management** tab (Figure 2-16), scroll down to **BMC LAN Configuration** and press **Enter**.
3. Scroll down to **IP Source** and select **Static**.

4. Configure the **IP Address**, **Subnet Mask**, and **Gateway IP** as required.
5. Press **F10** to save your settings.

Important: Keep a record of the **DHCP Host Name** and assigned **IP address**. These will be needed later when you are trying to connect to the Integrated BMC Web Console.

Setting Up User Accounts for the BMC

To be able to log into the BMC, user accounts must be configured through the BIOS.

1. In the BIOS, scroll down to **User Configuration** and change the **User ID** name as needed.

Note: You cannot change anonymous or root, nor can you log into the Integrated BMC Web Console using an anonymous account. You must either configure the root account or create a new user account.

---

2. Scroll down to **User Password**. Set the password (must be entered twice). User names and passwords are cAsE sEnSiTiVe.
3. When finished, press **F10** to save, and **Esc** to exit. The system will reboot with the new LAN settings.

Help Files

To view the **Help** files within the BMC, Click the **Help** button in the upper right corner (Figure 2-17).

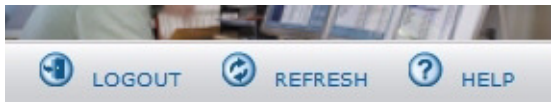


Figure 2-17 BMC Web Console – Logout, Refresh, and Help Buttons

System Debug Log

The System Debug Log page is not supported at this time. It allows administrators to collect system debug information. The files are compressed, encrypted, and password protected. The file is not meant to be viewable by the end user. De-encryption of these files is unavailable at this time.

Select either the “System Debug Log” or the “System & BMC Debug Log” and press the **Run** button. It may take some time for the debug information to be collected. Once the debug log dump is finished you can click the debug log filename to save the results as a `.zip` file on your client system. However, *this file cannot be used at this time*.

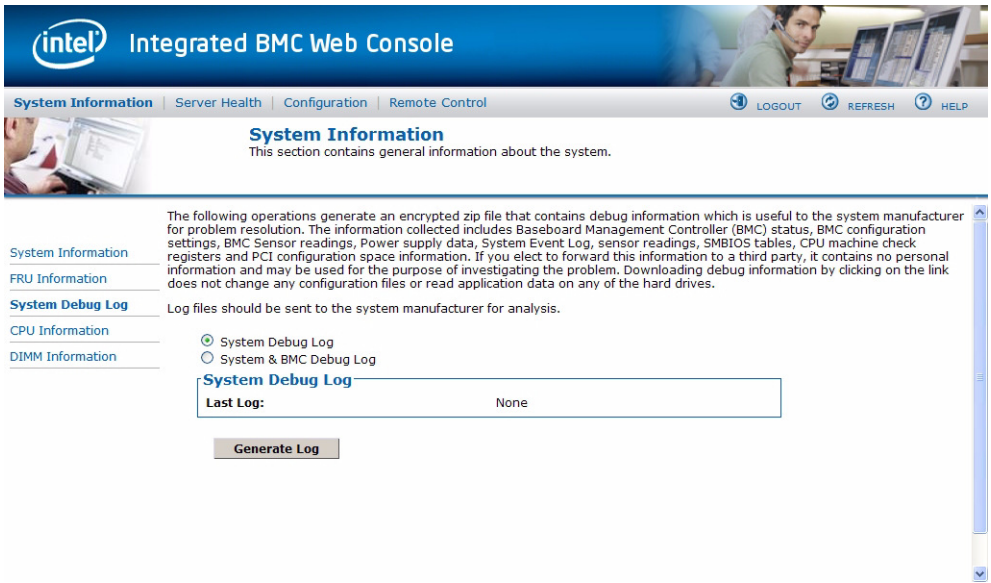


Figure 2-18 BMC Web Console – System Debug Log

Server Health

The **Server Health** tab shows you data related to the server's health, such as sensor readings, the event log, and power statistics as explained in the following sub sections. Click on the **Server Health** tab to select the various pages. By default, this tab opens the **Sensor Readings** page.

Sensor Readings

The **Sensor Readings** page displays system sensor information including status, health, and reading. By default the sensor readings are updated every 60 seconds, but this can be changed by entering a value in the **Set auto-refresh in seconds** selection box and then pressing the **Set** button.

The **Sensor Selection** drop-down box allows you to select the type of sensor readings to display in the list. The default is set to **All Sensors**, with other options: **Temperature Sensors**, **Voltage Sensors**, **Fan Sensors**, **Physical Security**, **Processor, Power Units**, **Memory**, **Event Logging Disable**, **System Event**, **Button/Switch**, **Module/Board**, **Watchdog Sensor**, **Management Subsystem Health**, **Node Manager**, and **SMI**.

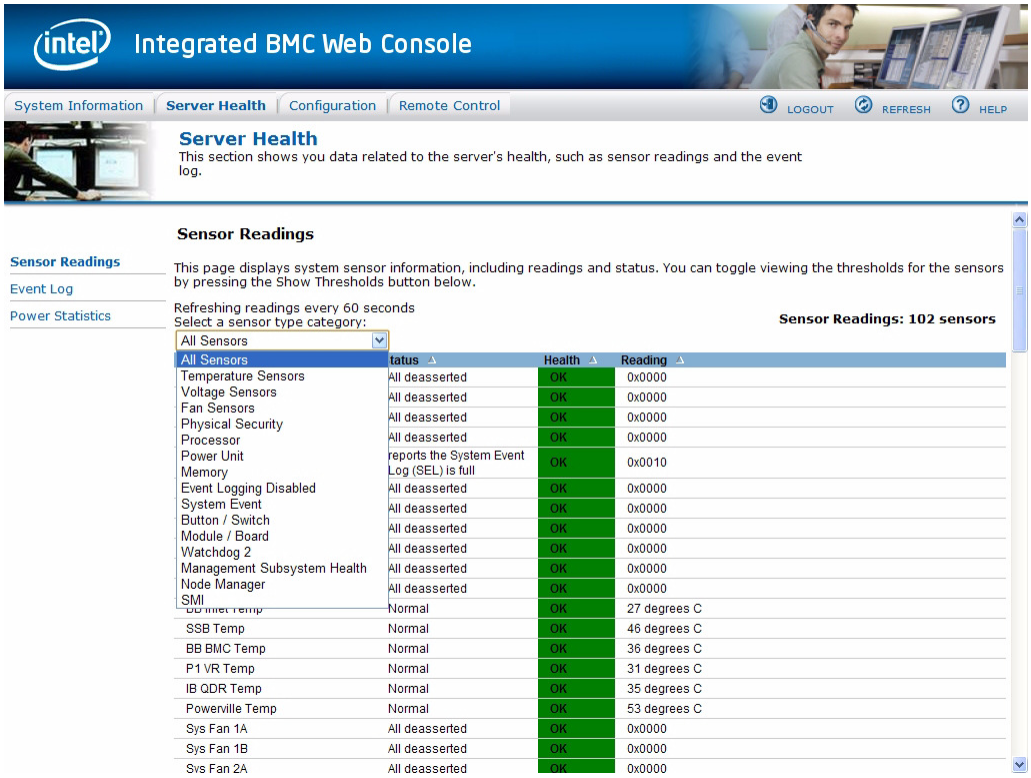


Figure 2-19 BMC Web Console – Server Health

Click **Show Thresholds** to expand the list, showing low and high threshold assignments. Use the scroll bar at bottom to move display left and right.

- CT: Critical threshold
- NC: Non-critical threshold

Click **Hide Thresholds** to return to original display, hiding the threshold values, showing only the name, status and reading for selected sensors. Click **Refresh** to refresh the selected sensor readings.

Event Log

The **Event Log** is a table of the events from the system's event log. The BMC provides a centralized, non-volatile repository for critical, warning, and informational system events called the **System Event Log** or **SEL**. The fan base firmware monitors all Power Supply Units (PSUs) installed in the system, and generates SEL entries regardless of whether or not the alerts are enabled. This functionality cannot be turned off.

By having the BMC manage the SEL and logging functions, it helps ensure that 'post-mortem' logging information is available should a failure occur that disables the system processor(s). Items that are monitored using the SEL, such as power supply status, can generate alerts through the BMC Integrated Web Console (see “Alerts” on page 68).

The BMC allows access to SEL from in-band and out-of-band mechanisms. There are various tools and utilities that can be used to access the SEL, such as the IPMI tools for your operating system (IPMItool – Linux-based systems, IPMIutil – Windows)

Note: All BIOS sensors and some BMC and ME sensors are “event-only”; meaning that they are not readable using the IPMI `Get Sensor Reading` command but rather are used just for event logging purposes.

You can choose a category from the pull-down box to filter the events, and also sort them by clicking on a column header. The filters available are: **All Events**, **Sensor-Specific Event**, **BIOS Generated Events**, and **System Management Software Events**. *Use this page to view and save the Event Log.* **Event Log Category** selects the type of events to display in the list. **Event Log List** is a list of the events with their ID, time stamp, sensor name, sensor type, and description. Click **Clear Event Log** to clear the event logs. Click on **Save Event Log** to download the event logs to local system.

The system event log hexidecimal codes can be translated using Intel's *System Event Log Troubleshooting Guide for EPSD Platforms Based on Intel Xenon Processors E5 4600/2600/2400/1600/1400 Product Families* (pdf).

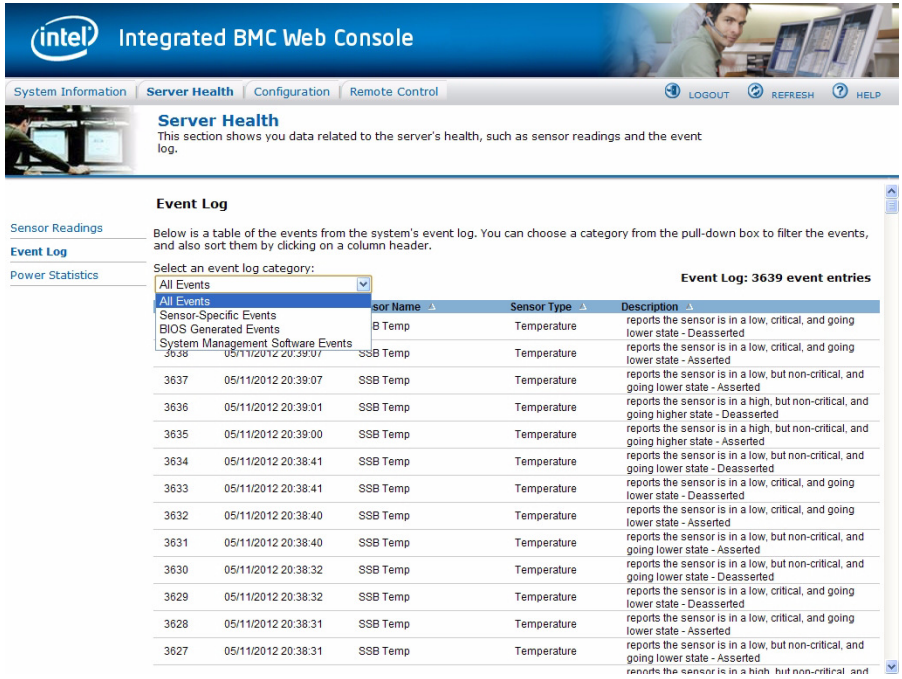


Figure 2-20 BMC Web Console – Event Log

Power Statistics

Not used by MIS platforms. See "Power Supply Monitoring" on page 55 instead.

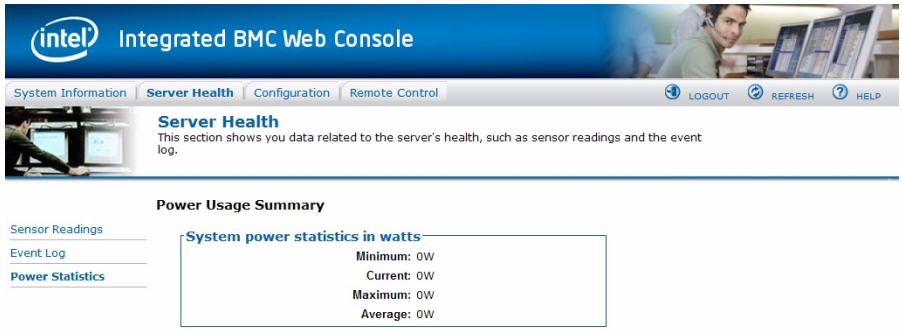


Figure 2-21 BMC Web Console – Power Statistics (not used)

Configuration Tab

The Configuration tab of the BMC Web Console is used to configure various settings, such as alerts, users accounts for the BMC, and network settings. It contains the following menu options in the left navigation pane: **IPv4 Network**, **IPv6 Network** (not used), **Users**, **Login**, **LDAP**, **VLAN**, **SSL**, **Remote Session**, **Mouse Mode**, **Keyboard Macros**, **Alerts**, **Alert Email**, and **Node Manager**.

Alerts

The **Alerts** page allows you to configure which system events generate alerts and the external network destinations to which they should be sent. When one of the selected system events occurs, an alert is generated and sent to the configured destination(s). Each LAN channel can have up to two destinations.

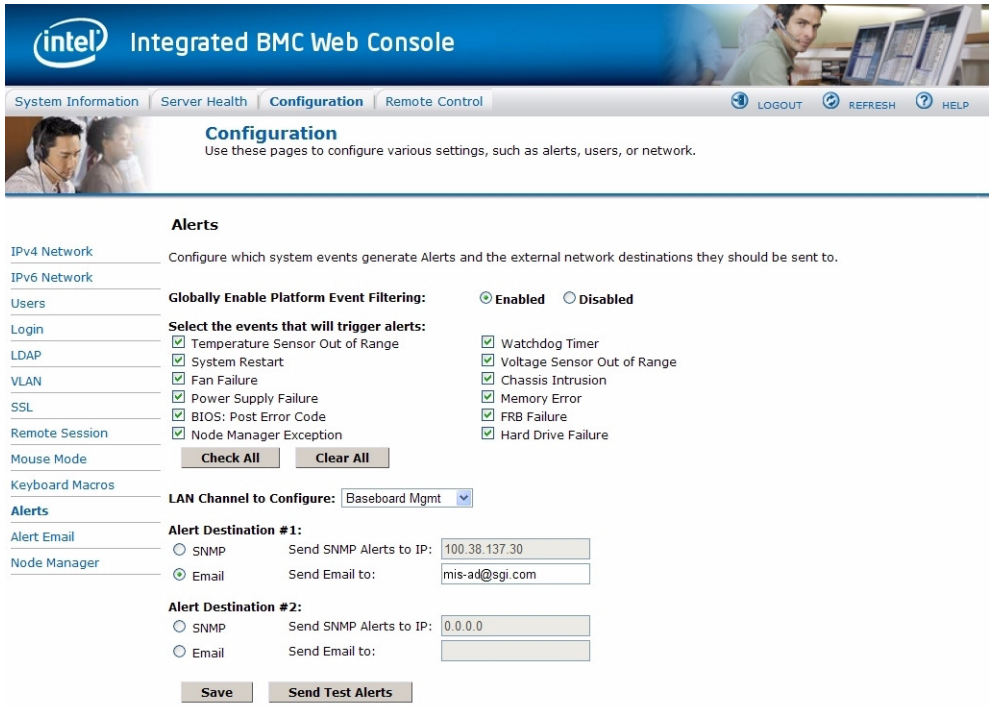


Figure 2-22 BMC Web Console – Alerts Page

To receive alerts for power supplies, see “Power Supply Monitoring” on page 55. The fan base firmware will monitor all Power Supply Units (PSUs) installed in the system and generate SEL entries regardless of whether or not the alerts are enabled. This functionality cannot be turned off.

Globally Enable Platform Event Filtering

Global control for enabling or disabling platform event filtering. This can be used to prevent sending alerts until you have fully specified your desired alerting policies.

Warning: **Do NOT disable except under explicit instruction from SGI Technical Support. When filtering is globally disabled through this setting, alerts (such as power supply faults) will *not* be sent.**

Select Events

Select one or more system events that will trigger an Alert. These events correspond to the 13 IPMI preconfigured Platform Event Filters (PEFs) set by Intel. This area only allows the selection of those 13 PEF filters configured by Intel: **Temperature Sensor Out of Range**, **System Restart**, **Fan Failure**, **Power Supply Failure**[2], **BIOS: POST Error Code**, **Node Manager Exception**[3], **Watchdog Timer**, **Voltage Sensor Out of Range**, **Chassis Intrusion**, **Memory Error**, **FRB Failure**, **Hard Drive Failure**[4].

Warning: Clearing all events disables Alerts.

LAN Channel

Select which LAN channel to configure destinations for. Each LAN channel has its own set of up to two destinations. Alert destinations can be one of two types:

- SMTP Trap
- Email (requires Alert Email to be configured)

The **Check All** button selects all events to generate Alerts. The **Clear All** button unchecks all events so no Alerts will be generated. Click the **Save** button to save any changes made.

Send Test Alert

To test whether an alert will reach its destination, set the **LAN Channel** field to the desired channel and configure at least one destination. Then click **Send Test Alerts** to send a simple test alert to the destination(s) for that channel.

2 Not used by SGI – Power Supply failure is reported through the BMC, but Power Supply Alerts are not configured through this interface. Instead, power supply failure is reported by configuring Platform Event Filters 5, 19, and 20 (see “DC Power Supply LEDs” on page 55).

3 Requires configuration of Node Manager.

4 Boot drives only. Capacity Drives are monitored using MegaRAID Storage Manager software (“Creating the Drive Groups in MegaRAID (CentOS, Linux & Windows)” on page 104).

Alert Email

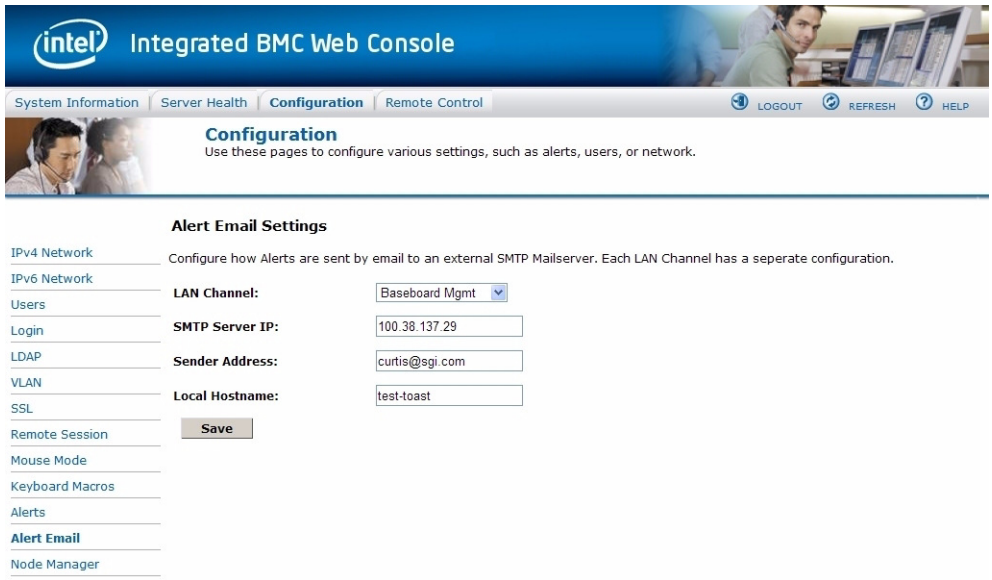


Figure 2-23 BMC Web Console – Alert Email Settings

Alert Email Settings allows you to configure how Alerts are sent by email to an external SMTP Mailserver. Each LAN Channel has a separate configuration, selected through the drop-down menu. The **SMTP Server IP** is the IP address of the remote SMTP Mailserver that Alert email should be sent to. The **Sender Address** is the string to be put in the `From:` field of outgoing Alert emails. **Local Hostname is** a name for the local machine that is generating the alert, and this name is included in the outgoing Alert email. The **Local Hostname** is a string of maximum 18 alpha-numeric characters. Spaces and special characters are not allowed.

Once these settings are saved, you can go to the previous Alerts screen and click the button **Send Test Alert**. If the **SMTP Server IP** address is correct, an email containing hexadecimal code should be sent to the emails configured on the Alerts page. To understand what these hex codes mean, see Intel's *System Event Log Troubleshooting Guide for EDSP Platforms Based on Intel Xeon Processor E5 4600/2600/2400/1600/1400 Product Families* (http://download.intel.com/support/motherboards/server/sb/g90620001_s1400_s4600_systemeventlog_troubleshooti.pdf).

In this example, the mail server's IP address is `100.38.137.29`. When the **Send Test Alert** button is pushed, it creates an alert email from the `Sender Address` (in this example,

Figure 2-24, `curtis@sgi.com`), with the heading "**Alert from <Local Hostname>**" (in this example, the local hostname is `test-toast`).

Figure 2-24 BMC Web Console – Alert Email Result

The resulting hex code in the email can be translated using the code tables given in Intel's *System Event Log Troubleshooting Guide for EDSP Platforms Based on Intel Xeon Processor E5 4600/2600/2400/1600/1400 Product Families*. In our example, the hex code includes the record identification (**RID**), a time stamp for when the event was generated in `MM/DD/YYYY HH:MM:SS` format (**TS**), the number of the sensor that generated the event (**SN**), they sensor type code (**ST**), event directory (**ED**), event type – Asserted or Deasserted (**ET**), event code (**EC**), record identification used for SEL record access (**RID**), record type in Hex code (**RT**), time stamp for when the event was logged (**TS**), generator identification in hex including RqSA and LUN if the event was generated from the IPMB software and software identification if the event was generated from system software (**GID**):

- 0001 – BIOS POST for POST errors, RAS Config/State, Timestamp Synch, OS Boot events
- 0033 – BIOS SMI Handler
- 0020 – BMC Firmware
- 002C – ME Firmware
- 0041 – Server Management Software
- 00C0 – HSC Firmware HSBP A
- 00C2 – HSC Firmware HSBP B

In the example above (Figure 2-24), you'll notice that the **GID** is `0020`, indicating correctly that the alert was sent from the BMC Firmware.

Continuing with the hex code contained within the email, ER is the IPMI version in use: 04 = IPMI version 2.0, 03 = IPMI version 1. Sensor Type (**ST**) and Sensor Number (**S#**) come next, followed by the Event Trigger (**ET**), Event Data (**ED**) and finally Event X (**EX**).

```
-----Original Message-----
From: AlertEmail [mailto:                    ]
Sent: Tuesday, July 23, 2013 7:05 PM
To:
Subject: Alert from <dlv1>


Event that generated this alert:
RID:0013 TS:07/24/2013 01:05:14 SN:MIS PSU2 STATUS
ST:Power Supply ED:Input Lost ET:Asserted EC:OK
RID:0013 RT:02 TS:51EF284A GID:002E ER:04 ST:08 S#:72
ET:6F ED:03 FF FF EX:00 FF FF FF FF FF FF FF
```

Figure 2-25 Alert Email – Power Cord Pulled from Power Supply Module

```
-----Original Message-----
From: AlertEmail [mailto:                    ]
Sent: Tuesday, July 23, 2013 6:12 PM
To:
Subject: Alert from <dlv1>


Event that generated this alert:
RID:0011 TS:07/24/2013 00:11:45 SN:MIS PSU1 STATUS ST:Power
Supply ED:Presence detected ET:Deasserted EC:OK
RID:0011 RT:02 TS:51EF1BC1 GID:002E ER:04 ST:08 S#:71 ET:EF
ED:00 FF FF EX:00 FF FF FF FF FF FF FF
```

Figure 2-26 Alert Email – Power Module Pulled From Chassis

Server Power Control

This page shows the power status of the server and the following power control operations can be performed:

Table 2-8 Server Power Control Actions

Option	Details
Reset Server	Selecting this option will hard reset the host without powering off.
Force-enter BIOS Setup	Check this option to enter into the BIOS setup after resetting the server.

Table 2-8 Server Power Control Actions

Option	Details
Power Off Server	Selecting this option will immediately power off the host.
Graceful Shutdown	Selecting this option will soft power off the host.
Power On Server	Selecting this option will power on the host.
Power Cycle Server	Selecting this option will immediately power off the host, then power it back on after one second.

All power control actions are done through the BMC and are **immediate** actions. It is suggested to gracefully shut down the operating system via the KVM interface or other interface before initiating power actions through the Virtual Front Panel.

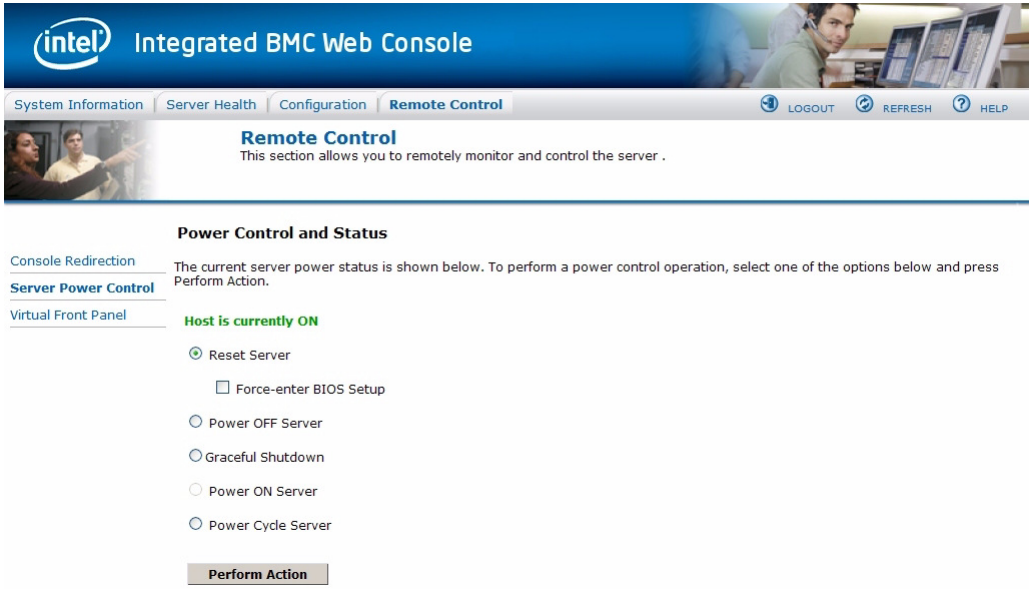


Figure 2-27 BMC Web Console – Power Control and Status

Virtual Front Panel

The Virtual Front Panel is a graphic representation of the front panel, providing remote functionality virtually. From here you can turn on the blue chassis identification LED to locate the chassis in the rack (Figure 2-28).

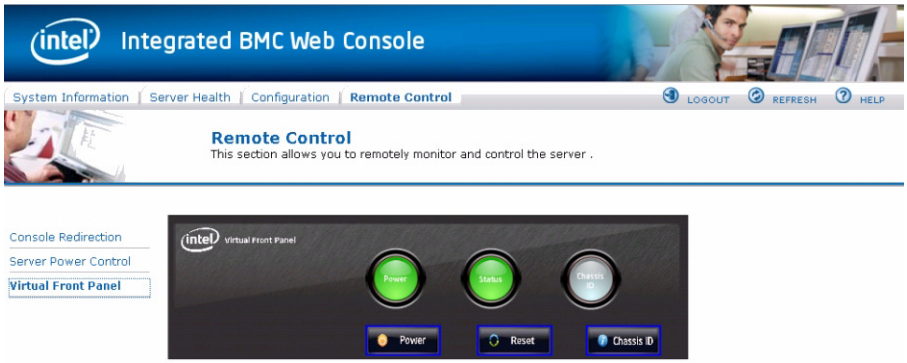


Figure 2-28 BMC Web Console – Virtual Front Panel

Intelligent Management Platform Interface (IPMI 2.0)

IPMI 2.0 is a standardized computer system interface used by system administrators for out-of-band management of computer systems and monitoring of their operation. The development of this interface specification was led by Intel Corporation. IPMI is a message-based, hardware-level interface specification: an IPMI subsystem operates independently of the operating system (OS) (i.e., out-of-band). This allows administrators to manage a system remotely in the absence of an operating system, before an OS has booted (allowing e.g. BIOS settings to be remotely monitored or changed), when the system is powered down, or after OS or system failure, which is the key characteristic of IPMI compared with in-band system management (such as, by remote login using SSH). Multiple disparate servers can all be managed together using IPMI because of its standardized interface and protocol.

