bullx

R424-E2/R424-INF-E2

Installation and User's Guide

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Hardware

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Preface

About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the bullx R424-E2/R424-INF-E2. Installation and maintenance should be performed by experienced technicians only.

The bullx R424-E2/R424-INF-E2 is a 2U Bi-Twin (four serverboards in a 2U chassis) rackmount server chassis and two R424-E2/R424-INF-E2 serverboards. The R424-E2/R424-INF-E2 serverboards supports Intel® 5500 Series Processor (Nehalem) and Intel® 5600 Series Processor (Westmere).

Manual Organization

Chapter 1: Introduction

The rst chapter provides a checklist of the main components included with the server system and describes the main features of the bullx R424-E2/R424-INF-E2 serverboard and the bullx R424-E2/R424-INF-E2 chassis.

Chapter 2: Server Installation

This chapter describes the steps necessary to install the bullx R424-E2/R424-INF-E2 into a rack and check out the server con guration prior to powering up the system. If your server was ordered without the processor and memory components, this chapter will refer you to the appropriate sections of the manual for their installation.

Chapter 3: System Interface

Refer to this chapter for details on the system interface, which includes the functions and information provided by the control panel on the chassis as well as other LEDs located throughout the system.

Chapter 4: System Safety

You should thoroughly familiarize yourself with this chapter for a general overview of safety precautions that should be followed when installing and servicing the bullx R424-E2/R424-INF-E2.

Chapter 5: Advanced Serverboard Setup

Chapter 5 provides detailed information on the R424-E2/R424-INF-E2 serverboard, including the locations and functions of connectors, headers and jumpers. Refer to this chapter when adding or removing processors or main memory and when recon guring the serverboard.

Chapter 6: Advanced Chassis Setup

Refer to Chapter 6 for detailed information on the R424-E2/R424-INF-E2 2U rackmount server chassis. You should follow the procedures given in this chapter when installing, removing or recon guring SAS/SATA or peripheral drives and when replacing system power supply units and cooling fans.

Chapter 7: BIOS

The BIOS chapter includes an introduction to BIOS and provides detailed information on running the CMOS Setup Utility.

Appendix A: BIOS Error Beep Codes

Appendix B: Intel HostRAID Setup Guidelines

Appendix C: Adaptec HostRAID Setup Guidelines

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Chapter 1. Introduction

1-1   Overview

The bullx R424-E2/R424-INF-E2 is a "2U Bi-Twin" server comprised of the 2U chassis and four (bi-twin) R424-E2/R424-INF-E2 serverboards. Please refer to our web site for information on operating systems that have been certi ed for use with the bullx R424-E2/R424-INF-E2.

In addition to the serverboard and chassis, various hardware components may have been included with the bullx R424-E2/R424-INF-E2, as listed below.

- Eight (8) CPU heatsinks (SNK-P0037P)

- SATA Accessories:
  Twelve (12) Hot-swappable Hard Drive Trays (MCP-220-00024-0B)
  One (1) Hot Swap Backplane (BPN-SAS827B)
  One (1) SATA cable set (CBL-0180L-01)

- Four (4) 80x35MM 9.5K RPM 4-PIN PWM fans (FAN-0111L4)

- Rail set, quick/quick, for 2, 3U (MCP-290-00053-ON)

- One (1) CD containing drivers and utilities

1-2   Serverboard Features

At the heart of the bullx R424-E2/R424-INF-E2 lies four R424-E2/R424-INF-E2 dual processor serverboards, which are based on Intel's S5520 chipset (Tylersburg IOH-36D). Below are the main features of the bullx R424-E2/R424-INF-E2 serverboard. Note that the features on each board are doubled for the server.

CPU

- Intel® Xeon® 5500 series processors (code-named Nehalem EP) or Intel® Xeon® 5600 series processors (code-named Westmere EP) with each processor supporting two full-width Intel QuickPath Interconnect (QPI) links with a total of up to 51.2 GT/s Data Transfer Rate supported (6.4 GT/s per direction).

Memory

- Twelve 240-pin DIMM sockets support up to 48 GB of DDR3 Registered ECC or 24 GB of Unbuffered ECC/Non-ECC 1333/1066/800 MHz Memory (with max. 4 GB of Registered ECC and 2 GB of Unbuffered memory per DIMM slot.) (See Section in Chapter 2 for DIMM Slot Population.).

Chipset

- Intel 5520 chipset, including: the 5520 (IOH-36D) and the ICH10R (South Bridge).

Expansion Slot

- One PCI-E x16 Gen. 2.0 slot (Slot 1).

BIOS

- 32 Mb AMI SPI Flash ROM.
- ACPI 1.0/2.0/3.0, Plug and Play (PnP), and USB Keyboard support.

PC health Monitoring

- Onboard voltage monitors for CPU1 VCore, CPU2 VCore, +5Vin, 12Vcc (V), VP1 DIMM, VP2 DIMM, +3.3Vcc (V), and Battery Voltage.
- Fan status monitor with rmware control.
- CPU/chassis temperature monitors.

- I2C temperature sensing logic.

- SDDC support.

- Platform Environment Control Interface (PECI) ready.

- CPU fan auto-off in sleep mode.

- CPU slow-down on temperature overheat.

- Pulse Width Modulation (PWM) Fan Control.

- CPU thermal trip support for processor protection, power LED.

- Power-up mode control for recovery from AC power loss.

- Auto-switching voltage regulator for CPU cores.

- System overheat/Fan Fail LED Indicator and control.

ACPI Features

- Slow blinking LED for suspend state indicator.

- Main switch override mechanism.

- ACPI Power Management.

- Keyboard Wakeup from Soft-off.

Onboard I/O

- Intel ICH10R supports a SATA port (with RAID0, RAID1, RAID10, RAID5 supported in the Windows OS Environment and RAID 0, RAID 1, RAID 10 supported for the Linux OS).

- Winbond WPCM450 BMC (Baseboard Management Controller) supports IPMI 2.0 with KVM support (For the X8DTT-HF/-HIBXF/-HIBQF).

- Dual Intel 82574 Dual-LAN Gigabit Ethernet Controllers support dual Gigabit LAN ports.

- Onboard PHY Chip supports IPMI dedicated LAN (For the X8DTT-HF/-HIBXF/-HIBQF).

- One COM port.

- In niBand Connector (For the X8DTT-HIBX/-HIBXF/ HIBQ/-HIBQF).

- Up to four USB 2.0 (Universal Serial Bus) connections (2 Rear USB Ports and 1 Type A Header w/2 USB connections supported).

- Super I/O: Winbond W83527HG.

Other

- Console redirection.

- Onboard Fan Speed Control by Thermal Management via BIOS.

CD/Diskette Utilities

- Device drivers and documentation.

Dimensions

- Proprietary 16.64" (L) x 6.80" (W) (422.66 mm x 172.72 mm).
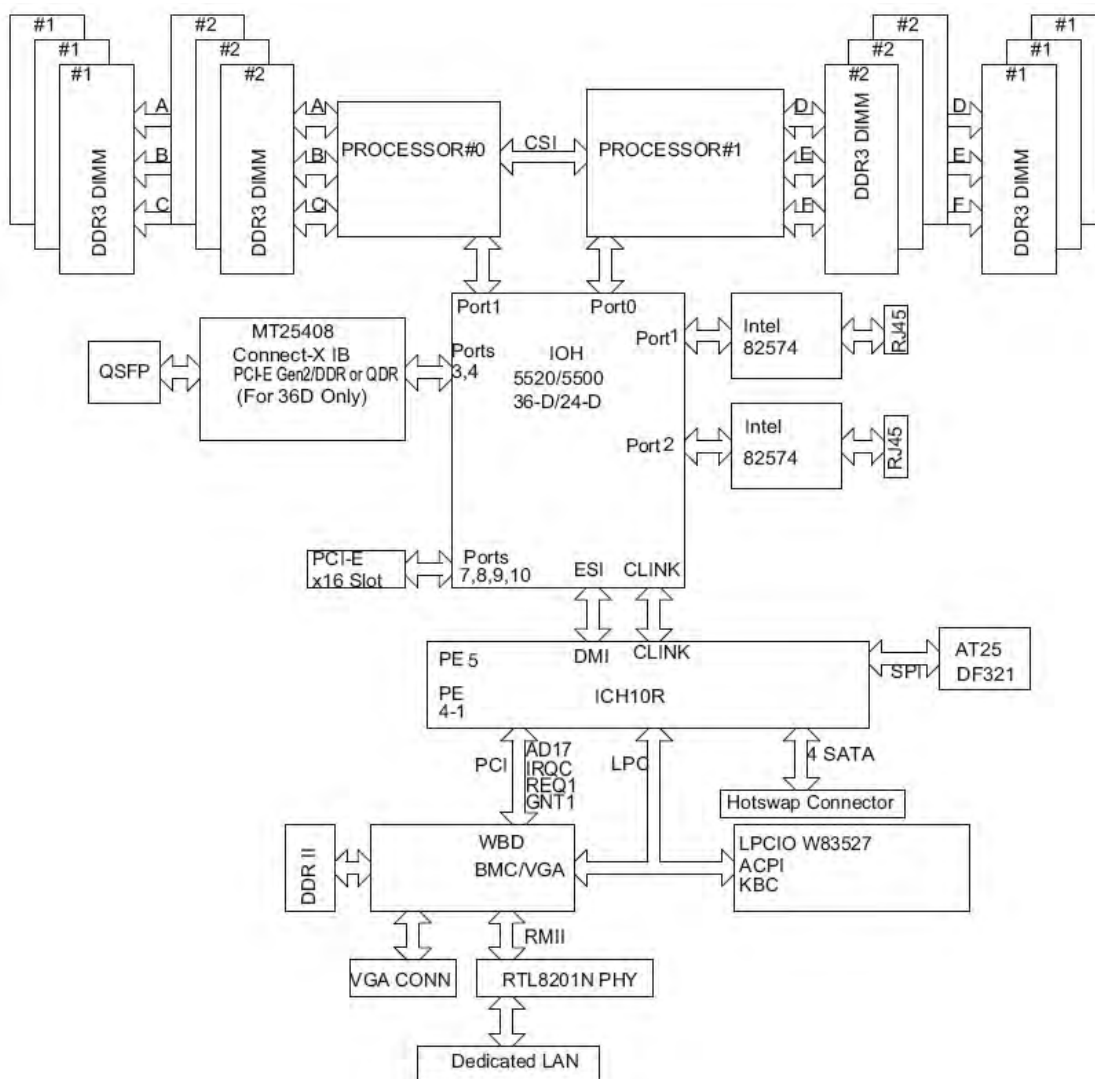
Figure 1-1. System Block Diagram

Note: This is a general block diagram. See the Motherboard Features pages for details on the features of each motherboard.

1-3   Chassis Components

Overview

This chapter describes the most common components included with your chassis. Some components listed may not be included or compatible with your particular chassis model. For more information, see the installation instructions detailed later in this manual.

Components

Chassis

- The bullx R424-E2 chassis includes twelve hot-swappable hard drive bays. For more information.

Backplane

- The bullx R424-E2 chassis comes equipped with a BPN-SAS-827B backplane. For more information regarding compatible backplanes, view the appendices found at the end of this manual..

Fans

- The bullx R424-E2 chassis accepts four system fans. System fans for the chassis are powered from the motherboards or the HDD backplane. The two fans on each side are controlled by two motherboards, so that when one of the motherboard nodes is removed, the second motherboard will continue to control both fans.

Power Supply

- The bullx R424-E2 chassis model includes a high-ef ciency 80 Plus Gold Level power supply, rated at 1400 Watts. In the unlikely event your power supply fails, replacement is simple and can be accomplished without tools.

Air Shroud

- The bullx R424-E2 chassis requires mylar air shrouds for each node to direct the air ow where cooling is needed.

1-6

Chapter 2. Server Installation

2-1   Overview

This chapter provides a quick setup checklist to get your bullx R424-E2/R424-INF-E2 up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time. This quick setup assumes that your system has come to you with the processors and memory preinstalled. If your system is not already fully integrated with a serverboard, processors, system memory etc., please turn to the chapter or section noted in each step for details on installing speci c components.

2-2   Unpacking the System

You should inspect the box the bullx R424-E2/R424-INF-E2 was shipped in and note if it was damaged in any way. If the server itself shows damage you should le a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack unit that will hold the bullx R424-E2/R424-INF-E2. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic elds are generated. You will also need it placed near a grounded power outlet. Be sure to read the Rack and Server Precautions in the next section.

2-3   Preparing for Setup

The box the bullx R424-E2/R424-INF-E2 was shipped in should include two sets of rail assemblies, two rail mounting brackets and the mounting screws you will need to install the system into the rack. Follow the steps in the order given to complete the installation process in a minimum amount of time. <u>Please read this section in its entirety before you begin the installation procedure outlined in the sections that follow</u>.

Choosing a Setup Location

- Leave enough clearance in front of the rack to enable you to open the front door completely (~63 cm/~25 inches).

- Leave approximately 76 cm (30 inches) of clearance in the back of the rack to allow for suf cient air ow and ease in servicing.

- This product is for installation only in a Restricted Access Location (dedicated equipment rooms, service closets and the like).

- This product is not suitable for use with visual display work place devices according to §2 of the the German Ordinance for Work with Visual Display Units.

Rack Precautions

 Warnings and Precautions!

- Ensure that the leveling jacks on the bottom of the rack are fully extended to the oor with the full weight of the rack resting on them.

- In single rack installation, stabilizers should be attached to the rack.

- In multiple rack installations, the racks should be coupled together.

- Always make sure the rack is stable before extending a component from the rack.

- You should extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.

Server Precautions

- Review the electrical and general safety precautions in Chapter 4.

- Determine the placement of each component in the rack *before* you install the rails.

- Install the heaviest server components on the bottom of the rack rst, and then work up.

- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges, voltage spikes and to keep your system operating in case of a power failure.

- Allow the hot plug SATA drives and power supply modules to cool before touching them.

- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

- Make sure all power and data cables are properly connected and not blocking the chassis air ow. See Chapter 5 for details on cable connections.

Rack Mounting Considerations

Ambient Operating Temperature

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (Tmra).

Reduced Airflow

Equipment should be mounted into a rack so that the amount of air ow required for safe operation is not compromised.

Mechanical Loading

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Ground

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e. the use of power strips, etc.).

2-4   Installing the System into a Rack

This section provides information on installing the chassis into a rack unit with the rails provided. There are a variety of rack units on the market, which may mean that the assembly procedure will differ slightly from the instructions provided. You should also refer to the installation instructions that came with the rack unit you are using.

NOTE: This rail will t a rack between 26.5" and 36.4" deep.

Identifying the Sections of the Rack Rails

The chassis package includes two rail assemblies in the rack mounting kit. Each assembly consists of three sections: An inner chassis rail which secures directly to the chassis, an outer rail that secures to the rack, and a middle rail which extends from the outer rail. These assemblies are speci cally designed for the left and right side of the chassis.
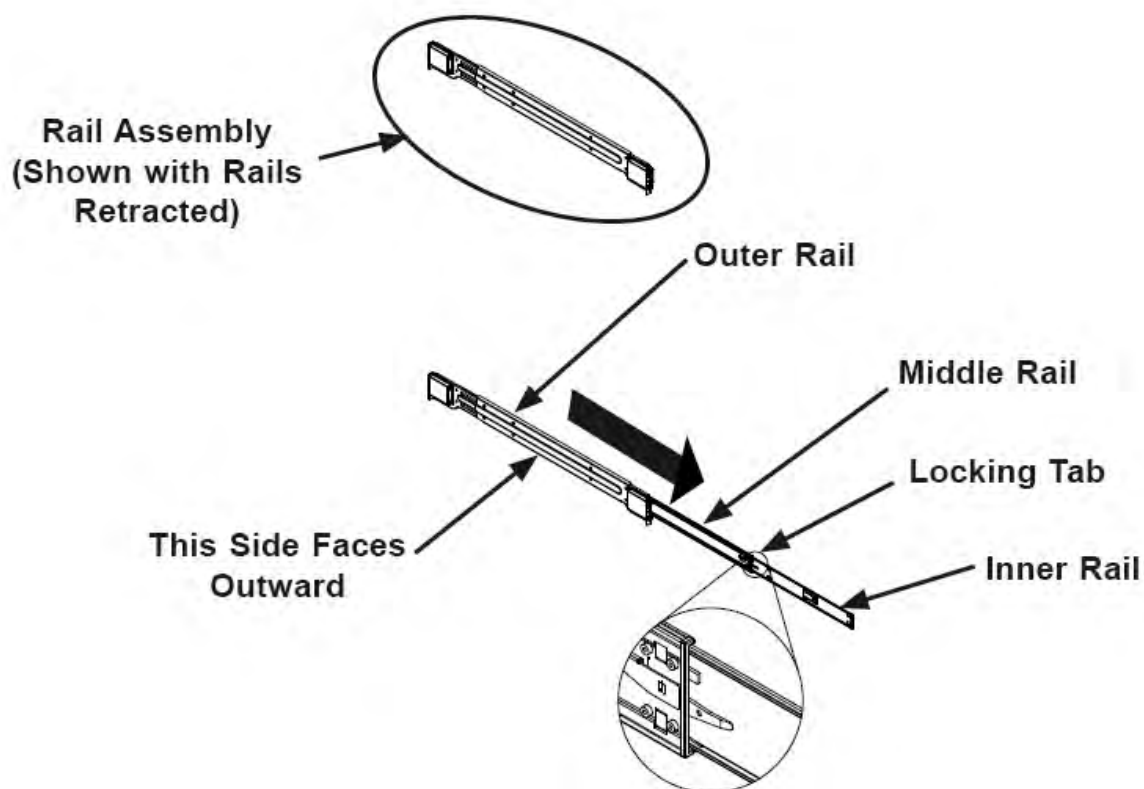
Figure 2-1. Identifying the Outer Rail, Middle Rail and Inner Rails
(Left Rail Assembly Shown)

Locking Tabs

Each inner rail has a locking tab. This tab locks the chassis into place when installed and pushed fully into the rack. These tabs also lock the chassis in place when fully extended from the rack. This prevents the server from coming completely out of the rack when when the chassis is pulled out for servicing.

Releasing the Inner Rail

Releasing Inner Rail from the Outer Rails

1. Identify the left and right outer rail assemblies.

2. Pull the inner rail out of the outer rail until it is fully extended as illustrated below.

3. Press the locking tab down to release the inner rail.

Repeat steps 1-3 for the second outer rail.
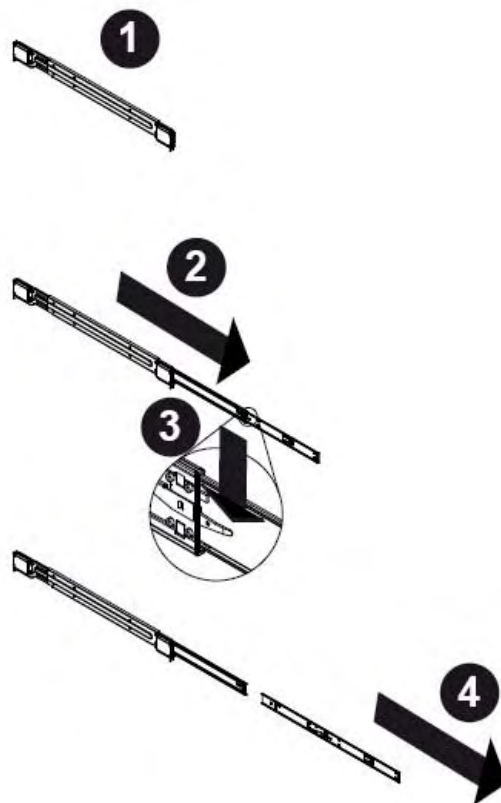
Figure 2-2. Extending and Releasing the Inner Rail

Installing The Inner Rails on the Chassis

Installing the Inner Rails

1. Confirm that the left and right inner rails have been correctly identified.

2. Place the inner rail firmly against the side of the chassis, aligning the hooks on the side of the chassis with the holes in the inner rail.

3. Slide the inner rail forward toward the front of the chassis until the rail clicks into the locked position, which secures the inner rail to the chassis.