System administrators can use IPMI messaging to:

- monitor platform status (e.g., system temperatures, voltages, fans, power supplies, and chassis intrusion),
- query inventory information,

- review hardware logs of out-of-range conditions,
- perform recovery procedures such as issuing requests from a remote console through the same connections (e.g., system power-down and rebooting, or configuring watchdog timers)
- and define an alerting mechanism for the system to send a simple network management protocol (SNMP) platform event traps (PETs).

The BMC supports LAN Alerting in the form of SNMP Traps that follows the Platform Event Trap format. SNMP Traps are typically sent as unreliable datagrams. However, IPMI includes PET Acknowledge and retry options that allow an IPMI-aware remote application to provide a positive acknowledge that the trap was received. Alert-Over-LAN notifies remote system management applications about PEF selected events, regardless of the state of the server's operating system. LAN alerts can be sent over any of the LAN channels supported by a system.

Programs such as IPMItool and IPMIutil are industry freeware standards that can both be used to configure and issue IPMI commands. More information on both tools can be found at http://ipmiutil.sourceforge.net/docs/UserGuide and http://ipmitool.sourceforge.net/manpage.html. IPMItool comes with Linux and IPMIutil is available for download through http://ipmiutil.sourceforge.net/).

More Information on IPMI can be found through http://www.intel.com/content/www/us/en/servers/ipmi/what-is-ipmi.html and http://en.wikipedia.org/wiki/Intelligent_Platform_Management_Interface.

Enabling IPMI on a Linux System

To use IPMI on a Linux system, the `ipmi service` must be running. Use the `# service ipmi status` command to determine if the service is running.

If the service is running, the output will be similar to:

```
# service ipmi status
ipmi_msghandler module loaded.
ipmi_si module loaded.
ipmi_devintf module loaded.
/dev/ipmi0 exists.
```

If the service is not running, use the `# ipmi service start` command to start the service.

```
# service ipmi start
Starting ipmi drivers:                                     [  OK  ]
```

Accessing IPMI on a Linux System

On a Linux system, use the `# ipmitool` command to access IPMItool.

On a local system, simply use the `ipmitool` command with the command it should run:

```
# ipmitool <command>
```

For example:

```
# ipmitool power status
Chassis Power is on
```

From a remote system, you must also specify a host, user, and password to access the system:

```
# ipmitool -H <host> -U <user> -P <password> power status
```

For example:

```
# ipmitool -H 137.38.64.3 -U admin -P Password1 power status
Chassis Power is off
```

Note: To access IPMI from a remote system, the BMC on the local system must be configured for network access. (Refer to “Setting the BMC IP Address” on page 62 for the procedure to enable network access.)

System Software

Overview

Important: Do **NOT** install any software from 3rd-party sites (unless for Windows[5]). All software required to monitor and operate MIS platforms is available through http://support.sgi.com or by contacting your SGI support representative.

This chapter contains information on each of the software sets necessary for zoning MIS Servers and JBODs:

- “Downloading & Installing Software,” on page 83,
- “Operating Zones 1.4.2 for CentOS, Linux, & Windows,” on page 90,
- “Creating the Drive Groups in MegaRAID (CentOS, Linux & Windows),” on page 104,
- “Formatting the Drives Using YaST2 in Linux,” on page 109,
- “Windows Server Manager,” on page 114,
- “CLI Zoning Tool, version 1.4,” on page 120,
- “Disk RAID Support,” on page 147.

Zoning is required when multiple SAS connections are operational, in order to stop drives from being affected by other non-owner SAS controllers (HBAs). Zoning allows the various SAS connections to be accessible only to the drives that they own. Essentially, zoning allows an administrator to control which HBAs can access which drives. When **open zoning** is enabled, all

[5] MIS hardware is WHQL certified for Microsoft® Windows® 2008 R2 SP1. Customers who wish to run Windows buy only the hardware from SGI. The customer is then responsible for operating system installation and configuration, and all support arrangements with Microsoft. SGI does not provide technical support for Windows drivers, utilities (including IPMIutil), device manager, etc.

the SAS connections can access all of the drives. For dual-slotted SAS drives, **both** slots will be exposed, so the drives will show up **twice**. This situation will cause conflict between the HBAs.

Caution: Do not assign two HBAs to the same drive sets as this will cause data collisions.

Zoning can be either hard or soft. In hard zoning, each device is assigned to a particular zone, and this assignment does not change. In soft zoning, device assignments can be changed by the network administrator to accommodate variations in the demands on different servers in the network. New drive sets are "zoned in" to existing drive sets using the zoning software described later in this chapter.

Phy-based zoning allows you to split the drives between two I/O *cards* in a JBOD (though it also may be used when only one I/O card is present).

Note: Zones 1.4.2 for CentOS, Linux, & Windows *no longer requires* the presence of an LSI MegaRAID ***card***. The MegaRAID Storage Manager *program*, however, is still necessary.

There are two main tools for zoning: the SGI Zones application and the SGI CLI Zoning Tool. Both zoning tools require the presence of other programs in order to operate. The Zones application offers a GUI interface, and can now zone JBODs (version 1.3 and later). The CLI Zoning Tool can zone in the absence of an operating system, but is a command-line only application, now with expanded features (version 1.4 and later).

Important: The Zones program is installed and run on the server you wish to zone. JBODs are zoned through their SAS connection to an MIS Server running the Zones or CLI programs, or directly through the hardware using the CLI Zoning tool installed on a laptop, and an Ethernet cable connected to the MIS-S9D proprietary network interface (Figure 3-44).

Even though MIS Servers and JBODs are shipped with zoning from SGI manufacturing, it is assumed that this zoning will be eliminated and replaced with your desired zoning. Any RAID sets will need to be cleared and set to unconfigured good before zoning (see "Creating the Drive Groups in MegaRAID (CentOS, Linux & Windows)," on page 104 for more information).

Section Guide

Inside the first section you will find instructions on downloading and installing the software needed. The next two sections give instructions on how to use the software to zone MIS Platforms. The final section contains information on the different RAID configurations available, advantages and disadvantages of each configuration, as well as best practices.

- "Downloading & Installing Software" and "Required Downloads," on page 83,
  - "Installing MegaRAID Storage Manager for CentOS," on page 84
  - "Installing Zones 1.4.2 for CentOS," on page 85
  - "Installing MegaRAID Storage Manager for Linux," on page 86,
  - "Installing Zones 1.4.2 for Linux," on page 87,
  - "Installing MegaRAID Storage Manager for Windows," on page 89,
  - "Installing Python for Windows," on page 89,
  - "Installing Zones 1.4.2 for Windows," on page 90,

The second section presents the new "Operating Zones 1.4.2 for CentOS, Linux, & Windows," on page 90, including step-by-step instructions for "Zoning MIS Server Platforms," "144 Drives Setup," "Zoning MIS JBOD Platforms," "Phy-based Zoning," and "Formatting the Drives," on page 115.

- "Operating Zones 1.4.2 for CentOS, Linux, & Windows," on page 90,
  - "Zoning MIS Server Platforms," on page 90,
  - "Opening a Session," on page 92,
  - "144 Drives Setup," on page 94,
  - "Saving Zoning Configuration," on page 96,
  - "Zoning MIS JBOD Platforms," on page 97,
  - "Phy-based Zoning," on page 100,
  - "Loading a CSV File to Zones," on page 102,

Sections three, four, and five cover "Creating the Drive Groups in MegaRAID (CentOS, Linux & Windows)," on page 104, "Formatting the Drives Using YaST2 in Linux," on page 109, and "Windows Server Manager," on page 114 to finish up the necessary steps for configuring MIS platforms.

- "Creating the Drive Groups in MegaRAID (CentOS, Linux & Windows)," on page 104
- "Formatting the Drives Using Command Line in CentOS," on page 107
  - "Verify Drives Seen," on page 107
  - "Adding a New Drive," on page 107
  - "Formatting Drives," on page 108
- "Formatting the Drives Using YaST2 in Linux," on page 109
  - "Verify Drives Seen," on page 111,
  - "Partitioning Drives," on page 111,
- "Windows Server Manager," on page 114
  - "Windows Server Manager," on page 114,
  - "Formatting the Drives," on page 115,

The next section details the "CLI Zoning Tool, version 1.4," the command-line-only tool that is run from a host machine connected to the MIS Server or JBOD through the MIS-S9D proprietary network interface. The CLI Zoning Tool requires the presence of Python version 2.6 or 2.7 on the host machine in order to run. Python is standard on most Linux-based machines, and will need to be installed for Windows-based machines for the CLI Zoning tool to run. (See "Installing Python for Windows," on page 89). "Preparing to Zone using the CLI Zoning Tool," on page 125 gives instruction on what is necessary before "Editing the ShackCLI.ini file for CentOS & Linux," on page 126 and "Editing the .csv File for the CLI Zoning Tool," on page 131.

- "CLI Zoning Tool, version 1.4," on page 120,
  - "Preparing to Zone using the CLI Zoning Tool," on page 125
    - "Editing the ShackCLI.ini file for CentOS & Linux," on page 126,
    - "Editing the ShackCLI.ini file for Windows," on page 127,
  - "CLI Zoning Tool Main Menu," on page 129
  - "Editing the .csv File for the CLI Zoning Tool," on page 131,

Finally, "RAID Configuration Notes," on page 148 explains the special considerations in creating RAID arrays for use on StorBricks, that is, there are RAID configurations, namely 6+2 and 7+2, that ensure there is no single point of failure on the StorBricks within the MIS system. This section details how to manage those concerns.

- "Disk RAID Support," on page 147,

› “RAID Configuration Notes,” on page 148

› “Spare Drives,” on page 150.

Downloading & Installing Software

All software downloads can be found by going to http://support.sgi.com, logging in with your SGI account credentials, and navigating to the software download section. This should be your primary source for downloading any software used by the MIS platforms. If difficulties arise, contact your SGI Support Technician for assistance.

Zoning the MIS Server and JBOD platforms requires certain software. Which software you need to download and install to zone your system will depend on the operating system on the MIS Server. MIS Servers and JBODs can also be zoned in the absence of an operating system using the CLI (Command Line Interface) Zoning Tool. However, the CLI zoning tool requires a cable connection through the MIS-S9D proprietary network interface (Figure 3-44) in order to zone. Otherwise, the operating system installed on the boot drives is what determines which software to download and use to zone.

Download the software for the operating system used by the MIS Server.

Required Downloads

No MIS Operating System – SGI CLI Zoning Tool 1.4 on host machine[6] with Python 2.6 or 2.7 installed

MIS Linux and Linux-based systems (CentOS, Red Hat) – LSI MegaRAID Storage Manager for Linux, SGI Zones 1.4.2 for Linux & Windows, IPMItool

MIS Windows 2008 R1 SP2 systems – LSI MegaRAID Storage Manager for Windows, Python 2.7 for Windows, SGI Zones 1.4.2 for Linux & Windows, IPMIUtil

[6] If the host laptop/server running the CLI Zoning Tool 1.4 is a Windows machine, Python for Windows is also required.

Installing MegaRAID Storage Manager for CentOS

Note: MegaRAID Storage Manager is not necessary for zoning using the CLI Zoning Tool.

The MegaRAID Storage Manager is used to prepare the drives for zoning, prior to using the Zones tool, and for creating the drive groups after zoning has been performed using the Zones tool. Currently, there is no specific version of MegaRAID Storage Manager for CentOS, but since CentOS is Linux-based, MegaRAID Storage Manager for Linux is used instead.

1. Go to http://support.sgi.com. Log in with your credentials.
2. Search for MegaRAID Storage Manager for Linux, or contact SGI Customer Support for the latest supported version.
3. Select the latest version for Linux and save the `.tar` file in a directory easily found from a command line interface, such as `/home/<user_name>`.
4. Open a shell prompt by selecting **Applications** from the desktop main menu, then selecting **System Tools** and **Terminal**, or right-click on the desktop and choose **Open Terminal** from the menu presented.
5. Change to the directory where the `.tar` file was saved (i.e., `# cd /home/<user_name>/`).
6. Untar the `.tar` file (e.g., `# tar -zxvf 13.04.03.01_Linuz(x86)_MSM.tar`).
7. You should see an output of files and a new directory called `disk`. Change to the `disk` directory (i.e., `cd disk`)
8. Run the installation by typing `./install`.
9. Press `Y` to accept the License Agreement. A menu with the following options comes up:

```
Press 0 to exit from the installation
Choose[1-5]:
(1) - Complete
       This option will install all the program features
(2) - client
       This option will only install components required to
       remotely view and configure servers
(3) - StandAlone
       This option will only install components required for
       local server management
(4) - Local
```

```
        This option will only install components required for
        local configuration
(5) - Server
        This option will only install components required for
        remote server management
```

10. Select option `1 - Complete`.
11. When the installation is finished, close the command line interface, and access MegaRAID Storage Manager from the **Applications** drop-down menu on the desktop.

Installing Zones 1.4.2 for CentOS

Zones 1.4.2 for Linux (proprietary SGI software) is compatible with CentOS 6.3 and later, and is used to zone drives on the MIS Server platform (and eventually MIS JBOD units as well). To install the software complete the following instructions.

1. Go to http://support.sgi.com, log in with your credentials, and download Zones 1.4.2 for Linux (or contact SGI Customer Support for the latest supported version) and save in the `/opt` directory.
2. Open a shell prompt by selecting **Applications** from the desktop main menu, then selecting **System Tools** and **Terminal**, or right-click on the desktop and choose **Open Terminal** from the menu presented.
3. Change to the `/opt` directory and unzip `Zones_1.4.2.zip` (e.g., `# unzip Zones_1.4.2.zip`). A `Zones` folder will appear, thus creating the `/opt/Zones` directory.

Warning: Zones *must* be installed in the `/opt/Zones/` directory or it *will not work*.

4. Change directory into the new `Zones` folder (e.g., `# cd /opt/Zones`)
5. Look for the folders `JBOD` and `MIS`. During copying, these folders names may change to lower case versions `jbod` and `mis`. If so, rename them back to all-capitalized versions.

Starting Zones 1.4.2 for CentOS

Run the Zones program by opening a shell prompt by selecting **Applications** from the desktop main menu, then selecting **System Tools** and **Terminal**, or right-click on the desktop and choose **Open Terminal** from the menu presented. Change to the `/opt/Zones` directory by typing `cd`

`/opt/Zones`. Run Zones by typing `# python Start.py` from the command line and pressing **Enter**.

Installing MegaRAID Storage Manager for Linux

Note: MegaRAID Storage Manager is not necessary for zoning using the CLI Zoning Tool.

The MegaRAID Storage Manager is used to prepare the drives for zoning, prior to using the Zones tool, and for creating the drive groups after zoning has been performed using the Zones tool.

1. Go to http://support.sgi.com, log in with your credentials, and search for MegaRAID Storage Manager for Linux, or contact SGI Customer Support for the latest supported version.
2. Select the latest version for Linux and save the `.tar` file to a directory that is easy to navigate to using a command line interface (e.g., `/home/<user_name>`).
3. Change directory to where you have saved your `.tar` file (e.g., `# cd /home/<user_name> )`
4. Untar the `.tar` file, `# tar -zxvf <filename.tar>` (e.g., `-zxvf 13.04.03.01_Linuz(x86)_MSM.tar`)
5. You should see an output of files and a new directory called `disk`. Change to the `disk` directory (i.e., `cd disk`)
6. Run the installation by typing `./install`.
7. Press `Y` to accept the License Agreement. A menu with the following options comes up:

```
Press 0 to exit from the installation
Choose[1-5]:
(1) - Complete
       This option will install all the program features
(2) - client
       This option will only install components required to
       remotely view and configure servers
(3) - StandAlone
       This option will only install components required for
       local server management
(4) - Local
       This option will only install components required for
       local configuration
(5) - Server
```

```
This option will only install components required for
remote server management
```

8. Select option `1 - Complete`.
9. When the installation is finished, issue `./startupui.sh` command to start MegaRAID Storage Manager GUI (i.e., `# ./startupui.sh`).

MegaRAID Storage Manager GUI for Linux will appear.

Installing Zones 1.4.2 for Linux

Zones 1.4.2 for Linux is proprietary SGI software, used to zone drives on the MIS Server platform and MIS JBODs. To install the software complete the following instructions.

1. Go to http://support.sgi.com, log in with your credentials, and download Zones 1.4.2 for Linux, or contact SGI Customer Support for the latest version.
2. Unzip `Zones_1.4.2.zip` from the command line (e.g., `# unzip Zones_1.4.2.zip`). A `Zones` folder will appear.
3. Copy the `Zones` folder into the `/opt` directory, thus creating the `/opt/Zones` directory.

Warning: Zones *must* be installed in the `/opt/Zones/` directory or it *will not work*.

4. Change directory into the new `Zones` folder (e.g., `# cd /opt/Zones`)
5. Look for the folders `JBOD` and `MIS`. During copying, these folders names may change to lower case versions `jbod` and `mis`. If so, rename them back to all-capitalized versions.

Starting Zones 1.4.2 for Linux

Run the Zones program from the `/opt/Zones` directory by typing `# python Start.py` from the command line and pressing **Enter**.

Enabling IPMI on a Linux System

To use IPMI on a Linux system, the `ipmi` service must be running. Use the `service ipmi status` command to determine if the service is running.

If the service is running, the output will be similar to:

```
# service ipmi status
ipmi_msghandler module loaded.
ipmi_si module loaded.
ipmi_devintf module loaded.
/dev/ipmi0 exists.
```

If the service is not running, use the `service ipmi start` command to start the service.

```
# service ipmi start
Starting ipmi drivers:                                     [  OK  ]
```

Accessing IPMI on a Linux System

On a Linux system, use the `ipmitool` command to access IPMItool.

On a local system, simply use the `ipmitool` command with the command it should run:

```
# ipmitool <command>
```

For example:

```
# ipmitool power status
Chassis Power is on
```

From a remote system, you must also specify a host, user, and password to access the system:

```
# ipmitool -H <host> -U <user> -P <password> power status
```

For example:

```
# ipmitool -H 137.38.64.3 -U admin -P Password1 power status
Chassis Power is off
```

Note: To access IPMI from a remote system, the BMC on the local system must be configured for network access. (Refer to "Setting the BMC IP Address," on page 62 for the procedure to enable network access.)

Installing MegaRAID Storage Manager for Windows

Note: MegaRAID Storage Manager is not necessary for zoning using the CLI Zoning Tool.

The MegaRAID Storage Manager is used to prepare the drives for zoning, and to create the drive groups after zoning.

1. Go to http://support.sgi.com, log in with your credentials, and search for MegaRAID Storage Manager for Windows, or contact SGI Customer Support for the latest supported version.
2. Click **Accept** on the license agreement page and install.
3. Once installed, select MegaRAID Storage Manager from the list of Programs available, and click to run.

MegaRAID Storage Manager GUI for Windows will appear.

Installing Python for Windows

Both Zones 1.4.2 for Windows and the CLI Zoning Tool require Python be installed on the machine that will perform the zoning. Zones 1.4.2 for Windows uses Python 2.7. The CLI Zoning Tool will work on Python 2.6 or 2.7.

1. Go to http://support.sgi.com, log in with your credentials, and select the version of Python required, or contact SGI Customer Support for the latest approved version.
2. Download and start the installation.
3. The installation will ask which directory in which to install python (the default is `c:\Python##\` where `##` is the version number).
4. On the **Customize Python** pane, click **Next**.
5. On the **Complete Python Installation** pane, click **Finish**.

Note: It may be necessary to set the variable path for Python in Windows. If errors occur after installation saying “cannot find path,” see Chapter 5, “Troubleshooting,” for more information.

Installing Zones 1.4.2 for Windows

Zones 1.4.2 for Windows is proprietary SGI software, used to zone drives on the MIS Server and JBOD platforms.

1. Go to http://support.sgi.com, log in with your credentials, and download Zones 1.4.2 for Windows, or contact SGI Customer Support for the latest released version.
1. Extract the `Zones.zip` files to the destination folder `c:\Program Files (x86)\`. This will create the directory `c:\Program Files (x86)\Zones\`.
2. In the directory `C:\Program Files (x86)\Zones\`, look for the extracted file `pygtk-all-in-one-2.22.6.win32-py2.7.msi`. Run by double-clicking on it.

Starting Zones 1.4.2 for Windows

Run Zones by typing `Start.py` from the command line and pressing **Enter**.

Operating Zones 1.4.2 for CentOS, Linux, & Windows

This updated release of Zones features the familiar graphic user interface, and is streamlined to make zoning faster and easier to execute. Zones 1.4.2 for CentOS & Linux and Zones 1.4.2 for Windows both function the same, with only a slight difference in appearance. The following instructions work for Linux (CentOS) and Windows versions, though only images from the Linux version appear here. For instructions on how to run Zones 1.4.2, see “Starting Zones 1.4.2 for CentOS,” on page 85, “Starting Zones 1.4.2 for Linux,” on page 87, or “Starting Zones 1.4.2 for Windows,” on page 90.

Zoning MIS Server Platforms

Upon opening, Zones will display the current zoning configuration, if present and if the previous zoning was done by the Zones tool.

Note: Zones will not display the previous zoning configuration if zoning was previously done using the CLI Zoning Tool.

Drives that are currently installed in the system will be highlighted and a check mark will be in their corresponding box. In the following example (Figure 3-1), **Drive 0** is zoned for every StorBrick (**Brick 0** through **Brick 7**) on **Adapter 0**.

Zones interface

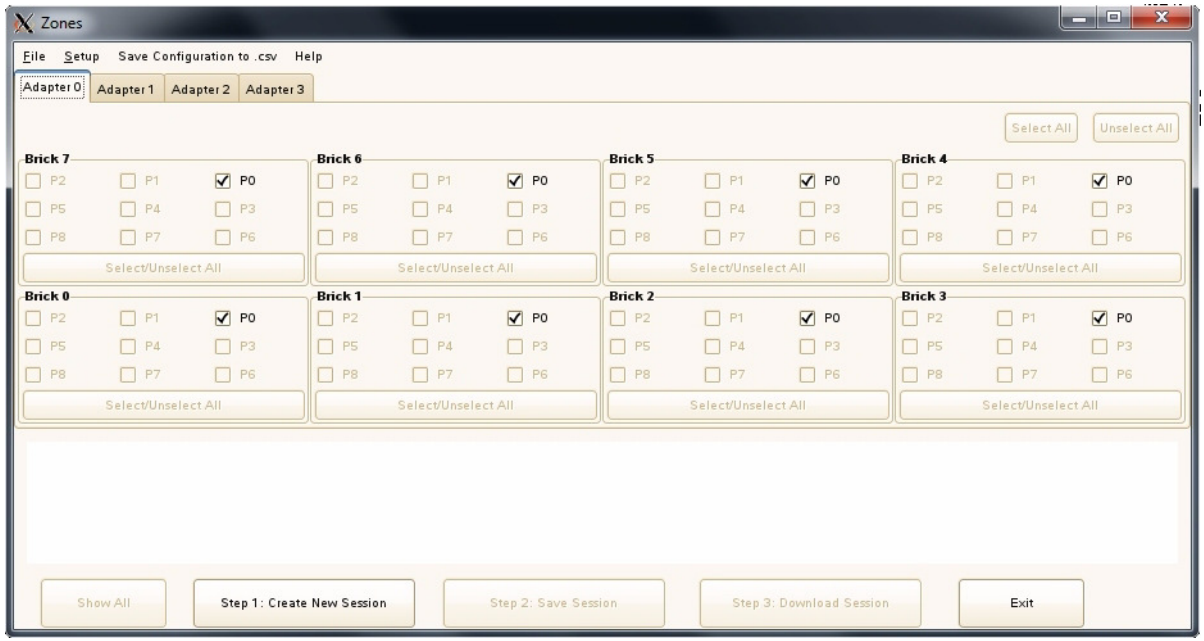


Figure 3-1 Zones 1.4.2 – Current Zoning Configuration

To begin zoning, click the button on the bottom of the home screen: **Step 1: Create a New Session** (Figure 3-2).

Figure 3-2 Zones 1.4.2 – Bottom Row of Buttons

This will give you the option to **Open a CSV Session**, **Open a New Session**, or **Cancel** the create new session operation (Figure 3-3). Select: **Open New Session**. (How to use CSV Sessions is covered in “Loading a CSV File to Zones,” on page 102.)

Opening a Session

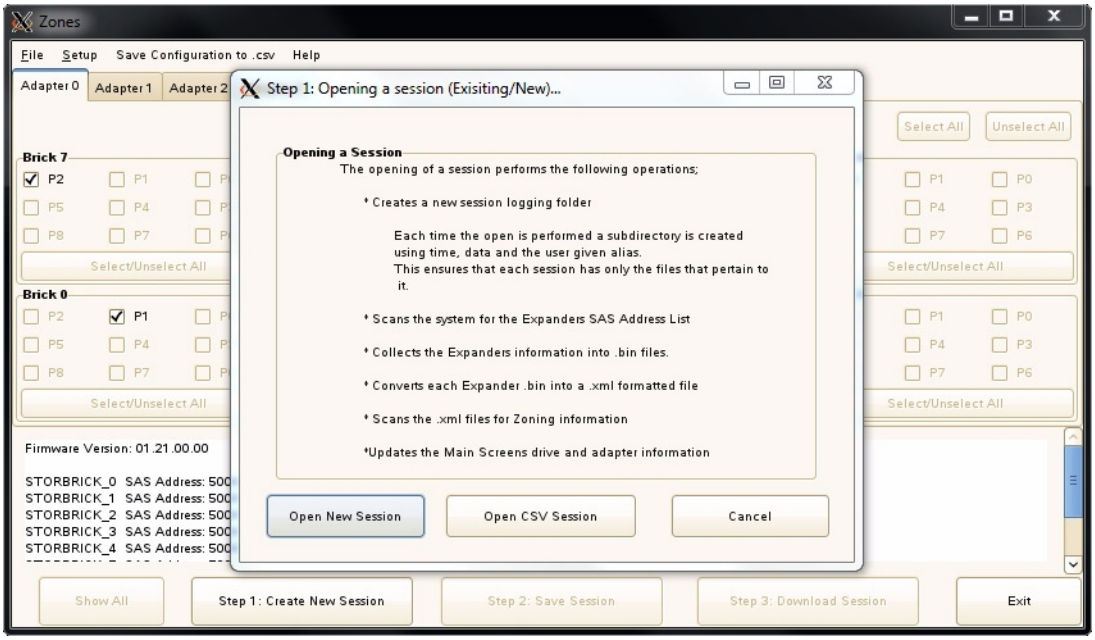


Figure 3-3 Zones 1.4.2 – Step 1: Opening a Session

This will bring up a **New Session** prompt, asking you to create an alias name for the session (Figure 3-4). This alias name will be used to create a time-stamped folder with that alias, necessary to store the files used to zone the machine: `YYMMDD_HHMMSS_alias`. This folder will be stored in the `/opt/Zones/MIS` folder for Linux and the `C:\Program Files (x46)\Zones\MIS` folder for Windows. After entering a session alias, click **OK**.

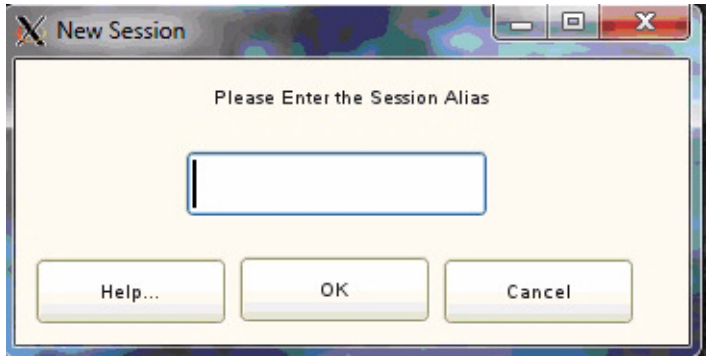


Figure 3-4 Zones 1.4.2 – New Session Alias

Note: Aliases have a 64 character limit and may not contain spaces or non-alpha-numeric characters. If used, a warning message will appear (Figure 3-5).

Figure 3-5 Zones 1.4.2 – Warning Box, Alias Rules

The home screen will now display the number of adapters present in the system. In this example (Figure 3-6), all four adapters are present, which can be seen by the four new tabs at the top, labeled **Adapter 0**, **Adapter 1**, **Adapter 2**, and **Adapter 3**. This would be the result of having a

single server with four adapters, or a dual server machine with two adapters per server. If the MIS Server was a dual server with only one adapter per server, only two adapter tabs would show.

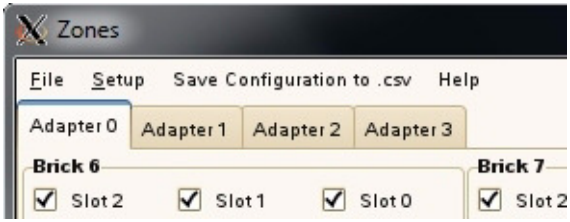


Figure 3-6 Zones 1.4.2 – Top Menu Bar and Adapter Tabs

In a dual server configuration, Zones is unable to determine which adapter belongs to which server. The user can determine which adapters belong to which server module by powering on only one server module and then running the zoning tool. The adapter tabs that show up will belong to the server module that is currently powered on.

1. Power on the first server.
2. Open Zones.
3. Open a session. (There's no need to save this session.)
4. Make note of which adapter in Zones belongs to that server.
5. Exit Zones.
6. Power on the second server module.
7. Start Zones again.
8. The user may then continue to zone.

Next, enable all the drives by clicking the **Show All** button at the bottom of the home screen (Figure 3-2). This will enable all the slots, and you can now select which drives you would like associated with which adapter.

144 Drives Setup

If the machine is populated with 9mm profile SSD drives, this allows two drives per slot in the machine. It splits the slot, creating primary and secondary drives. By default, only primary drives are seen. To zone the drives on the secondary slots, you will first need to go to the **Setup** menu option (Figure 3-7) on the top menu bar and select **144 Drives**.

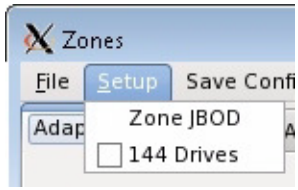


Figure 3-7 Zones 1.4.2 – Setup Menu Options

Before being allowed to continue, the following warning will appear (Figure 3-8). If you do *not* have a 144-drive system, you can select the **Cancel** button. If you *do* have a 144-drive system, click **OK**.

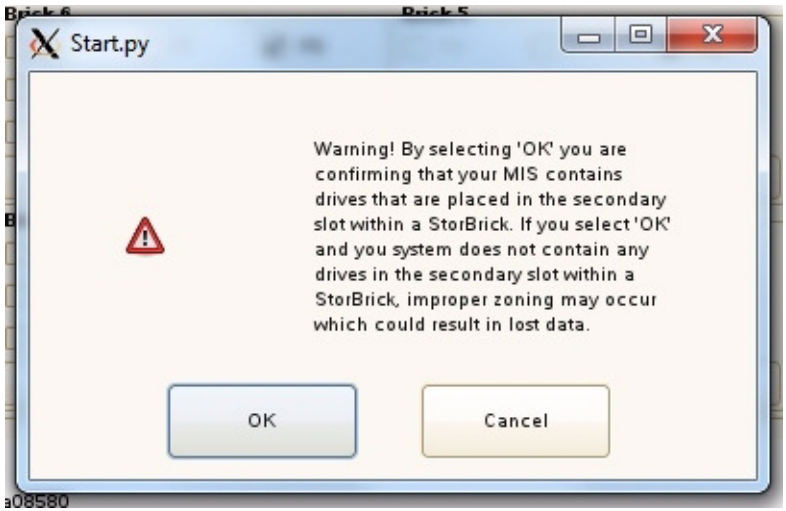


Figure 3-8 Zones 1.4.2 – Warning 144 Drive Configuration

The following diagram (Figure 3-9) shows the layout of the primary and secondary drives in the StorBrick.

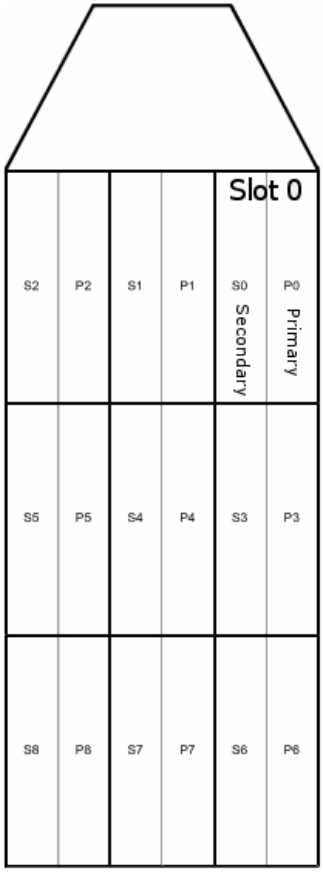


Figure 3-9 StorBrick Diagram for 144-Drive Systems

Saving Zoning Configuration

Once you have allocated the drives to the desired adapters, you can save the configuration by clicking on the button, **Step 2: Save Session**. This saves the configuration in the session folder, and enables the **Step 3: Download Session** button (Figure 3-2).

Clicking on the **Step 3: Download Session** button brings up the **Brick Selection** window (Figure 3-10). This allows you to select which StorBricks will be updated with the new configuration information. Once selected, clicking the OK button downloads the new configuration to the StorBricks. When complete, the **Brick Selection** window will disappear.

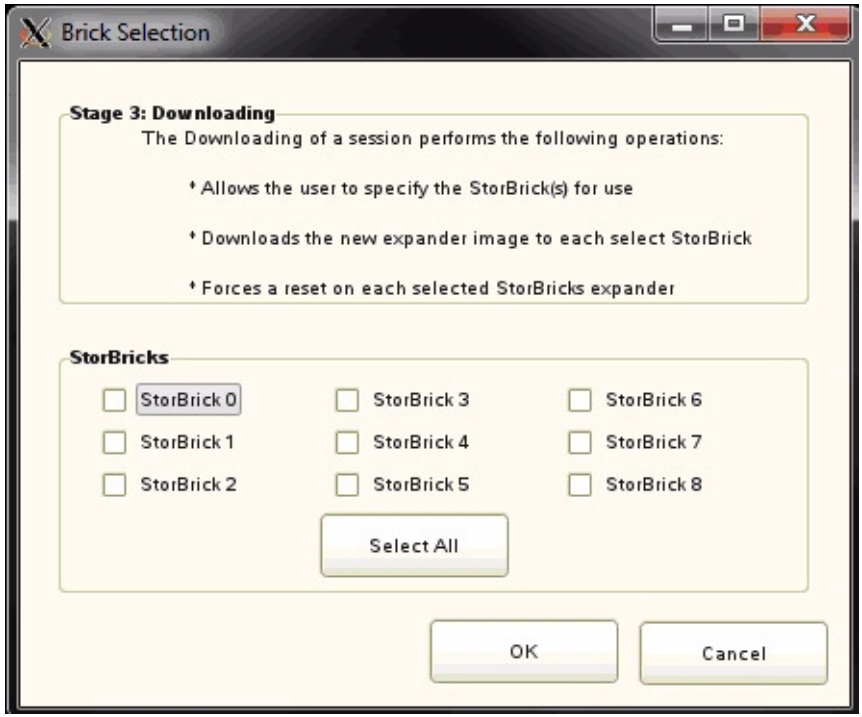


Figure 3-10 Zones 1.4.2 – Brick Selection Window

To complete the zoning process, the machine must be POWER-CYCLED (turned off and turned back on again) for the new configuration to re-flash the firmware files and accept the new settings for each StorBrick. Simply rebooting the machine will not suffice.

Zoning MIS JBOD Platforms

There are two scenarios for zoning JBODs: the first assumes the JBOD is networked to an MIS Server platform, the second is when a JBOD is networked to a non-MIS Server. If the JBOD is connected to an MIS Server, the JBOD can be zoned by clicking on **Setup** from the menu bar (Figure 3-7) and selecting **Zone JBOD**.

To zone a JBOD attached to a non-MIS Server, change to the `/opt/Zones/JBOD` directory and type **`python JGUI.py`**, or through Windows by typing `JGUI.py` from the command line in

the `C:\Program Files (x86)\Zones\JBOD\` directory. That will bring up the **JBOD Zoning Tool interface** (Figure 3-11).

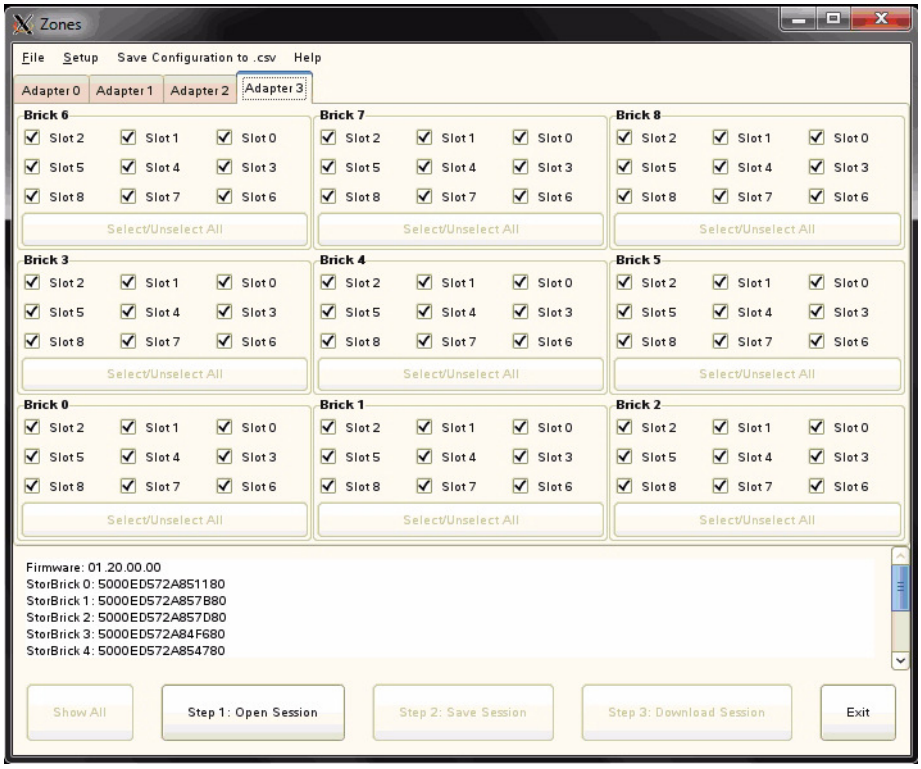


Figure 3-11 Zones 1.4.2 – JBOD Zoning Interface

To begin, click on the button, **Step 1: Open Session** (Figure 3-2).

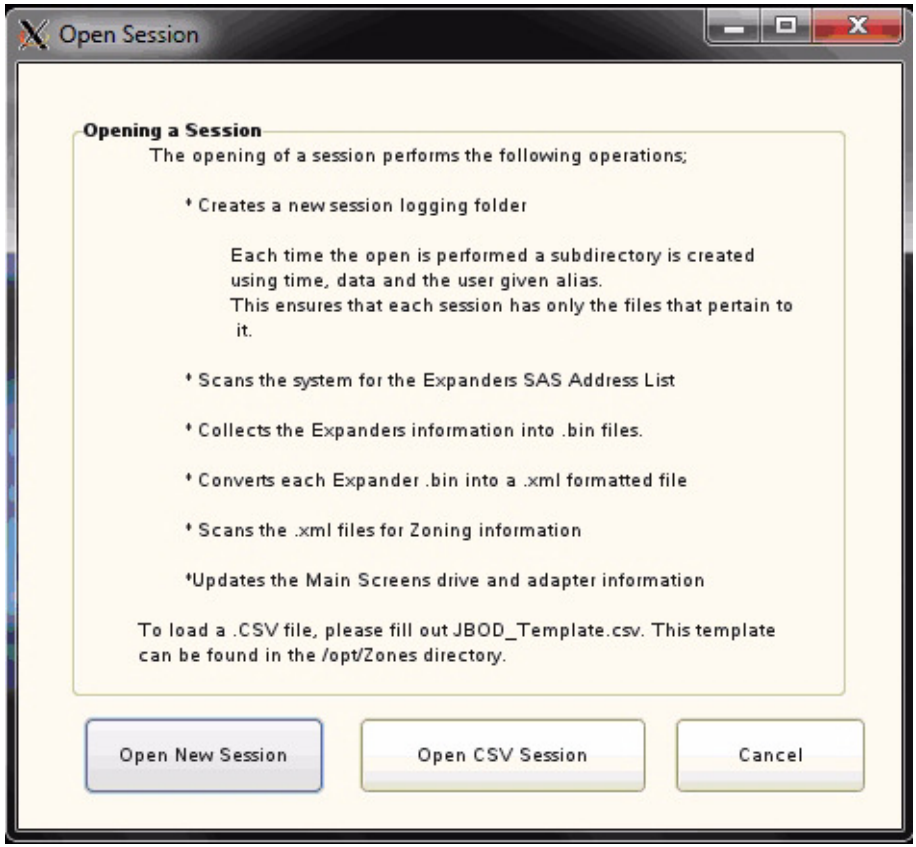


Figure 3-12 Zones 1.4.2 – JBOD Open Session Window

This displays the Open Session window (Figure 3-12). Here you have the option to **Open New Session**, **Open CSV Session**, or **Cancel** the operation. If you have a CSV with the desired zoning configuration, you can choose **Open CSV Session**. (See "Loading a CSV File to Zones," on page 102 for more information.) Otherwise, click on **Open a New Session**.

Note: Figure 3-12 states: **To load a .CSV file, please fill out JBOD_Template.csv. This template can be found in the /opt/Zones directory.** If the `JBOD_Template.csv` template file is unavailable, another template can be found in the `/opt/Zones/JBOD/` directory for CentOS & Linux, and in the `C:\Program Files (x86)\Zones\JBOD` directory for Windows. It is called `First.csv`.

This will bring up the **New Session** prompt, asking for a **Session Alias** to be associated with the zoning configuration. This alias name will be used to create a time-stamped folder with that alias, necessary to store the files used to zone the machine. This folder will be stored in the `/opt/zones/JBOD` directory for Linux and in `C:\Program Files (x86)\Zones\JBOD` for Windows. After entering a session alias, click **OK** (Figure 3-13).

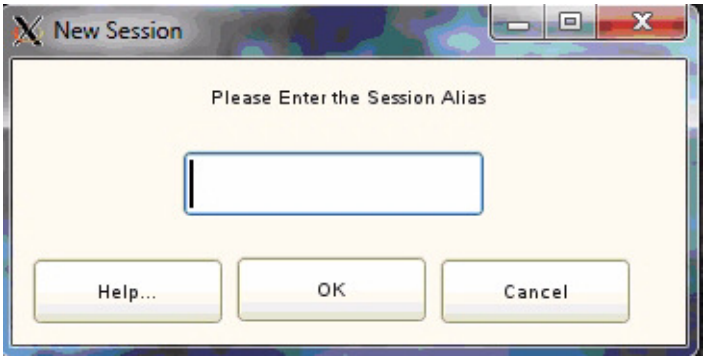


Figure 3-13 Zones 1.4.2 – JBOD New Session Alias

Phy-based Zoning

Phy-based Zoning is automatically enabled as the only option. **Phy-based zoning** allows you to split the drives **between two I/O CARDS** (Figure 1-13 on page 11), though it also may be used when only one I/O card is present.

With **Phy-based zoning**, the main JBOD zoning window will appear with Adapter 0 and Adapter 2 available for zoning (Figure 3-14).

The two adapter tabs correspond to the two JBOD I/O cards the drives can be split between. Which adapter tab (adapter 0 or adapter 2) belongs to which JBOD IO-card is displayed in the text window at the bottom of the interface.

Next, enable all the drives by clicking the **Show All** button at the bottom of the home screen. This will enable all the slots, and you can now select which drives you would like associated with which adapter.

Once you have allocated the drives to the desired adapters, you can save the configuration by clicking on the button, **Step 2: Save Session**. This saves the configuration in the session folder, and enables the **Step 3: Download Session** button.

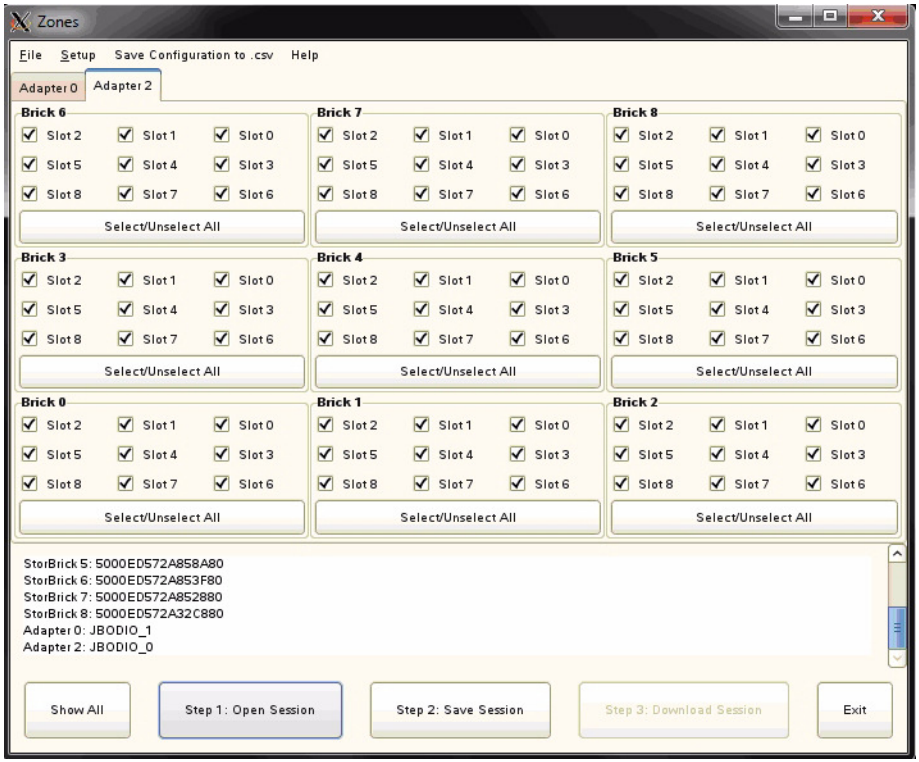


Figure 3-14 Zones 1.4.2 – JBOD Phy-based Zoning Interface

Clicking on the **Step 3: Download Session** button brings up the **Brick Selection** window (Figure 3-15). This allows you to select which StorBricks will be updated with the new configuration information. Once selected, clicking the **OK** button downloads the new configuration to the StorBricks. When complete, the **Brick Selection** window will disappear.

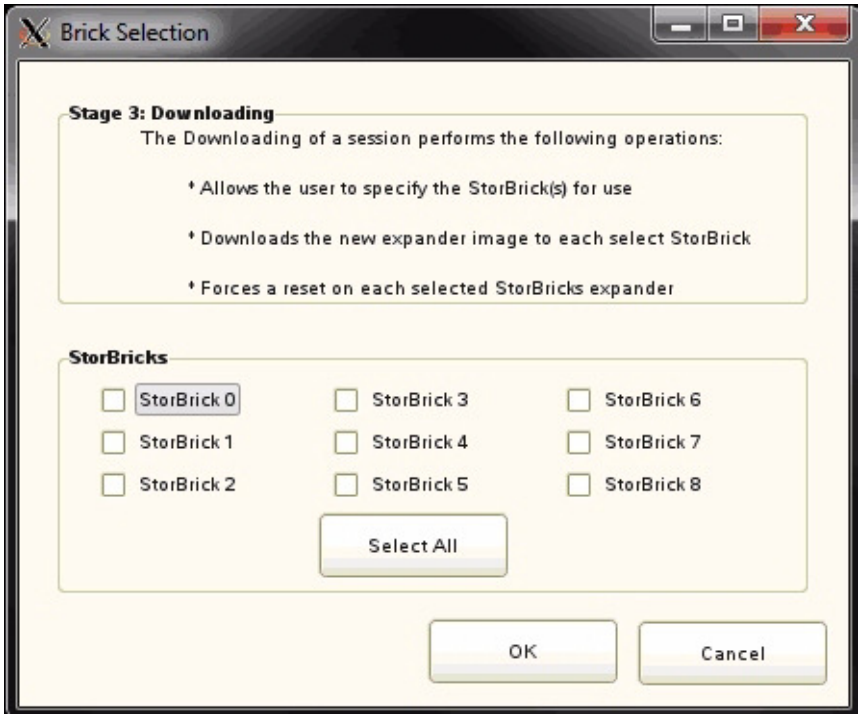


Figure 3-15 Zones 1.4.2 – JBOD Brick Selection Window

To complete the zoning process, the machine in question must then be power-cycled (turned off and turned back on again) for the new configuration to re-flash the firmware files and accept the new settings for each StorBrick.

Loading a CSV File to Zones

The following refers to both MIS Server platforms and MIS JBOD[7] platforms. Many times it is economical to use a CSV file that contains the zoning configuration and load that into the machine, rather than creating a zoning configuration each time from scratch. When this is the case, open the tool appropriate to the machine on which you are working (either Server or JBOD zoning tools), and click **Step 1: Open Session** (Figure 3-2 on page 91).

[7] Loading a CSV file always results in Phy-based zoning.

In the **Open Session** window (Figure 3-3 on page 92), select **Open CSV Session**. This will bring up the file selection window (Figure 3-16).

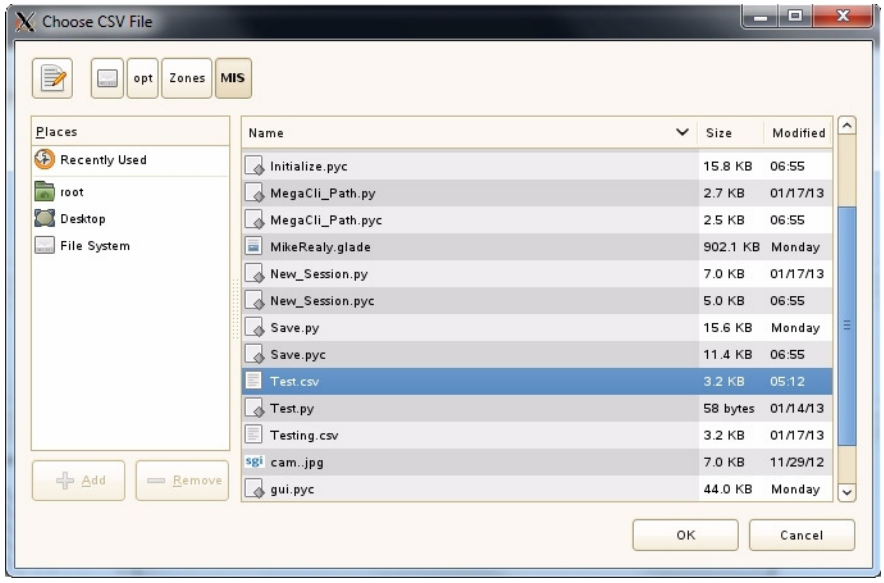


Figure 3-16 Zones 1.4.2 – Choose CSV File Window

Browse to the location to where the desired CSV file is stored, select it, and click **OK**. This will prompt you with a selection for **Primary Only** or **Primary and Secondary** (Figure 3-17).

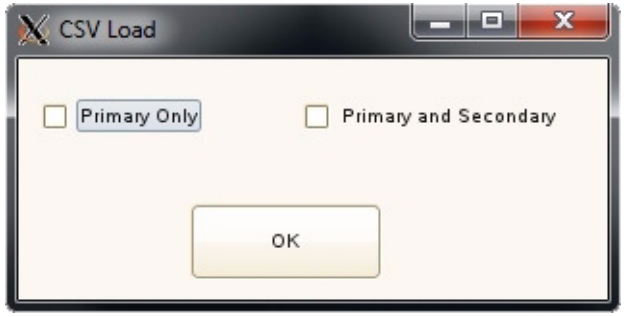


Figure 3-17 Zones 1.4.2 – CSV Load: Primary Only or Primary and Secondary

Place a check next to the box **Primary Only**, unless you are running a platform with a 144 drives (smaller profile 9mm drives that fit two drives—primary and secondary—per slot), in which case, choose **Primary and Secondary**. After making your selection, click **OK**.

A **Warning** box, asking you if you are sure you want to continue (Figure 3-18).

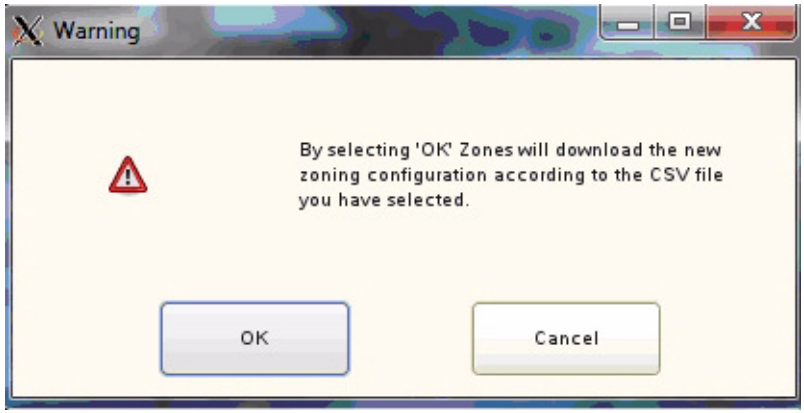


Figure 3-18 Zones 1.4.2 – CSV Warning Window

Clicking **OK** loads the configuration file to the StorBricks. Once complete, the **Warning** box will disappear.

The machine must now be power-cycled (turned off and back on again) for the changes to re-flash the firmware files and take effect the new settings for each StorBrick.

Creating the Drive Groups in MegaRAID (CentOS, Linux & Windows)

Power on the machine to complete power-cycle. Open MegaRAID. Right-click on the expander and select **Create a Virtual Drive** (Figure 3-19).

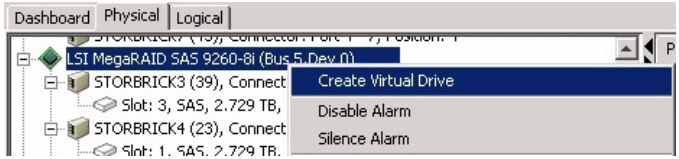


Figure 3-19 MegaRAID – Create a Virtual Drive

A screen will pop up asking you to choose **Simple** or **Advanced** (Figure 3-20). In Simple mode, the drives are chosen for you. In Advanced mode, you get to choose the drives, and are given additional selections in RAID levels, allowing for spanned (00, 10, 50, 60) drives.

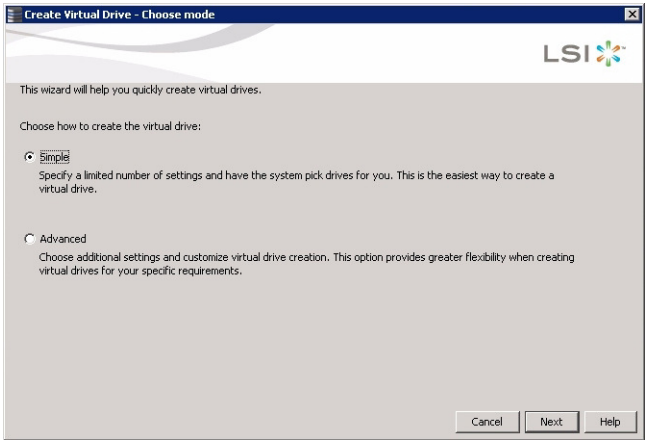


Figure 3-20 MegaRAID – Create Virtual Drive Mode

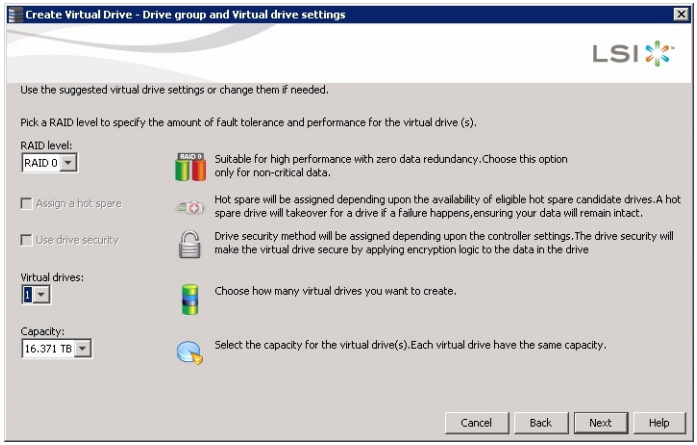


Figure 3-21 Create Virtual Drive – Drive Group Settings

Choose **Write Back BBU** (battery back-up unit). This mode is the safest and the fastest, and will automatically switch from caching mode to write-straight-to-disk whenever battery power has reached low. **Write Through** writes straight to disk. **Write Back** is a cached data flow.