4. Secure the inner rail to the chassis with the screws provided.

5. Repeat steps 1 through 4 above for the other inner rail.
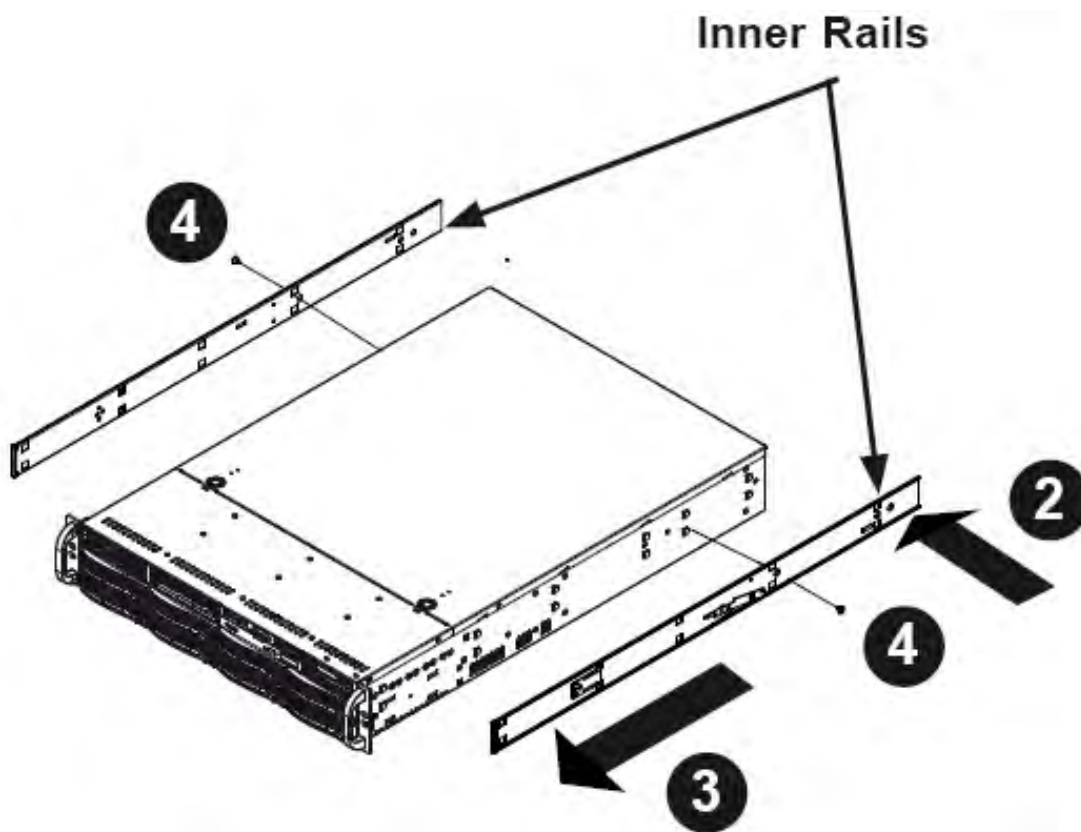
Figure 2-3. Installing the inner rails
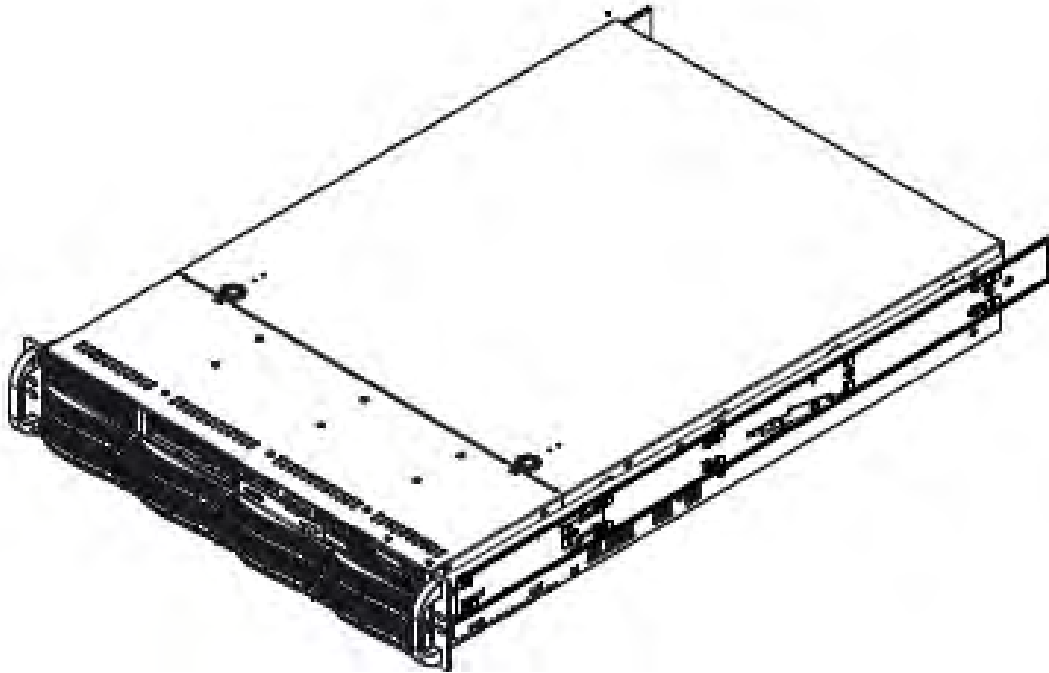
Figure 2-4. Inner Rails Installed on the Chassis

Installing The Outer Rails on the Rack

Installing the Outer Rails

1. Press upward on the locking tab at the rear end of the middle rail.

2. Push the middle rail back into the outer rail.

3. Hang the hooks of the front of the outer rail onto the slots on the front of the rack. If necessary, use screws to secure the outer rails to the rack, as illustrated above.

4. Pull out the rear of the outer rail, adjusting the length until it ts within the posts of the rack.

5. Hang the hooks of the rear portion of the outer rail onto the slots on the rear. of the rack. If necessary, use screws to secure the rear of the outer rail to the rear of the rack.

6. Repeat steps 1-5 for the remaining outer rail.
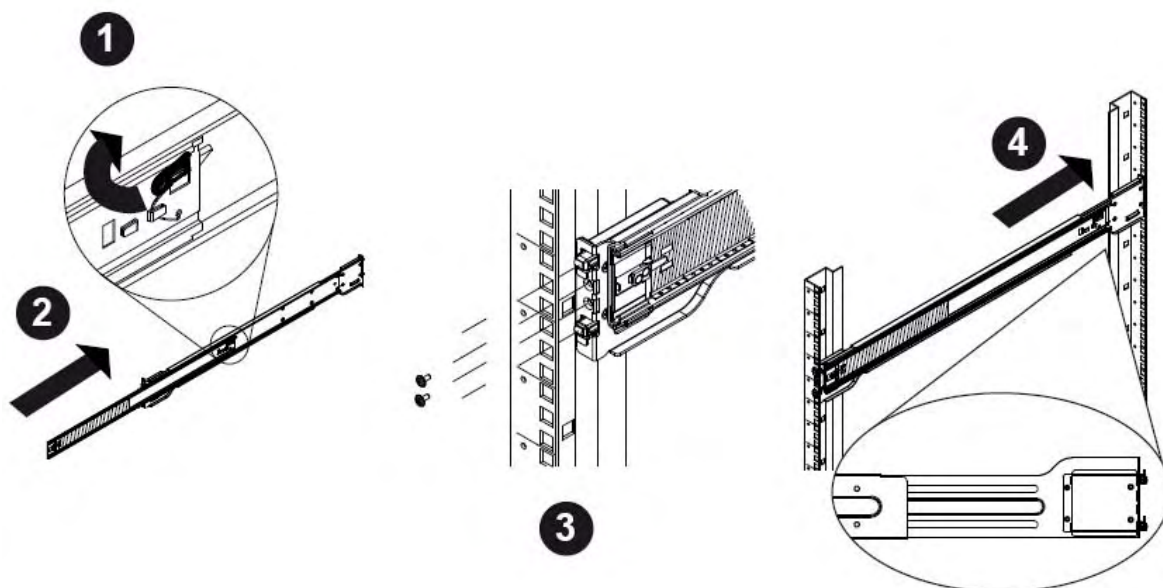
Figure 2-5. Extending and Releasing the Outer Rails

Standard Chassis Installation

Installing the Chassis into a Rack

1. Con rm that the inner rails are properly installed on the chassis.

2. Con rm that the outer rails are correctly installed on the rack.

3. Pull the middle rail out from the front of the outer rail and make sure that the ball-bearing shuttle is at the front locking position of the middle rail.

4. Align the chassis inner rails with the front of the middle rails.

5. Slide the inner rails on the chassis into the middle rails, keeping the pressure. even on both sides, until the locking tab of the inner rail clicks into the front of the middle rail, locking the chassis into the fully extended position.

6. Depress the locking tabs of both sides at the same time and push the chassis all the way into the rear of the rack.

7. If necessary for security purposes, use screws to secure the chassis handles to the front of the rack.
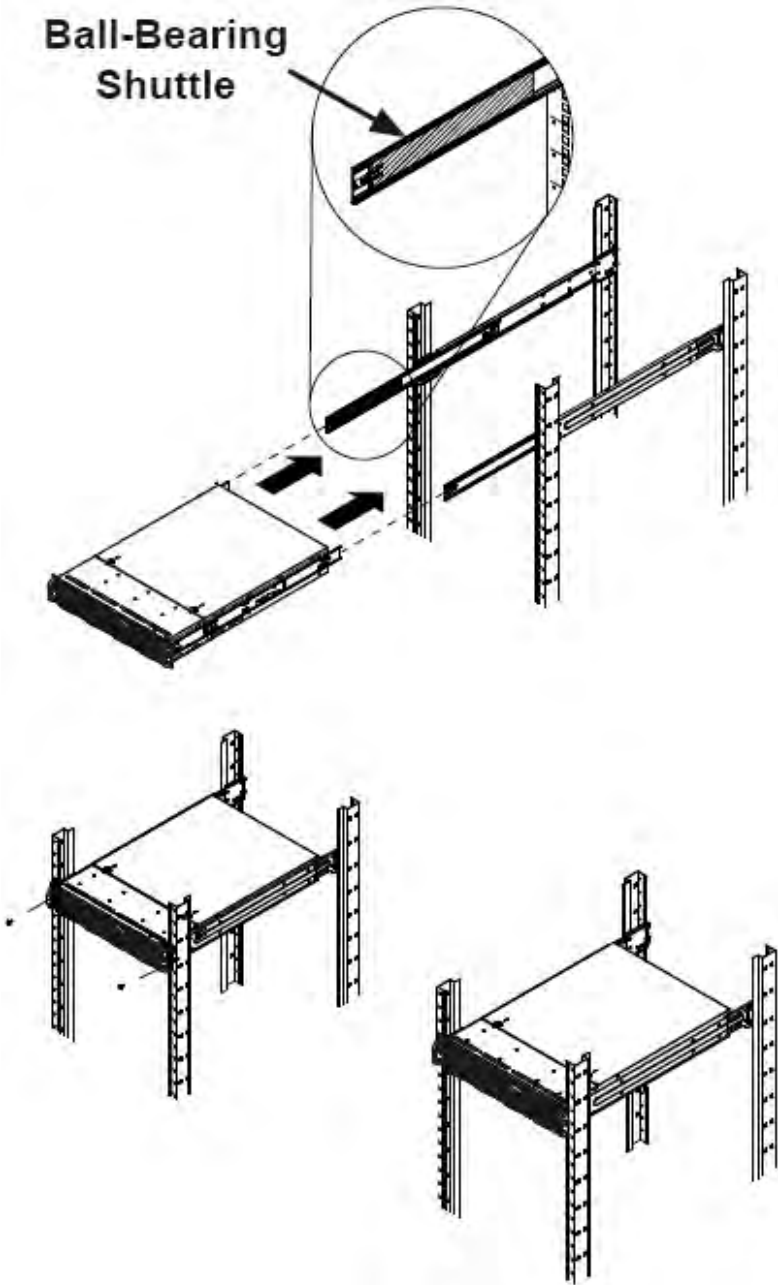
Figure 2-6. Installing into a rack

Optional Quick Installation Method

The following quick installation method may be used to install the chassis onto a rack.

Installing the Chassis into a Rack

1. Install the whole rail assembly onto the rack.

2. Release the inner rail without retracting the middle rail.

3. Install the inner rails on the chassis.

4. Install the chassis onto the middle rail as described in the previous section. If necessary for security purposes, use screws to secure the chassis handles to the front of the rack.

2-5   Checking the Serverboard Setup

After you install the bullx R424-E2/R424-INF-E2 in the rack, you will need to open the top cover to make sure the serverboard is properly installed and all the connections have been made.

Accessing the Inside of the System

1. Release the retention screws that secure the system to the rack.

2. Grasp the two handles on either side and pull the system straight out until it locks (you will hear a "click").

3. Remove the four screws (two on the sides and two on the top) that secure the top cover to the chassis. Place your thumbs in the two rectangular recesses and push the cover away from you (toward the rear of the chassis) until it stops. You can then lift the top cover from the chassis to gain full access to the inside of the server (see Figure 2-6).

4. To remove the system from the rack completely, depress the locking tabs in the chassis rails (push the right-side tab down and the left-side tab up) to continue to pull the system out past the locked position.

Checking the Components and Setup

1. You may have one or two processors already installed in each of the two serverboards. Each processor needs its own heatsink. See Chapter 5 for instructions on processor and heatsink installation.

2. Your server system may have come with system memory already installed. Make sure all DIMMs are fully seated in their slots. For details on adding system memory, refer to Chapter 5.

3. You can install two add-on cards to the system. See Chapter 5 for details on installing PCI add-on cards.

4. Make sure all power and data cables are properly connected and not blocking the chassis air ow. See Chapter 5 for details on cable connections.

2-6   Preparing to Power On

Next, you should check to make sure the peripheral drives and the SATA drives and SATA backplane have been properly installed and all connections have been made.

Checking the SATA drives

1. All drives are accessable from the front of the server. The SATA disk drives can be installed and removed from the front of the chassis without removing the top chassis cover.

2. Depending upon your system's con guration, your system may have one or two drives already installed. If you need to install SATA drives, please refer to Chapter 6.

Checking the Airflow

1. Air ow is provided by six sets of 4-cm fans (each set of fans consists of two fans that are mounted back to back) and an air shroud. The system component layout was carefully designed to direct suf cient cooling air ow to the components that generate the most heat.

2. Note that all power and data cables have been routed in such a way that they do not block the air ow generated by the fans.

Providing Power

1. Plug the power cords from the power supplies unit into a high-quality power strip that offers protection from electrical noise and power surges.

2. It is recommended that you use an uninterruptible power supply (UPS).

3. Finally, depress the power on button on the front of the chassis.

2-7   Chassis Cover
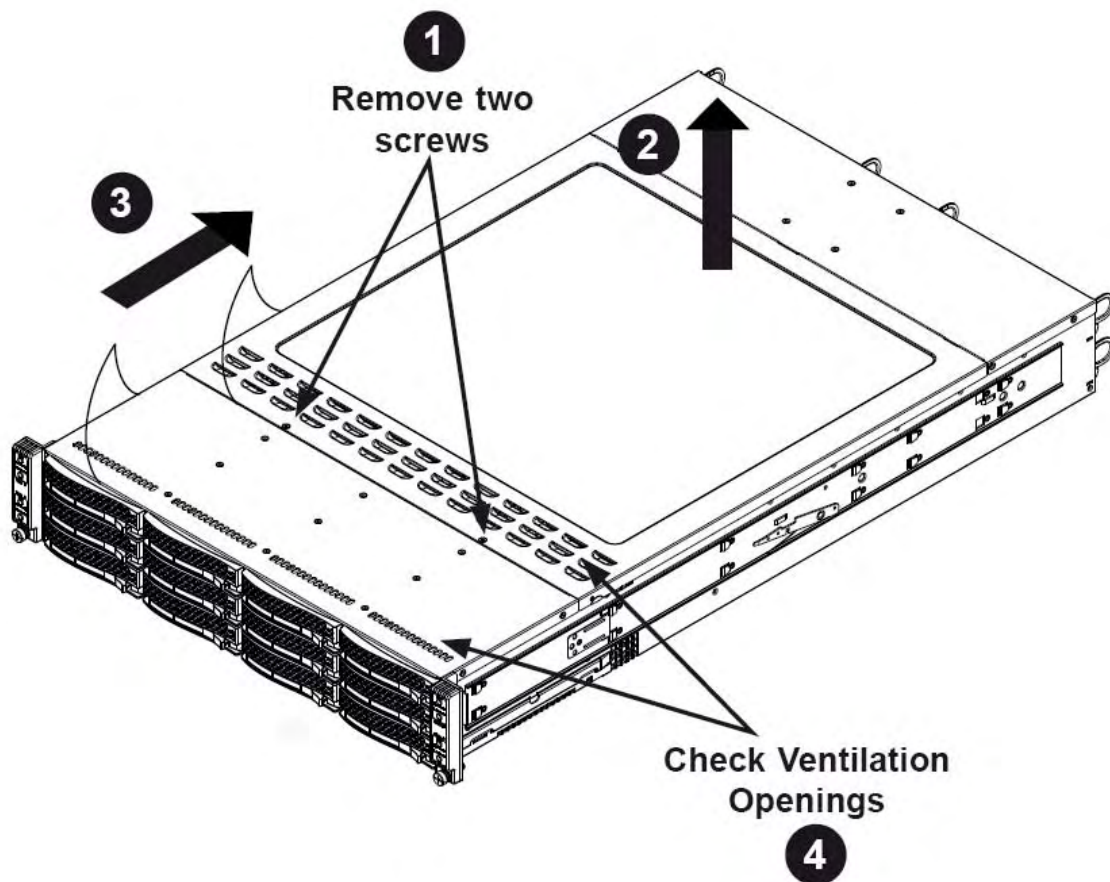
Figure 2-7. Removing the Chassis Cover

Before operating the R424-E2 chassis for the rst time, it is important to remove the protective lm covering the top of the chassis, in order to allow for proper ventilation and cooling.

Removing the Chassis Cover and Protective Film

1. Remove the two screws which secure the top cover onto the chassis as shown above.

2. Lift the top cover up and off the chassis.

3. Peel off the protective lm covering the top cover and the top of the chassis.

4. Check that all ventilation openings on the top cover and the top of the chassis are clear and unobstructed.

!	**Warning: Except for short periods of time, do NOT operate the server without the cover in place. The chassis cover must be in place to allow proper air-flow and prevent overheating.**

Chapter 3. System Interface

3-1   Overview

There are several LEDs on the control panel and on the drive carriers to keep you constantly informed of the overall status of the system. R424-E2 models include four control panels on the handles of the chassis which control each of the systems.

This chapter explains the meanings of all LED indicators and the appropriate response you may need to take.
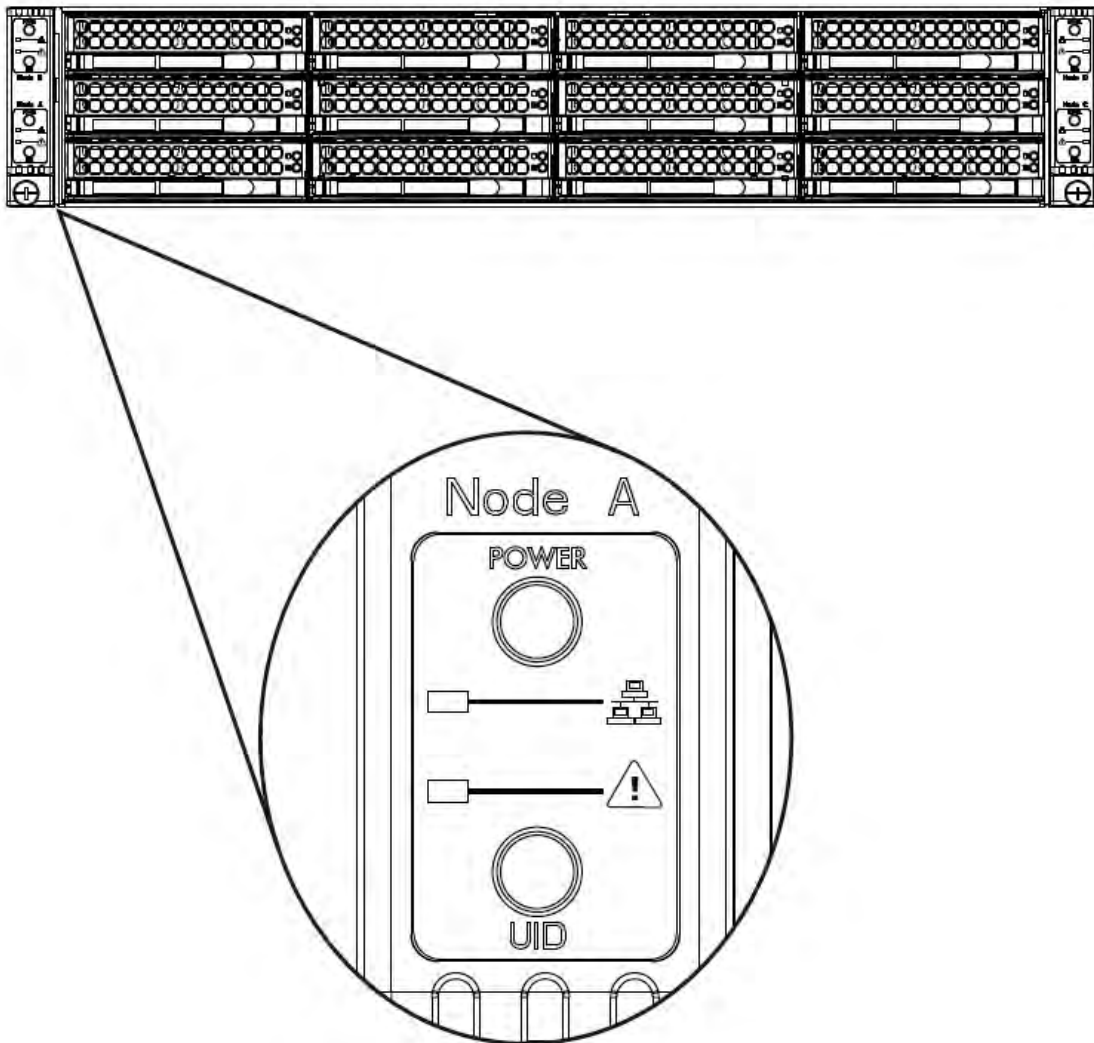
Figure 3-1. Chassis Control Panel

3-2   Control Panel Buttons

- Power: The main power button on each of the four control panels is used to apply or remove power from the power supply to each of the four systems in the chassis. Turning off system power with this button removes the main power, but keeps standby power supplied to the system. Therefore, you must unplug system before servicing. The poer button has a built-in LED which will turn green when the power is on.

- UID: When used with a UID compatible motherboard, the UID button is used to turn on or off the blue light function of the LED. This is built into the front side of the UID button and at the rear end of each motherboard node, for those motherboards which support it. Once the blue light is activated, the unit can be easily located in very large racks and server banks.

3-3   Control Panel LEDS

The four control panels are located on the front handle of the SC827 chassis. Each control panel has two additional LEDs. These LEDs provide you with critical information related to different parts of the system. This section explains what each LED indicates when illuminated and any corrective action you may need to take.