Warning: If you select Write Back and power to the system is lost, data is lost.

Click **Next**, and a summary screen verifying settings will appear (Figure 3-22).

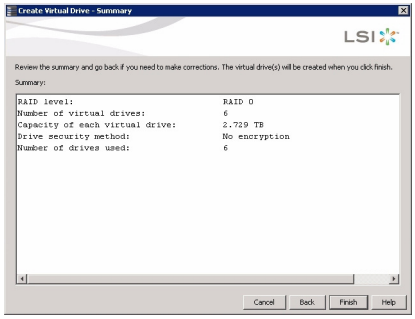


Figure 3-22 Create Virtual Drive – Summary

If the settings are correct, click **Finish**, and click **Ok**.

Formatting the Drives Using Command Line in CentOS

CentOS does not use YaST2 like other Linux-based systems. Instead, drives may be formatted and mounted using command line.

You will need to be at the `root` or add `sudo` before each command.

Verify Drives Seen

To view the drives already recognized by the system, issue the following command:

```
[root@server]# ls /dev/sd*
```

Adding a New Drive

If adding a new drive, you will need to make a partition and format it. If not, skip the following steps. These steps will create a single partition that will take up the entire drive.

```
[root@server]# fdisk /dev/sdb

WARNING: DOS-compatible mode is deprecated. It's strongly recommended
to
         switch off the mode (command 'c') and change display units to
         sectors (command 'u').

Command (m for help):
```

Switch off DOS compatible mode and change the units to sectors:

```
Command (m for help): c
DOS Compatibility flag is not set
Command (m for help): u
Changing display/entry units to sectors
```

Create a new partition by typing `n`. We will then select this as a primary partition by entering `p` and select this as the first partition by entering `1`.

```
Command (m for help): n
Command action
   e   extended
```

```
   p   primary partition (1-4)
p
Partition number (1-4): 1
First cylinder (1-182401, default 1):
Using default value 1
Last cylinder, +cylinders or +size{K,M,G} (1-182401, default 182401):
Using default value 182401
```

We can review our results by entering `p`:

```
Command (m for help): p

Disk /dev/sdb: 1500.3 GB, 1500301910016 bytes
255 heads, 63 sectors/track, 182401 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000

   Device Boot      Start         End      Blocks   Id  System
/dev/sdb1               1      182401  1465136001   83  Linux
```

Write (save) the part ion by entering `w`.

```
Command (m for help): w
The partition table has been altered!
```

Formatting Drives

To format the drives, issue the command `mkfs.ext4 /dev/sdb1`

```
mke2fs 1.41.12 (17-May-2010)
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
Stride=0 blocks, Stripe width=0 blocks
91578368 inodes, 366284000 blocks
18314200 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=0
11179 block groups
32768 blocks per group, 32768 fragments per group
```

```
8192 inodes per group
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632,
2654208,
    4096000, 7962624, 11239424, 20480000, 23887872, 71663616, 78675968,
    102400000, 214990848
```

This will take some time, and `Writing inode tables:` with numbers will detail progress.

Mount the New Drive

If you don't already have a mount point, make one. This is the directory you will able to access the newly mounted drive.

```
[root@server]# mkdir /mnt/backup
```

We can now mount the partition we created earlier to the new mount point:

```
[root@server] mount /dev/sdb1 /mnt/backup
```

Formatting the Drives Using YaST2 in Linux

Drives may be formatted using YaST2 Partitioner. In Linux, the folders that the drives will be mounted to need to be created first. Each mount will need a new folder. Some Linux customers will have the ability to issue the YaST2 command, bringing up a GUI to partition drives. Otherwise, drives are formatted and mounted using command line.

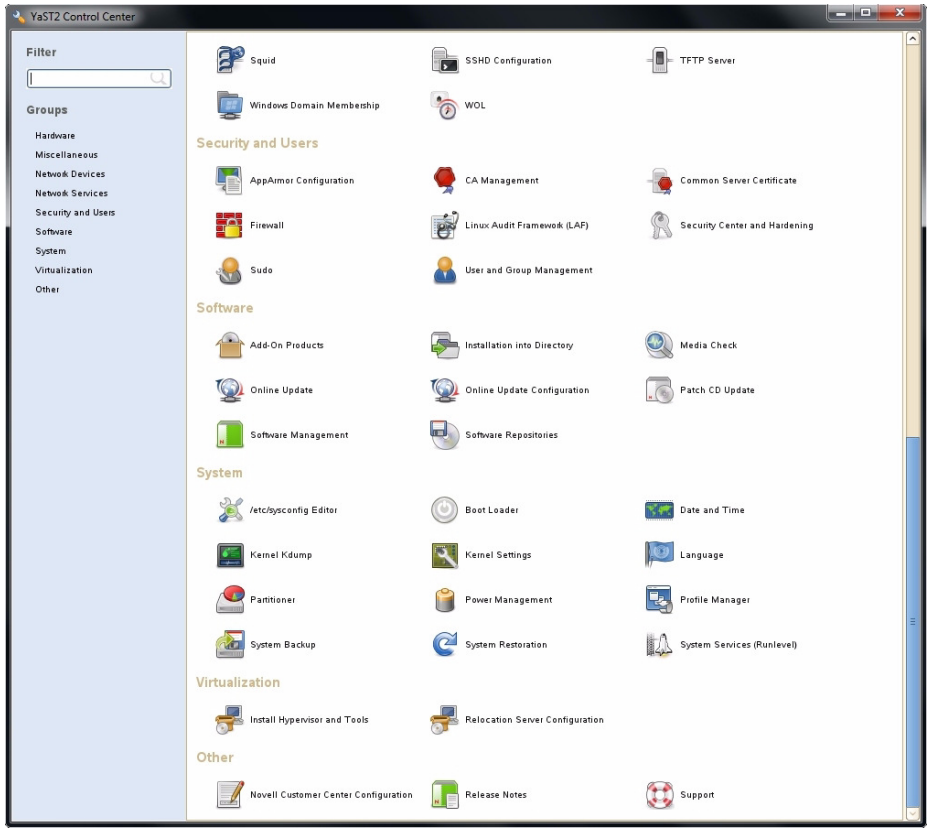


Figure 3-23 YaST2 – Server Manager GUI

1. Issue YaST2 command (i.e., `# yast2`) to launch the YaST2 Server Manager GUI (Figure 3-23).
2. Double-click **Partitioner** to launch.
3. A warning message will appear (Figure 3-24). Click **Yes**.

Figure 3-24 YaST2 – Warning Message

Verify Drives Seen

4. Verify that all of your disks have appeared under **Hard Disks** (Figure 3-25).

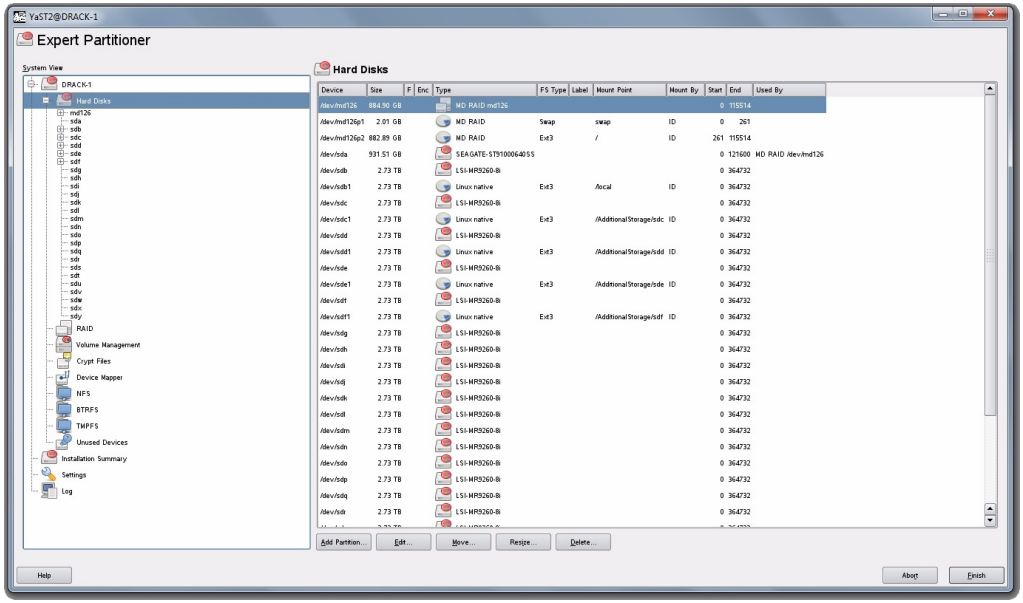


Figure 3-25 YaST2 – Drives Have Appeared

Partitioning Drives

5. Under **Hard Disks**, select the disk you would like to partition and click **Add** at the bottom of the screen (Figure 3-26).

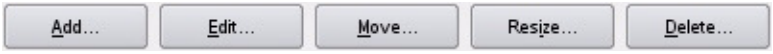


Figure 3-26 YaST2 – Add Button

6. Select the partition size (Figure 3-27) and click **Next**.

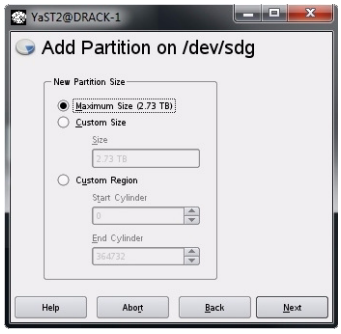


Figure 3-27 YaST2 – Select Partition Size

7. Format the partition using `ext3`, mount the disk to your desired folder, and click **Finish** (Figure 3-28).

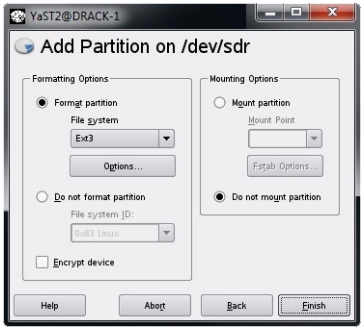


Figure 3-28 YaST2 – Format & Mount the Drive

8. Verify the partition shows up (Figure 3-29) and click **Next**.

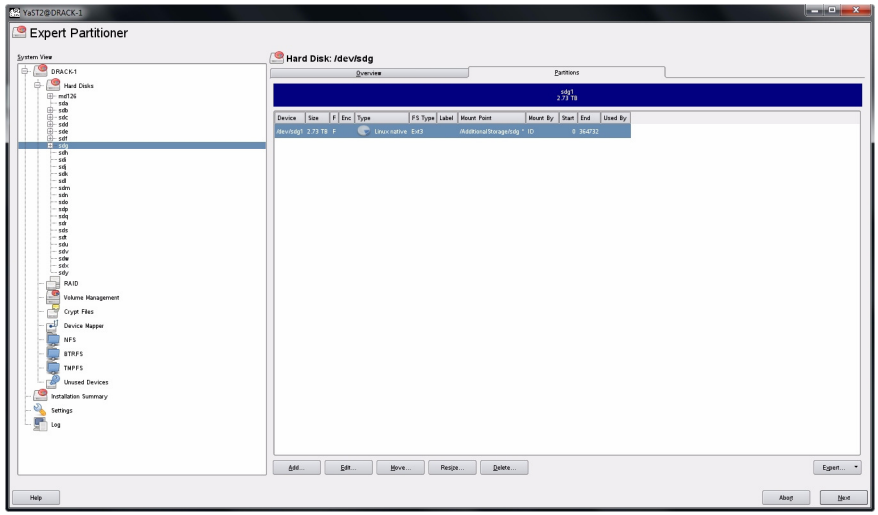


Figure 3-29 YaST2 – Check for Partition

9. Click **Finish** (Figure 3-30).

Figure 3-30 YaST2 – Click Finish

It may take several minutes for the system to mount the disk.

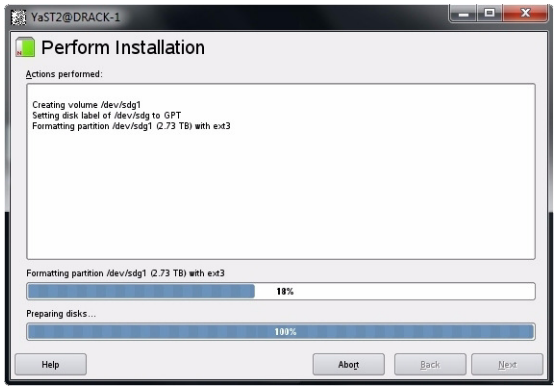


Figure 3-31 YaST2 – Disk Mounting (in process)

Once the disk is mounted (Figure 3-31), the system will return you to the beginning YaST2 GUI.

Windows Server Manager

In Windows, open Server Manager (Figure 3-32).

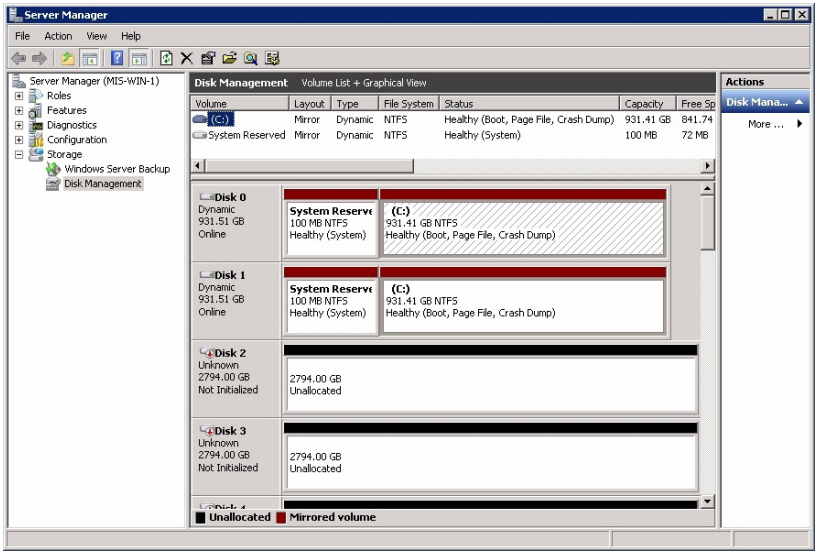


Figure 3-32 Windows Server Manager – Disk Management

Verify Drives Seen

Verify that the only disks the system sees are system drives, and that they are labeled `C:\`.

Note: Unconfiguring drives removes them from the system.

Formatting the Drives

Drives are formatted using Windows Server Manager (Figure 3-33). Open **Server Manager**—the screen should start at **Disk Management** with the drives showing. If not, click **Storage** in the system tree, and click **Disk Management**. The collection of disks/RAID sets will now show.

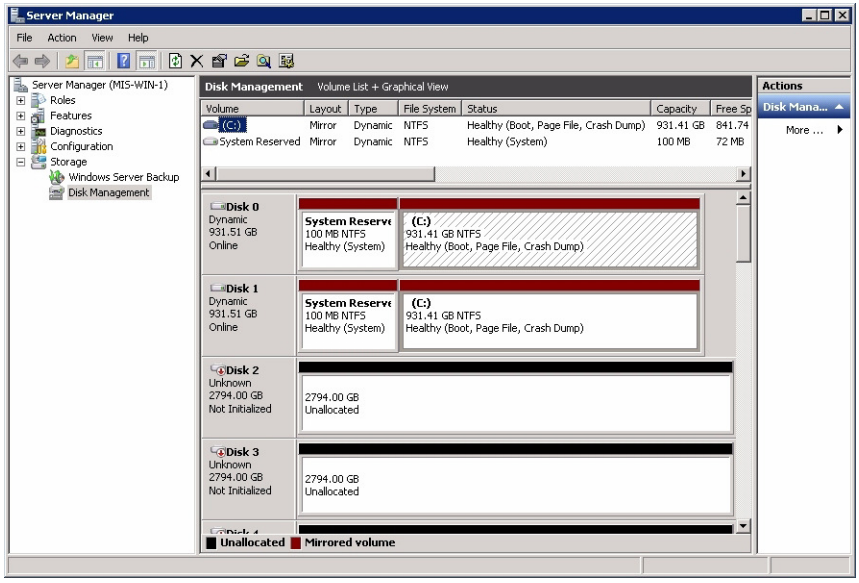


Figure 3-33 Server Manager – Disk Management

Right click in the grey area of the first non-system disk. In the menu that appears, choose **Initialize Disk** (Figure 3-34).

Figure 3-34 Server Manager – Initialize Disks

A pop-up window will appear, showing all the uninitialized disks (Figure 3-35).

Warning: Be sure to select GPT (GUID Partition Table).

Figure 3-35 Server Manager – Select GPT (GUID Partition Table)

Click **OK.** All the disks should now show as **Online** (Figure 3-36).

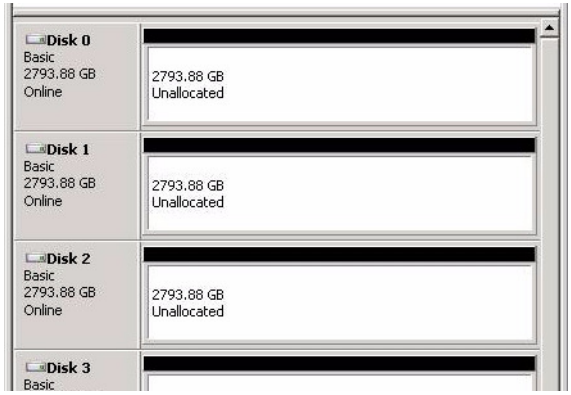


Figure 3-36 Server Manager – Disks Initialized and Online

Right click the first non-system disk. Select **New Simple Volume** (Figure 3-37).

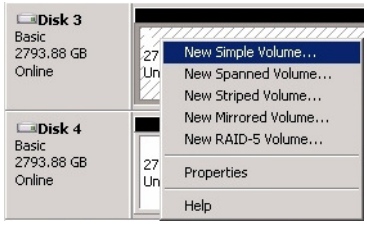


Figure 3-37 Server Manager – New Simple Volume

Click **Next** at the **New Simple Volume Wizard** welcome screen (Figure 3-38). Select the size of the volume in MB and click **Next** (Figure 3-39).

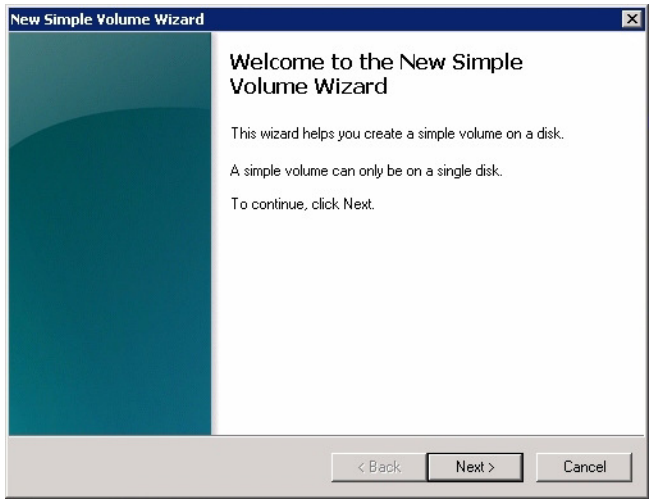


Figure 3-38 Server Manager – New Simple Volume Wizard

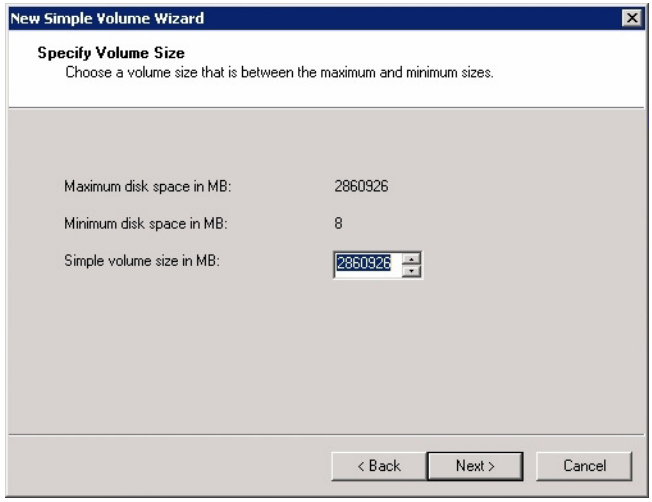


Figure 3-39 New Simple Volume Wizard – Volume Size

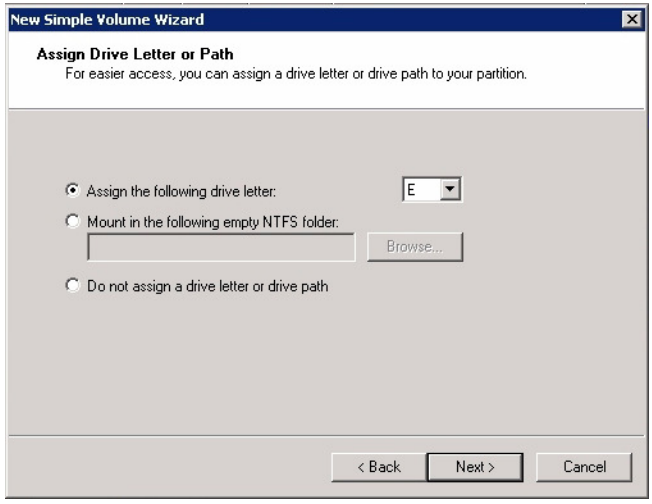


Figure 3-40 New Simple Volume Wizard – Assign Drive Letter or Path

Choose the drive letter to be assigned or click **Next** for the next drive letter available (Figure 3-40).

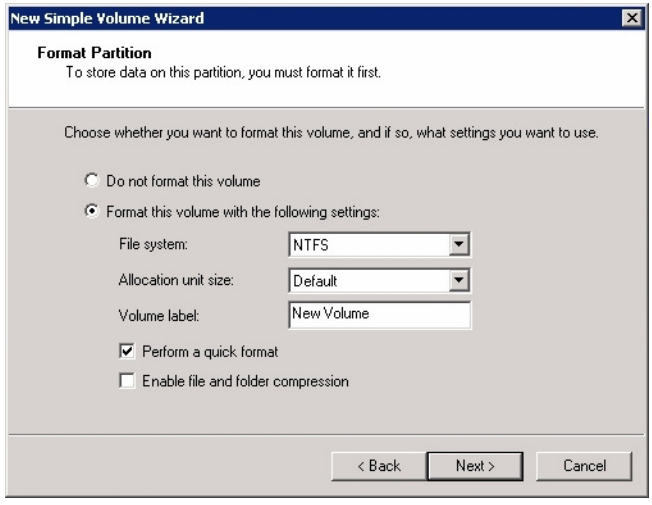


Figure 3-41 New Simple Volume Wizard – Format Partition

Select the format settings to be used, and click **Next** (Figure 3-41).

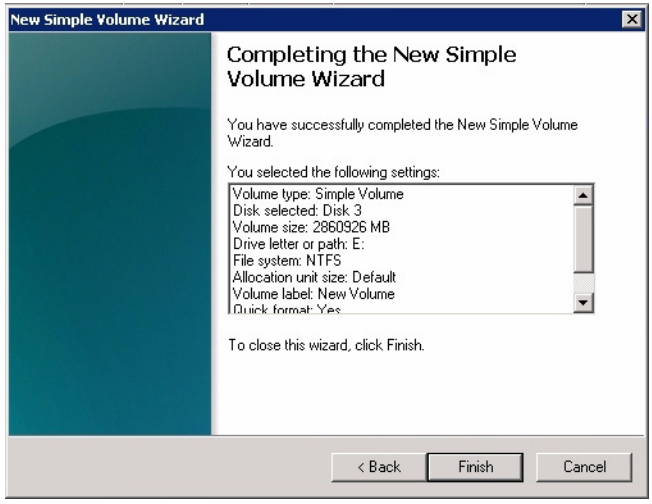


Figure 3-42 New Simple Volume Wizard – Settings Confirmation

Click **Finish** to format the disks (Figure 3-42). New volumes will show in the Disk Management window below the volumes (Figure 3-43).

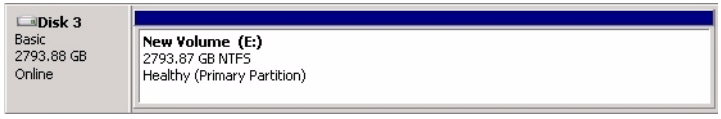


Figure 3-43 Server Manager – New Simple Volume

CLI Zoning Tool, version 1.4

Note: T10-based zoning is not available for JBODs at this time. Future releases will support T10-based zoning for JBODs

This updated release of the CLI Zoning tool introduces proprietary SGI software, used to zone drives on a MIS Server platform and MIS JBOD units. The tool also supports diagnostic functions useful to Field Service. The CLI Zoning Tool contains the following features:

- Allows for Zoning JBODs with a single JBOD-IO PCBA in PHY-Based Zoning.

- Includes the 'Expert Mode' commands to aid in diagnosing issues with MIS Enclosures.
- Real-time PHY configuration information available
- Connection to JBOD-IO or fan base for command execution
- Prints JBOD-IO status and fan base status
- Ability to erase Persistent Flash regions programmed by ShackCLI
- New 'hints' in Initialization file for JBOD

Installing CLI Zoning Tool on CentOS or Linux Host

The CLI Zoning Tool is proprietary SGI software, used to zone drives on the MIS Server platform and MIS JBOD units. To install the software:

1. Create a directory for the application: `mkdir /opt/ShackCLI`
2. Go to http://support.sgi.com and log in with your credentials.
3. Download the latest version of **ShackCLI_release_xxx.zip** into the above directory
4. Extract the files: `unzip ShackCLI_release_xxx.zip`

Installing CLI Zoning Tool on Windows Host

The CLI Zoning Tool on a Windows host machine **requires the presence of Python**, version 2.6 or 2.7 installed on the host. Follow the instructions given in the subsequent section, “Installing Python for Windows,” prior to running the CLI Zoning Tool.

To install the CLI Zoning Tool software:

1. Go to http://support.sgi.com and log in with your credentials.
2. Download the CLI Zoning Tool for Windows, version 1.4.
3. Unzip `ShackCLI_release_xxx`. The program will ask if you want to create a directory name for the `.zip` file, `C:\python##\ShackCLI\`, where `##` is the version number of Python installed.
4. Click **Yes**.

Basics of CLI Zoning

Note: T10 Zoning is unsupported at this time. Future versions of the CLI Zoning Tool will support T10-based zoning.

The basic idea of Zoning is fairly simple, if you don't need to know the mechanics of PHY-based zoning. The goal is to allow Initiators to see specific disk drives or not see specific disk drives based on your zoning policy. Typically, zoning should be configured by the customer to spread across the StorBricks as much as possible. When using RAID controllers, it is **not** recommended to have multiple Initiators seeing the same drive, but is supported if the user so chooses.

The ShackCLI uses Comma Separated Values (CSV) files that the user creates to apply Zoning changes. The format of the CSV file is meant to simplify the Zoning configuration down to a simple Initiator to drive connection matrix. The ShackCLI expects a specific format for all CSV files used for Zoning:

Table 3-1 Zoning Configuration

Drive	Initiator 1	Initiator 2	Initiator 3	Initiator4	Initiator 5	Initiator 6	Initiator 7	Initiator 8
0	1	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0
2	0	0	1	0	0	0	0	0
3	0	0	0	1	0	0	0	0
4	1	0	0	0	0	0	0	0
5	0	1	0	0	0	0	0	0
6	0	0	1	0	0	0	0	0
7	0	0	0	1	0	0	0	0
8	1	0	0	0	0	0	0	0
9	1	0	0	0	0	0	0	0
10	0	1	0	0	0	0	0	0
11	1	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0

Table 3-1 Zoning Configuration

Drive	Initiator 1	Initiator 2	Initiator 3	Initiator4	Initiator 5	Initiator 6	Initiator 7	Initiator 8
13	0	0	0	0	0	0	0	0
14	0	1	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0

Column 0 is the drive and columns 1-8 are the Initiators. Each StorBrick may contain up to 18 disk drives when using the SGI 2.5" drive adapter or up to 9 disk drives when using 3.5" disk drives. There is an implied relationship between the Drive Numbers and the StorBrick numbers where Drive 0-8 is StorBrick 0, drive 9-17 is StorBrick 1, etc. Blank rows are supported to help in formatting. If you are not using 2.5" drives, designate the drives 72-143 for Servers, and 82-163 for JBODs in the CSV file, and fill the cells with zeroes so the ShackCLI will know to not map any Initiators to those drives.