- Alert: This LED is illuminated when an alert condition occurs. A solid red light indicates an overheat condition in the system. A ashing red light which ashes in one second intervals indicates a fan failure. A ashing red light which ashes in four second interfals indicates a power failure. When noti ed of an alert, check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers and air shrouds are installed. Finally, verify that the heatsinks are installed properly. This LED will remain ashing or on as long as the temperature is too high or a fan does not function properly.
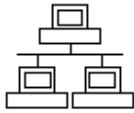
- NIC: Indicates network activity on either LAN1 or LAN2 when ashing.

3-3   Drive Carrier LEDS

The R424-E2 chassis uses SAS/SATA drives.

SAS/SATA Drives

Each SAS/SATA drive carrier has two LEDs.

- Blue: Each Serial ATA drive carrier has a blue LED. When illuminated, this blue •
  LED (on the front of the SATA drive carrier) indicates drive activity. A connection
  to the SATA backplane enables this LED to blink on and off when that particular
  drive is being accessed.

- Red: The red LED to indicate an SAS/SATA drive failure. If one of the SAS/SATA
  • drives fail, you should be noti ed by your system management software.

SCSI Drives

This chassis does not support SCSI drives at this time.

Notes

3-4

Chapter 4. System Safety

4-1   Electrical Safety Precautions

Basic electrical safety precautions should be followed to protect yourself from harm and the bullx R424-E2/R424-INF-E2 from damage:

- 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.

- Power should always be disconnected from the system when removing or installing main system components, such as the serverboard, memory modules and oppy drive. When disconnecting power, you should rst power down the system with the operating system rst and then unplug the power cords of all the power supply units in the system.

- When working around exposed electrical circuits, another person who is familiar with the power-off controls should be nearby 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 they come into contact with.

- Do not use mats designed to decrease static electrical discharge as protection from electrical shock. Instead, use rubber mats that have been speci cally designed as electrical insulators.

- The power supply power cords must include a grounding plug and must be plugged into grounded electrical outlets.

- Serverboard Battery: **CAUTION** - There is a danger of explosion if the onboard battery is installed upside down, which will reverse its polarites (see Figure 4-1). This battery must be replaced only with the same or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

- Mainboard replaceable soldered-in fuses: Self-resetting PTC (Positive Tempera-ture Coef cient) fuses on the mainboard must be replaced by trained service technicians only. The new fuse must be the same or equivalent as the one replaced. Contact technical support for details and support.

4-2 General Safety Precautions

Follow these rules to ensure general safety:

- Keep the area around the bullx R424-E2/R424-INF-E2 clean and free of clut-ter.

- The bullx R424-E2/R424-INF-E2 weighs approximately 40 lbs (~18.2 kg) when fully loaded. When lifting the system, two people at either end should lift slowly with their feet spread out to distribute the weight. Always keep your back straight and lift with your legs.

- Place the chassis top cover and any system components that have been removed away from the system or on a table so that they won't accidentally be stepped on.

- While working on the system, do not wear loose clothing such as neckties and unbuttoned shirt sleeves, which can come into contact with electrical circuits or be pulled into a cooling fan.

- Remove any jewelry or metal objects from your body, which are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.

- After accessing the inside of the system, close the system back up and secure it to the rack unit with the retention screws after ensuring that all connections have been made.

4-3   ESD Precautions

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 suf cient 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 serverboard 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 serverboard.

4-4   Operating Precautions

Care must be taken to assure that the chassis cover is in place when the bullx R424-E2/R424-INF-E2 is operating to assure proper cooling. Out of warranty damage to the system can occur if this practice is not strictly followed.

Figure 4-1. Installing the Onboard Battery

LITHIUM BATTERY

BATTERY HOLDER

OR

LITHIUM BATTERY

BATTERY HOLDER
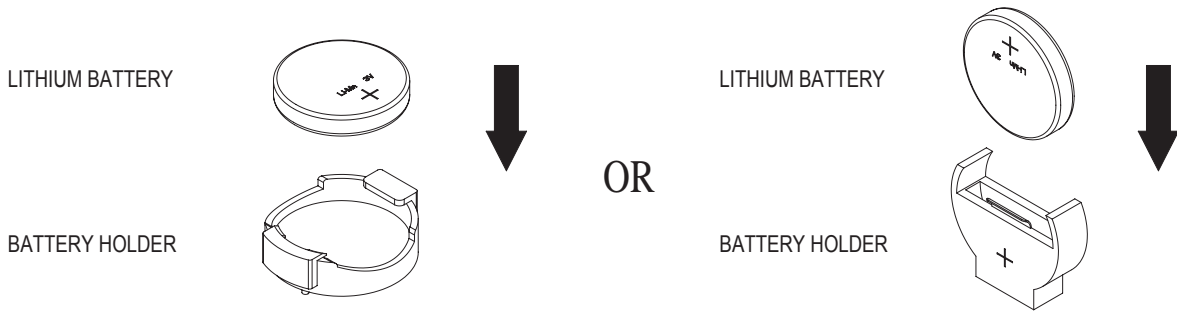
Battery model: CR2032 3 Volts or equivalent type (Varta, Sony, Matsushita, Panasonic, FDK).

Chapter 5. Advanced Serverboard Setup

This chapter covers the steps required to install the bullx R424-E2/R424-INF-E2 serverboard into the chassis, connect the data and power cables and install add-on cards. All serverboard jumpers and connections are also described. A layout and quick reference chart are included in this chapter for your reference. Remember to completely close the chassis when you have nished working with the serverboard to better cool and protect the system.

5-1 Handling the Serverboard

Electrostatic discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully (see previous chapter). To prevent the serverboard from bending, keep one hand under the center of the board to support it when handling. The following measures are generally suf cient to protect your equipment from electric static discharge.

Precautions

- Use a grounded wrist strap designed to prevent Electrostatic Discharge (ESD).

- Touch a grounded metal object before removing any board from its antistatic bag.

- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

- When handling chips or modules, avoid touching their pins.

- Put the serverboard, add-on cards 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 serverboard.

Unpacking

The serverboard is shipped in antistatic packaging to avoid electrostatic discharge. When unpacking the board, make sure the person handling it is static protected.

5-2 Installing the Serverboard
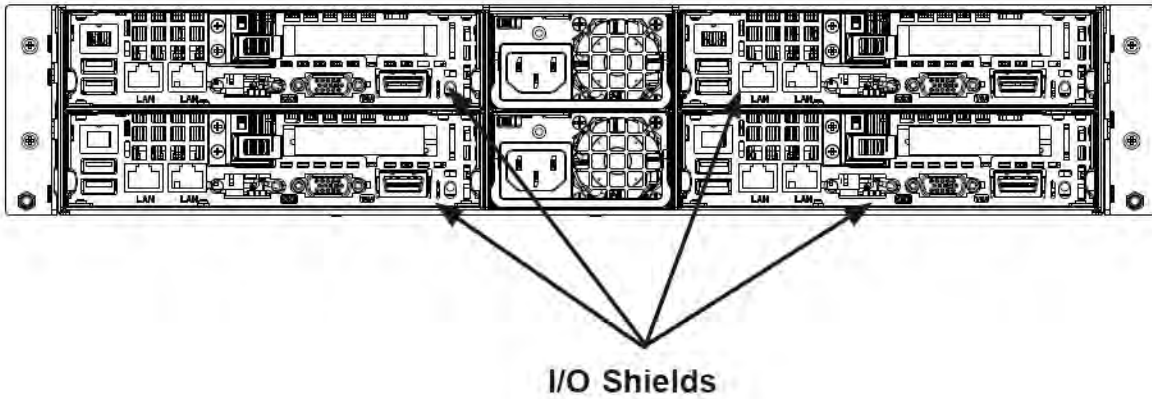
I/O Shields

Figure 5-1. I/O Shield Placement

Permanent and Optional Standoffs

Standoffs prevent short circuits by securing space between the serverboard and the chassis surface. The R424-E2 chassis includes permanent standoffs in locations used by the serverboards. These standoffs accept the rounded Phillips head screws included in the R424-E2 accessories packaging.

Some serverboards require additional screws for heatsinks, general components and/or non-standard security. Optional standoffs are used for these serverboards.

To use an optional standoff, you must place a hexagon screw through the bottom the chassis and secure the screw with the hexagonal nut (rounded side up).

Depending upon the con guration of the serverboard being used, it is also possible that some of the optional standoffs which are pre-installed in the chassis, may need to be removed.

Figure 5-2. Installing he Serverboard in the Serverboard Node Drawer

Installing the Serverboard

1. Review the documentation that came with your serverboard. Become familiar with component placement, requirements, precautions, and cable connections.

2. Pull the serverboard node drawer out of the back of the chassis. 2.

3. Remove the add-on card brackets:
    3a. Remove screw securing the add-on card bracket to the back of the node drawer.
    3b. Lift the bracket out of the node drawer.

4. Lay the serverboard in the node drawer aligning the standoffs with the serverboard.

5. Secure the serverboard to the node drawer using the rounded, Phillips head screws included for this purpose.

6. Install the adapter card associated with the serverboard if the chassis is a hot-swappable version. Refer to the next section for instructions on installing the adapter card

7. Secure the CPU(s), heatsinks, and other components to the serverboard as described in the serverboard documentation.

8. Connect the cables between the serverboard, backplane, chassis, front panel, and power supply, as needed. Also, fans may be temporarily removed to allow access to the backplane ports.

9. Replace the add-on card bracket and secure the bracket with a screw.

10. Repeat steps 3 - 5 for the remaining nodes.

5-3   Connecting Cables

Now that the serverboards are installed, the next step is to connect the cables to the boards. These include the data cables for the peripherals and control panel and the power cables.

Connecting Data Cables

The cables used to transfer data from the peripheral devices have been carefully routed to prevent them from blocking the ow of cooling air that moves through the system from front to back. If you need to disconnect any of these cables, you should take care to keep them routed as they were originally after reconnecting them (make sure the red wires connect to the pin 1 locations). The following data cables (with their locations noted) should be connected. (See the serverboard layout for connector locations.) Note that each connection listed should be made for both serverboards in the chassis.

- SATA drive cables (I-SATA0 ~ I-SATA1)

- Control Panel cable (JF1)

Connecting Power Cables

The bullx R424-E2/R424-INF-E2 serverboard has two 20-pin ATX power supply connectors for connection to the ATX power supply. Only one of these from each board should be connected to the power supply. The "Primary ATX Power Header" is used to supply power to the primary serverboard and the "Secondary ATX Power Header" is used to supply power to the secondary serverboard. Connect the power supply to only one of these on both boards (primary = left, secondary = right when viewed from front of server). See Section 5-9 for power connector pin de nitions.

Connecting the Control Panel

JF1 contains header pins for various front control panel connectors. See Figure 5-1 for the pin locations of the various front control panel buttons and LED indicators. All JF1 wires have been bundled into a single ribbon cable to simplify this connection. Make sure the red wire plugs into pin 1 as marked on the board. The other end connects to the Control Panel PCB board, located just behind the system status LEDs on the chassis.

Figure 5-1. Control Panel Header Pins

	20	19	
Ground	○	○	NMI
x (Key)	○	○	x (Key)
Power On LED	○	○	Vcc
HDD LED	○	○	Vcc
NIC1 LED	○	○	Vcc
NIC2 LED	○	○	Vcc
OH/Fan Fail LED	○	○	Vcc
Power Fail LED	○	○	Vcc
Ground	○	○	Reset (Button)
Ground	○	○	Power (Button)
	2	1	
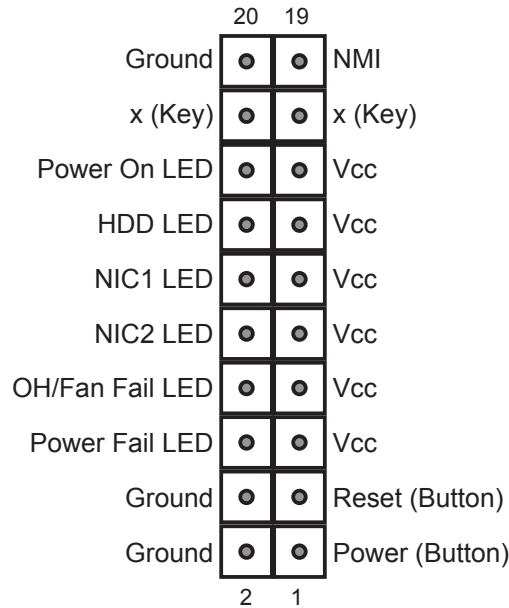
5-4   Control Panel Connectors/IO Ports

The I/O ports are color coded in conformance with the PC 99 speci cation. See the picture below for the colors and locations of the various I/O ports.

Figure 5-2. Back Panel Connectors/IO Ports
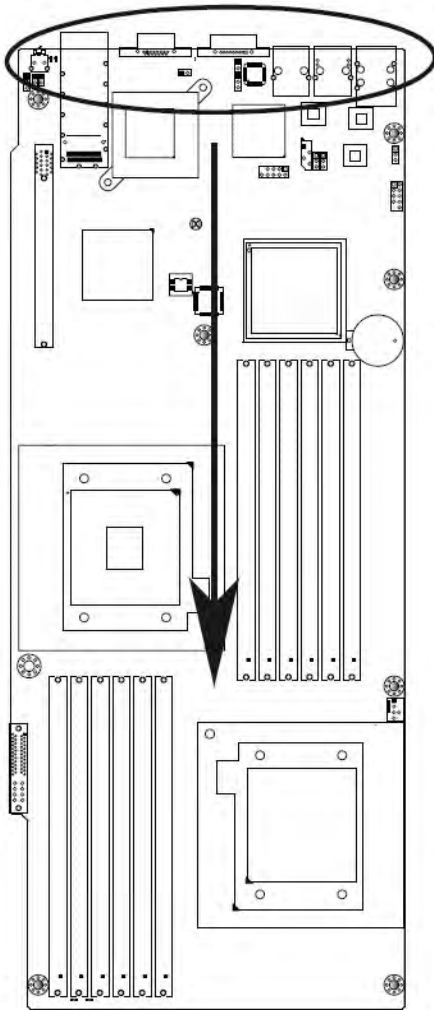
1.	USB 0
2.	USB 1
3	IPMI_dedicated LAN (R424-E2/ R424-INF-E2)
4.	LAN 1
5.	LAN 2
6.	COM Port 1 (Black)
7.	VGA (Blue)
8.	In niband (R424-INF-E2)
9.	UID switch
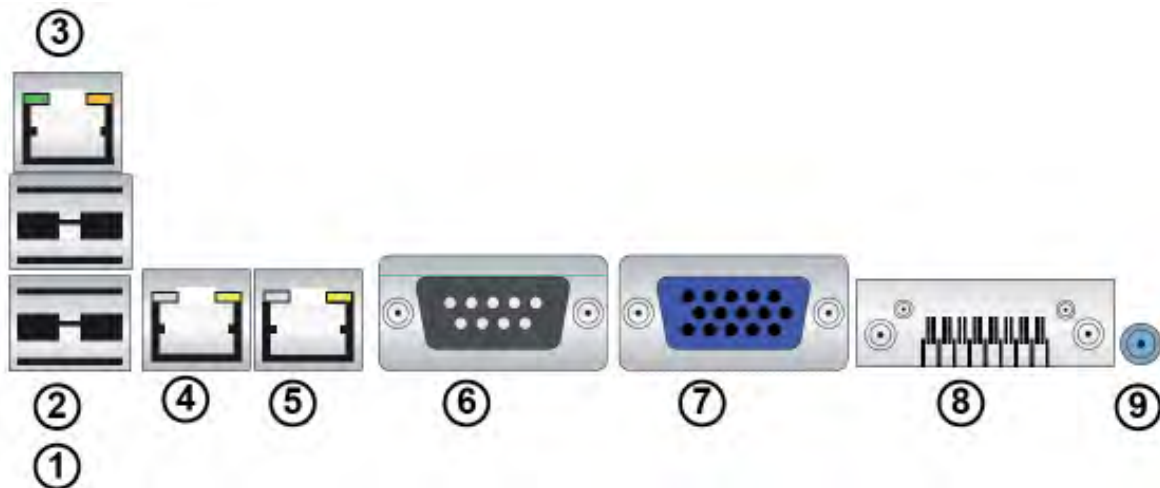
5-5   Installing Processor and Heat Sink

> ⚠️ When handling the processor package, avoid placing direct pressure on the label area of the fan.

Notes:

1.   Always connect the power cord last and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the CPU heatsink.

2.   Make sure to install the serverboard into the chassis before you install the CPU heatsink and heatsink fans.

3.   When purchasing a serverboard without a 5500 Series processor preinstalled, make sure that the CPU socket plastic cap is in place, and none of the CPU socket pins are bent; otherwise, contact the retailer immediately..

Installing an LGA 1366 Processor

1. Press the socket clip to release the load plate, which covers the CPU socket, from its locking position..

Socket clip   Load plate
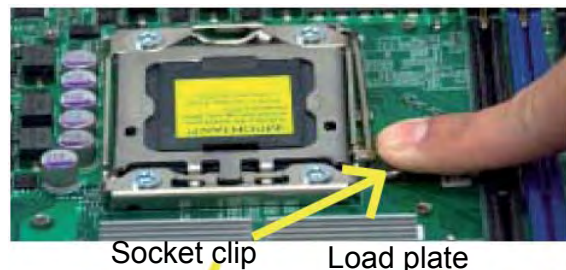
2. Gently lift the socket clip to open the load plate.
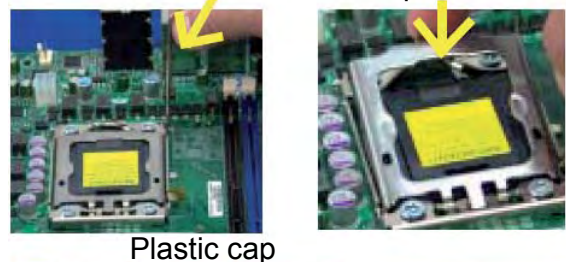
Plastic cap

3. Hold the plastic cap at its north and south center edges to remove it from the CPU socket.
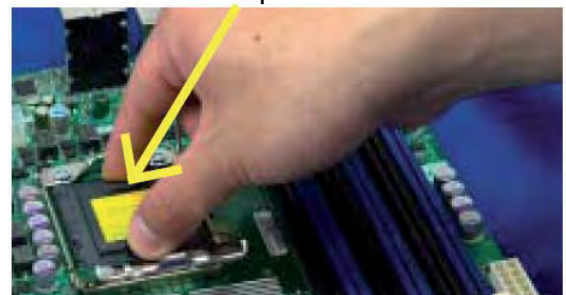
Hold the north and south edges of the plastic cap to remove it

4. After removing the plastic cap, using your thumb and the index nger , hold the CPU at the north and south center edges.

5. Align the CPU key, the semi-circle cutout, against the socket key, the notch below the gold color dot on the side of the socket.

6. Once both the CPU and the socket are aligned, carefully lower the CPU straight down into the socket. (Do not rub the CPU against the surface of the socket or its pins to avoid damaging the CPU or the socket.).

7. With the CPU inside the socket, inspect the four corners of the CPU to make sure that the CPU is properly installed..

8. Once the CPU is securely seated on the socket, lower the CPU load plate to the socket.

9. Use your thumb to gently push the socket clip down to the clip lock..

Warning: Please save the plastic cap. The serverboard must be shipped with the plastic cap properly installed to protect the CPU socket pins. Shipment without the plastic cap properly installed will cause damage to the socket pins..

CPU

CPU Socket
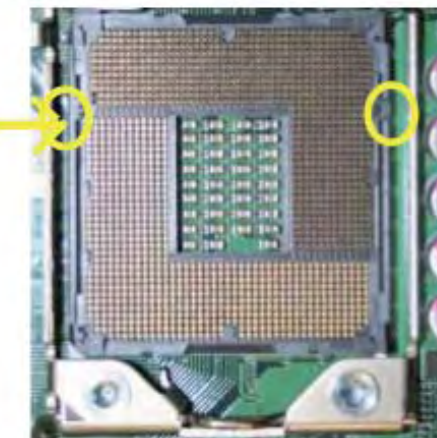
Socket keys

CPU keys

Load Plate
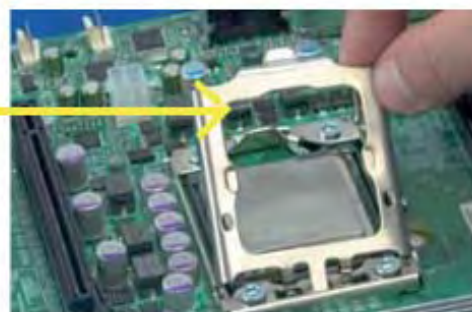
Installing a CPU Heatsink

1. Do not apply any thermal grease to the heatsink or the CPU die because the required amount has already been applied.

Screw #1   Screw #2
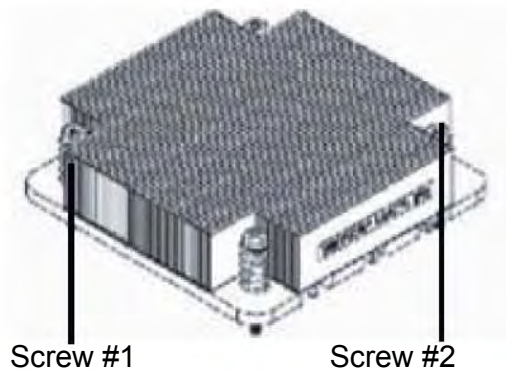
2. Place the heatsink on top of the CPU so that the four mounting holes are aligned with those on the retention mechanism.