A '1' in a cell means the Initiator in that column will be connected to the drive in the row. A '0' in a cell means the Initiator in the column will not be connected to the drive in the row.

All Initiators may be connected to any or all drives or no Initiators may be connected to any drive. Any combination of Initiator to Drive connectivity possible in the CSV file will be supported in the Enclosure, therefore there is no combination of Initiator to drive Zoning that is not supported. It is up to the user to determine how they want to allocate drives to Initiators.

For Servers, Initiator 0 is mapped to PHY 7 on the StorBricks and connects to HBA 0, Initiator 1 is mapped to PHY 6 on the StorBricks and connects to HBA 1, etc.

For JBODs, since there are up to two JBOD-IOs PCBAs, JBOD-IO 0 connects to PHY 7/6 on the StorBricks and JBOD-IO 1 connects to PHY 5/4 on the StorBricks. For the StorBrick 8 the PHY mapping is JBOD-IO 0 connects to PHY 5/4 and JBOD-IO 1 connects to PHY 7/6 on the StorBrick. The ShackCLI automatically programs JBODs with the appropriate Initiator to PHY Zoning so you do not have to handle StorBrick 8 any different than any other StorBrick.

If the user wants to read the current zoning on a StorBrick and selects menu option 2, the ShackCLI will print zoning information on a PHY-basis where Initiators are connected to specific PHYs on the StorBrick. In the following example, the ShackCLI is printing zoning information for StorBrick 0 in a JBOD Enclosure, and automatically allows for the wide ports previously

described. If you enter a 1 in the cell corresponding to StorBrick 0 drive 0, the display will show Initiator 0/1 connected to drive 0. If you enter a 1 in the cell corresponding to StorBrick 0 drive 1, the display will show Initiator 2/3 connected to drive 1. This is due to everything in PHY-based Zoning is connected with PHYs.

Table 3-2 Phy Based Zoning Table for StorBrick 0

Drive	Initiator 0	Initiator 1	Initiator 2	Initiator 3
00	X	X	0	0
01	0	0	X	X
02	X	X	0	0
03	0	0	0	0
04	0	0	0	0
05	0	0	X	X
06	0	0	0	0
07	0	0	0	0
08	0	0	0	0
09	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0

The CLI Zoning Tool performs changes through the use of Comma Separated Values (CSV) files. A Session is defined as the act of querying, editing, saving, and downloading the expander's binary zoning information.

The CLI Zoning Tool runs on any CentOS/Linux/Windows host that has Python 2.6 or Python 2.7 installed. Most Linux-based systems come with Python. The target MIS JBOD/Server does not require an OS since the CLI Zoning Tool uses the fan base firmware to access the StorBricks. Table 3-3 is how the Zone Groups (ZG) are implemented in the MIS Enclosure.

Table 3-3 Zone Group Implementation

Zone Group	Description
ZG0	The Dead Zone that only talks to ZG 127
ZG0 – ZG1	Always enabled
ZG2–3	Enabled for initiators
ZG2	For Initiators that have SMP Zoning Access
ZG3	Initiators that have access to Broadcast
ZG4–7	Reserved per SAS Specification
ZG8–15	The eight possible initiators
ZG16–96	For drives 0–80 for 81 possible drives
ZG97–127	Reserved in the MIS implementation
ZG128-208	For drives 81 - 161. If using 9mm 2.5" drives

A configuration file is used by the CLI application to zone the StorBricks. **A set of standard configuration files are included with the CLI Zoning Tool software package.** A custom file can be created, using a spreadsheet application and then saving it as a `.csv` file (see “Editing the .csv File for the CLI Zoning Tool,” on page 131).

Preparing to Zone using the CLI Zoning Tool

CLI Zoning uses the MIS-S9D proprietary network interface. This interface is to be used when zoning using the CLI Zoning Tool, or when accessing the Fan Base Service Page. It is located at the front of the chassis at the upper right corner (Figure 3-44). The chassis must be slid out forward at least one inch in order to connect a network cable. (See “Sliding the Chassis Forward/Backward,” on page 154.) Ensure the MIS system is powered on.

Figure 3-44 MIS-S9D Proprietary Network Interface

Use an Ethernet cable to connect a server/laptop running either a CentOS, Linux, or Windows operating system and the CLI Zoning application software. The network port connected to the server/laptop must be set to `192.168.0.xxx` (`10` will do). The static IP address of the fan base is set to `192.168.0.3`. Verify connectivity to the fan base with a `ping` command to `192.168.0.3` from the server/laptop. If there is no response, or the `ping` times out, it will be necessary to power cycle the MIS Server or JBOD.

Editing the ShackCLI.ini file for CentOS & Linux

In the `/opt/ShackCLI` directory, open up the `ShackCLI.ini` file with a text editor or vi.

The following is a sample file:

```
[main]
# Input filename. This must be either a pathname or a simple
# dash (-), which signifies we'll use standard in.
input_source = cli
target = 192.168.0.3
[maxsize]
# When we hit this threshold, we'll alert for maximum
# file size.
threshold = 100
[display]
show_footer = yes
# Fill up all SB infomation before going to Menu
auto_fill = no
```

```
[default]
#MIS_Variant = JBOD
MIS_Variant = SERVER
NUM_JBODIO = 2
#ETH_Variant = JBODIO
ETH_Variant = FANBASE
storbrick = 0 1 2 3 4 5 6 7
#storbrick = 0 1 2 3 4 5 6 7 8
cmd = menu
pcsv = /opt/ShackCLI/MIS-Server_4HBA_zoning_PCSV.csv
zcsv = /opt/ShackCLI/ZonePhy_Default.csv
pbcsv = /opt/ShackCLI/MIS-JBOD_1-IOMOD_zoning_PBCSV.csv
#pcsv = C:\Python##\ShackCLI\MIS-Server_4HBA_zoning_PCSV.csv
#zcsv = C:\Python##\hackCLI\ZonePhy_Default.csv
#pbcsv = C:\Python##\ShackCLI\MIS-JBOD_1-IOMOD_zoning_PBCSV.csv
```

First, verify that the target IP address is `192.168.0.3` and is not commented out (i.e., there is no `#` at the beginning of the line). Next, make the needed changes to the file, as follows.

1. Set the MIS Variant to the type of system to be zoned, `JBOD` or `SERVER`. (Be sure the other is commented out.)
2. Change the StorBrick count to be either `0-7` for a server, or `0-8` for a JBOD.
3. Select the type of zoning file to be used `pcsv`, `zcsv`, or `pbcsv`.
4. Add the path to where the configuration file is located.
5. Unless issues develop, leave the remaining selections at default.
6. Save the `ShackCLI.ini` file and close.
7. Change to the `/opt/ShackCLI/Compiled_Python_2.x/` where `x` is the version of Python you are running.
8. Execute the CLI command: `python ShackCLI.pyc --ini ../ShackCLI.ini --cmd menu`.

This will set the StorBricks to debug mode, and display a menu (“CLI Zoning Tool Main Menu,” on page 129).

Editing the ShackCLI.ini file for Windows

In the `C:\python##\` directory, open up the `ShackCLI.ini` file with an editor or vi.

The following is a sample file:

```
[main]
# Input filename. This must be either a pathname or a simple
# dash (-), which signifies we'll use standard in.
input_source = cli
target = 192.168.0.3
[maxsize]
# When we hit this threshold, we'll alert for maximum
# file size.
threshold = 100
[display]
show_footer = yes
# Fill up all SB infomation before going to Menu
auto_fill = no
[default]
#MIS_Variant = JBOD
MIS_Variant = SERVER
NUM_JBODIO = 2
#ETH_Variant = JBODIO
ETH_Variant = FANBASE
storbrick = 0 1 2 3 4 5 6 7
#storbrick = 0 1 2 3 4 5 6 7 8
cmd = menu
pcsv = /opt/ShackCLI/MIS-Server_4HBA_zoning_PCSV.csv
zcsv = /opt/ShackCLI/ZonePhy_Default.csv
pbcsv = /opt/ShackCLI/MIS-JBOD_1-IOMOD_zoning_PBCSV.csv
#pcsv = C:\Python##\ShackCLI\MIS-Server_4HBA_zoning_PCSV.csv
#zcsv = C:\Python##\ShackCLI\ZonePhy_Default.csv
#pbcsv = C:\Python##\ShackCLI\MIS-JBOD_1-IOMOD_zoning_PBCSV.csv
```

First, verify that the target IP address is `192.168.0.3` and is not commented out (i.e., there is no # at the beginning of the line). Next, make the needed changes to the file, as follows.

1. Set the MIS Variant to the type of system to be zoned, `JBOD` or `SERVER`. (Be sure the other is commented out.)
2. Change the StorBrick count to be either `0-7` for a server, or `0-8` for a JBOD.
3. Add the path to where the configuration file is located.
4. Unless issues develop, leave the remaining selections at default.
5. Save the `ShackCLI.ini` file and close.
6. Change to the `C:\Python##\ShackCLI\Compiled_Python_##\` directory where `##` is the version of Python installed.

7. Execute the CLI command: `python ShackCLI.pyc --ini ..\ShackCLI.ini --cmd menu`.

This will set the StorBricks to debug mode, and display a menu ("CLI Zoning Tool Main Menu").

CLI Zoning Tool Main Menu

Version 1.4.0 Default Menu

```
####  Zoning Commands  ####
 1) Set Active StorBrick(s)
 2) Display Current StorBrick(s) Zoning
 3) Update StorBrick(s) Permissions Table From CSV
 4) Update StorBrick(s) Phy Zones From CSV
 5) Update StorBrick(s) Phy Based Zoning from CSV
 6) Change Zoning type (Server <-> JBOD)
 7) Save current StorBrick(s) Zoning to CSV
 8) Toggle Expert Mode
 0) Exit CLI - back to command prompt
Please enter your selection:
```

When the ShackCLI is used in menu mode the simplified menu is displayed. This menu only includes commands associated with the Zoning features of the ShackCLI. Operation of the ShackCLI in terms of Zoning has not changed from version 1.0.

Table 3-4 CLI Zoning Tool Menu Options and Descriptions

Menu Option	Description
`1) Set Active Storbrick(s)`	This menu option allows user to select the StorBrick(s) to act upon. The StorBricks may be entered in any order: 0 1 2 3 4 5 6 7 or 7 6 5 4 3 2 1 0, or in subsets: 0 or 0 1, etc. Storbrick numbers must be less than or equal 7 for MIS Server and less than or equal 8 for MIS JBOD.
`2) Display Current StorBrick(s) Zoning`	Displays the Zoning configuration that is currently stored in the StorBricks.
`3) Update StorBrick(s) Permissions Table From CSV`	This menu option uses the `csv` file described in the `ini` file under the heading '`pcsv`' to modify the Zoning Permission Tables for the selected StorBricks. If no `csv` file has been specified in the `ini` file the CLI Zoning Tool will prompt you for the name of the `csv` file to use.

Table 3-4 CLI Zoning Tool Menu Options and Descriptions **(continued)**

Menu Option	Description
`4) Update StorBrick(s) Phy Zones From CSV`	This menu option uses the `csv` file described in the `ini` file under the heading 'zcsv' to modify the PHY Zone Groups for the selected StorBricks. If no `csv` file has been specified in the `ini` file the CLI Zoning Tool will prompt you for the name of the `csv` file to use.
`5) Update StorBrick(s) Phy Based Zoning from CSV`	This menu option uses the `csv` file described in the `ini` file under the heading 'pbcsv' to modify the Phy-based Zoning Tables for the selected StorBricks. This is the only supported Zoning configuration for MIS JBOD and is an optional configuration for MIS Server.
`6) Change Zoning type (Server <-> JBOD)`	This menu option allows you to change the zoning type from SERVER/JBOD to JBOD/SERVER.
`7) Save current StorBrick(s) Zoning to CSV`	This menu option allows you to save the current configuration of the Enclosures Zoning in a file. This file is compatible with the CLI commands that require a `csv` file to update Zoning.
`8) Toggle expert mode`	This menu option displays all the menu options available.
`0) Exit CLI - back to command prompt`	This menu option will exit the CLI Zoning Tool.

When ready to zone, complete the following instructions.

1. Execute option 7 to make a copy of the current configuration (be sure to add `.csv` as the file extension). Example: `MIS-System1-zoning-092012-121103.csv`
2. Edit the `.csv` file to the desired zone configuration. Once satisfied, save the file with a different name so as not to over write the saved one.
3. Change the name in the `ShackCLI.ini` file to point it to the new file.
4. Select option 5 for PHY.
5. When finished, select option 8 to show the expanded menu, and then option 13 to reset the fan base.
6. Choose option 6, when it asks if you really want to proceed, select **Yes**.
7. Next, select 0 for Phy-based, the type of zoning that was set in the configuration.
8. Select option 13 again to reset the fan base, and exit the CLI.

9. **Power-cycle the MIS Server and reboot any head-of-string controller of a JBOD to refresh the information in the servers.**

Editing the `.csv` File for the CLI Zoning Tool

A configuration file made of comma separated values (a "`csv`" file) is used by the CLI application to zone the StorBricks. A set of standard configuration files are included with the software package. A custom file can be created, using a spreadsheet application and then saving it as a `.csv` file.

Figure 3-45 on page 132 is a block diagram of MIS JBOD StorBrick `SB0`. The other eight StorBricks for the MIS JBOD repeat this, but are offset to other lanes from the I/O modules.

Table 3-5 gives a portion of a `csv` file. A `1` in the spreadsheet indicates that the drive in question is accessible by the above HBA. The `0` indicates that the path is disabled.

Table 3-5 Zone Group Implementation

SB0 Drive	HBA-A Indicator 1	HBA-B Indicator 2	HBA-C Indicator 3	HBA-D Indicator 4	N/U Indicator 5	N/U Indicator 6	N/U Indicator 7	N/U Indicator 8
0	1	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0
2	0	0	1	0	0	0	0	0
3	0	0	0	1	0	0	0	0
4	1	0	0	0	0	0	0	0
5	0	1	0	0	0	0	0	0
6	0	0	1	0	0	0	0	0
7	0	0	0	1	0	0	0	0
8	1	0	0	0	0	0	0	0

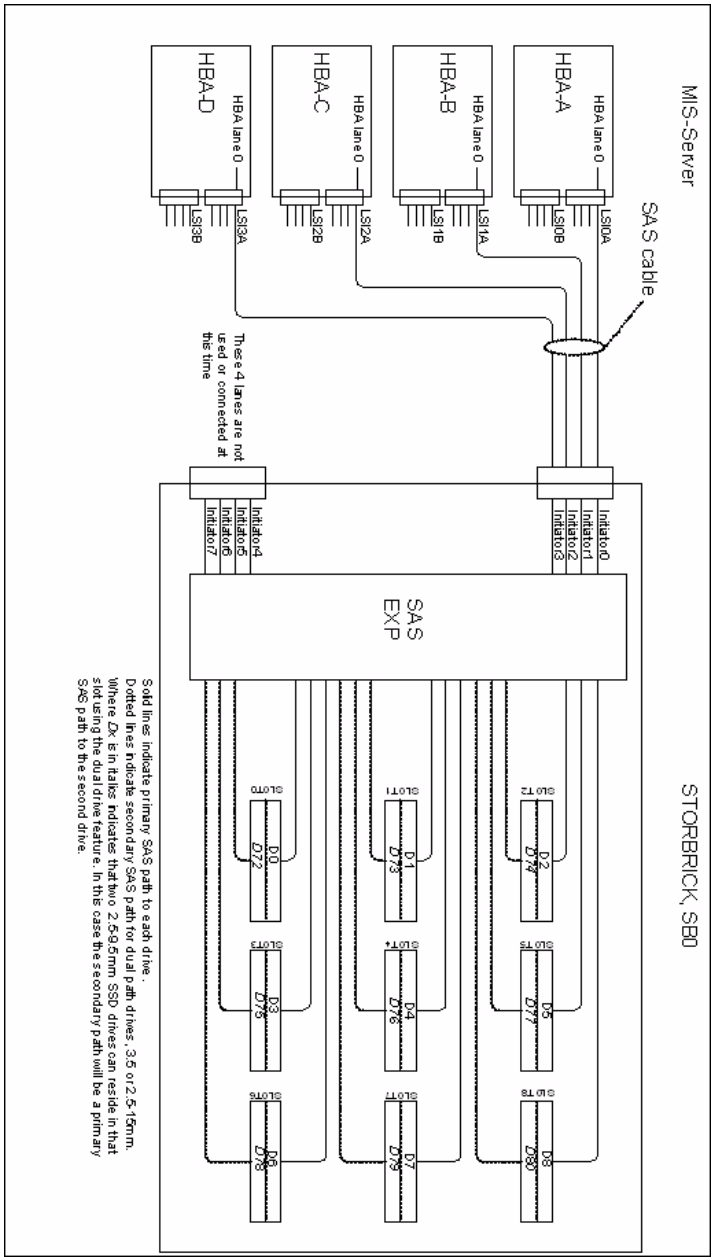


Figure 3-45 Block diagram of MIS Server StorBrick `SB0`

Version 1.4.0 Expanded Menu

```
####  Zoning Commands  ####
 1) Set Active StorBrick(s)
 2) Display Current StorBrick(s) Zoning
 3) Update StorBrick(s) Permissions Table From CSV
 4) Update StorBrick(s) Phy Zones From CSV
 5) Update StorBrick(s) Phy Based Zoning from CSV
 6) Change Zoning type (Server <-> JBOD)
 7) Save current StorBrick(s) Zoning to CSV
 8) Toggle Expert Mode
    ####  System Testing Commands  ####
    ####  Expert Mode Commands     ####
 9) Display StorBrick(s) Settings
10) Display CLI Settings
11) Enter StorBrick CLI (Must select a single StorBrick)
12) Reboot Fan Base - will not reset StorBricks
13) Reset Fan Base - Danger. This will reset StorBricks
14) Force StorBrick(s) into Debug Mode
15) Exit StorBrick(s) Debug Mode
16) Display PHY Error Counters for selected StorBricks
17) Display PHY Information for selected StorBricks
18) Display StorBrick UUID for selected StorBricks
19) Display StorBrick Firmware Revision Levels for Selected StorBricks
20) Change state of JBODIO ID LED - off, on blink
21) Clear Persistent Flash
22) Display Fan Base Status
23) Display JBODIO Status
24) Change Polling of Expanders by Fan Base or JBODIO
25) Display Disk Drive Status
26) Change Power State of a Disk Drive
27) Power Cycle test
28) Update StorBrick UUID
29) Write/Read Buffer Test
 0) Exit CLI - back to command prompt
Please enter your selection:
```

Select option 8 from the simplified menu to enter expert mode. When in `Expert Mode` additional features of the ShackCLI are made available.

`9) Display StorBrick(s) Settings`

This option displays the following information about the StorBricks that have been selected in the Configuration file:

1. Total Errors – total communication errors logged by the ShackCLI during this session. This value should always be zero unless there are hardware or firmware errors in the Enclosure.
2. EXP SAS Address – SAS address of the expander on the StorBrick.
3. SXP SAS Address – SAS address of the target SMP for the expander on the StorBrick.
4. STP SAS Address – SAS address of the STP for the expander on the StorBrick.
5. Permission Table Loaded – When this value is `Yes` then the ShackCLI has read the current configuration of the Zoning Permission Table into the local memory.
6. Debug Mode Enabled – When this value is `Yes` then the selected StorBrick is in debug mode and ready to accept commands from the SEP interface.

Example Output of Menu option (9):

```
StorBrick 0:
   Total Errors: 0
   EXP SAS Address:  0x5000ED572A851180
   SXP SAS Address:  0x5000ED572A8511BD
   STP SAS Address   0x000000000000003E
   Permission Table Loaded: No
   Debug Mode Enabled: Yes
```

10) Display CLI Settings

This menu option prints the current settings of ShackCLI. Generally these settings come from the Initialization file passed to the CLI at run time but may be changed by actions of the user during operation of the ShackCLI.

Example Output of Menu option (10):

```
MIS CLI current settings:
MIS Variant: JBOD
StorBricks:
StorBrick 0 is active
StorBrick 1 is active
StorBrick 2 is active
StorBrick 3 is active
StorBrick 4 is active
StorBrick 5 is active
StorBrick 6 is active
StorBrick 7 is active
StorBrick 8 is active
```

```
Using Fan Base at IP 10.4.3.229
Permission Table range: 0 through 255
Using CSV file for Permissions Table Update:
C:\Shackleford\ShackZzone\ShackZone\One_Initiators_72_drives.csv
Using CSV file for Phy Zone Update None
Using CSV file for Phy Based Zoning Update
C:\Shackleford\ShackZzone\ShackZone\Two_Initiators_36_drives_jbod.csv
CLI Version: Shack CLI: Version 1.4.0.0 Date: 01/24/2013
```

11) Enter StorBrick CLI (Must select a single StorBrick)

Menu option 11 allows SGI to debug the StorBrick hardware and firmware and generally would not be used by customers or field service. If you wish to use the StorBrick CLI you must select a single StorBrick using the Initialization file or Menu option 1.

12) Reboot Fan Base – will not reset StorBricks

Menu option 12 will reboot the Fan Base without resetting the StorBricks.

13) Reset Fan Base – Danger. This will reset StorBricks

Menu option 13 will reset the Fan Base and the StorBricks. All the StorBricks in the Enclosure shall be reset regardless of the CLI settings.

14) Force StorBrick(s) into Debug Mode

Menu option 14 allows the user to place the selected StorBricks into Debug Mode which allows the ShackCLI to communicate with the StorBricks internal CLIs. At the start of ShackCLI the selected StorBricks shall be placed into Debug mode automatically. If the selected StorBricks changes during the session this menu option allows the user to place the newly selected StorBricks into Debug Mode.

15) Exit StorBrick(s) Debug Mode

Menu option 15 allows the user to place the selected StorBricks in default mode. This action will result in the selected StorBricks being reset.

Warning: Use this option at your own risk if you are using the ShackCLI on an enclosure that is performing I/O.

16) Display PHY Error Counters for selected StorBricks

Menu option 16 prints the PHY error counters for the selected StorBricks. PHYs with an abnormal error count may be experiencing issues requiring a service action. Note that the current release of the Fan Base Firmware will truncate the PHY event counters section of the output due to overflow of the receive buffer. The PHY Events are used for Internal StorBrick Firmware functions and may change in subsequent StorBrick Firmware releases.

- InvWrdCnt - Invalid work count error count.
- DispErrCnt - Running Disparity error count.
- LossSynccnt - Loss of Sync error count.
- RstSeqFailCnt - Reset sequence failed count.

PHY mapping to drive slots:

```
PHY Drive
    Slot
0    11
1     8
2    25
3    13
4    17
5    22
6    15
7    19
8    20
9    10
10    9
11   24
12   12
13   16
14   23
15   14
16   18
17   21
```

Note: The PHY error counters for the drive slots are typically zero. If you see large values in any of the PHY errors for drive slots you probably have an issue with that drive slot that needs attention.

```
INFO: PHY Error Counters for StorBrick 0
========================================================================
Phy Layer Error Counters
========================================================================
InvWrdCnt DispErrCnt LossSyncCnt RstSeqFailCnt
========================================================================
Phy 00 0x00000000 0x00000000 0x00000000 0x00000000
Phy 01 0x00000000 0x00000000 0x00000000 0x00000000
Phy 02 0x00000000 0x00000000 0x00000000 0x00000000
Phy 03 0x00000000 0x00000000 0x00000000 0x00000000
Phy 04 0x00000000 0x00000000 0x00000000 0x00000000
Phy 05 0x00000000 0x00000000 0x00000000 0x00000000
Phy 06 0x000001e0 0x0000019a 0x0000001e 0x00000000
Phy 07 0x0000007a 0x00000065 0x0000001e 0x00000000
Phy 08 0x00000000 0x00000000 0x00000000 0x00000000
Phy 09 0x00000000 0x00000000 0x00000000 0x00000000
Phy 10 0x00000000 0x00000000 0x00000000 0x00000000
Phy 11 0x00000000 0x00000000 0x00000000 0x00000000
Phy 12 0x00000000 0x00000000 0x00000000 0x00000000
Phy 13 0x00000000 0x00000000 0x00000000 0x00000000
Phy 14 0x00000000 0x00000000 0x00000000 0x00000000
Phy 15 0x00000000 0x00000000 0x00000000 0x00000000
Phy 16 0x00000000 0x00000000 0x00000000 0x00000000
Phy 17 0x00000000 0x00000000 0x00000000 0x00000000
Phy 18 0x00000000 0x00000000 0x00000000 0x00000000
Phy 19 0x00000000 0x00000000 0x00000000 0x00000000
Phy 20 0x00000000 0x00000000 0x00000000 0x00000000
Phy 21 0x00000000 0x00000000 0x00000000 0x00000000
Phy 22 0x00000000 0x00000000 0x00000000 0x00000000
Phy 23 0x00000000 0x00000000 0x00000000 0x00000000
Phy 24 0x00000000 0x00000000 0x00000000 0x00000000
Phy 25 0x00000000 0x00000000 0x00000000 0x00000000
Phy 26 0x00000000 0x00000000 0x00000000 0x00000000
Phy 27 0x00000000 0x00000000 0x00000000 0x00000000
Phy 28 0x00000000 0x00000000 0x00000000 0x00000000
Phy 29 0x00000000 0x00000000 0x00000000 0x00000000
Phy 30 0x00000000 0x00000000 0x00000000 0x00000000
Phy 31 0x00000000 0x00000000 0x00000000 0x00000000
Phy 32 0x00000000 0x00000000 0x00000000 0x00000000
```

```
Phy 33 0x00000000 0x00000000 0x00000000 0x00000000
Phy 34 0x00000000 0x00000000 0x00000000 0x00000000
Phy 35 0x00000000 0x00000000 0x00000000 0x00000000
================================================================================
================================================================================
Link Layer Event Counters
================================================================================
Event # Event Type Event Threshold
================================================================================
12ah 0x00000000
240h 0x00000000
341h 0x00000000
42dh 0x00000000
================================================================================
Phy # EventData1 EventData2 EventData3 EventData4
================================================================================

Phy 00 0x00000000 0x00000000 0x00000000 0x00000000
Phy 01 0x00000000 0x00000000 0x00000000 0x00000000
Phy 02 0x00000000 0x00000000 0x00000000 0x00000000
Phy 03 0x00000000 0x00000000 0x00000000 0x00000000
Phy 04 0x01606392 0x00000000 0x014904b8 0x000003bc
Phy 05 0x06b084c1 0xec636528 0x025a2c23 0x000003ab
Phy 06 0x0053e9df 0x00000000 0x004bd5a9 0x00000356
Phy 07 0x016b6a91 0x3237dda3 0x0088112f 0x00000359
Phy 08 0x03cf2b5b 0x01d18ca5 0x76319c04 0x00000001
Phy 09 0x00000000 0x00000000 0x00000000 0x00000000
Phy 10 0x00000000 0x00000000 0x00000000 0x00000000
Phy 11 0x00e45221 0x00717733 0x1afe520c 0x00000001
Phy 12 0x00000000 0x00000000 0x00000000 0x00000000
Phy 13 0x00000000 0x00000000 0x00000000 0x00000000
Phy 14 0x00000000 0x00000000 0x00000000 0x00000000
```

17) Display PHY Information for selected StorBricks

Menu option 17 displays details on all 36 PHYs for the selected StorBricks expanders. In the following example the PHY information for StorBrick 0 in a JBOD is displayed. Note that PHYs 7, 6 and 5, 4 are configured as wide ports and have the same SAS address associated.

In a server configuration there are allowances for up to four HBAs with a single SAS lane attached to each of the HBAs on expander PHYs 7-4. The ShackCLI uses the information in the current configuration file to determine if the enclosure is a JBOD or a server and configures zoning appropriately, without user intervention.

```
INFO: Retrieving PHY Information for StorBricks: [0]
INFO: PHY Information for StorBrick 0
                                SSSSSSS                          CONN CONN CONN MAP DFE
              PHY        ZONE   STMSTMA                   ROUTE TYPE ELEM PHY  PHY ADAPT
PHY TYPE NLR  CNG  ZONE  CTRL   PPPPPPT ATTACHED SAS ADDR TYPE INDX LINK ID       VAL
              CNT  GRP   BUS    IIITTTA
00       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 000
01       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 001
02       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 002
03       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 003
04  EXP  6.0  0x01 0x20  0x00   -----1- 5000ED57_2ED64300   T  0x00 0x00 0x00 004 0x1
05  EXP  6.0  0x01 0x07  0x00   -----1- 5000ED57_2ED64300   T  0x00 0x00 0x00 005 0x0
06  EXP  6.0  0x3f 0xcc  0x00   -----1- 5000ED57_DEAD203F   T  0x00 0x00 0x00 006 0x0
07  EXP  6.0  0x3f 0xee  0x00   -----1- 5000ED57_DEAD203F   T  0x00 0x00 0x00 007 0x1
08  END  6.0  0x01 0xe0  0x00   ---1--- 5000C500_40AB40C1   D  0x20 0x01 0x00 008 0x0
09  END  6.0  0x01 0x07  0x00   ---1--- 5000C500_40AB40C2   D  0x00 0x00 0x00 009 0x0
10  END  6.0  0x01 0x40  0x00   ---1--- 5000C500_4093FBD2   D  0x20 0x09 0x00 010 0x0
11  END  6.0  0x01 0x00  0x00   ---1--- 5000C500_4093FBD1   D  0x20 0x00 0x00 011 0x0
12       0x0  0x00 0x00  0x00   -------                     D  0x20 0x0C 0x00 012
13       0x0  0x00 0x00  0x00   -------                     D  0x20 0x03 0x00 013
14       0x0  0x00 0x00  0x00   -------                     D  0x20 0x0F 0x00 014
15       0x0  0x00 0x00  0x00   -------                     D  0x20 0x06 0x00 015
16       0x0  0x00 0x00  0x00   -------                     D  0x20 0x0D 0x00 016
17       0x0  0x00 0x00  0x00   -------                     D  0x20 0x04 0x00 017
18       0x0  0x00 0x00  0x00   -------                     D  0x20 0x10 0x00 018
19       0x0  0x00 0x00  0x00   -------                     D  0x20 0x07 0x00 019
20       0x0  0x00 0x00  0x00   -------                     D  0x20 0x08 0x00 020
21       0x0  0x00 0x00  0x00   -------                     D  0x20 0x11 0x00 021
22  END  6.0  0x01 0xdd  0x00   ---1--- 5000C500_40AAF695   D  0x20 0x05 0x00 022 0x0
23  END  6.0  0x01 0xee  0x00   ---1--- 5000C500_40AAF696   D  0x20 0x0E 0x00 023 0x0
24  END  6.0  0x01 0x60  0x00   ---1--- 5000C500_40AB1102   D  0x20 0x0A 0x00 024 0x0
25  END  6.0  0x01 0x07  0x00   ---1--- 5000C500_40AB1101   D  0x20 0x02 0x00 025 0x0
26       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 026
27       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 027
28       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 028
29       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 029
30       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 030
31       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 031
32       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 032
33       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 033
34       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 034
35       0x0  0x00 0x00  0x00   -------                     D  0x00 0x00 0x00 035
SXP END  6.0  0x01 0x00  0x00   1-11--- 5000ED57_2A8511BD   D  0x2F 0x00 0x00 036
STP      0x0  0x00 0x00  0x00   ----1--                     D  0x2F 0x00 0x00 037
EXP END  6.0  0x01 0x00  0x00   ---1-1- 5000ED57_2A851180   D  0x00 0x00 0x00 038
```

18) Display StorBrick UUID for selected StorBricks

Menu option 18 displays the current UUID programmed into each of the selected StorBricks.

19) Display StorBrick Firmware Revision Levels for Selected StorBricks

Menu option 19 displays all the StorBrick firmware revisions of the selected StorBricks. The STORBRICK-x (where x = 0 in the example) should match the slot number of the StorBrick.

```
INFO: Retrieving Firmware Revision Information for StorBricks: [0]
INFO: Firmware Revision Information for StorBrick 0

================================================================================
Hardware Revision Information:-
================================================================================

Vendor ID:SGI CORP
Product ID:STORBRICK-0
Product Revision Level:Minor = 0x16, Unit = 0x00
Component ID:0x0223 (Bond Option :36)
Component Revision Level:5(B3)

================================================================================
Firmware Revision Information:-
================================================================================

Active Firmware: Active Image

Boot Image:
  Revision: 1.22.0.0
  Platform Name:   SGI - Shackleford STORBRICK
  Version Name:    STORBRICK-01.22.00.00 01/21/13
  Firmware Family: 1  OemFamily: 0
  Fast Boot: No  Image Address: 0x14000000

Active Image:
  Revision: 1.22.0.0
  Platform Name:   SGI - Shackleford STORBRICK
  Version Name:    STORBRICK-01.22.00.00 01/21/13
  Firmware Family: 1  OemFamily: 0
  Fast Boot: No  Image Address: 0x14080000

Backup Image:
  Revision: 1.20.0.0
```

```
  Platform Name:   SGI - Shackleford STORBRICK
  Version Name:    STORBRICK-01.20.00.00 07/20/12
  Firmware Family: 1  OemFamily: 0
  Fast Boot: No  Image Address: 0x14100000

================================================================================
SDK Revision:-
================================================================================

  HAL Revision: 1.0.0.6
  SES Revision: 1.0.0.7
  SCE Revision: 1.0.0.1
```

20) Change state of JBOD-IO ID LED - off, on blink

Menu option 20 changes the state of the JBOD-IO ID LED. This is the blue LED on the JBOD-IO PCBA and is generally used to locate the enclosure in the rack (see "JBOD LEDs" in Chapter 2):

```
INFO: ID LED State is currently Off
Enter '0' to turn off, '-1' to turn on or '1' to blink:
```

21) Clear Persistent Flash

Menu option 21 will clear the persistent flash for all selected StorBricks. This option will clear all changes made by the ShackCLI over this session and all previous ShackCLI sessions and when the selected StorBricks are reset whatever has been loaded in the primary manufacturing image regions will become the current active image. Use this command if you have made changes with the ShackCLI from which you want to back out, or if there was an error reported by the ShackCLI during configuration.

22) Display Fan Base Status

Menu option 22 will display fan base status, including all the voltage and temperature sensor information the fan base has gathered from the StorBricks:

```
Please enter your selection: 22
FAN ID    FAN Name    Power      On            LED Blue     LED Green     FAN ID    FAN TACH
  0         0          100        1               0             1          0          11160
  1         1          100        1               0             1          2          11430
  2         2          100        1               0             1          4          11520
  3         3          100        1               0             1          6          11250
  4         4          100        1               0             1          8          11160
  5         5          100        1               0             1         10          11610


StorBrick  ID       Temp Sensor Name     Status_txt        Age          Reading
     0      0      SBExpander Temp0           Ok          18054          29.0
     0      1          Intake Temp0           Ok           8062          22.0
     0      2           SBMid Temp0           Ok          28069          23.0
     1      0      SBExpander Temp1           Ok          17120          30.0
     1      1          Intake Temp1           Ok           7127          22.0
     1      2           SBMid Temp1           Ok          27134          22.0
     2      0      SBExpander Temp2           Ok          16187          28.0
     2      1          Intake Temp2           Ok           6193          23.0
     2      2           SBMid Temp2           Ok          26201          23.0
     3      0      SBExpander Temp3           Ok          15253          29.0
     3      1          Intake Temp3           Ok           5260          23.0
     3      2           SBMid Temp3           Ok          25266          22.0
     4      0      SBExpander Temp4           Ok          14319          30.0
     4      1          Intake Temp4           Ok           4326          23.0
     4      2           SBMid Temp4           Ok          24333          23.0
     5      0      SBExpander Temp5           Ok          13386          38.0
     5      1         Exhaust Temp5           Ok           3393          32.0
     5      2           SBMid Temp5           Ok          23400          32.0
     6      0      SBExpander Temp6           Ok          12451          39.0
     6      1         Exhaust Temp6           Ok           2459          32.0
     6      2           SBMid Temp6           Ok          22465          32.0
     7      0      SBExpander Temp7           Ok          11518          39.0
     7      1         Exhaust Temp7           Ok           1525          31.0
     7      2           SBMid Temp7           Ok          21532          33.0
     8      0      SBExpander Temp8           Ok          10583          39.0
     8      1         Exhaust Temp8           Ok            590          32.0
     8      2           SBMid Temp8           Ok          20598          31.0
```

StorBrick	ID	Volt Sensor Name	Status_txt	Age	Reading
0	0	1V	Ok	28044	0.998V
0	1	1.8V	Ok	18051	1.805V
0	2	5V	Ok	8059	5.006V
0	3	12V	Ok	48067	11.952V
0	4	3.3V	Ok	38074	3.260V
1	0	1V	Ok	27110	1.000V
1	1	1.8V	Ok	17118	1.802V
1	2	5V	Ok	7125	4.998V
1	3	12V	Ok	47132	11.968V
1	4	3.3V	Ok	37140	3.275V
2	0	1V	Ok	26176	1.001V
2	1	1.8V	Ok	16184	1.792V
2	2	5V	Ok	6192	4.992V
2	3	12V	Ok	46198	11.980V
2	4	3.3V	Ok	36207	3.265V
3	0	1V	Ok	25242	1.000V
3	1	1.8V	Ok	15250	1.793V
3	2	5V	Ok	5257	5.008V
3	3	12V	Ok	45265	11.964V
3	4	3.3V	Ok	35273	3.270V
4	0	1V	Ok	24308	1.000V
4	1	1.8V	Ok	14316	1.803V
4	2	5V	Ok	4324	5.008V
4	3	12V	Ok	44331	11.980V
4	4	3.3V	Ok	34339	3.253V
5	0	1V	Ok	23375	0.995V
5	1	1.8V	Ok	13382	1.801V
5	2	5V	Ok	3390	5.002V
5	3	12V	Ok	43397	11.948V
5	4	3.3V	Ok	33406	3.248V
6	0	1V	Ok	22441	0.996V
6	1	1.8V	Ok	12448	1.806V
6	2	5V	Ok	2456	4.990V
6	3	12V	Ok	42464	11.988V
6	4	3.3V	Ok	32471	3.263V
7	0	1V	Ok	21507	0.999V
7	1	1.8V	Ok	11515	1.803V
7	2	5V	Ok	1523	4.982V
7	3	12V	Ok	41531	11.996V
7	4	3.3V	Ok	31538	3.247V
8	0	1V	Ok	20574	0.997V
8	1	1.8V	Ok	10580	1.795V
8	2	5V	Ok	586	5.012V
8	3	12V	Ok	40596	11.968V
8	4	3.3V	Ok	30604	3.251V

23) Display JBOD-IO Status

Menu option 23 displays information regarding any JBOD-IO PCBAs that are in the enclosure, if the enclosure is in fact a JBOD. In the following example the ShackCLI is retrieving JBOD-IO status for a JBOD populated with two JBOD-IO PCBAs, and status for both JBOD-IOs is displayed:

```
JBODIO PCBA is in slot # 0:
Other JBODIO PCBA present: Yes
Temp            Name       Status   Status_txt   Timestamp     Age   Reading
Sensor
  0          Expander Temp      0          Ok       104021    1137        35
  1     JBODIO Outlet Temp      0          Ok       100021    5195        27
  2           LTC2991 Temp      0          Ok       102021    3252        32

Expander Voltage Sensors:
Volt        Sensor               Status              Time                   Voltage
Sensor      Name         Status    Text              Stamp         Age      Reading
     0          1V            0      Ok              98010        7322        0.998
     1        1.8V            0      Ok             100010        5385        1.797
     2          5V            0      Ok             102010        3448        4.986
     3         12V            0      Ok             104010        1516       11.952
     4        3.3V            0      Ok              96010        9583        3.274

PCBA Voltage Sensors:
    Sensor                    Status      Voltage
    Name               Status Text        Reading
          1.0V           1     normal        0.99
          1.8V           1     normal        1.79
    5V Standby           1     normal        4.95
           12V           1     normal       11.89
     Reference           1     normal        1.50

    LED Name             State
           power             on
    status_green             on
    status_amber            off
              id            off
    lan_activity            off
    hdd_activity            off
JBODIO PCBA is in slot # 1:
Other JBODIO PCBA present: Yes
```

```
Temp            Name          Status   Status_txt     Timestamp     Age  Reading
Sensor
  0          Expander Temp      0            Ok      685440021    4502       39
  1     JBODIO Outlet Temp      0            Ok      685442021    2562       28
  2           LTC2991 Temp      0            Ok      685444021     621       30

Expander Voltage Sensors:
Volt        Sensor               Status        Time                      Voltage
Sensor      Name        Status   Text          Stamp          Age        Reading
     0          1V        0       Ok         685438010        6690         0.997
     1        1.8V        0       Ok         685440010        4754         1.794
     2          5V        0       Ok         685442010        2822         4.982
     3         12V        0       Ok         685444011         888        11.992
     4        3.3V        0       Ok         685436010        8957         3.261

PCBA Voltage Sensors:
    Sensor                      Status      Voltage
    Name               Status   Text        Reading
          1.0V           1     normal         1.00
          1.8V           1     normal         1.79
    5V Standby           1     normal         4.94
           12V           1     normal        11.94
     Reference           1     normal         1.49

    LED Name              State
           power             on
    status_green             on
    status_amber            off
              id            off
    lan_activity            off
    hdd_activity            off
```

24) Change Polling of Expanders by Fan Base or JBOD-IO

Menu option 24 toggles the state of the fan base or JBOD-IO options in terms of polling StorBricks for voltage and temperature data. In versions of StorBrick Firmware prior to 1.21.0.0, the temperature and voltage polling was not supported while in debug mode, and the JBOD-IO and fan base would report issues with the SMBUS communications used for enclosure management. Use this command if you want to suspend polling of voltage and temperature data while using the ShackCLI.

25) Display Disk Drive Status

Menu option 25 displays information about the drives populated in the selected StorBricks. Drive slots that are not populated will show no connected SAS address:

```
StorBrick: 0

Drive       SAS Address       Power     Interface    Link
                              State     Type         Rate

0      0x5000c5004093fbd1      On         SAS        6.0
1      0x5000c50040ab40c1      On         SAS        6.0
2      0x5000c50040ab1101      On         SAS        6.0
3                     0x0      On         SAS        0x0
4                     0x0      On         SAS        0x0
5      0x5000c50040aaf695      On         SAS        6.0
6                     0x0      On         SAS        0x0
7                     0x0      On         SAS        0x0
8                     0x0      On         SAS        0x0
```

26) Change Power State of a Disk Drive

Menu option 26 allows the user to turn off/on power to the selected disk drives. The ShackCLI will ask for the StorBrick and drive slot to act upon.

27) Power Cycle test

Menu option 27 runs a drive power cycle test on the selected disk drive slots. This test should not be run while the server/JBOD is connected to a host.

28) Update StorBrick UUID

Menu option 28 allows the user to program the UUID into the StorBrick. This menu option would not be used by a customer since the UUID is programmed at the factory.

29) Write/Read Buffer Test

Menu option 29 runs a Write/Read buffer test on the selected StorBricks drive slots. This test utilizes the StorBricks Embedded SSP Initiator to issue Write/Read buffer commands to SAS drives in the enclosure. The user should take note of the PHY Error Counters prior to running this test and then take another reading on the PHY Error Counters after running the test to determine if there are slot issues with the selected drive slots.

Disk RAID Support

The MIS platform supports both software and hardware RAID, standard and nested. Disk performance is improved because more than one disk can be accessed simultaneously. Fault tolerance is improved because data loss caused by a hard drive failure can be recovered by rebuilding missing data from the remaining data or parity drives.

The MIS platform supports the following RAID levels:

- RAID 0 (striping without parity or mirroring)
- RAID 1 (mirrored without parity or striping)
- RAID 5 (striping with parity)
- RAID 6 (striping with dual parity)
- RAID 00 (spanned drive group striped set from a series of RAID 0 drive groups)
- RAID 10 (mirrored stripes across spanned drive groups)
- RAID 50 (distributed parity and striping across spanned drive groups)
- RAID 60 (distributed parity, with two independent parity blocks per stripe in each RAID set, and disk striping across spanned drive groups)

The onboard MIS Server zoning application is supported in both Windows and Linux operating systems. There is also an external fan base CLI, where a system running either CentOS, Linux, or Windows can be used to zone the JBOD in addition to MIS Servers. When LSI MegaRAID HBAs are used, they support RAID 0, RAID 1, RAID 5 and RAID 6, along with their variants. Where ever possible, the zoning and RAID selection for a MIS Server should provide for the maximum amount of availability in the event of a StorBrick failure. The StorBrick has four SAS lanes into it from up to four SAS RAID HBAs. These SAS lanes are inputs to a SAS expander that connects to the drives installed in the StorBrick. Since there are eight StorBrick in the MIS Server, each with nine drives, the highest availability for the data would be RAID groupings that span the StorBricks.

Important: Unless specified, all systems ship as **RAID 6**.

RAID Configuration Notes

To get the best availability, treat each drive brick as an enclosure. For a RAID 1 with only one drive per StorBrick in the group, the loss of a StorBrick does not affect the availability of the data (Figure 3-46).

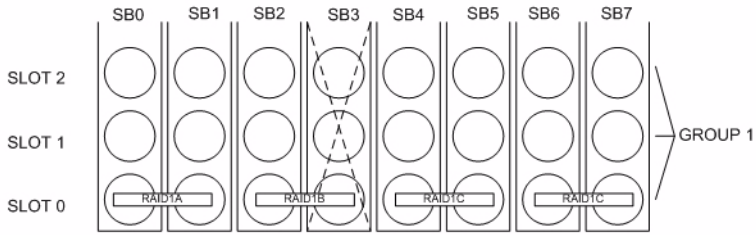


Figure 3-46 RAID 1 with One Drive per StorBrick

However, with two drives spanning a StorBrick, the loss of a StorBrick will cause the data to be unavailable until the failed storbrick is replaced (Figure 3-47).

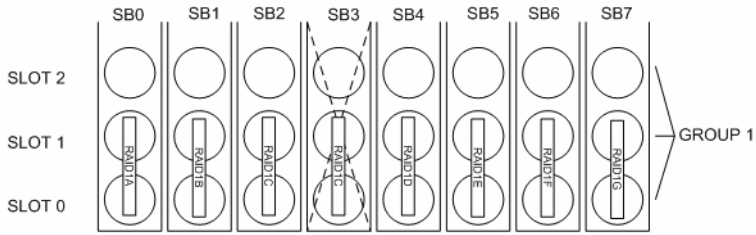


Figure 3-47 RAID 1 with Two Drives Spanning a StorBrick

For redundancy, choose one drive from each drive brick as you build the LUNs. Configure the drives in a RAID group to span the StorBricks. For instance, configuring 8 drives from StorBrick 0 as a RAID 5, 7+1 group will work. However, if that StorBrick (StorBrick 0) fails, all 8 drives will become inaccessible, making that RAID group's data unavailable until the StorBrick is replaced.

If, however, drive 0 from each StorBrick (`SB0-0`, `SB1-0`, `SB2-0`, `SB3-0`, `SB4-0`, `SB5-0`, `SB6-0` and `SB7-0`) is used to make up the RAID 5, 7+1 group, and any StorBrick were to fail, only one drive of that group would be affected. The RAID 5 algorithm would be able to recover the data from the remaining drives and the RAID group would remain available. Configurations varies based on needs for capacity versus protection.

There is also the option to assign both a RAID group dedicated spare drive or a global spare drive. For example, a RAID 5 group could be a 6+1 with a dedicated spare drive. In a full up system you would have 9 sets of these RAID groups, all spread across the StorBricks. One method for greater capacity is available by configuring 8 groups of 7+1, one group of 6+1 and a global spare. In a RAID 6 6+2, a spare may not be desirable at all, as one is already part of the group automatically. For configurations that maximize storage, can allow unavailability of data for a time and/or predict a high-success rate for StorBricks, very large RAID groups may be desirable. For typical RAID usage, RAID 5 7+1 or RAID 6 6+2 are most likely.

Warning: Do not configure multiple drives in a RAID group to be on the same StorBrick.

Since there are eight StorBrick in the MIS Server, each with nine drives, the highest availability for the data would be RAID groupings that span the StorBricks. For example, a RAID 6 configuration should have eight drives, one from each StorBrick. In this configuration, if a StorBrick failed, the data would still be available. For RAID 5 or RAID 6, with one drive per StorBrick in a group, the loss of a StorBrick (SB3) does not affect the availability of the data (Figure 3-48).

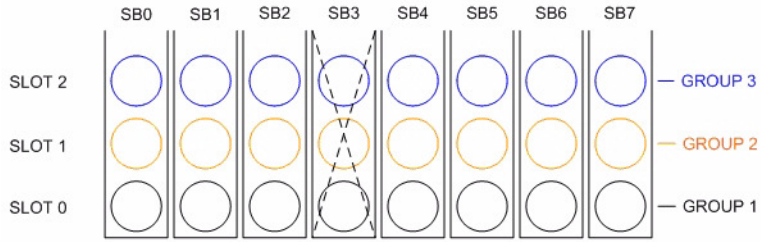


Figure 3-48 RAID 5 or 6 with One Drive per StorBrick

If a larger RAID group is desired, it would need to have multiple drives on a StorBrick. Then if a StorBrick were to fail, two drives would be unavailable. If this were a RAID 6 implementation, the data would still be available, though another StorBrick failure or even a drive failure in that group would cause a loss of data availability. If this were a RAID 5 implementation, the data would become unavailable until the failed StorBrick is replaced (Figure 3-49).

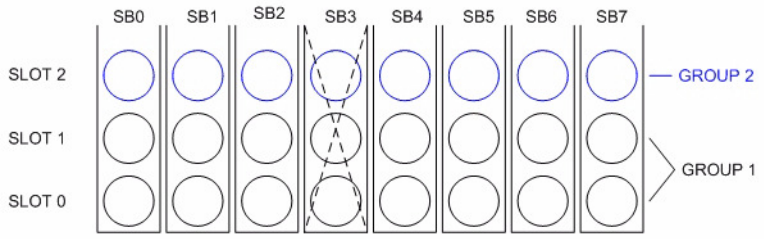


Figure 3-49 Loss of a Drive with Multiple Drives on a StorBrick

For RAID 6 with three drives of the group spanning a StorBrick, the data is unavailable until the failed StorBrick is replaced (Figure 3-50).

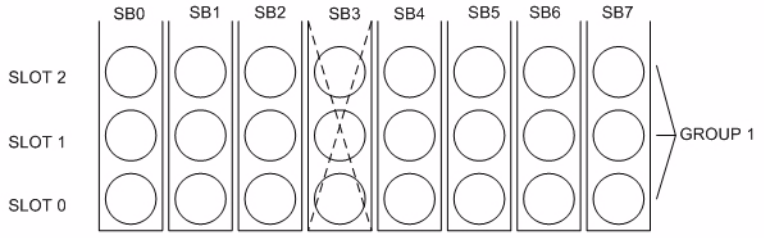


Figure 3-50 Three Drive Loss in RAID 6 Requires StorBrick Replacement

Spare Drives

The LSI MegaRAID HBA can configure drives to be used as spares. There are two ways of assigning spares. One method is local to a RAID set, be it RAID 1, RAID 3, RAID 5, RAID 6, or any of their variations, in that the assigned spare will only be used within that specific VLUN. The other method is called a global spare, where it can be used by any VLUN that requires one.

The usage of spare drives is an option the customer can select when they configure and create their VLUNs from the physical drives.

For more on RAID configuration, see the MegaRAID guides on the Technical Publications Library (http://docs.sgi.com). Operating System software RAID support appears in: Windows Dynamic Disks, or Linux mdadm.

System Maintenance

For warranty and safety considerations, SGI designates the following chassis components as customer-replaceable units (CRUs):

- Power supplies
- Fans
- Disk drives (capacity and boot drives)
- Rack Air Ducts
- Front Bezel Grille & Control Panel

Important: Review the warnings and precautions listed in, “Important Information” on page xix, before servicing this chassis.

This chapter describes the steps necessary to replace these CRUs. There are utilities required for some replacement procedures, such as IPMItool (Linux) and IPMIutil (Windows). Instructions for downloading and installing these utility programs can be found in Chapter 3, “System Software.”

Common to these replacement procedures are the following steps:

- “Detecting Component Failures” on page 152,
- “Selecting Which Side to Access” on page 153,
- “Sliding the Chassis Forward/Backward” on page 154,
- and “Removing the Front or Rear Chassis Cover” on page 155.

Once the component in question is identified as a failed CRU, service actions can be taken to replace the failed component. Replacement components are issued through SGI Customer Support (see “Product Support” on page xxvi).

All of the modules are hot-swappable when certain preconditions are met. That is, you can replace the hardware without powering down the platform. Whether or not a module is hot-swappable

depends on the configuration of the MIS platform. For example, power supplies require the redundant power option be installed to allow for hot-swappable capability. Boot drives require mirroring enabled to be hot-swappable. Otherwise, all of the following modules are hot swappable:

- “Replacing a Power Supply” on page 156,
- “Replacing a Fan Module” on page 158,
- “Replacing a Boot Drive” on page 161
- “Replacing a Capacity Drive” on page 163,
- “Installing the Rack Air Ducts” on page 166,
- and “Replacing the Front Bezel Grille” on page 167.

The following tools are required for these replacement procedures:

- #1 and #2 Phillips screwdrivers
- Short #2 Phillips screwdriver
- Flat-head screwdriver

Note: Phillips screwdrivers with magnetic tips are recommended.

Videos of these procedures are available through the SGI Supportfolio web site (http://support.sgi.com). SGI Product Account and log-in credentials required.

Detecting Component Failures

In general, when a system component fails, the BMC sends an alert when configured to do so (see “Alert Email” on page 71 for more information). Capacity drive failures are recognized and reported through MegaRAID Storage Manager (MSM). Boot drive failures are monitored and reported through `mdadm`. Fan and power supply failures are monitored through the fan baseboard and are reported by the BMC, with a few adjustments. See “Drive Monitoring” on page 47, “Power Supply Monitoring” on page 55, and “Fan Monitoring” on page 58 of Chapter 2, “System Interfaces” for more information on how to configure monitoring and alerting of component failures.

Selecting Which Side to Access

If you are servicing any of the **fans** or **StorBricks 0-4**, or using the **MIS-S9D Proprietary Network Interface** port, access them through the **FRONT** of the rack, and extending the chassis out forward.

If you are servicing the **boot modules**, **StorBricks 5-8**, **server modules**, **JBOD I/O modules**, **internal** or **external cabling**, access them through the **REAR** of the rack, and extending the chassis out backwards.

Table 4-1 Access Points

Target	Access Instructions
Boot Module	Extend chassis BACKWARDS
Drives in StorBrick 0-4	Extend chassis FORWARD
Drives in StorBricks 5-8	Extend chassis BACKWARDS
Exterior Air Ducts	FRONT access, extend the chassis BACKWARDS
External Cabling	REAR access, no need to extend the chassis from the rack
Fans	Extend chassis FORWARD
Internal Cabling	Extend chassis BACKWARDS
JBOD I/O Modules	REAR access, no need to extend the chassis from the rack
MIS-S9D Proprietary Network Interface	FRONT panel, on top of the grille.
Power Supplies	REAR access, no need to extend the chassis from the rack
Server Modules	REAR access, no need to extend the chassis from the rack

Warning: Only extend ONE (1) MIS chassis out of a rack in either direction at any given time (e.g., one chassis extended backwards and one chassis extended forwards – OK; two or more chassis extended out forwards or backwards – BAD). Too much weight in either direction can potentially tip the rack over, causing injury or death.

Figure 4-1 MIS-S9D Proprietary Network Interface

Sliding the Chassis Forward/Backward

The newly designed rail kit of the MIS chassis allows it to be slid forward or backwards (20"). The industry-exclusive, rolling rail design is such that one person can move the chassis forwards and backwards in the rack. To slide the chassis out in either direction to service components, follow these steps:

1. Push the two release latches in, at the left and right sides and in the center of the rail mounts, towards the center of the chassis.
2. Pull the chassis out using the handles. The chassis will latch at the 20-inch limit.
3. To slide the chassis back in, depress the two release latches near the rail and slide it back in.