Screw #1   Screw #2
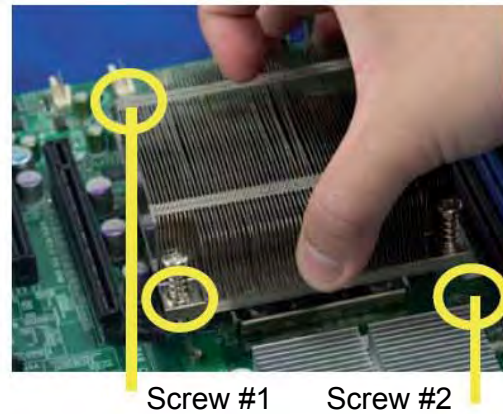
Install Screw #1

3. Install two diagonal screws (ie the #1 and the #2 screws) and tighten them until just snug (-do not fully tighten the screws to avoid possible damage to the CPU.)
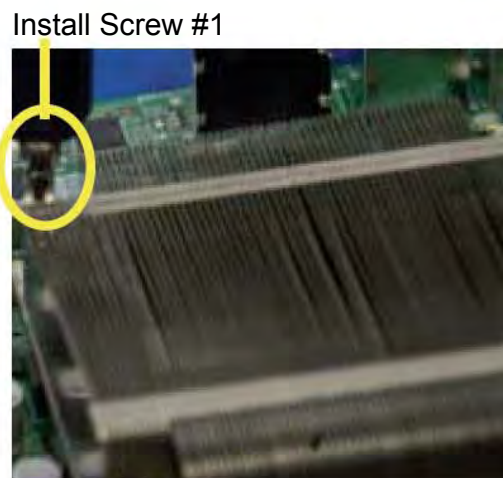
4. Finish the installation by fully tightening all four screws.
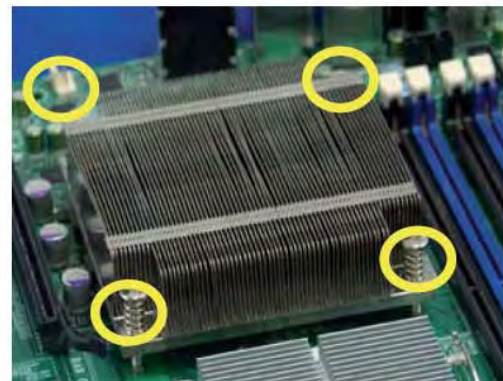
Removing the Heatsink

⚠️ !	**Warning**: We do not recommend that the CPU or the heatsink be removed. However, if you do need to remove the heatsink, please follow the instructions below to uninstall the heatsink and prevent damage to the CPU or other components.

1. Unplug the power cord from the power supply.

2. Disconnect the heatsink fan wires from the CPU fan header.

3. Using a screwdriver, loosen and remove the heatsink screws from the serverboard in the sequence as show in the picture on the right.

Using a screwdriver to remove Screw #1

4. Hold the heatsink as shown in the picture on the right and <u>gently</u> wriggle the heatsink to loosen it from the CPU. (Do not use excessive force when wriggling the heatsink.)

Remove Screw #2

5. Once the heatsink is loosened, remove it from the CPU socket.

6. To reinstall the CPU and the heatsink, clean the surface of the CPU and the heatsink to get rid of the old thermal grease. Reapply the proper amount of thermal grease on the surface before reinstalling them on the serverboard.

5-6   Installing Memory

CAUTION

Exercise extreme care when installing or removing DIMM modules to prevent any possible damage. Also note that the memory is interleaved to improve performance (See step 1).

Installing a DIMM

1. Insert the desired number of DIMMs into the memory slots, starting with P1-DIMM 1A. For best memory performance, please install memory modules of the same type and same speed on the memory slots as indicated on the tables below. (See the Memory Installation Table Below.)

2. Insert each DIMM module vertically into its slot. Pay attention to the notch along the bottom of the module to prevent inserting the DIMM module incorrectly.

3. Gently press down on the DIMM module until it snaps into place in the slot. Repeat for all modules.

Memory Population for Optimal Performance For a serverboard with One CPU (CPU1) installed					
	Branch 0		Branch 1		Branch 2	
3 DIMMs	P1-DIMM1A		P1-DIMM2A		P1-DIMM3A	
6 DIMMs	P1-DIMM1A	P1-DIMM1B	P1-DIMM2A	P1-DIMM2B	P1-DIMM3A	P1-DIMM3B

Memory Population for Optimal Performance For a serverboard with One CPU (CPU2) installed					
	Branch 0		Branch 1		Branch 2	
3 DIMMs	P2-DIMM1A		P2-DIMM2A		P2-DIMM3A	
6 DIMMs	P2-DIMM1A	P2-DIMM1B	P2-DIMM2A	P2-DIMM2B	P2-DIMM3A	P2-DIMM3B

Memory Population for Optimal Performance For a serverboard with Two CPUs installed											
	CPU1						CPU2					
	Branch 0		Branch 1		Branch 3		Branch 0		Branch 1		Branch 3	
6 DIMMs	1A		2A		3A		1A		2A		3A	
12 DIMMs	1A	1B	2A	2B	3A	3B	1A	1B	2A	2B	3A	3B

Memory Support

The R424-E2/R424-INF-E2 supports up to 96 GB Registered ECC or 24 GB of Unbuffered ECC/Non-ECC DDR3 1333 MHz/1066 MHz/800 MHz in 12 DIMMs (with maximum of 8 GB of Registered ECC per DIMM slot).

Note: Memory speed support is dependent on the type of CPU used on the board.

Nehalem DIMM Module Population Configuration

DIMM Population Table				
DIMM Slots per Channel	DIMMS Populated per Channel	DIMM Type Reg.=Registered	Speeds (in MHz)	Ranks per DIMM Any combination: SR=Single Rank, DR=Dual Rank, QR=Quad Rank.
2	1	Reg. DDR3 ECC	800, 1066, 1333	SR or DR
2	1	Reg. DDR3 ECC	800, 1066	QR
2	2	Reg. DDR3 ECC	800, 1066	Mixing SR, DR
2	2	Reg. DDR3 ECC	800	Mixing SR, DR, QR

Note 1: Due to OS limitations, some operating systems may not show more than 4 GB of memory.

Note 2: Due to memory allocation to system devices, the amount of memory that remains available for operational use will be reduced when 4 GB of RAM is used. The reduction in memory availability is disproportional.

Westmere DIMM Module Population Configuration

DIMM Population Table				
DIMM Slots per Channel	DIMMS Populated per Channel	DIMM Type Reg.=Registered	Speeds (in MHz)	Ranks per DIMM Any combination: SR=Single Rank, DR=Dual Rank, QR=Quad Rank.
2	1	Reg. DDR3 ECC	1066, 1333	SR or DR
2	1	Reg. DDR3 ECC	1066, 1333	QR
2	2	Reg. DDR3 ECC	1066, 1333	Mixing SR, DR
2	2	Reg. DDR3 ECC	1066, 1333	Mixing SR, DR, QR

Possible System Memory Allocation & Availability		
System Device	Size	Physical Memory Available (4 GB Total System Memory)
Firmware Hub ash memory (System BIOS)	1 MB	3.99 GB
Local APIC	4 KB	3.99 GB
Area Reserved for the chipset	2 MB	3.99 GB
I/O APIC (4 Kbytes)	4 KB	3.99 GB
PCI Enumeration Area 1	256 MB	3.76 GB
PCI Express (256 MB)	256 MB	3.51 GB
PCI Enumeration Area 2 (if needed) -Aligned on 256-MB boundary-	512 MB	3.01 GB
VGA Memory	16 MB	2.85 GB
TSEG	1 MB	2.84 GB
Memory available to OS & other applications		2.84 GB

Installing and Removing DIMMs

To install: Insert module vertically and press down until it snaps into place. Pay attention to the alignment notch at the bottom.

To Remove: Use your thumbs to gently push the release tabs near both ends of the module. This should release it from the slot.
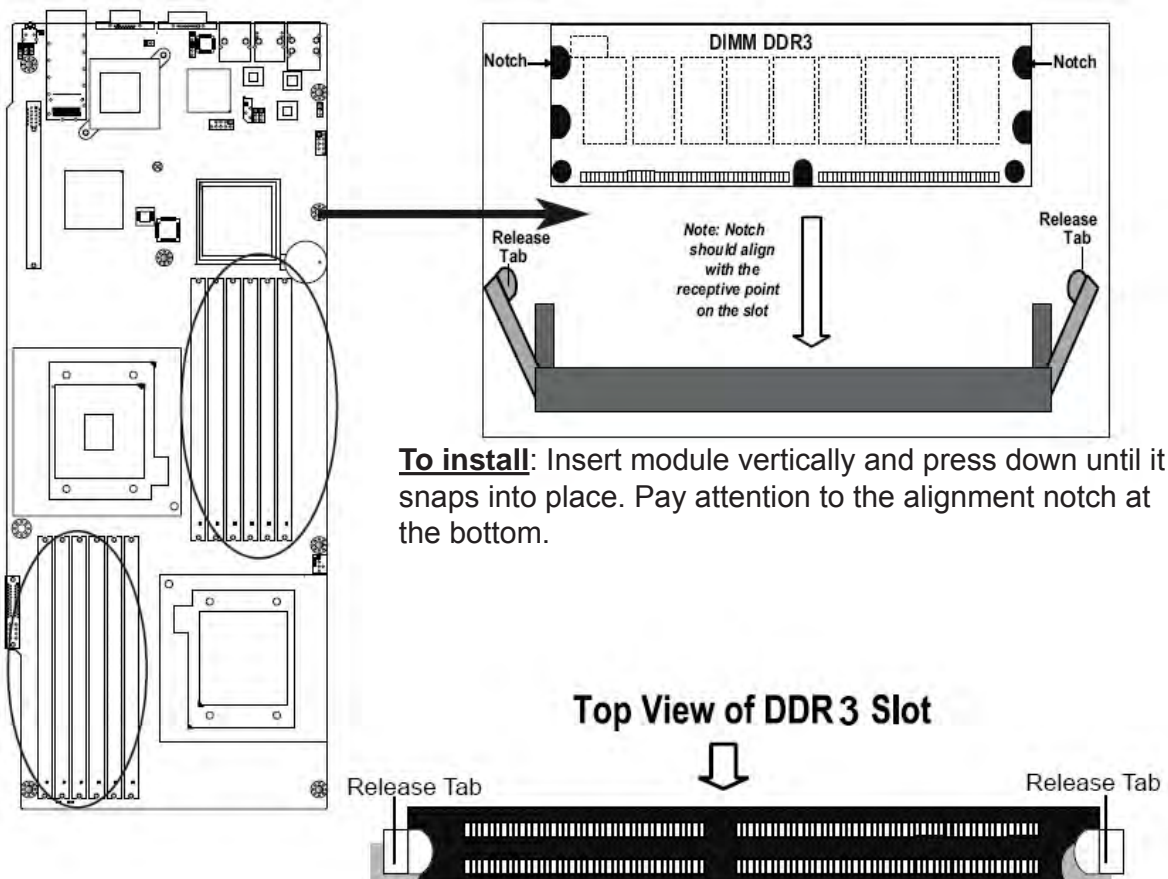
Figure 5-3. DIMM Installation

5-7   Adding PCI Cards

Add-on Card/Expansion Slot Setup
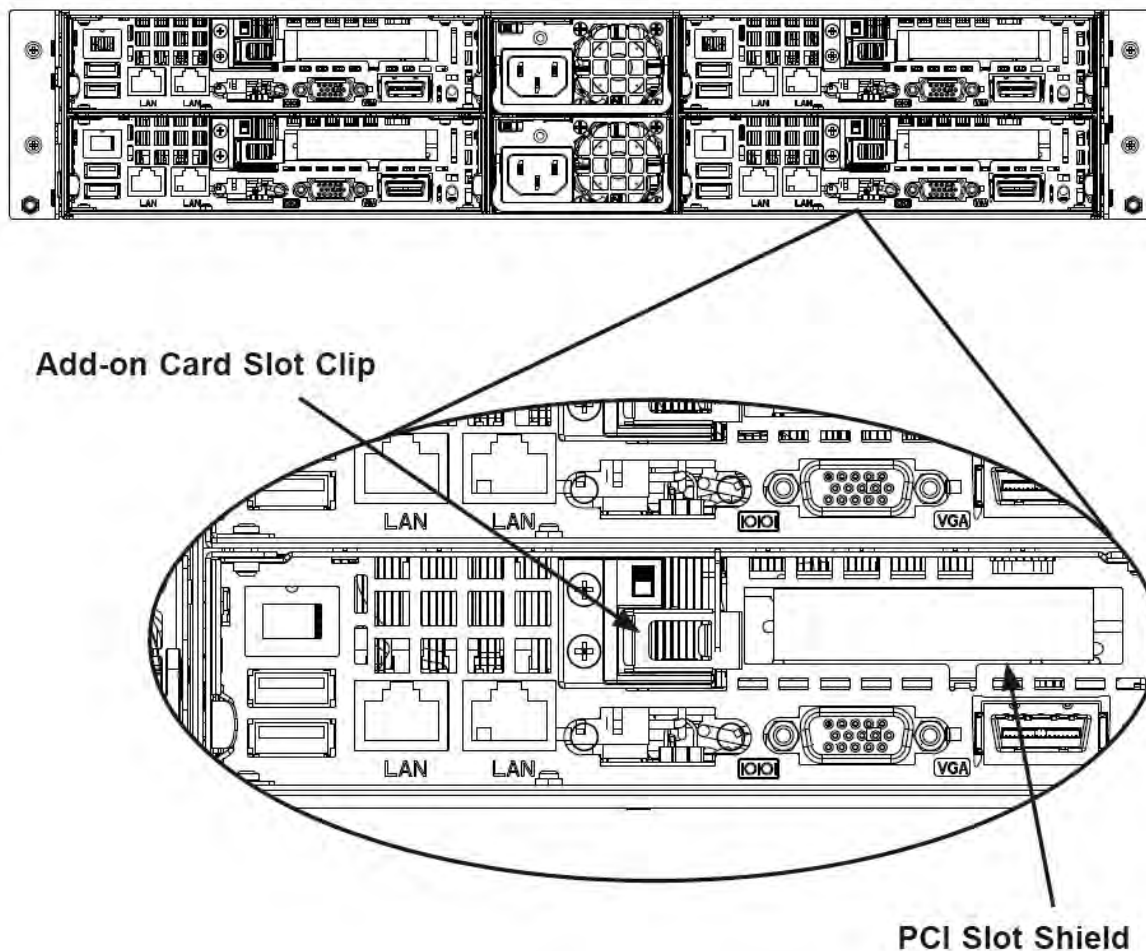
Figure 5-3. I/O Shield Configuration

Installing the Riser Card

1. Disconnect the power supply and lay the chassis on a at surface.

2. Pull the serverboard node drawer from the chassis.

3. Remove the add-on card bracket.
    3a. Remove the screw securing the add-on bracket to the back of the drawer.
    3b. Lift the bracket out of the serverboard node drawer.

4. Align the riser card mounting hole to the bracket standoff and secure the riser card to the bracket using the two screws included in the accessory box.

5. Insert the riser card along with the riser bracket into the serverboard.

6. Secure the riser bracket to the serverboard node drawer's rear window.
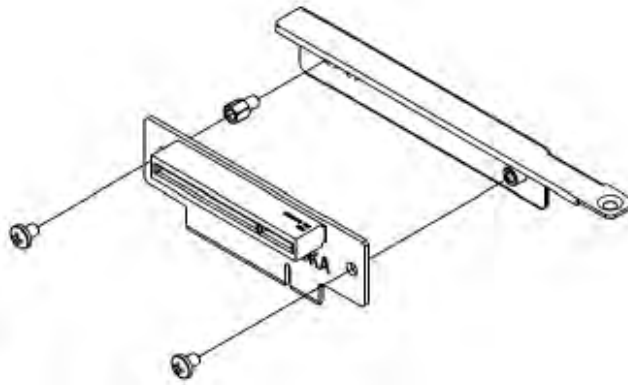
Figure 5-4. Installing the Riser Card

Installing Add-on Cards

1. Disconnect the power supply, lay the chassis on a at surface, and open the chassis cover.

2. Pull out the serverboard node drawer from the chassis.

3. Pull open the add-on card slot clip in the rear of the serverboard node drawer.

4. Remove the PCI slot shield.

5. Place the add-on card into the serverboard node drawer.

6. Slide the add-on card into the rear riser card slot and t the add-on card bracket with the opening in the rear of the serverboard node drawer.

7. Close the add-on card slot clip.
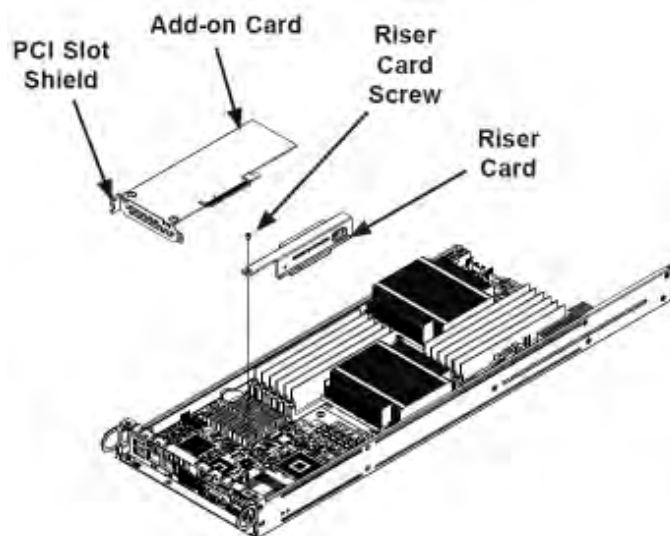
Figure 5-5. Installing the Add-on Card

5-8   Serverboard Details

Figure 5-6. bullx R424-E2 serverboard image

Model Variations			
	R424-E2	**R424-INF-E2 (DDR)**	**R424-INF-E2 (QDR)**
IPMI 2.0 w/ KVM Over LAN	Yes	Yes	Yes
InfiniBand Connection	No	Yes	Yes
DDR IB	No	Yes	No
QDR IB	No	No	Yes

Note: The drawings and pictures shown in this manual were based on the latest PCB Revision available at the time of publishing of the manual. The serverboard you've received may or may not look exactly the same as the graphics shown in the manual.

Figure 5-7. bullx R424-E2 Layout
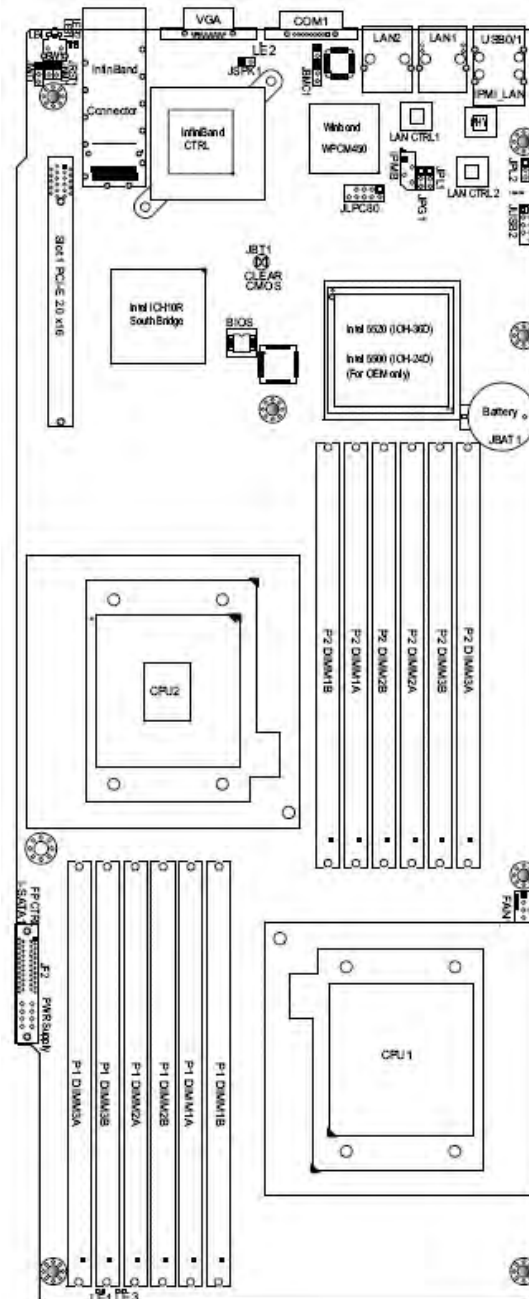
1. **J**umpers not indicated are for test purposes only. For more information on jumpers or components, refer to 'Jumper Settings' in this chapter.

2. " " indicates the location of Pin 1.

3. When LE1 LED is on, the onboard power connection is on. Make sure to unplug the power cables before removing or installing components.

4. To use Hot-swap support on the 827 chassis, connect a cable to pins 2~3 on JPEN1. Close pins 1~2 of JPEN1 with a cap to use regular PWR setting.