Removing the Front or Rear Chassis Cover

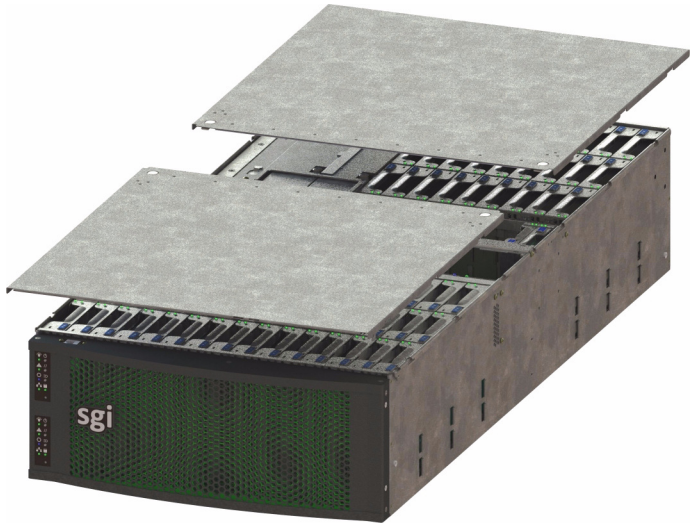


Figure 4-2 Front & Rear Chassis Covers

Important: When a chassis cover is removed, an intrusion sensor monitored by the BMC will detect its removal. If the cover is off for more than 15 minutes or any system temperature sensor exceeds its threshold limit, the server will perform an orderly shutdown and power-off.

As shown in Figure 4-2, the top of the chassis is bifurcated; that is, there is a front and rear chassis cover. Except for power supply maintenance, all service actions require that you remove the front or rear chassis cover, detailed below.

1. To remove a chassis cover, first follow the instructions in “Sliding the Chassis Forward/Backward” on page 154.
2. Remove the single security screw from the cover (Figure 4-3).

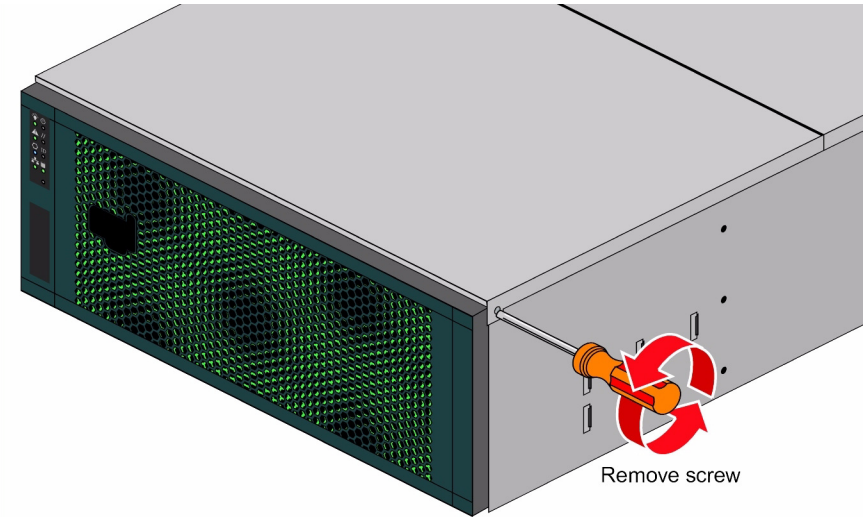


Figure 4-3 Top Cover Security Screw

3. Push the detent, and slide the cover out and up from the chassis.

Replacing a Power Supply

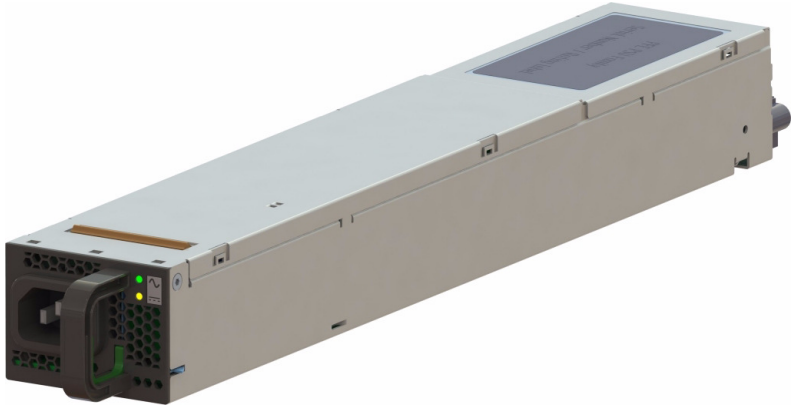


Figure 4-4 AC Power Supply Module

Power supplies are hot-swappable, and can be replaced under full load, as long as there are *two or more* functioning power supplies present—this requires the redundant power option be installed. The power supplies can be replaced under full load as long as there are three or more functioning power supplies present. Removal of one power supply when there are only two power supplies present will cause an unexpected shut-down that may result in data loss. Power supplies are numbered 0-3 from the bottom up, on the rear panel of the enclosure (Figure 1-16 on page 16).

Warning: Removal of one power supply when there are *only two* power supplies present may cause an unexpected shut-down that may result in data loss.

1. Using the **BMC Web Interface**, verify the fault (failed unit) and turn on the locator LED (blue) for that chassis.
2. Locate the failed unit in the specified chassis: its amber service LED should be lit, indicating a fault (see Figure 4-4).
3. Unplug the power supply that will be replaced and remove its power cord.
4. Push the release tab on the back of the power supply.
5. Pull the power supply out using the handle.
6. Replace the failed power module with another of the same model.
7. Push the new power supply module into the power bay until it clicks into the locked position.
8. Plug the power cord back into the module, and plug the module in.
9. If the power supply is being hot-swapped on a system that is already powered on, the power supply will power up automatically. If the power supply is being installed in a system that is not powered on, the system should be powered on at this time.
10. You will have to wait a few moments for the power supply to respond to power, and complete its internal processes, before its status LEDs are illuminated. Once lit, ensure that it is also recognized as **Good** on the **Fan Base Service Page**.

Figure 4-5 DC Power Supply Module

Replacing a Fan Module

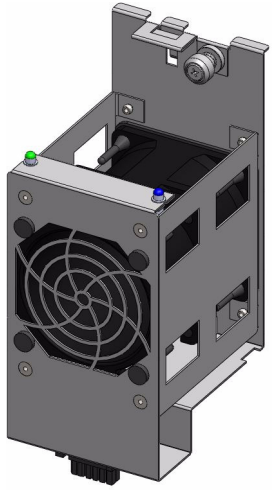


Figure 4-6 Fan Module

Warning: If a fan is NOT set in a "Safe to Service" mode, there are only 10 *seconds* available to exchange a fan. Without setting "Safe to Service," the platform will assume a fan has experienced *critical failure*, requiring an emergency shutdown for thermal requirements. Setting "Safe to Service" allows more time for replacement procedures (15 minutes) before initiating thermal shutdown.

1. Using the **BMC Web Interface**, verify the fault (failed module) and turn on the locator LED (blue) for that chassis.
2. Locate that chassis and extend it forward out of the rack until it reaches its 20" limit.
3. Use an Ethernet cable to connect a server/laptop to the **MIS-S9D Proprietary Network Interface** port (Figure 4-1).
4. Access the **Fan Base Service Page** from the connected server/laptop by pointing a browser to: `192.168.0.3/service.xml` (Figure 4-7).
5. From the **Fan Base Service Page**, locate the faulted fan, and click the **Off** button.
6. At the prompt, **Are you sure you want to turn OFF FAN #?** (where # is the number of the fan), click **Ok**. This put the fan in a "Safe to Service" mode and will illuminate its blue locator LED.

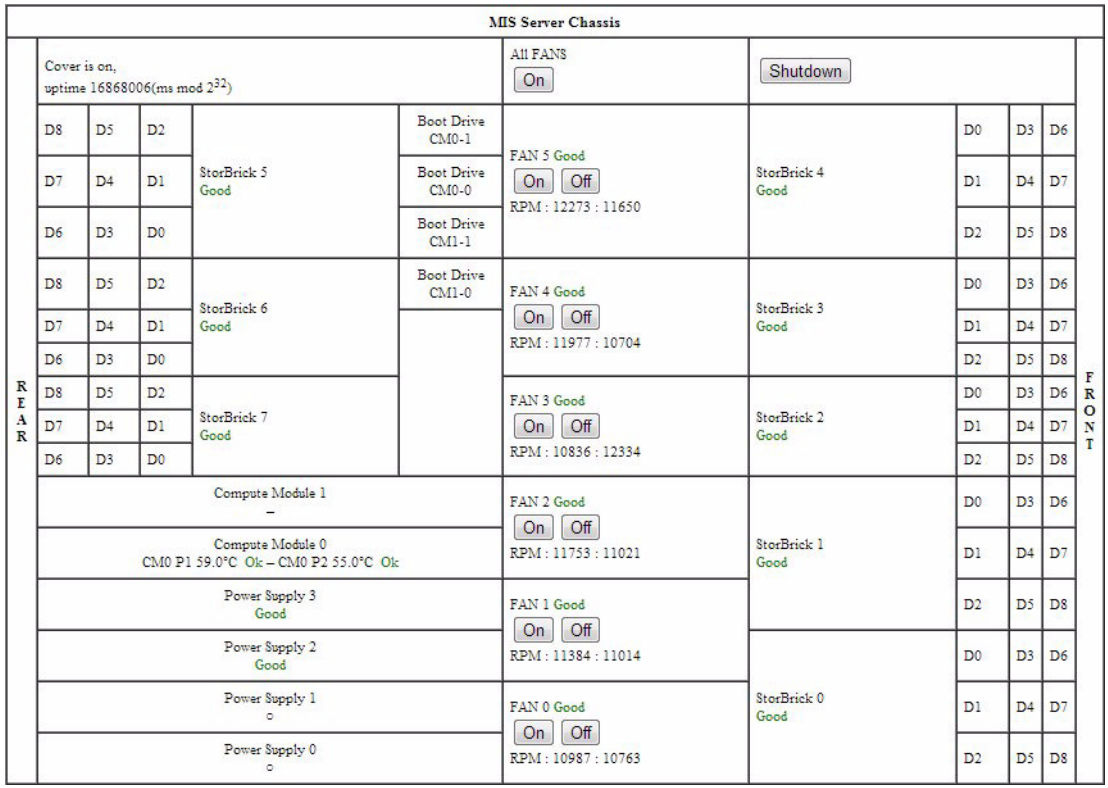
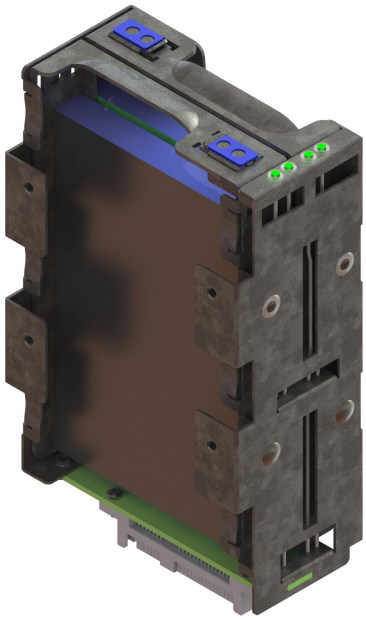


Figure 4-7 Fan Base Service Page

7. Remove the front chassis cover (see “Removing the Front or Rear Chassis Cover” on page 155) and locate the fan module with the illuminated blue LED (Figure 4-6).
8. Loosen the thumbscrew, pull out the faulted fan by pulling upward on both the front and rear flanges, and replace it.
9. Once the fan module is replaced, seat the fan by pushing between the two LEDs until it seats.
10. Re-install the chassis cover and security screw.
11. Using the **Fan Base Service Page**, return the fan to **On/Full Power**.
12. At the prompt, **Are you sure you want to turn ON FAN #?** (where # is the number of the fan), click **Ok**.
13. If there are no faults, the fan will show a status of **Good**, and its green LED will be lit. This will also turn off its blue locator LED.

14. Unlock the chassis from the extended position and push it back until it locks into the stowed position.
15. Using the **BMC Web Console**, clear the chassis locator LED.

Replacing a Boot Drive



Drives have two functions in an MIS Server: as capacity drives in the StorBricks, and in the boot drive module which houses the operating system (MIS JBODs are all capacity drives). The following instructions are for replacing a failed boot drive in an MIS Server.

Important: These instructions are for a system with an SGI factory-installed operating system, which features a mirrored boot drive. If the machine has a customer-installed OS, RSTe may not have been enabled in the BIOS, and therefore mirroring may not be enabled. If so, these instructions will not work, and a complete reinstall of the operating system will be necessary (as there is no mirrored data from which to rebuild a lost drive).

1. Turn on the chassis ID LED using the **BMC Web Console** to identify the chassis in the rack (“Virtual Front Panel” on page 75).
2. Once located, extend the chassis out the rear of the rack until it locks at the 20" mark.
3. Remove the chassis cover. (See “Removing the Front or Rear Chassis Cover” on page 155.)
4. Locate the faulted drive with the unilluminated status LED (i.e., the drive *without* a flashing green LED), and remove it from its boot drive bay. (See “Removing a Drive” on page 164.)
5. Replace the faulted drive. (See “Re-installing a Drive” on page 165.)
6. Once the drive is replaced, re-install the chassis cover and security screw.
7. Unlock the chassis from the extended position and push it back until it locks into the stowed position.
8. Turn off the chassis ID LED on the front control panel.
9. Check the drive assignment by issuing the `# lsscsi` command. In this example, the new drive appears as `sdd`. This drive assignment is used in the next step to add the drive.

```
# lsscsi

[0:0:11:0]   enclosu SGI CORP STORBRICK-7      1500  -
[0:0:15:0]   enclosu SGI CORP STORBRICK-0      1500  -
[0:0:19:0]   enclosu SGI CORP STORBRICK-2      1500  -
[0:0:23:0]   enclosu SGI CORP STORBRICK-3      1500  -
[0:0:27:0]   enclosu SGI CORP STORBRICK-6      1500  -
[0:0:31:0]   enclosu SGI CORP STORBRICK-5      1500  -
[0:0:35:0]   enclosu SGI CORP STORBRICK-4      1500  -
[0:0:39:0]   enclosu SGI CORP STORBRICK-1      1500  -
[7:0:0:0]    disk    ATA      INTEL SSDSA2CW30 4PC1  /dev/sda
[7:0:1:0]    disk    ATA      TG32C10120GK3001 PRO6  /dev/sdd
```

10. Add the new drive to the container as a spare with the `# mdadm –a` command, and it will replace the missing drive:

```
# mdadm –a /dev/md/md127 /dev/sdd
mdadm: added /dev/sdd
```

Important: If you get the error, "`Cannot add disks to a 'member' array, perform this operation on the parent container`," make sure you are adding to the container, not the RAID1.

11. Issue the `# cat /proc/mdstat` to monitor the rebuild.

```
# cat /proc/mdstat
```

```
Personalities : [raid1] [raid0] [raid10] [raid6] [raid5] [raid4]
md125 : active raid1 sdc[2] sdb[1]
      111357952 blocks super external:/md127/0 [2/1] [U_]
      [>....................]  recovery =  3.8% (4257024/111358084)
finish=9.2min speed=193501K/sec

md126 : active raid1 sdc[2] sdb[1]
      5556224 blocks super external:/md127/1 [2/1] [U_]
        resync=DELAYED

md127 : inactive sdc[1](S) sdb[0](S)
      6306 blocks super external:imsm
```

Note: Finish time is only an approximation since the resync speed will vary according to other I/O demands.

Replacing a Capacity Drive

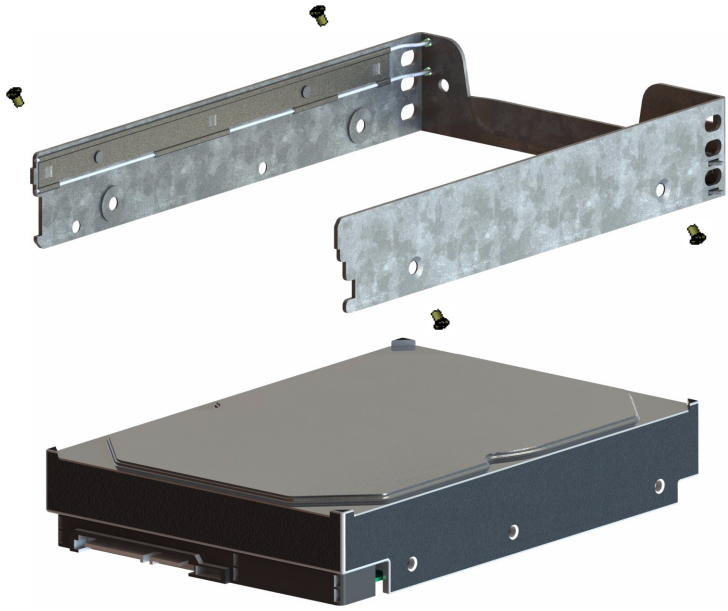


Figure 4-8 Capacity Drive and Carrier

Important: Empty drive carriers cannot be inserted into the storbricks, so slots without HDDs will not have carriers.

To replace a failed capacity drive:

1. Using MegaRAID Storage Manager, verify the fault (failed unit).
2. Set the drive to a service state for the removal of the faulted drive. The MegaRAID Storage Manager will turn off the drive. It will then turn on the fault LED (yellow) for that drive.
3. Turn on the chassis ID LED in the Integrated BMC Web Console to identify the chassis in the rack (“Virtual Front Panel” on page 75).
4. If the drive is in StorBrick 0 through StorBrick 4, extend the chassis out the front of the rack until it locks at the 20" mark. If the drive is a boot drive or in StorBrick 5 through StorBrick 8, extend the chassis out the rear of the rack until it locks at the 20" mark.
5. Remove the chassis cover. (See “Removing the Front or Rear Chassis Cover” on page 155.)
6. Locate the faulted drive with the illuminated yellow LED, and remove it from its StorBrick (or boot drive bay). (See “Removing a Drive” on page 164.)
7. Replace the faulted drive. (See “Re-installing a Drive” on page 165.)
8. Once the drive is replaced, re-install the chassis cover and security screw.
9. Unlock the chassis from the extended position and push it back until it locks into the stowed position.
10. Using the MegaRAID Storage Manager, return the system to a normal state. The new drive will be powered on.
11. If there are no faults at this time, the rebuild or mirroring of the data to the new drive will begin.

Removing a Drive

As shown in Figure 4-8, the drives are mounted in drive carriers to simplify their installation and removal from the drive bricks or boot drive bays in the chassis.

To remove a drive, perform the following steps:

1. Ensure that the drive LEDs are off (except the blue locator LED), indicating that the drive is not in use and can be removed.
2. Unlatch the drive carrier by sliding the grey latch toward the drive and pull the drive carrier out of the StorBrick or boot drive bay.
3. Remove the four screws that secure the drive to the drive carrier.
4. Remove the drive from the carrier.

Re-installing a Drive

To re-install a hard drive into the hard drive carrier, perform the following steps:

1. Place the hard drive carrier on a flat, stable surface such as a desk, table, or work bench.
2. Slide the hard drive into the carrier with the printed circuit board side facing down.
3. Carefully align the mounting holes in the hard drive and the carrier.

Important: Make sure the bottom of the hard drive and bottom of the hard drive carrier are flush.

---

4. Secure the hard drive using the four screws (see Figure 4-8).
5. Replace the drive carrier into the chassis.
6. Push the drive carrier down to lock it place.
7. Replace the chassis cover and security screw.
8. Unlatch the chassis from the 20" mark and return the chassis back into place in the rack.

Installing the Rack Air Ducts

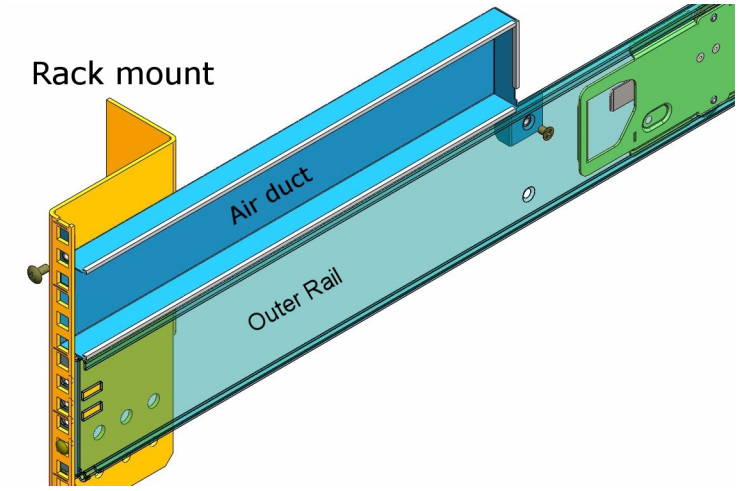


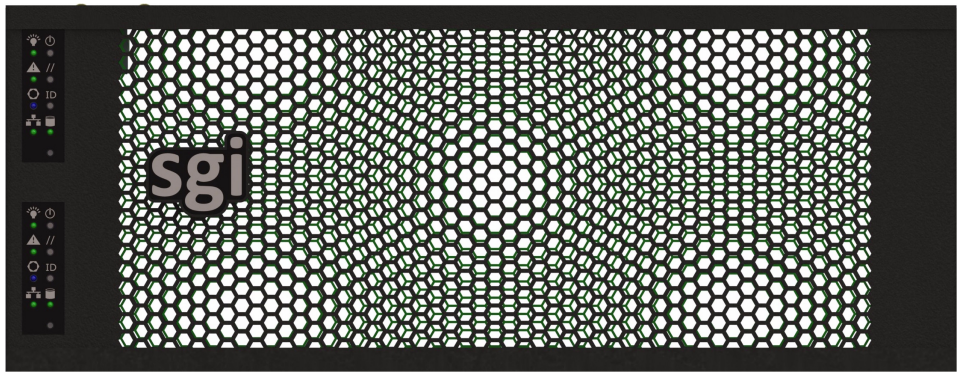
Figure 4-9 Rack Air Duct Placement

There are two air ducts that install in the rack above either outer rail for the MIS chassis. In order to install these air ducts, you will need a #2 Phillips screw driver. (Some air duct kits do not attach with a interior screw, but rather with Velcro.)

1. Push the chassis backwards into the server rack, until it locks into place. This will give you access to the inside of the rack, where the air ducts will be installed.
2. Place the air duct above the outer rail, and secure it to the outer rail and rack using the two screws provided.
3. There is a smaller flat-head screw that goes on the inside in the counter-sunk hole. Make sure the screw to the outer rail is sunk deep enough so that it does not catch or scratch the chassis as it returns to its normal position in the rack.
4. The larger truss head screw attaches to the back, where it is large enough to cover the wide, square hole.

The second air duct installs on the opposite outer rail, in mirror image to the first.

Replacing the Front Bezel Grille



Occasionally there may be a button malfunction or other even requiring replacement of the front bezel grille. There are some key steps to take which greatly improve repair times, covered here. First, remove the old grille by performing the following steps.

1. The MIS front bezel grill can be detached from the front of the chassis by gently tugging on the right side.
2. There are two or three cables (one or two for control panel functionality, and one for the **S9D Network Interface** port) at the the front left corner of the chassis (Figure 4-10). These cables must be unattached from their corresponding sockets on the front bezel grille, before removing the grille from the chassis.
3. Once detached, the grille is easily removed so the new front grille can be installed.
4. Orient the new front grille so that the left inner edge containing the sockets (Figure 4-11) lines up with the front left edge of the chassis where the cables protrude.
5. Use the two latches on the bezel grille to help **attach it to the chassis on the left side**, and work from the right side (swinging it open *like a door*, rather than top or bottom, to make cabling easier).

Figure 4-10 Chassis Front Cables

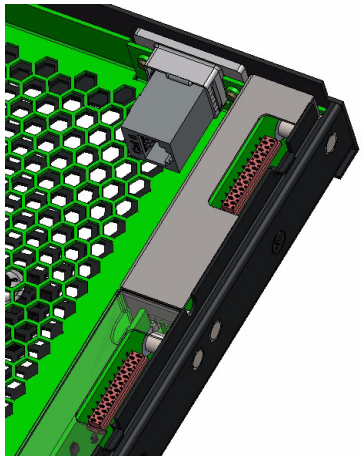


Figure 4-11 Front Bezel Grille Control Panel Sockets and S9D Network Interface Port

6. Plug the ribbon cable(s) into their corresponding control panel socket (Figure 4-12).

Figure 4-12 Control Panel Ribbon Cables Attached to Front Bezel

7. Plug the network cable into the underside of the **S9D Network Interface** port(Figure 4-13s).

Figure 4-13 S9D Network Interface Cable

8. Once all the wires have been successfully connected, swing the grille shut such that it can be snapped into place on the front of the chassis using the attached tabs (Figure 4-14). Push firmly but gently to attach the front grille.

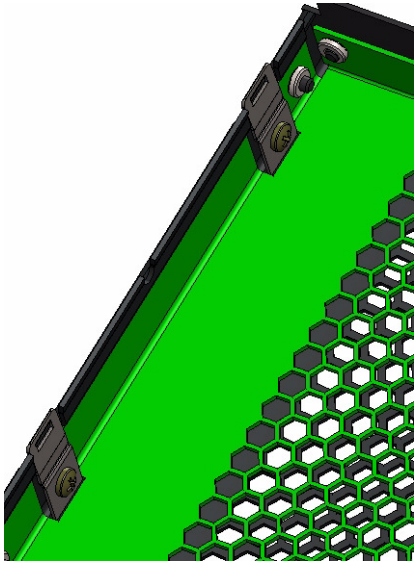


Figure 4-14 Front Bezel Grille Attach Tabs

Troubleshooting

This chapter describes troubleshooting for the problems listed below, that customers are able to perform without the assistance of SGI Field Technicians. Chapter 2, “System Interfaces,” describes use of the control panel to monitor the overall system status and the status of specific components. Chapter 4, “System Maintenance,”describes how to replace defective components.

- “No Video” on page 172
- “Losing the System’s Setup Configuration” on page 172
- “Safe Power-Off” on page 172
- ““Missing” Firmware Files” on page 173
- “Cannot Receive Email Alerts Using BMC” on page 174
- “Path not found errors after installing Python for Windows” on page 176
- “Intel BIOS POST error messages and handling description” on page 176
- “Beep Codes” on page 180
- “Not all beep codes signal an error” on page 181
- “Fans don’t spin when power button pressed” on page 181
- “Fans spin when power button is pressed, but no video display is seen” on page 181
- “BIOS or board logo appear, but OS load screen never appears” on page 181
- “OS load screen appears, but nothing further” on page 181
- “OS fully loads, but errors are seen” on page 182
- “Cannot boot after settings were changed in BIOS” on page 182
- “System Gets Stuck in a Reboot Cycle” on page 182
- “Server Diagnostic LED Decoding” on page 182
- “Shortening the Cable Management Arm” on page 183

Other troubleshooting information is contained in “Related Publications” on page xxv (such as, *Intel® Remote Management Module 4 and Integrated BMC Web Console User Guide* (pdf)).

Important: If you require software to run or monitor the MIS platform, need technical assistance, or to contact SGI Customer Support, please see “Product Support” on page xxvi.

No Video

If the power is on but there is no video, remove all add-on cables (besides power & video). Use a different monitor to determine if the fault lies with it. Use the speaker to determine if any beep codes exist. Refer to “Beep Codes” on page 180 for details.

Losing the System’s Setup Configuration

Make sure there is no fault with the power supplies. A fault with the power supply may cause the system to lose the CMOS setup information. If this does not fix the Setup Configuration problem, contact SGI for repairs.

Safe Power-Off

There are different ways to shut down an MIS machine, each more extreme than the next. The most polite way is to go into the machine’s operating system and select **Shut Down**. This will prompt the user to enter a password before allowing the shut-down process. They include,

- Using the OS GUI power-off button at the console screen, if a keyboard/mouse/video monitor is connected.
- When logged in via an ssh session and executing a “shutdown” or “poweroff” command.
- When logged in to the BMC and using the power control page to power off the sever.
- Using the remote console screen GUI power-off button, if a KVM RMM4Lite session is established through the BMC.

- Connecting to the Fan Base Service Page using the MIS-S9D proprietary network interface and using a "`shutdown`" command.

If the platform is an MIS dual-server and **both** servers are powered up, performing the above steps **only** powers off the server with which you are working. The fans, drives and second server will remain powered on until the second server is powered off, then all power (but standby) will be turned off.

For a JBOD Unit, the power button on the front panel will turn off the power to that I/O module. If a second module is installed and powered on, it, the fans and the drives will remain on until it, too, is powered off.