5. To avoid overheating, be sure to provide adequate air ow to the system.

Figure 5-8. bullx R424-E2 serverboard Quick Reference
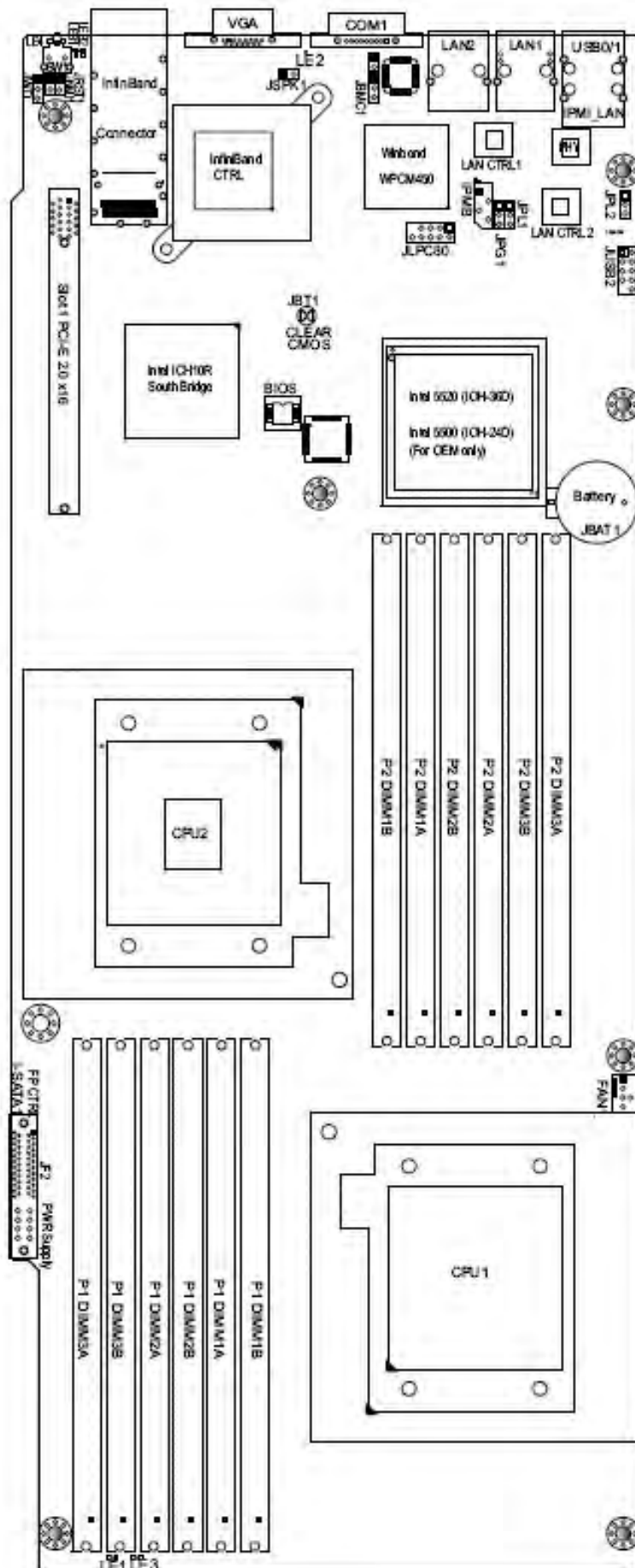
R424-E2 Quick Reference

Jumper	Description	Default Setting
JBMC1	BMC Enable/Disable	Pins 1-2 (Enabled)
JBT1	CMOS Clear	(See Section 5-10)
JPEN1	Normal Power Enable	Pins 1-2 (Enabled)
JPG1	VGA Enable/Disable	Pins 1-2 (Enabled)
JPL1	LAN1/2 Enable/Disable	Pins 1-2 (Enabled)
J_UID_OW	Red LED Overwrite	Open (Overwrite)
JWD1	Watch Dog Enable/Disable/Reset	Pins 1-2 (Reset)

Connector	Description
COM1	COM1 Serial Port
FAN 1-4	System/CPU Fan Headers
In niBand	In niBand Connector
IPMB	IPMB Header (for an IPMI Card)
PWR I^{2}C	Power Supply SMBus I^{2}C Header
JF1	Front Panel Connector
JNMI1	NMI (Non-Masked Interrupt) Header
JP10	Onboard 4-pin Power Connector
JPSK1	Internal Speaker/Buzzer Header
JTPM1	Trusted Platform Module Header
JWR1/JWR2	12V 20-pin Power Connectors
JWOL1	Wake-On-LAN Header
LAN1/2	Gigabit Ethernet (RJ45) Ports
IPMI LAN	Dedicated IPMI LAN Port
SATA0 ~ SATA5	SATA Ports
SMBus	System Management Bus Header
SW1	Unit Identifer Switch
T-SGPIO-0/T-SGPIO-1	Serial General Purpose Input/Output Headers
USB0/1, USB 2/3	Universal Serial Bus (USB) Ports 0/1, 2/3

LED	Description
LE1	Standby Power LED
LE2	BMC Heartbeat LED
LE4	(Rear) Unit Identifer (UID) LED Indicator
LEB1	In niBand Link LED
LEB2	BMC Activity LED

Serverboard Features

CPU

- Two Intel® Xeon® 5500 Series processors (code-named Nehalem EP) or Intel® Xeon® 5600 Series processors (code-named Westmere EP) with each processor supporting two full-width Intel QuickPath Interconnect (QPI) links with a total of up to 51.2 GT/s Data Transfer Rate supported (6.4 GT/s per direction)

Memory

- Twelve 240-pin DIMM sockets support up to 96 GB of DDR3 Registered ECC or 24 GB of Unbuffered ECC/Non-ECC 1333/1066/800 MHz Memory (with max. 8 GB of Registered ECC per DIMM slot.).

Chipset

- Intel 5520 chipset, including: the 5520 (IOH-36D) and the ICH10R (South Bridge).

Expansion Slot

- One PCI-E x16 Gen. 2.0 slot (Slot 1)

BIOS

- 32 Mb AMI SPI Flash ROM
- ACPI 1.0/2.0/3.0, Plug and Play (PnP), and USB Keyboard support PC Health Monitoring
- Onboard voltage monitors for CPU1 VCore, CPU2 VCore, +5Vin, 12Vcc (V), VP1 DIMM, VP2 DIMM, +3.3Vcc (V), and Battery Voltage
- Fan status monitor with rmware control
- CPU/chassis temperature monitors
- I2C temperature sensing logic
- SDDC support
- Platform Environment Control Interface (PECI) ready
- CPU fan auto-off in sleep mode
- CPU slow-down on temperature overheat
- Pulse Width Modulation (PWM) Fan Control
- CPU thermal trip support for processor protection, power LED
- Power-up mode control for recovery from AC power loss
- Auto-switching voltage regulator for CPU cores
- System overheat/Fan Fail LED Indicator and control

ACPI Features

- Slow blinking LED for suspend state indicator
- Main switch override mechanism
- ACPI Power Management
- Keyboard Wakeup from Soft-off

Onboard I/O

- Intel ICH10R supports a SATA port (with RAID0, RAID1, RAID10, RAID5 supported in the Windows OS Environment and RAID 0, RAID 1, RAID 10 supported for the Linux OS)
- Winbond WPCM450 BMC (Baseboard Management Controller) supports IPMI 2.0 with KVM support
- Dual Intel 82574 Dual-LAN Gigabit Ethernet Controllers support dual Giga-bit LAN ports
- Onboard PHY Chip supports IPMI dedicated LAN
- One COM port
- In niBand Connector
- Up to four USB 2.0 (Universal Serial Bus) connections (2 Rear USB Ports and 1 Type A Header w/2 USB connections supported)
- Super I/O: Winbond W83527HG

Other

- Console redirection
- Onboard Fan Speed Control by Thermal Management via BIOS CD/Diskette Utilities
- • BIOS ash upgrade utility and device drivers

Dimensions

- Proprietary 16.64" (L) x 6.80" (W) (422.66 mm x 172.72 mm)

5-9   Back Panel Connector Pin Definitions

Universal Serial Bus (USB)

Two Universal Serial Bus ports (USB 0/1) are located on the I/O back panel. In addition, another two USB connections (USB 2/3) are located at JUSB2 to provide front chassis access. Connect USB cables to these USB ports/ headers to use USB connections. (USB cables are not included). See the tables on the right for pin definitions.

Back Panel USB 0/1 Pin Definitions

Pin#	Definition	Pin #	Definition
1	+5V	5	+5V
2	USB_PN1	6	USB_PN0
3	USB_PP1	7	USB_PP0
4	Ground	8	Ground

Front Panel USB 2/3 Pin Definitions

USB 2		USB 3	
Pin#	Definition	Pin #	Definition
1	+5V	6	+5V
2	USB_PN2	7	USB_PN3
3	USB_PP2	8	USB_PP3
4	Ground	9	Ground
5	No Connection	5	Key

1: USB 0
2: USB 1
3: USB 2/3
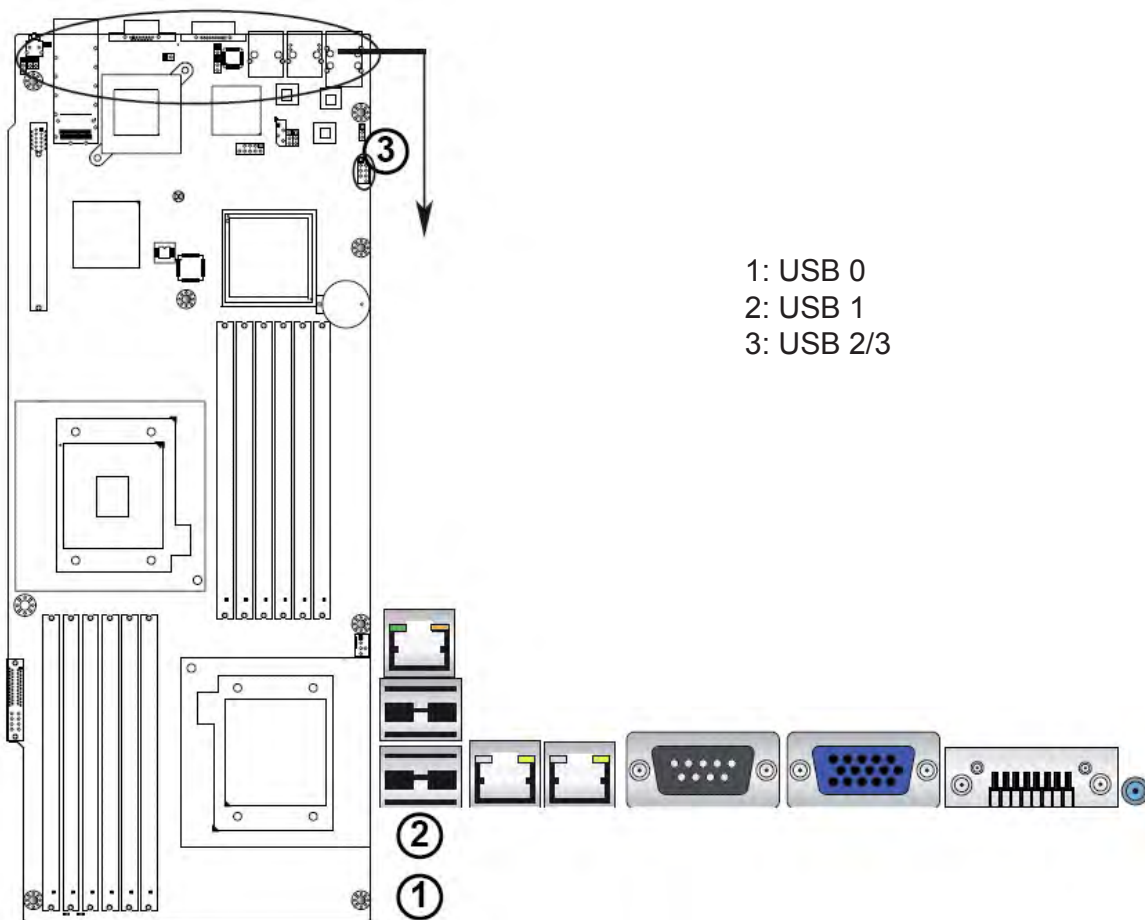
Ethernet Ports

Two Ethernet ports are located next to the USB 0/1 on the IO Backplane. In addition, an IPMI Dedicated LAN is located above the USB ports 0/1. These ports accept RJ45 type cables.

Notes:

1. The IPMI Dedicated LAN is for R424-E2/R424-INF-E2.

2. Please refer to the LED Indicator Section for LAN LED information.

LAN Ports Pin Definitions			
Pin #	De nition	Pin #	De nition
1	P2V5SB	10	SGND
2	TD0+	11	Act LED
3	TD0-	12	P3V3SB
4	TD1+	13	Link 100 LED (Yellow, +3V3SB)
5	TD1-	14	Link 1000 LED (Yellow, +3V3SB)
6	TD2+	15	Ground
7	TD2-	16	Ground
8	TD3+	17	Ground
9	TD3-	18	Ground

1: LAN1
2: LAN2
3: IPMI Dedicated LAN
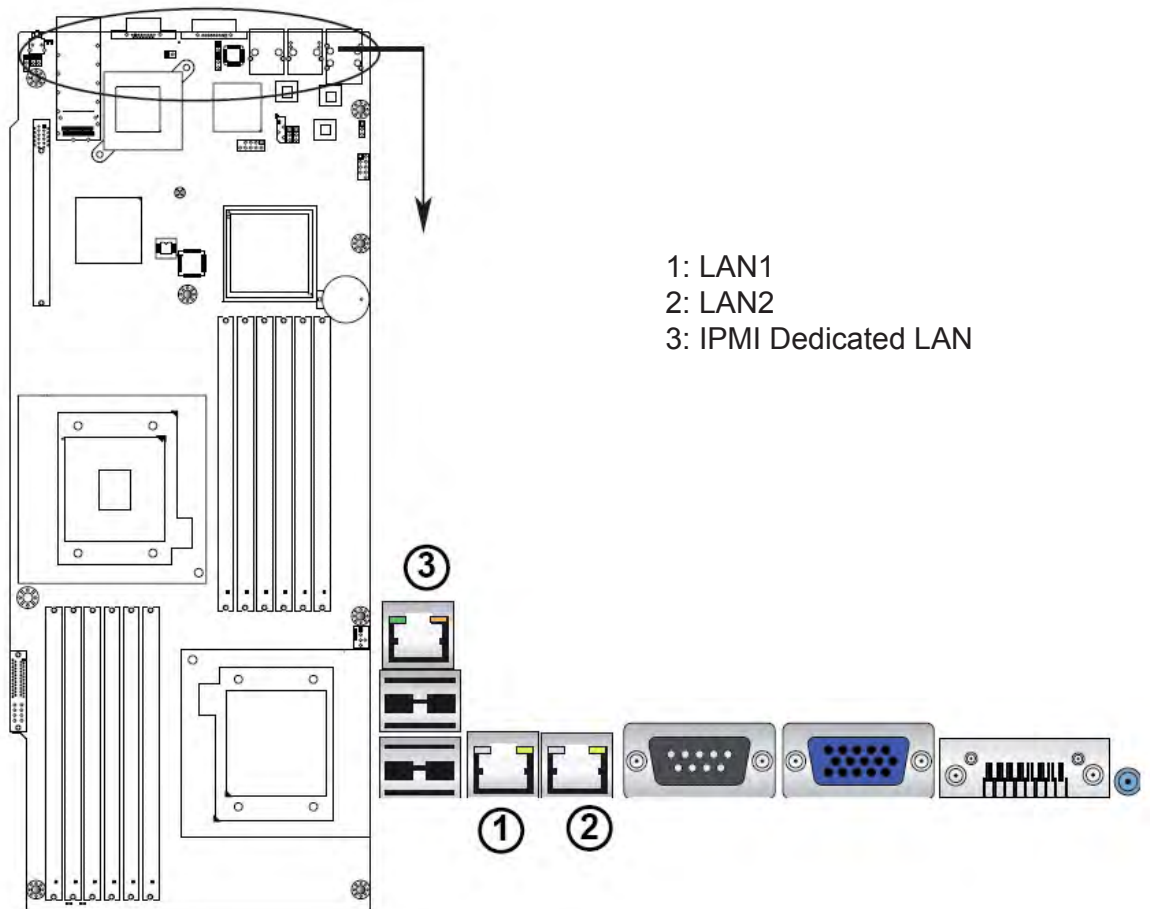
Serial Ports

A COM Port is located on the IO Backplane. See the table on the right for pin de nitions..

Serial Ports Pin Definitions (COM1)			
Pin #	De nition	Pin #	De nition
1	CDC	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	Ground		

Video Connector

A Video (VGA) connector is located next to the COM Port on the IO backplane. This connector is used to provide video and CRT display. Refer to the board layout below for the location.

1: COM Port
2: VGA Port
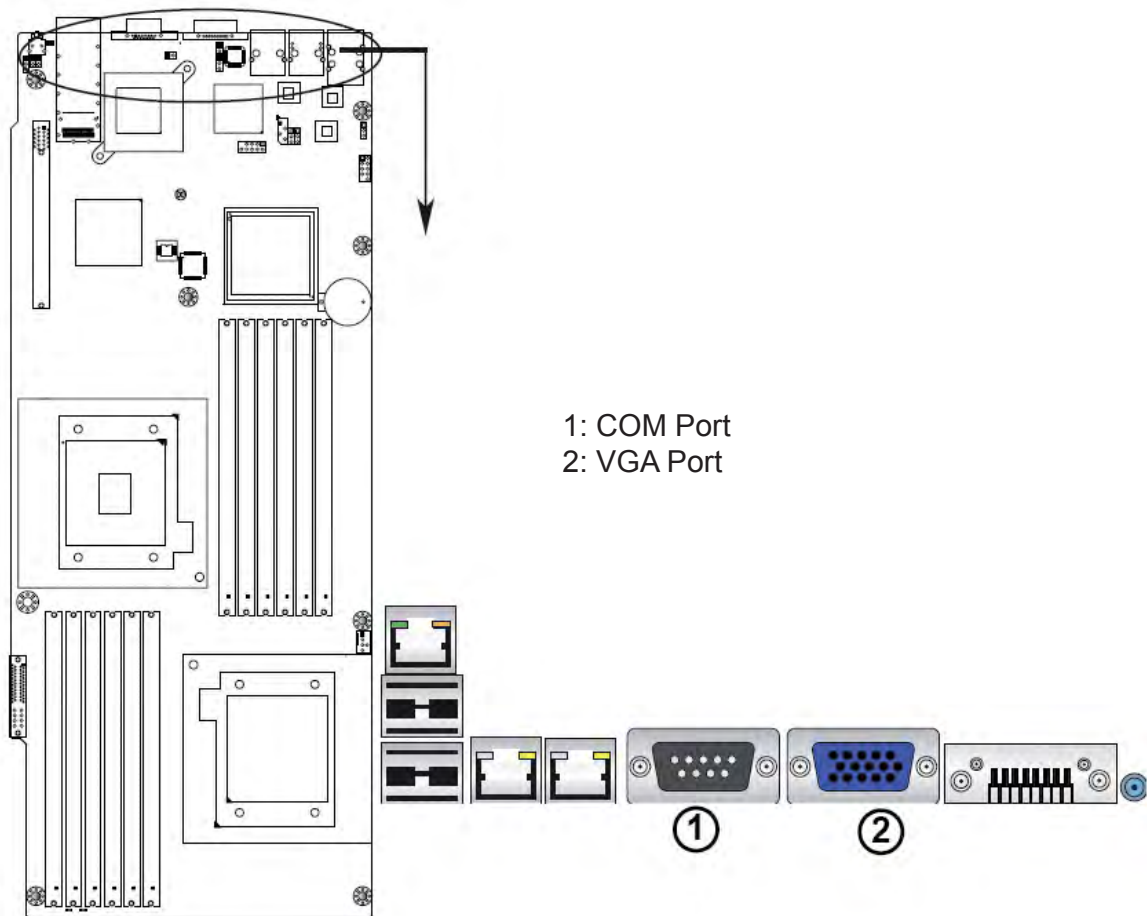
InfiniBand Connecttion (R424-INF-E2)

The onboard InfiniBand connector is located on the backplane on the serverboard. This switch is primarily used for High-performance computing. See the table on the right for pin de nitions..

	InfiniBand Pin Definitions			
Pin #	De nition	Pin #	De nition
S1	Input Pair0:Pos	S9	Input Pair3:Pos
S2	Input Pair0: Neg	S10	Input Pair3: Neg
S3	Input Pair1:Pos	S11	Input Pair2:Pos
S4	Input Pair1: Neg	S12	Input Pair2: Neg
S5	Input Pair2:Pos	S13	Input Pair1:Pos
S6	Input Pair2: Neg	S14	Input Pair1: Neg
S7	Input Pair3:Pos	S15	Input Pair0:Pos
S8	Input Pair3: Neg	S16	Input Pair0: Neg
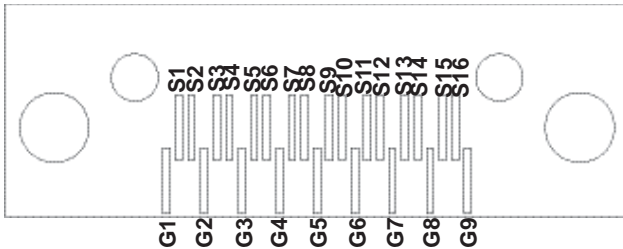
InfiniBand Ground Pins (G1~G9) Pin Definitions	
Pin#	De nitions
G1~G9	Ground
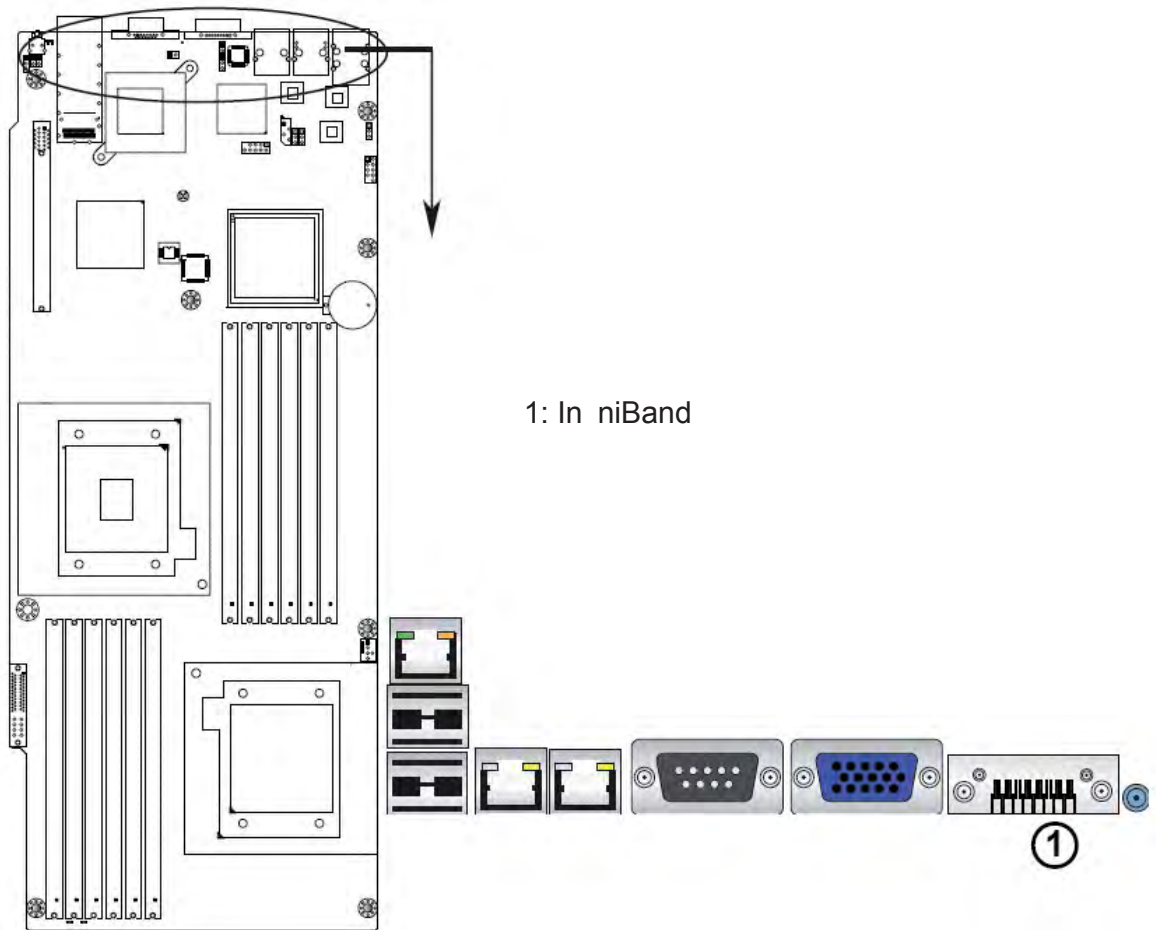
1: In niBand

Unit Identifier Switches

Two Unit Identi er (UID) Switches and LED Indicators are located on the serverboard. The Front Panel UID Switch is located at Pin 16 on JF2. The Rear UID Switch is located at SW1 next to the In niBand Connector. The Front Panel UID LED is located at Pin 17 of JF2, and the Rear UID LED is located at LE4. When you press a UID switch on the front panel or on the back panel, both Rear UID LED and Front Panel UID LED Indicators will be turned on. Press the UID switch again to turn off both LED Indicators. These UID Indicators provide easy identi cation of a system unit that may be in need of service. See the table on the right for pin de nitions.