The next way shut down the platform is to hold down the **Power** button on the front of the unit (Figure 2-1) until the machine powers off. However, this is not a polite way to power off the machine, and will require a recovery process at start-up.

If power is lost from outside the machine (power outage), the machine will recognize the loss of power and execute an emergency shutdown procedure. If there is a battery back-up unit installed, it will protect integrity of cache in the event of power or server failure.

"Missing" Firmware Files

There may come a time when you will need to update the zoning tool in order to support the firmware that is present on the StorBricks in a new MIS Server or JBOD machine. If this is the case, you will receive an error message that states either: **Unable to find directory that contains firmware files** or **Unable to find firmware file**, and below that, the version number of the firmware files necessary (example: **01.30.00.00**).

The firmware folders necessary for download will contain the version number in the folder name. For this example, the desired firmware folders will have a name similar to `storbrick-release-01.30.00.00 <date>`.

You will need to download the necessary firmware files and place them into the `/opt/Zones/Versions` folder for Linux and the `c:\Program Files (x86)\Zones\Versions` folder for Windows.

Cannot Receive Email Alerts Using BMC

In order to receive email alerts, the MIS Server must be networked to a SMTP mail server. Next, using the BMC, go to the **Configuration** page, and click on **Alert Email** (Figure 5-1).

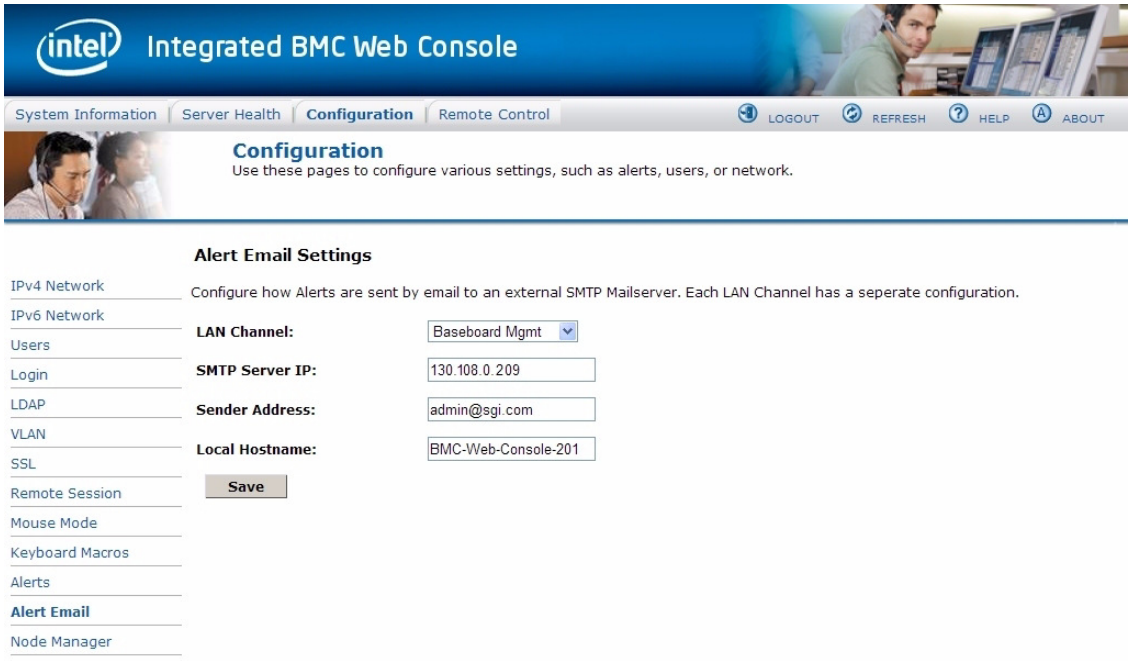


Figure 5-1 BMC Alerts Email Settings Page

The **LAN Channel** should be set to **Baseboard Mgmt**. The **SMTP Server IP** should be the IP address of the mail server to which the MIS platform is connected. **Sender Address** can be any email address configured on the SMTP server. **Local Hostname** can be any name to identify the machine sending the alert (limit of 18 characters). When finished, click the **Save** button at the bottom of the page. A pop-up will let you know that the changes have been saved (Figure 5-2).

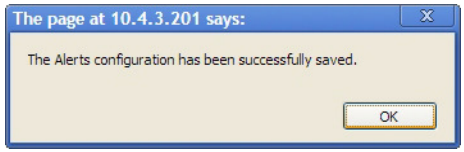


Figure 5-2 BMC Alert Configuration Success Pop-up

Next, click on **Alerts** in the left-hand navigation pane (Figure 5-3).

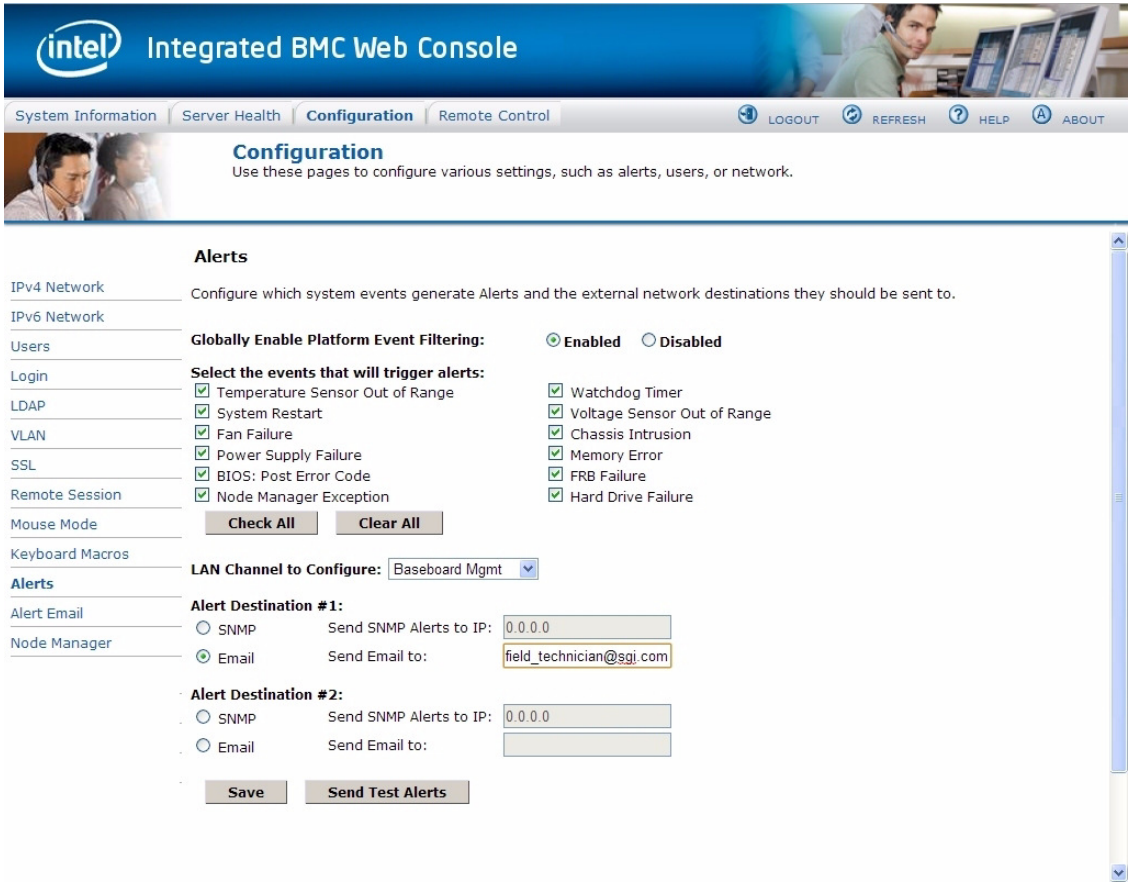


Figure 5-3 BMC Alerts Configuration Page

Make sure all the checkboxes for alerts contain a check for each alert to be sent. The **LAN Channel to Configure** should be set to **Baseboard Mgmt**. **Alert Destination #1** should be set to **Email**, and **Send Email to:** should be the email address of the account to receive the alerts. When finished, click the **Save** button at the bottom of the page. A pop-up will let you know that the changes have been saved. To test your configuration, click the **Send Test Alerts button**. You will receive a pop-up letting you know that the email was sent, and you will receive an email notifying you of a successful test.

Path not found errors after installing Python for Windows

Some Windows machines will need the variable path set for Python, and will display “Path not found” errors if not set. The path is set by doing the following:

1. Go to **Control Panel** and double-click the **System** icon.
2. Click on the **Advanced** tab.
3. Click the **Environment Variables** button at the bottom.
4. In the system variables box in at the bottom, find the entry `Path` and select it.
5. Click the **Edit** button and add to the end of the string: `C:\python##` where `##` is the version number of Python installed on the Windows machine.
6. Click **Apply** and **Okay**.

Python will now run normally.

Intel BIOS POST error messages and handling description

Refer to this table if you receive a code during the POST of booting by Intel® Server Board. What does it mean?

See table for listing of codes for BIOS events relevant to Intel® Server Boards.

Table 5-1 Intel BIOS POST Error Messages

Error Code	Error Message Response	Event Type
004C	Keyboard / interface error	Major
0012	CMIS date / time not set	Major
0048	Password check failed	Fatal
0141	PCI resource conflict	Major
0146	Insufficient memory to shadow PCI ROM	Major
0192	L# cache size mismatch	Fatal
0194	CPUID processor family are different	Fatal

Table 5-1 Intel BIOS POST Error Messages **(continued)**

Error Code	Error Message Response	Event Type
0195	Front side bus mismatch	Major
5220	Configuration cleared by jumper	Minor
5221	Passwords cleared by jumper	Major
8110	Processor 01 internal error (IERR) on last boot	Major
8111	Processor 02 internal error (IERR) on last boot	Major
8120	Processor 01 thermal trip error on last boot	Major
8121	Processor 02 thermal trip error on last boot	Major
8130	Processor 01 disabled	Major
8131	Processor 02 disabled	Major
8160	Processor 01 unable to apply BIOS update	Major
8161	Processor 02 unable to apply BIOS update	Major
8190	Watchdog timer failed on last boot	Major
8198	Operating system boot watchdog timer expired on last boot	Major
8300	Baseboard management controller failed self-test	Major
8305	Hot swap controller failed	Major
84F2	Baseboard Management Controller failed to respond	Major
84F3	Baseboard management controller in update mode	Major
84F4	Sensor data record empty	Major
84FF	System event log full	Minor
8500	Memory component could not be configured in the selected RAS mode	Major
8520	DIMM_A1 failed Self Test (BIST)	Major
8521	DIMM_A2 failed Self Test (BIST)	Major
8522	DIMM_A3 failed Self Test (BIST)	Major

Table 5-1 Intel BIOS POST Error Messages **(continued)**

Error Code	Error Message Response	Event Type
8523	DIMM_A4 failed Self Test (BIST)	Major
8524	DIMM_B1 failed Self Test (BIST)	Major
8525	DIMM_B2 failed Self Test (BIST)	Major
8526	DIMM_B3 failed Self Test (BIST)	Major
8527	DIMM_B4 failed Self Test (BIST)	Major
8528	DIMM_C1 failed Self Test (BIST)	Major
8529	DIMM_C2 failed Self Test (BIST)	Major
852A	DIMM_C3 failed Self Test (BIST)	Major
852B	DIMM_C4 failed Self Test (BIST)	Major
852C	DIMM_D1 failed Self Test (BIST)	Major
852D	DIMM_D2 failed Self Test (BIST)	Major
852E	DIMM_D3 failed Self Test (BIST)	Major
852F	DIMM_D4 failed Self Test (BIST)	Major
8580	DIMM_A1 Correctable ECC error encountered	Minor/Major after 10 events
8581	DIMM_A2 Correctable ECC error encountered	Minor/Major after 10 events
8582	DIMM_A3 Correctable ECC error encountered	Minor/Major after 10 events
8583	DIMM_A4 Correctable ECC error encountered	Minor/Major after 10 events
8584	DIMM_B1 Correctable ECC error encountered	Minor/Major after 10 events
8585	DIMM_B2 Correctable ECC error encountered	Minor/Major after 10 events
8586	DIMM_B3 Correctable ECC error encountered	Minor/Major after 10 events

Table 5-1 Intel BIOS POST Error Messages **(continued)**

Error Code	Error Message Response	Event Type
8587	DIMM_B4 Correctable ECC error encountered	Minor/Major after 10 events
8588	DIMM_C1 Correctable ECC error encountered	Minor/Major after 10 events
8589	DIMM_C2 Correctable ECC error encountered	Minor/Major after 10 events
858A	DIMM_C3 Correctable ECC error encountered	Minor/Major after 10 events
858B	DIMM_C4 Correctable ECC error encountered	Minor/Major after 10 events
858C	DIMM_D1 Correctable ECC error encountered	Minor/Major after 10 events
858D	DIMM_D2 Correctable ECC error encountered	Minor/Major after 10 events
858E	DIMM_D3 Correctable ECC error encountered	Minor/Major after 10 events
858F	DIMM_D4 Correctable ECC error encountered	Minor/Major after 10 events
8601	Override jumper set to force boot from lower alternate BIOS bank of flash ROM	Minor
8602	WatchDog timer expired (secondary BIOS might be bad)	Minor
8603	Secondary BIOS checksum fail	Minor
92A3	Serial port component was not detected	Major
92A9	Serial port component encountered a resource conflict error	Major
0xA000	TMP device not detected	Minor
0xA001	TMP device missing or not responding	Minor

Table 5-1 Intel BIOS POST Error Messages **(continued)**

Error Code	Error Message Response	Event Type
0xA002	TMP device failure	Minor
0xA003	TMP device failed self test	Minor

Beep Codes

The BMC may generate beep codes upon detection of failure conditions. Beep codes are sounded each time the problem is discovered (for example, on each power-up attempt), but are not sounded continuously. Common supported codes are listed in Appendix B, “BIOS Error Codes” for details.

Another source of beep codes may be the LSI MegaRAID card. Table 5-2 contains a summary of the LSI MegaRAID card beep codes. These beep codes indicate activity and changes from the optimal state of your RAID array.

Table 5-2 Summary of LSI MegaRAID Card Beep Codes

Beep Code	LSI Firmware State	Cause (Depending on RAID Level)
3 seconds on, 1 second off	SPEAKER_OFFLINE_ENTRY	RAID 0: One or more drives offline. RAID 1: Two drives offline. RAID 5: Two or more drives offline. RAID 6: More than two drives offline.
1 second on, 1 second off	SPEAKER_DEGRADED_ENTRY	RAID 1: A mirrored drive failed. RAID 5: One drive failed. RAID 6: One or two drives failed.
1 second on, 3 seconds off	SPEAKER_HOTSPARE_ENTRY	A hot spare drive has completed the rebuild process and has been brought into the array.

Not all beep codes signal an error

Intel boards and systems are designed to indicate USB readiness by a series of beep codes during POST, before video becomes available. These beeps mean USB is powered and initialized.

Device such as a pen drives or USB CD/DVD ROM drives attached to external USB port will generate a beep once the device is recognized, powered and initialized.

These beep codes do not signal any error. They signal USB and external device readiness during POST.

Fans don’t spin when power button pressed

Is at least one power supply fan spinning? If yes, there is good power to the modules. Verify all required power cables are correctly plugged into the chassis.

If no, there is potential lack of clean power to the module. Swap power cables, try different wall circuit, or try replacing a power supply module (see “Replacing a Power Supply” on page 156).

Fans spin when power button is pressed, but no video display is seen

Are there any beeps? If **yes**, beep codes are listed in Table 5-2 on page 180. If the answer is **no**, there may be a memory card error or with the processor. For either case, contact SGI Technical Support (see “Product Support” on page xxvi).

BIOS or board logo appear, but OS load screen never appears

This may be a problem with add-in cards in the server system. Contact SGI Technical Support (see “Product Support” on page xxvi).

OS load screen appears, but nothing further

This may be a problem with add-in cards in the server system. Contact SGI Technical Support (see “Product Support” on page xxvi).

OS fully loads, but errors are seen

Use operating system logging utility such as Windows Event Viewer or Linux dmesg to narrow the source of the error, and contact SGI Technical Support (see “Product Support” on page xxvi).

Cannot boot after settings were changed in BIOS

Certain changes in BIOS settings (such as chipset timing or latency, memory timing or latency, processor clock frequency, etc.) can cause a system to no longer boot. If you are able to enter the BIOS Setup by pressing F2, reset the BIOS to factory defaults by pressing F9. Save and exit the BIOS Setup. If you cannot enter the BIOS Setup, contact SGI Technical Support (see “Product Support” on page xxvi).

System Gets Stuck in a Reboot Cycle

If the platform gets stuck in a cycle where it is continuously rebooting without ever going into full power on, try replacing two of the power supplies, even if they are not reporting faults.

If a power supply has failed and does not correctly issue its fault (i.e., it *falsely* reports that it is still working), it will cause the platform to go into standby power mode, and the platform will try rebooting in order to power up. This can cause the platform to get stuck in a reboot cycle, and never actually successfully powering on. Replacing the faulty power supplies resolves this issue.

Server Diagnostic LED Decoding

On the server module motherboard are 8 diagnostic LEDs. The BIOS sends a value to the LEDs and the display can then be decoded using the following table. During the system boot process, the BIOS executes several platform configuration processes, each of which is assigned a specific hex POST code number. As each configuration routine is started, the BIOS displays the POST code on the POST diagnostic LEDs found on the back edge of the server board. To assist in troubleshooting a system hang during the POST process, the diagnostic LEDs can be used to identify the last POST process to be executed.

Note: These diagnostic LED codes are only used during system boot.

Each POST code is represented by eight diagnostic LEDs. The POST codes are divided into two nibblets, and upper and lower nibblets. The upper nibblet bits are represented by diagnostic LEDs #4, #5, #6, & #7. The lower nibblet bits are represented by diagnostic LEDs #0, #1, #2, & #3. The diagnostic LED #7 is the Most Significant Bit (MSB), and diagnostic LED #0 is the Least Significant Bit (LSB).

The table with the diagnostic codes starts on page 171 of *Intel Server Board S2600JF, Technical Product Specification*: http://download.intel.com/support/motherboards/server/sb/473674_g31608_005_s2600jf_tps_r1_4.pdf.

Shortening the Cable Management Arm

The cable management arm is an optional addition to the MIS chassis that helps keep cables organized in the rack. It attaches to a plate on the rear of the MIS chassis and to the rack in which the chassis is mounted. The cable management arm comes in a length designed for 26" deep racks, such as the D-Rack. It can be shortened to accommodate other rack sizes (Figure 5-4).

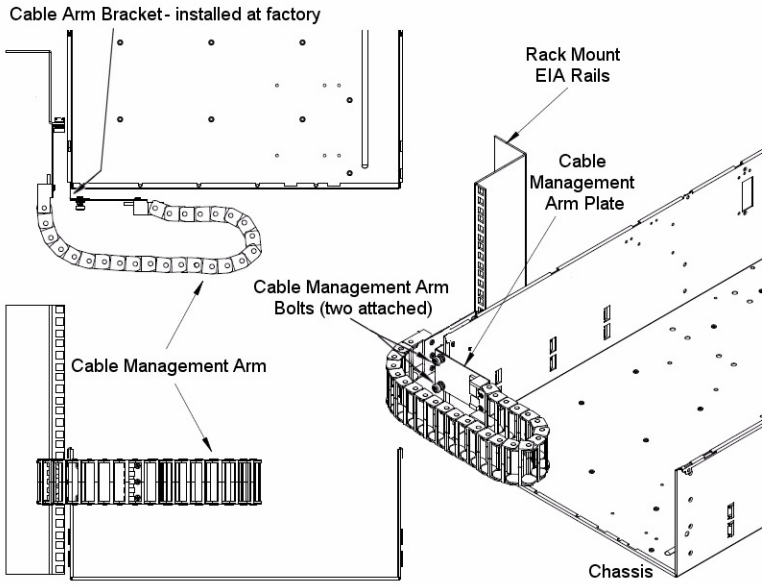


Figure 5-4 Cable Management Arm

Removing segments from the cable management arm is done using a thin flat-head screwdriver.

- For a 26" deep rack, do not remove any sections.
- For a 30" deep rack, remove 3 sections of the arm.
- For a 34" deep rack, remove 6 sections of the arm.

There are two ways that segments can be removed: either while the cable management arm is not attached to the chassis or rack, and devoid of cables, or while attached to the rack and chassis, with cables within.

For the first method, segments are removed from the *end* of the arm. Use the flat-head screwdriver and slip it between the plastic pieces that form the joint of the arm (Figure 5-5).

Figure 5-5 Remove Segments from the End of an Empty Arm

Pry the joint apart on one side (Figure 5-6).

Figure 5-6 Pry the Joint Apart

Pull the joint open (Figure 5-6).

Figure 5-7 Pull the Segments from the Arm

The segments are now removed from the end of the arm (Figure 5-7), and the arm can now be attached to the chassis and rack (Figure 5-8).

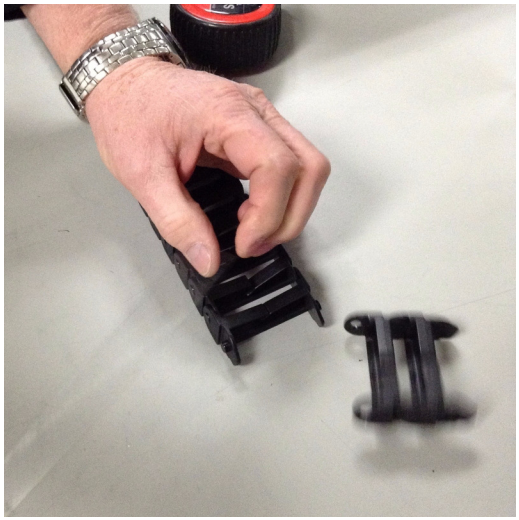


Figure 5-8 Shortened Arm Ready for Installation

The second way to shorten the cable management arm is while it is already installed on the rack, with cables in it. In this case, the segments are removed from the *middle* of the cable management arm (Figure 5-9).

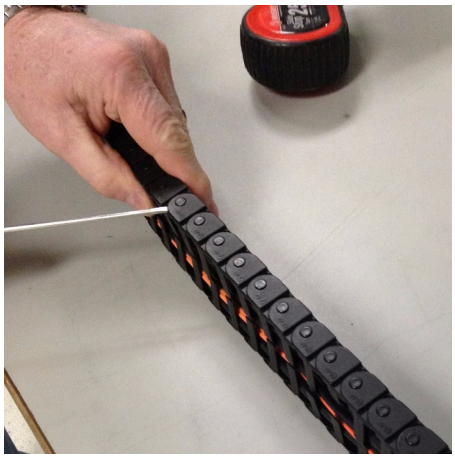


Figure 5-9 Remove Segments from the Middle of a Full Arm

As before, using a thin flat-head screwdriver, pry apart the joint of a segment on one side (Figure 5-10).

Figure 5-10 Pry Open the Segment Joint

Do this to the other side, and then pull apart the arm (Figure 5-11).

Figure 5-11 Pull Apart the Cable Management Arm

Repeat the process on the other end of the segment you wish to remove.

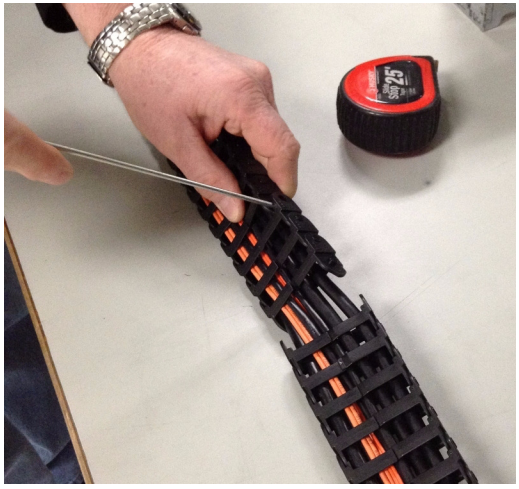


Figure 5-12 Pry Apart the Joint at the Other End

Once complete, separate the segment from the cables by twisting the segment off (Figure 5-13).

Figure 5-13 Removing the Segment from the Cables

Bring the two spliced ends of the cable management arm together, and snap the joint together (Figure 5-14).

Figure 5-14 Join the Spliced Ends of the Cable Management Arm

The cable arm should now be the appropriate length for the depth of the rack.

Technical Specifications

Table A-1 describes the technical specifications for the SGI MIS platform.

Table A-1 Technical Specifications

Attribute	Specification
Overview	
Profile	4U Standard-depth chassis
Product type	SGI MIS Server Platform (single or dual server), or SGI MIS JBOD Unit
Connectivity	Up to four SGI MIS JBOD units per SGI MIS Server Platform
Mount	–Standard 19-inch rack-compatible rail kit (weight-dependent) –SGI 19-inch Destination Rack (D-Rack), 42U –Up to 10 chassis per D-Rack
Chassis Dimensions	
Height	6.94" (176 mm)
Width	16.9" (429.2 mm)
Depth	36" (914.4 mm)
Max weight	220 lbs.
Power	
AC Input	100-240 VAC (50-60Hz) single phase
DC Input	45-72 VDC

Table A-1 Technical Specifications **(continued)**

Attribute	Specification
Safety	–NRTL certified to UL60950-1 –CB certified to EN60950/IEC60950
EMC	–North America FCC Part 15 Class A –Canada ICES-003 –Europe EN55022/EN55024 –Korea KN22, KN24 –Taiwan CNS 13438
Operating Environment	
Operating temperature range	41° to 95° F [5° to 35° C] (up to 5,000 ft. [1,500 m]) – Derate max temperature (95° F [35° C]) by 1.8° Fahrenheit [1° Celsius] per 1,000 ft. [305 m] of altitude above 5,000 ft. [1525 m]) – Temperature rate of change must not exceed 18° F [10° C] per hour
Operating humidity range	8% to 80% non-condensing – Humidity rate of change must not exceed 10% relative humidity per hour
Operating altitude	Up to 10,000 ft. [3,050 m]
Shipping temperature range	minus 40º to 140º F [minus 40º to 60º C]
Shipping Humidity	10% to 95% non-condensing
Shipping Altitude	Up to 40,000 ft. [12,200 m]
Storage Temperature	41° F [5° C] to 113° F [45° C] – Temperature rate of change must not exceed 36° F [20° C] per hour
Storage Humidity	8% to 80% non-condensing
Storage Altitude	up to 40,000 ft. [up to 12,200 m]
SGI MIS Server Specifications	
Servers/System	–One or two server modules per system –Dual-socket processors per server

Table A-1 Technical Specifications **(continued)**

Attribute	Specification
Processor support	–Supports Intel® Xeon® E5-2600 series processors
Max cores	16 per server (32 per system)
Memory	–Up to 8 DDR3 DIMMs (8, 16, 32 GB) for a single server configuration –Up to 16 DIMMs for a dual server configuration. –Max 256GB per server module
Boot drives	–Two per server module, mirrored using RAID 1 –3.5" or 2.5" (15mm or 9.5mm) –SAS or SATA –Rotational or SSD
Supported operating systems	–CentOS 6.3 –RHEL 6.2 –SLES 11 SP1 –VMware ESXi 5.0 –Windows 2008 R2 SP1 (WHQL certified, not supported through SGI)
Networking	Up to four user-specified PCIe HBAs, full-height (4.25") and half-depth (3.375"), externally or internally facing.
Expansion slots	Single server: 6 x PCIe gen 2 Dual server: 4 x PCIe gen 2 per server (8 total)
RAID controllers	–8 to 32 SAS ports via 8-port PCIe cards –Support for RAID 0, 1, 5, 6, 00, 10, 50, and 60
External storage	Up to 4 SGI MIS JBOD Units per server module via PCIe cards
Internal storage	–Up to 72 SAS or SATA 15mm, 2.5" or 3.5" drives –Up to 144 SAS or SATA 9.5mm, 2.5" drives –Drive size and capacity can be mixed in groups of 8 –Supported internal drives: SAS or SATA, rotational or SSD
SGI MIS JBOD Specifications	
Internal Storage	–Up to 81 SAS or SATA 15mm, 2.5" or 3.5" drives –Up to 162 SAS or SATA 9.5mm, 2.5" drives –Drive type and size can be mixed in groups of 9 –Supported internal drives: SAS or SATA, rotational or SSD
Connectivity	8 or optional 16 SAS ports