UID Switch	
Pin#	De nition
1	Ground
2	Ground
3	Button In
4	Ground

> **Note**: UID LED is supported by the physical switch or the BMC. When it is controlled by the physical switch, it will stay solid. When it is controlled by the BMC, it will blink.

UID Switches & LEDs	
Description#	Location
FP Switch	Pin 16 on JF2
Rear Switch	SW1
FP UID LED (Blue LED)	Pin 17 on JF2
Rear UID LED	LE4

1: Rear UID Switch
2: FP UID Switch & UID LED
3: Rear UID Switch and Rear UID LED
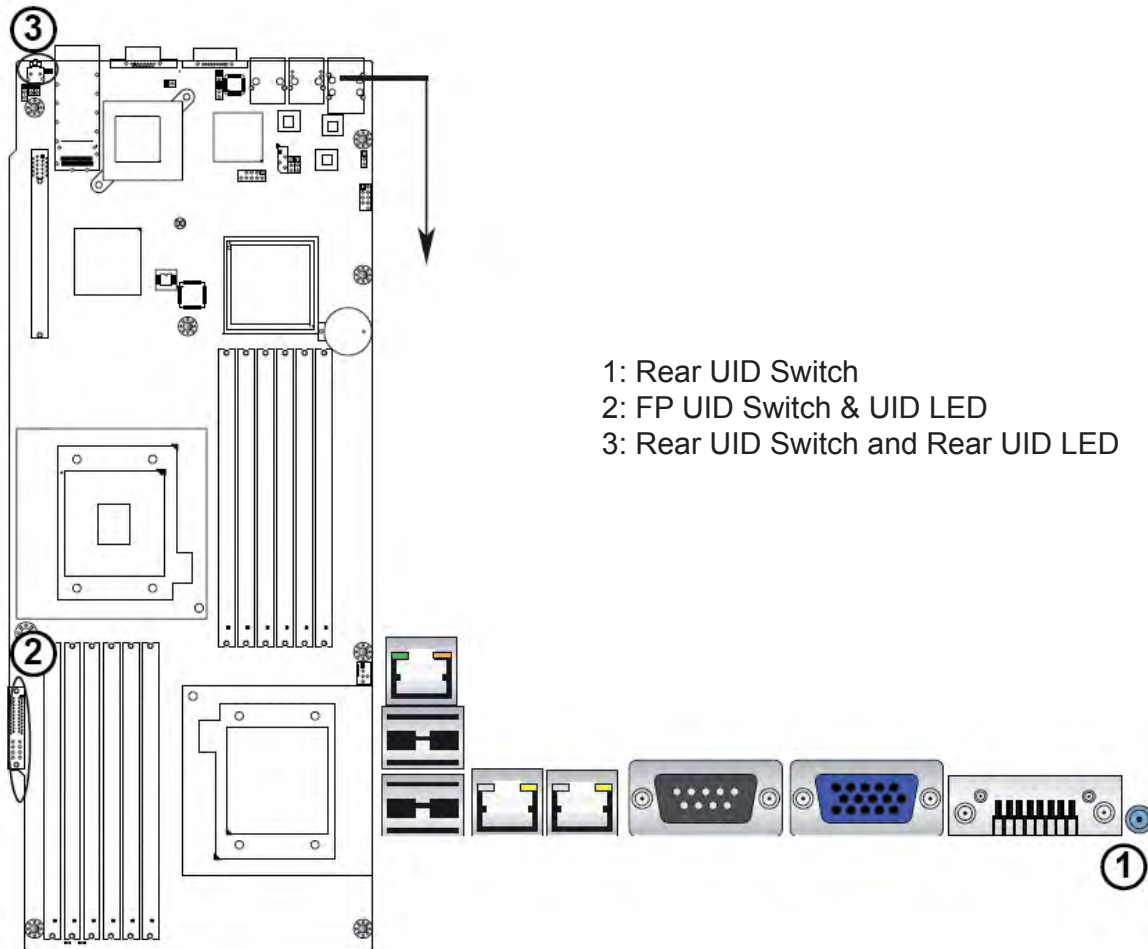
5-10 Front Panel Accessible Add-on Card Header (JF2)

JF2 Add-on card header provides front access to the power supply, Serial ATA and Front Panel Control connections for the R424-E2 serverboard. Plug an Add-On card into this header to use the functions indicated above. This header is designed speci cally for this serverboard. Refer to the tables below for pin-out de nitions.
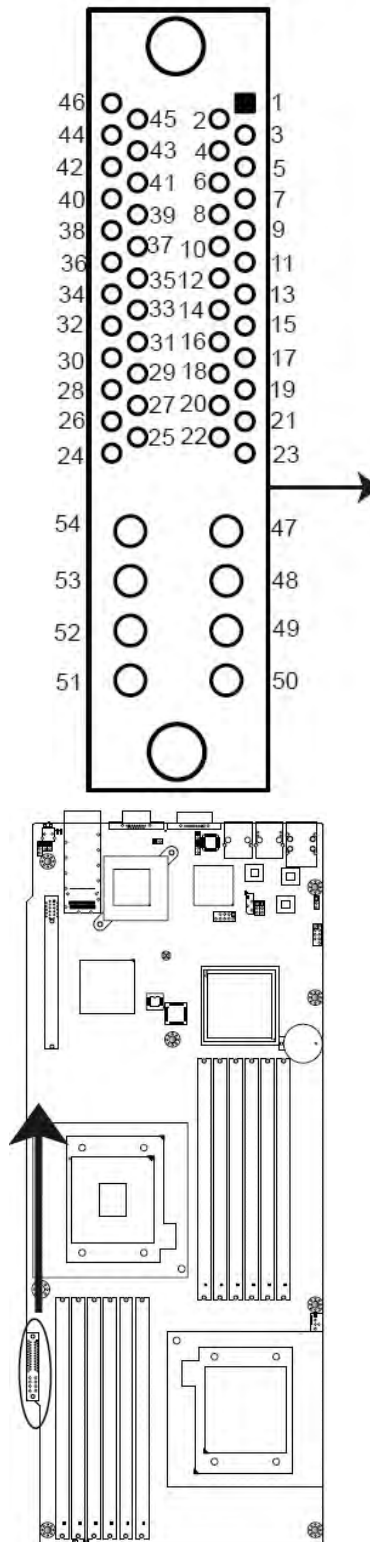
JF2 Header Pin-Out Definitions			
Pin #	Pin De nition	Pin #	Pin De nition
46	Ground	1	P5V_Standby
45	SATA3_RX_P_C	2	P5V_Standby
44	SATA3_RX_N_C	3	No connection
43	Ground	4	PS_ON_OR_N
42	SATA_TX_P_C	5	No connection
41	SATA3_TX_N_C	6	No connection
40	Ground	7	P12V_Enable
39	SATA2_RX_P_C	8	Fan_PWM
38	SATA2_RX_N_C	9	TACHO_A1
37	Ground	10	TACHO_A2
36	SATA2_TX_P_C	11	SMBCLK_PS
35	SATA2_TX_N_C	12	SMBDAT_PS
34	Ground	13	PS_PWRFail_N_R
33	SATA1_RX_P_C	14	Link_Act_1_N
32	SATA1_RX_N_C	15	FP_PWR_LED_N
31	Ground	16	UID_SW_FP_N
30	SATA1_TX_P_C	17	Blue_C
29	SATA1_TX_N_C	18	Red_C
28	Ground	19	FP_PWRBTN_R
27	SATA0_RX_P_C	20	Ground
26	SATA0_RX_N-C	21	SATA0_TX_N_C
25	Ground	22	SATA0_TX_P_C
24	No connection	23	Ground
54	Ground	47	P12V_In
53	Ground	48	P12V_In
52	Ground	49	P12V_In
51	Ground	50	P12V_In

5-11 Connecting Cables.

NMI Header

The non-maskable interrupt header is located at JNMI1. Refer to the table on the right for pin de nitions.

NMI Button Pin Definitions (JF1)	
Pin#	De nition
1	Control
2	Ground

Internal Buzzer

The Internal Buzzer, located at JSPK1, can be used to provide audible alarms for various beep codes. See the table on the right for pin de nitions. Refer to the layout below for the locations of the Internal Speaker/Buzzer.

Internal Buzzer Pin Definitions		
Pin#	De nition	
1	Pos. (+)	Beep In
2	Neg. (-)	Alarm Speaker
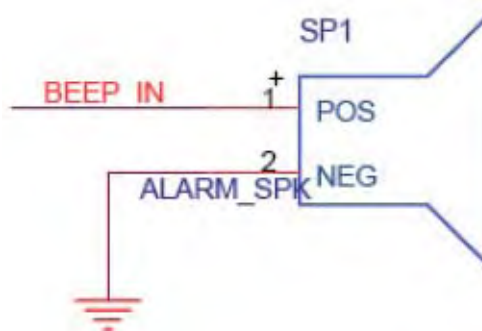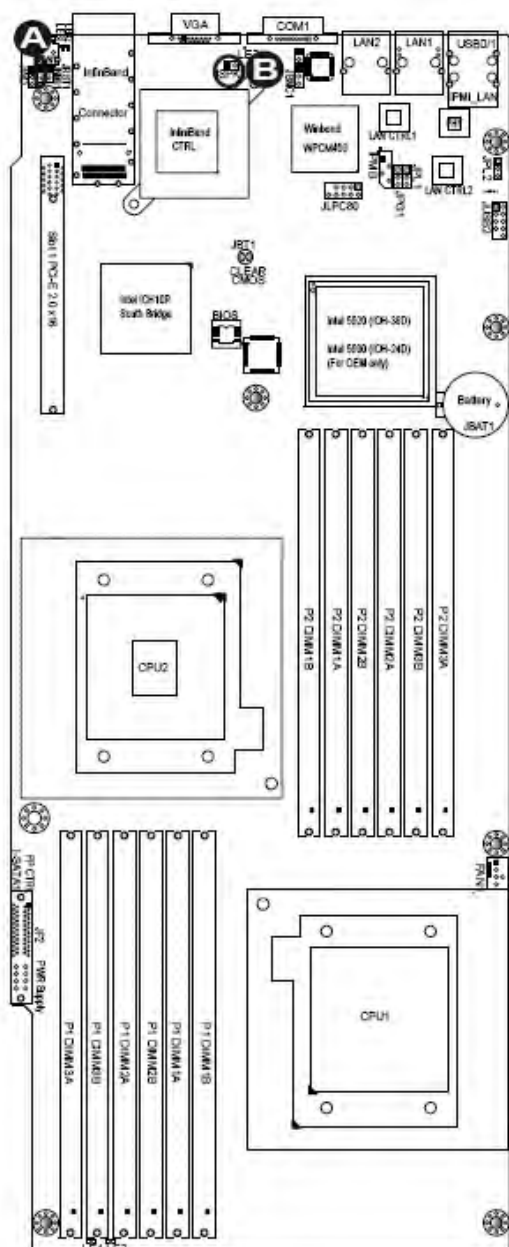
A: NMI Header
B: Internal Speaker

IPMB I²C SMB

A System Management Bus header for the IPMI slot is located at IPMB. Connect the appropriate cable here to use the IPMB I²C connection on your system.

SMB Header Pin Definitions	
Pin#	De nition
1	Data
2	Ground
3	Clock
4	No Connection

Fan Header

The R424-E2 serverboard has a cooling fan on the serverboard. This 4-pin fan header is backward compatible with the traditional 3-pin fan. However, fan speed control is only available for a 4-pin fan. The fan speeds are controlled by Thermal Management via Hardware Monitoring in the Advanced Setting in the BIOS. (The Default setting is Disabled.). See the table on the right for pin de nitions..

Fan Header Pin Definitions	
Pin#	De nition
1	Ground
2	+12V
3	Tachometer
4	PWR Modulation
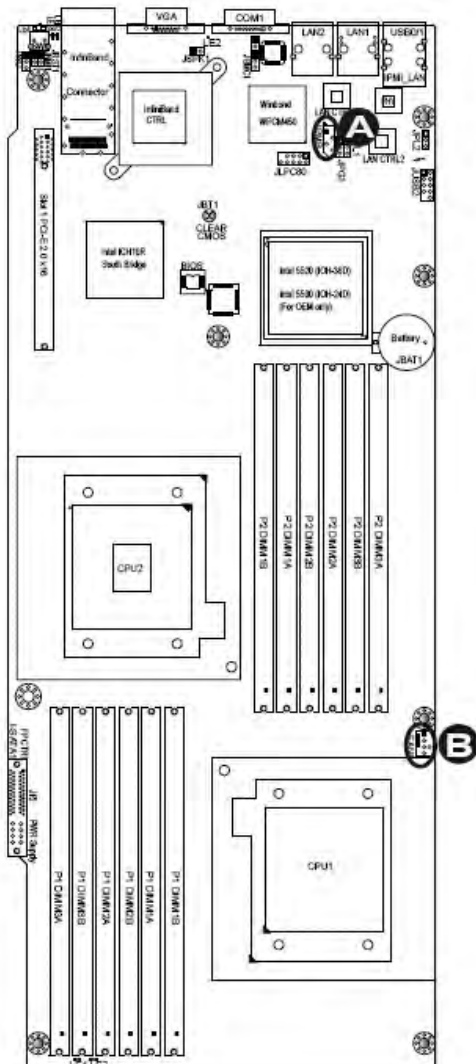
A: IPMB
B: Fan 1

Alarm Reset

If three power supplies are installed and Alarm Reset (JRST1) is enabled, the system will notify you when any of the three power modules fails. Connect JRST1 to a micro-switch to enable you to turn off the alarm that is activated when a power module fails. See the table on the right for pin definitions..

Alarm Reset	
Pin#	Definition
1	Ground
2	+5V
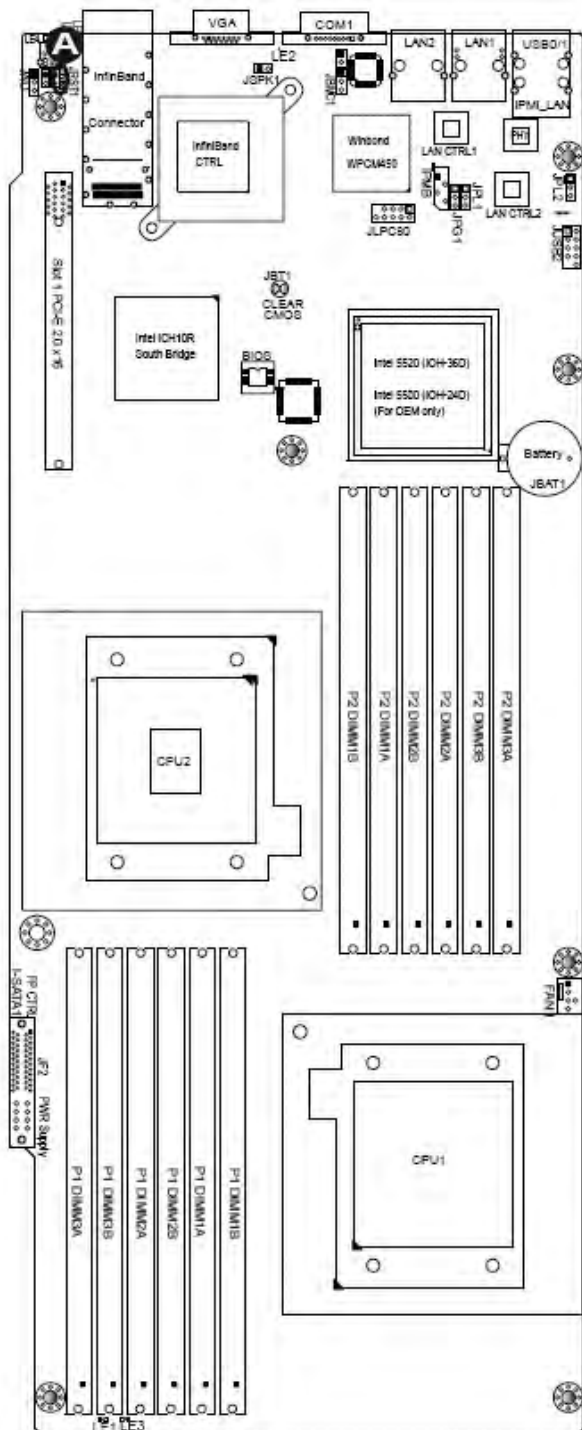
A: Alarm Reset

5-12 Jumper Settings

Explanation of Jumpers

To modify the operation of the serverboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identi ed with a square solder pad on the printed circuit board. See the serverboard layout pages for jumper locations.
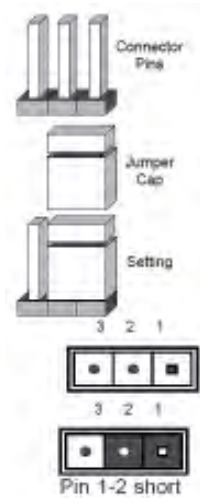
> **Note**: On two pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.

GLAN Enable/Disable

Use JPL1/JPL2 to enable or disable the GLAN Port 1 & GLAN Port 2 on the serverboard. See the table on the right for jumper settings.

GLAN Enable Jumper Settings	
Pin #	De nition
1-2	Enabled (default)
2-3	Disabled
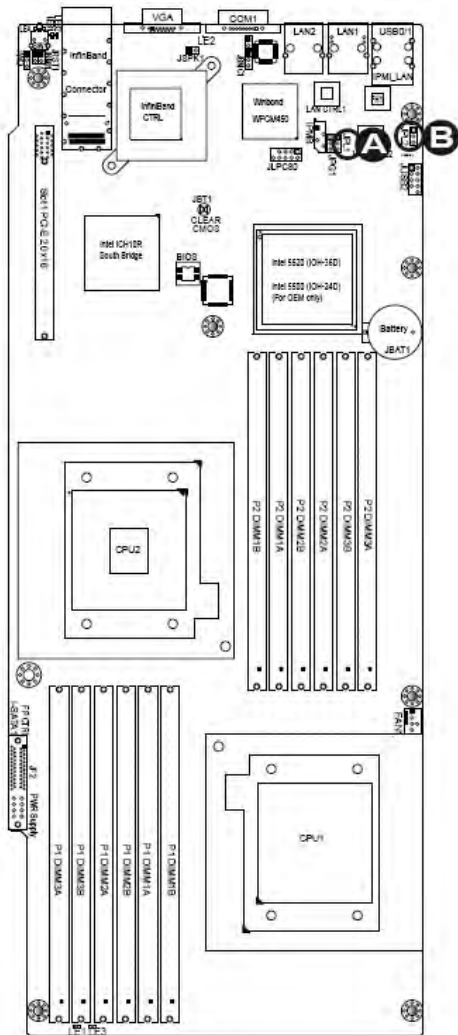
A: GLAN Port 1 Enable
B: GLAN Port 2 Enable

CMOS Clear

JBT1 is used to clear CMOS. Instead of pins, this "jumper" consists of contact pads to prevent the accidental clearing of CMOS. To clear CMOS, use a metal object such as a small screwdriver to touch both pads at the same time to short the connection. Always remove the AC power cord from the system before clearing CMOS.

> **Note**: For an ATX power supply, you must completely shut down the system, remove the AC power cord and then short JBT1 to clear CMOS.

Watch dog Enable/Disable

Watch Dog (JWD1) is a system monitor that reboots the system when a software application hangs. Close Pins 1-2 to reset the system if an application hangs. Close Pins 2-3 to generate a non-maskable interrupt signal for the application that hangs. See the table on the right for jumper settings. Watch Dog must also be enabled in the BIOS..

Watch Dog Jumper Settings	
Jumper Setting	De nition
Pins 1-2	Reset (default)
Pins 2-3	NMI
Open	Disabled
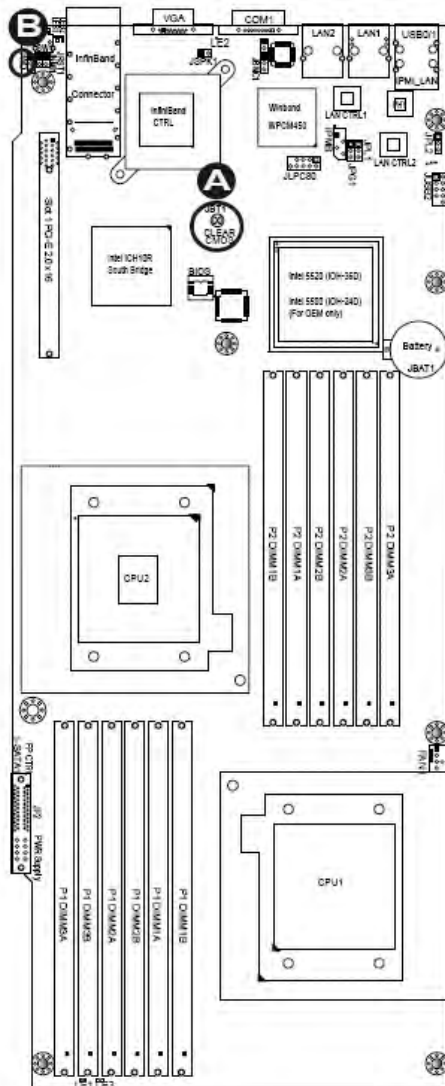
A: Clear CMOS
B: Watch Dog Enable

VGA Enable

JPG1 allows you to enable or disable the onboard VGA connection supported by the onboard VGA Controller. The default position is on pins 1 and 2 to enable VGA. See the table on the right for jumper settings.

VGA Enable/Disable Jumper Settings (JPG1)	
Both Jumpers	De nition
Pins 1-2	Enabled
Pins 2-3	Disabled
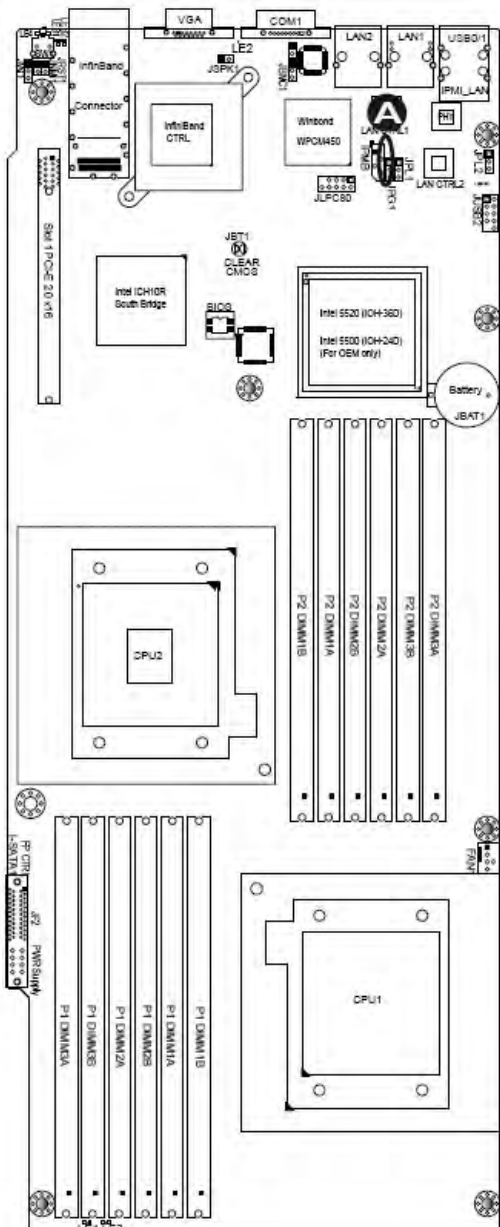
A: VGA Enable

5-13 Onboard Indicators

GLAN LEDs

There are two GLAN ports on the serverboard. An additional IPMI dedicated LAN port is also located on the R424-E2/R424-INF-E2. Each Gigabit Ethernet LAN port has two LEDs. The yellow LED indicates activity, while the Link LED may be green, amber or off to indicate the speed of the connection. See the tables at right for more information.

> **Note**: IPMI dedicated LAN does not operate at 1 Gbps.

L i n k
LED

Activity
LED

Rear View (when facing the rear side of the chassis)

GLAN Activity Indicator LED Settings		
Color	Status	De nition
Yellow	Flashing	Active

GLAN Link Indicator LED Settings	
LED Color	De nition
Off	No connection or 10 Mbps
Green	100 Mbps
Amber	1Gbps
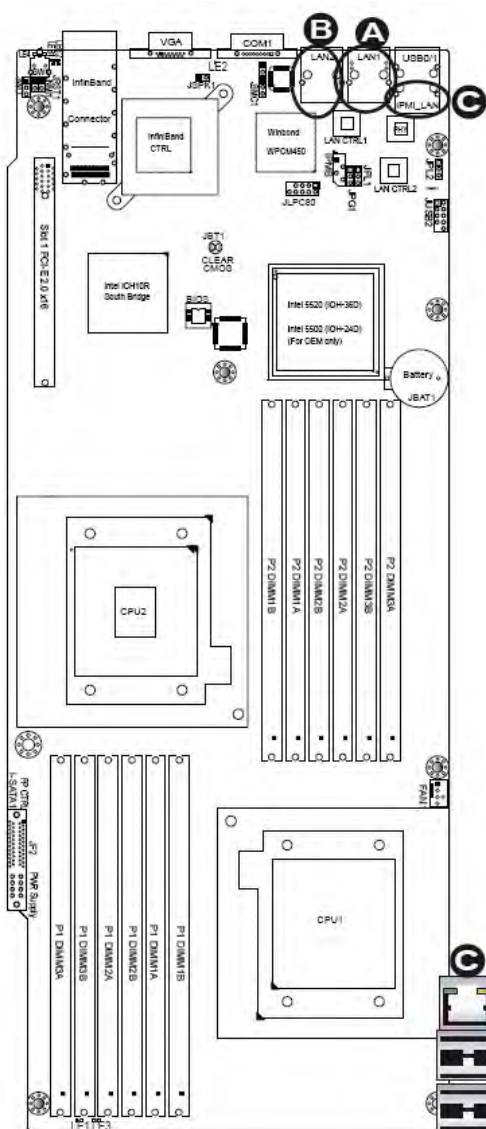
A: LAN 1
B: LAN 2
C: IPMI Dedicated LAN

InfiniBand LED Indicators (LEB1/LEB2)

Two InfiniBand LED Indicators (LEB1/LEB2) are located on the serverboard. The green LED (LEB1) is the InfiniBand Link LED. The yellow LED (LEB2) indicates activity. Refer to the table on the right for details. Also see the layout below for the LED locations.

Onboard Power LED

An Onboard Power LED is located at LE1 on the serverboard. When this LED is on, the system power is on. Be sure to turn off the system and unplug the power cord before removing or installing components. See the tables at right for more information.

InfiniBand Link LED (LEB1) Settings

Color	Status	Definition
Green	Solid	InfiniBand connected
Off	Off	No connection

InfiniBand Link LED (LEB2) Settings

Color	Status	Definition
Yellow	Solid	InfiniBand active
Yellow	Dim	InfiniBand: connected Activity: idle
Off	Off	No connection

Onboard PWR LED Indicator Settings

LED Color	Definition
Off	System Off (PWR cable not connected)
Green	System On
Green: flashing quickly	ACPI S1 State
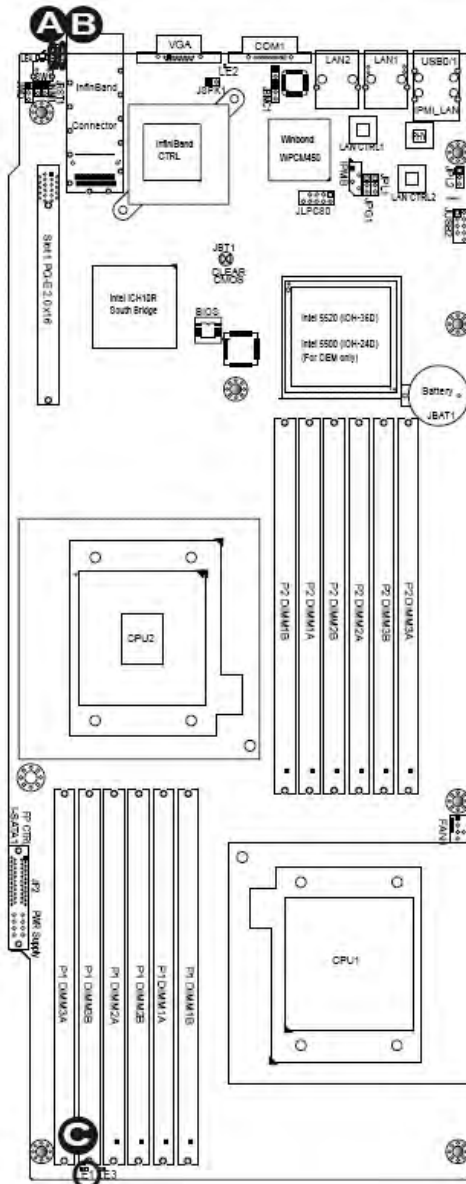
A: LEB1
B: LEB2
C: LE1

BMC Activity LED (LE2)

A BMC Heartbeat LED is located at LE2 on the serverboard. When LE2 is on, BMC (Baseboard Management Controller) is active. See the tables at right for more information..

BMC Heartbeat LED indicator LED Settings	
On	BMC is normal

HDD/SATA LED (LE3)

An HDD/SATA LED Indicator is located at LE3 on the serverboard. This LED indicates the status of hard drive activities or SATA activities supported by the South Bridge. Also see the layout below for the LED locations..

HDD/SATA LED (LE3) LED Settings	
Status	De nition
On	HDD/SATA connected
Amber	No connection
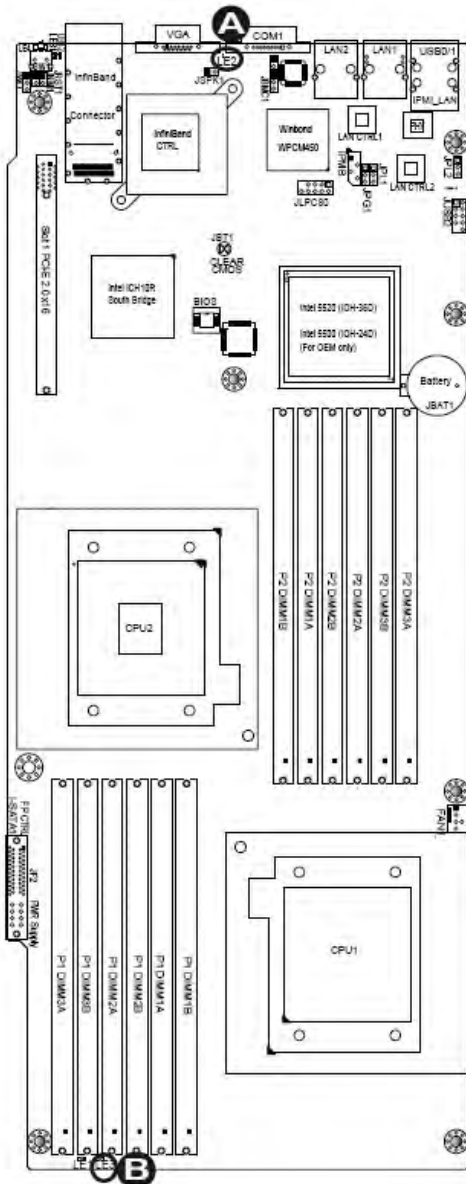
A: LE2
B: LE3

Rear UOD LED (LE4)

The Rear UID LED is located at LE4 on the
serverboard. Refer to Section 5-4 for details.
See the layout below for the location...
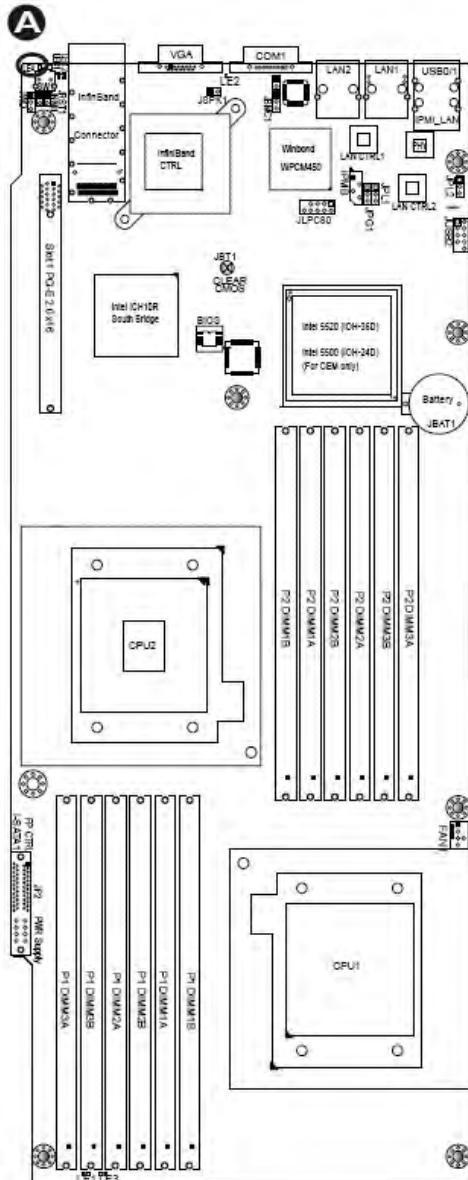
A: LE4

5-14 Serial ATA and PCI-E Connections

PCI-Express x16 Gen. 2 Slot

A PCI-Express 2.0 x16 slot (Slot 1) is located on the serverboard. Refer to the layout below for the location.
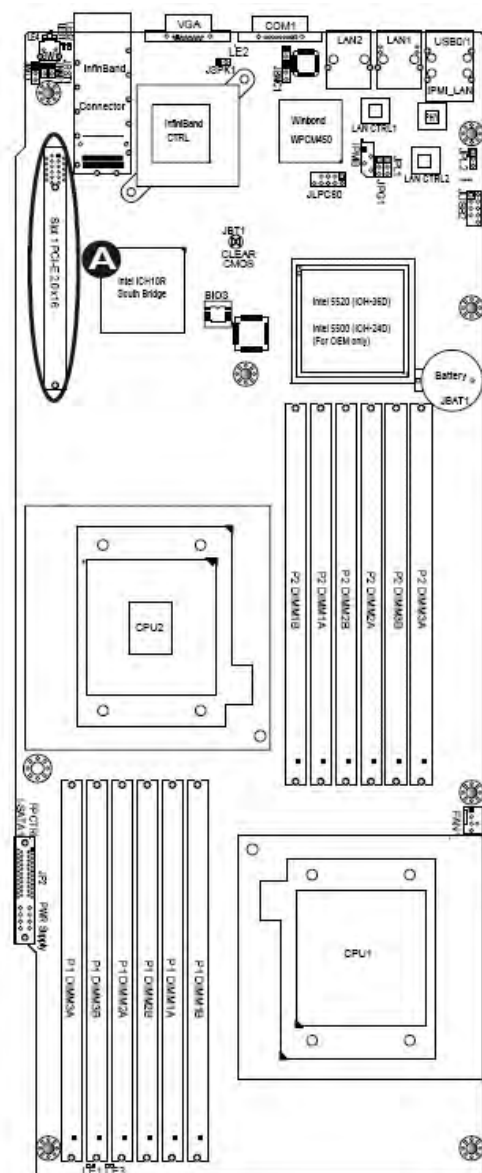
A: PCI-E 2.0 x16 (Slot 1)

Serial ATA Connections

A Front Panel Add-On Card header is located at JF2 on the serverboard. This header provide onboard SATA support. Plug an add-on card in JF2 to use SATA connections. These connections provide serial-link signal transmission, which is faster than that of the traditional Parallel ATA. Refer Page 5-27 to see JF2 pin-out de - nitions..

A: FP Add-on Card header (w/ SATA support)

5-40
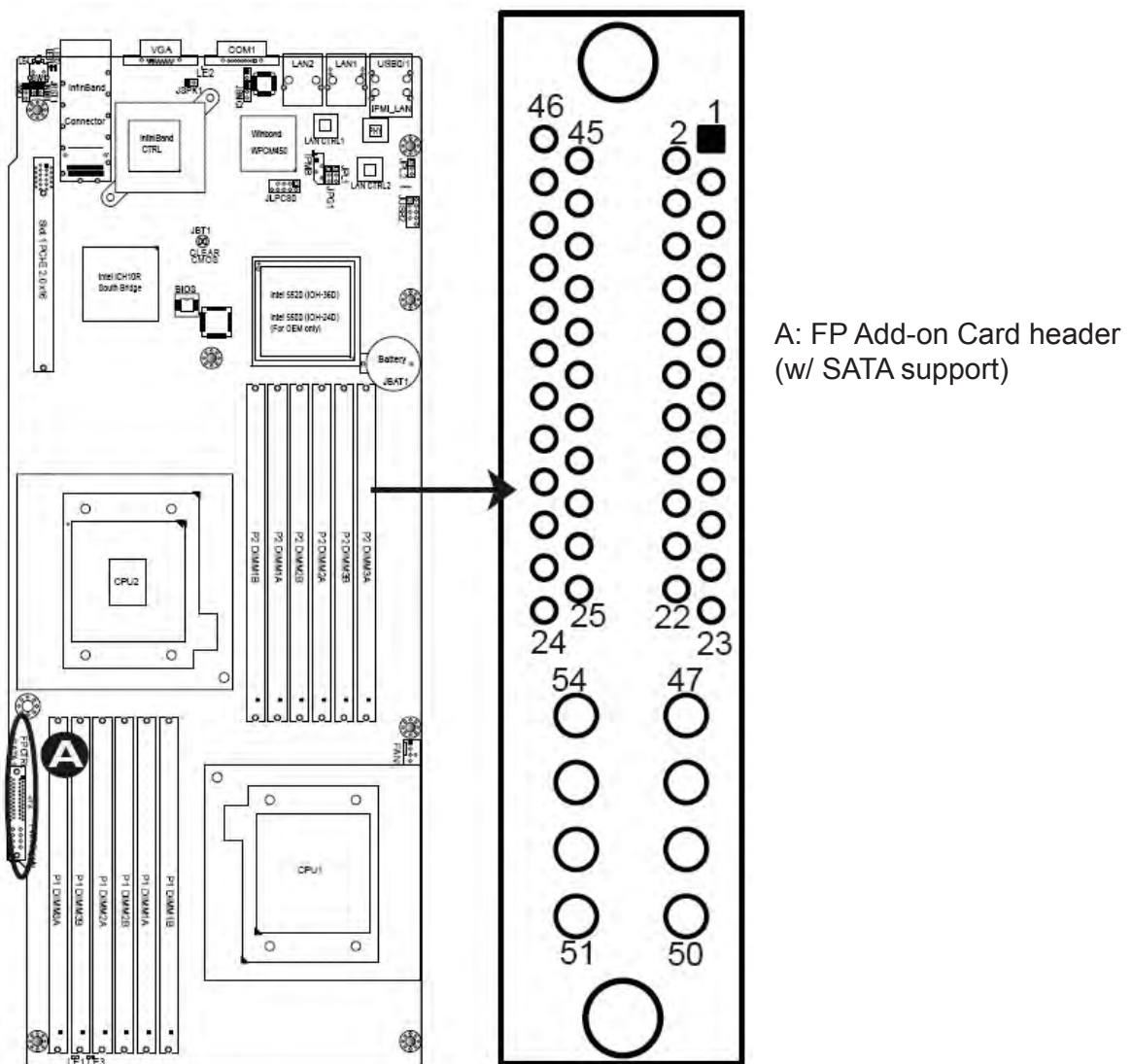
Chapter 6. Advanced Chassis Setup

This chapter covers the steps required to install components and perform mainte-nance on the bullx R424-E2 chassis. For component installation, follow the steps in the order given to eliminate the most common problems encountered. If some steps are unnecessary, skip ahead to the step that follows. The only tool you will need to install components and perform maintenance is a Philips screwdriver.

6-1   Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully. The following measures are generally suf cient to protect your equipment from ESD discharge.

Precautions

- Use a grounded wrist strap designed to prevent static discharge.

- Touch a grounded metal object before removing any board from its antistatic bag.

- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

- When handling chips or modules, avoid touching their pins.

- Put the serverboard, add-on cards 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 serverboard.

Unpacking

The serverboard is shipped in antistatic packaging to avoid static damage. When unpacking the board, make sure the person handling it is static protected.

Figure 6-1. Chassis Front View
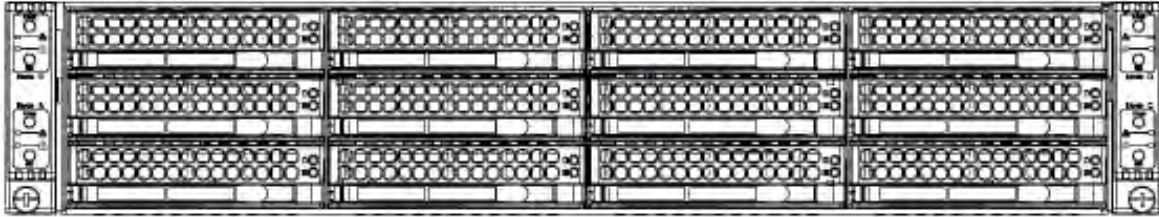
Figure 6-2. Chassis Rear View
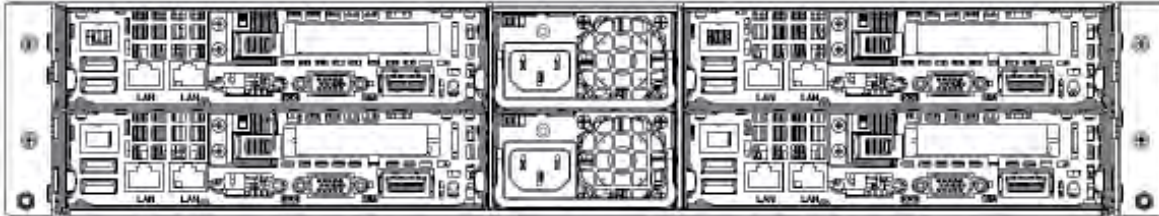
6-2   Installing and Removing Hard Drives

The R424-E2 chassis contains four individual serverboards in separate node drawers. Each serverboard node controls a set of three hard drives. Note that if a serverboard node drawer is pulled out of the chassis, the hard drives associated with that node will power down as well..

Serverboard Drawer Locations in the Chassis	
Motherboard B Controls HDDs B1, B2 and B3	Motherboard C Controls HDDs C1, C2 and C3
Motherboard A Controls HDDs A1, A2 and A3	Motherboard D Controls HDDs D1, D2 and D3
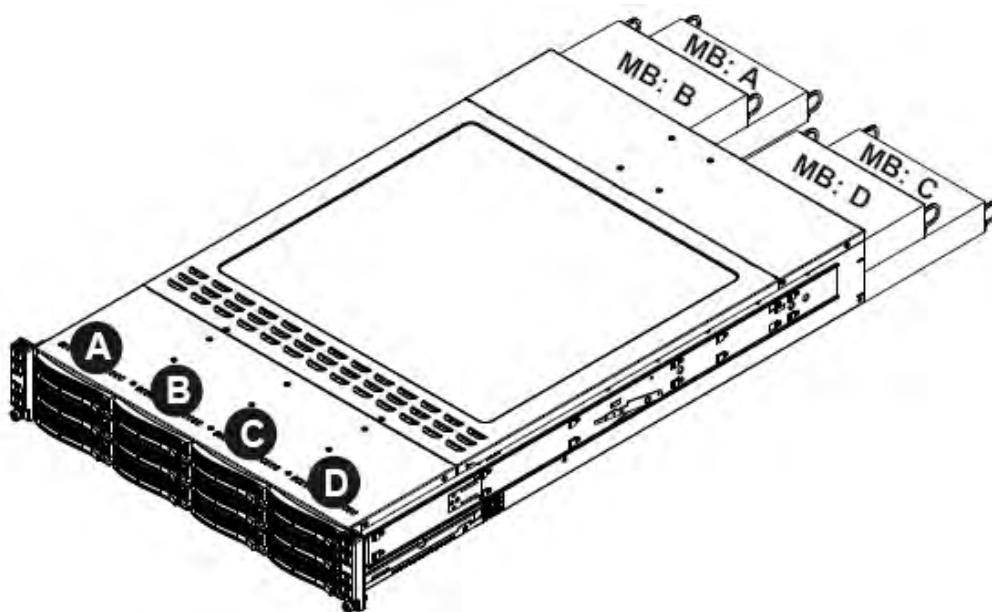
Figure 6-3. Hard Drives and the Corresponding Serverboards
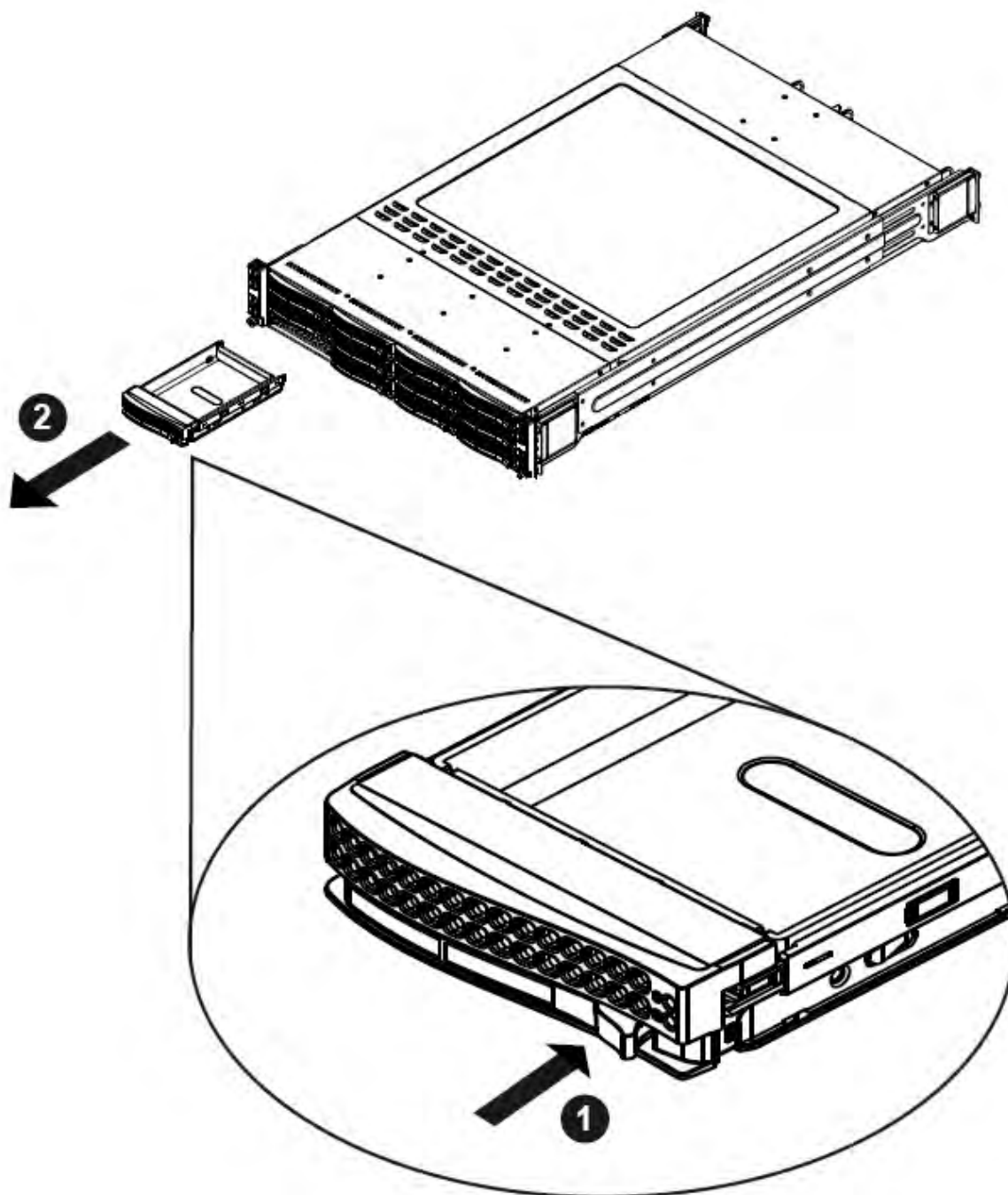
Figure 6-4. Removing a Hard Drive Tray

Removing Hard Drive Trays from the Chassis

1. Press the release button on the drive tray. This extends the drive bay handle.1.

2. Use the handle to pull the drive out of the chassis.
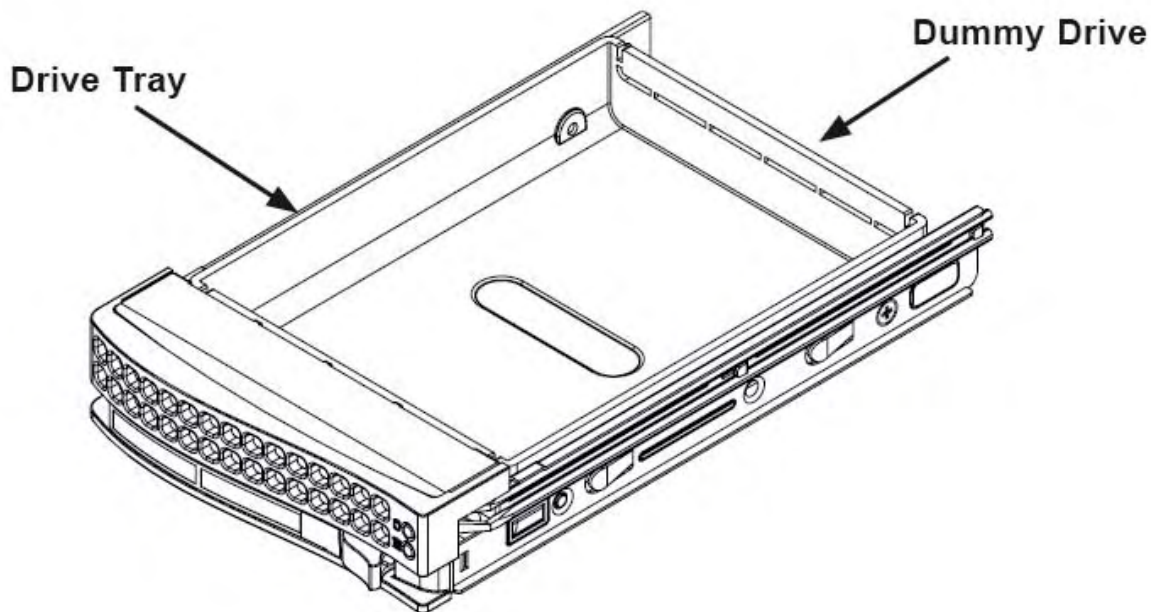
Figure 6-5. Chassis Drive Tray

The drives are mounted in drive trays to simplify their installation and removal from the chassis. These trays also help promote proper air ow for the drive bays.

Warning: Except for short periods of time while swapping hard drives, do not operate the server with the hard drives bays empty.
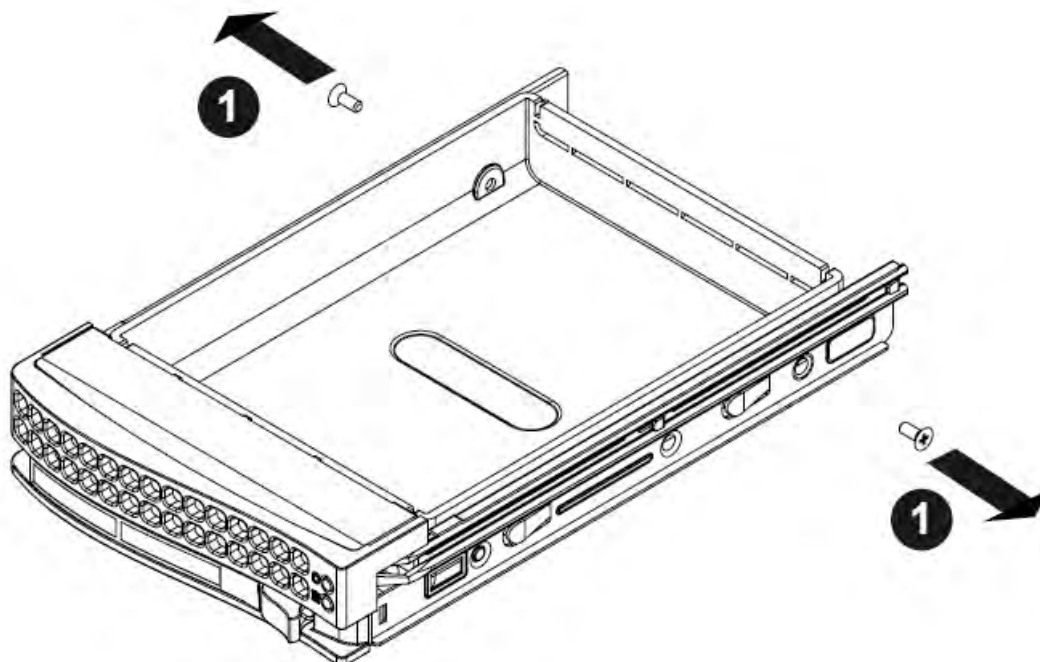
Figure 6-6. Removing Dummy Drive from Tray

Installing a Drive into the Hard Drive Tray

1. Remove the screws (2) holding the drive to the tray.

2. Remove the drive from the tray.
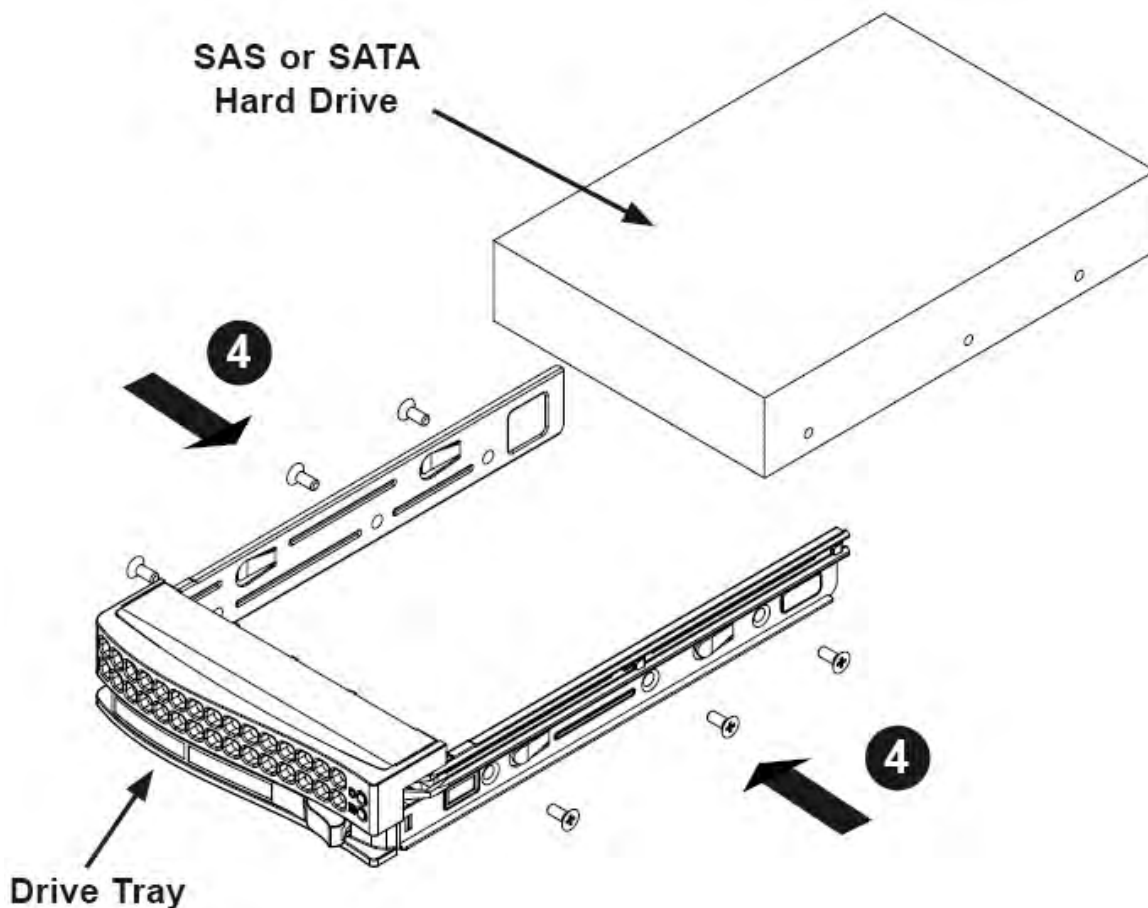
Figure 6-7. Removing Hard Drive

3. Install a new drive into the tray with the printed circuit board side facing down so that the mounting holes align with those in the carrier.

4. Secure the hard drive by tightening all six (6) screws.

5. Use the open handle to replace the drive tray into the chassis. Make sure the close the drive tray handle.

6-3   Removing and Installing the Backplane

The R424-E2 chassis backplane is located behind the hard drives and in front of the front system fans. Although backplane failure rarely occurs, in the event of a backplane failure, follow the instructions below.

Removing the Backplane

Removing the Backplane from the Chassis

1. Power down and unplug the system from any power source.

2. Remove the chassis cover.

3. Disconnect the cabling to the backplane.

4. Remove all of the hard drive trays from the front of the chassis.

5. Remove the ve upper screws at the top of the backplane and the screw from the side of the chassis, as indicated by the arrows below.
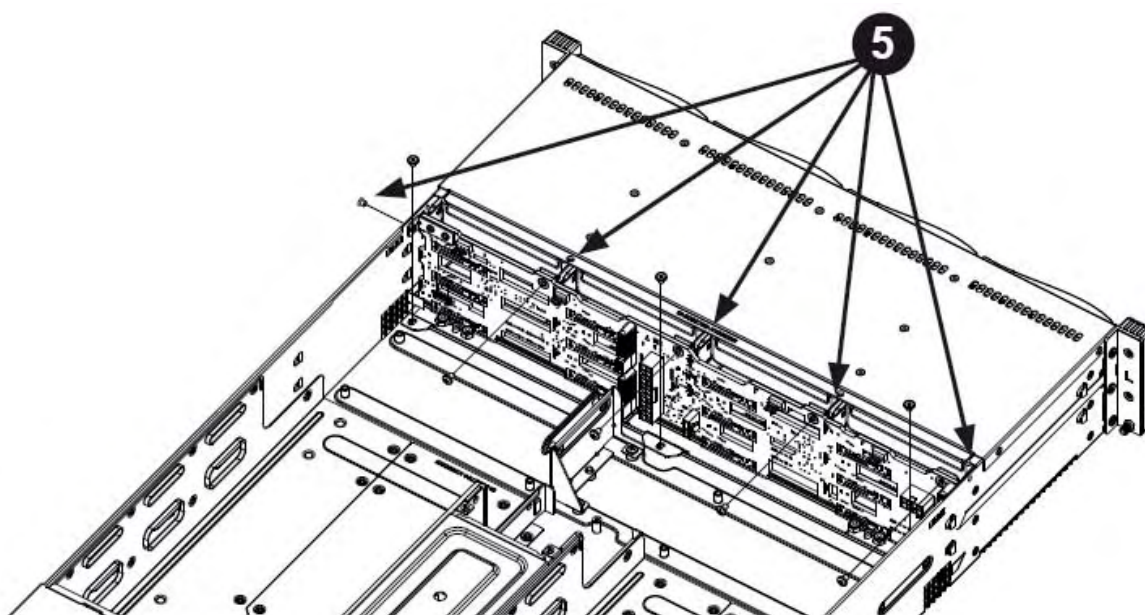
Figure 6-8. Removing the Screws at the Top of the Backplane

6. Loosen the three screws in the spring bar, located on the oor of the chassis, indicated by the arrows below.
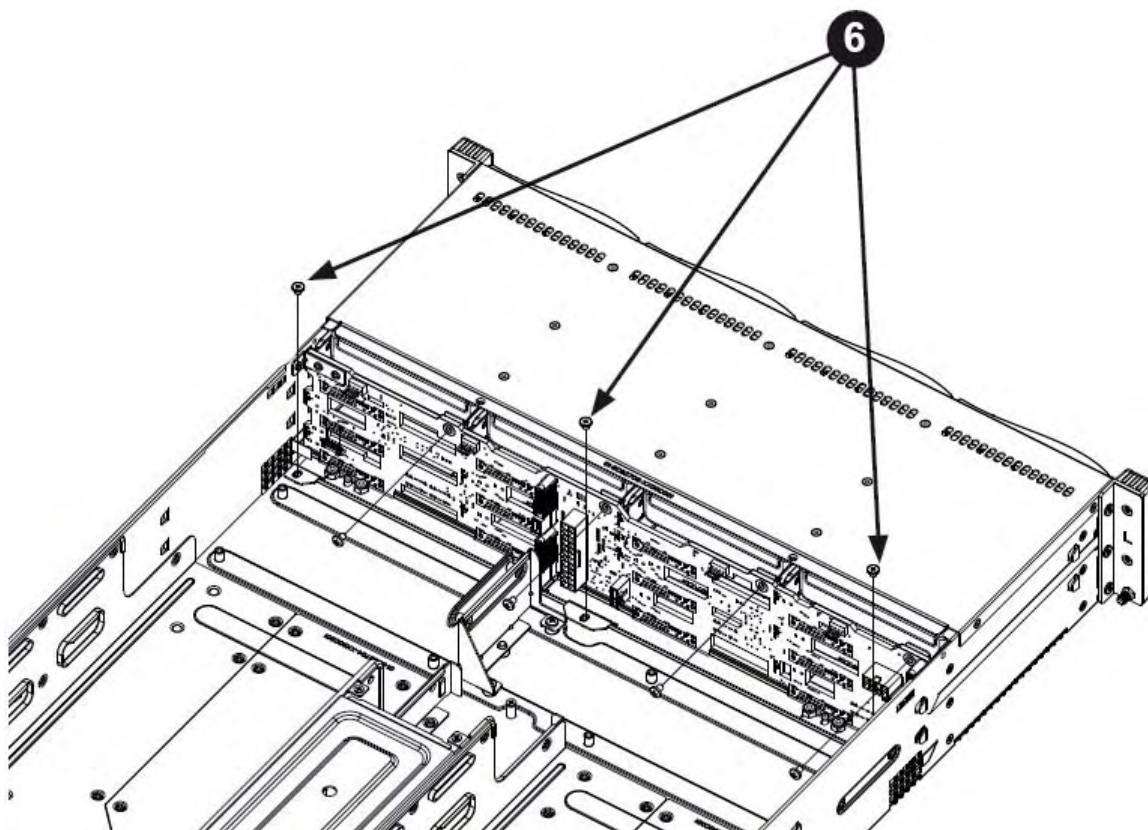
Figure 6-9. Loosening the Spring Bar Screws in the Floor of the Chassis
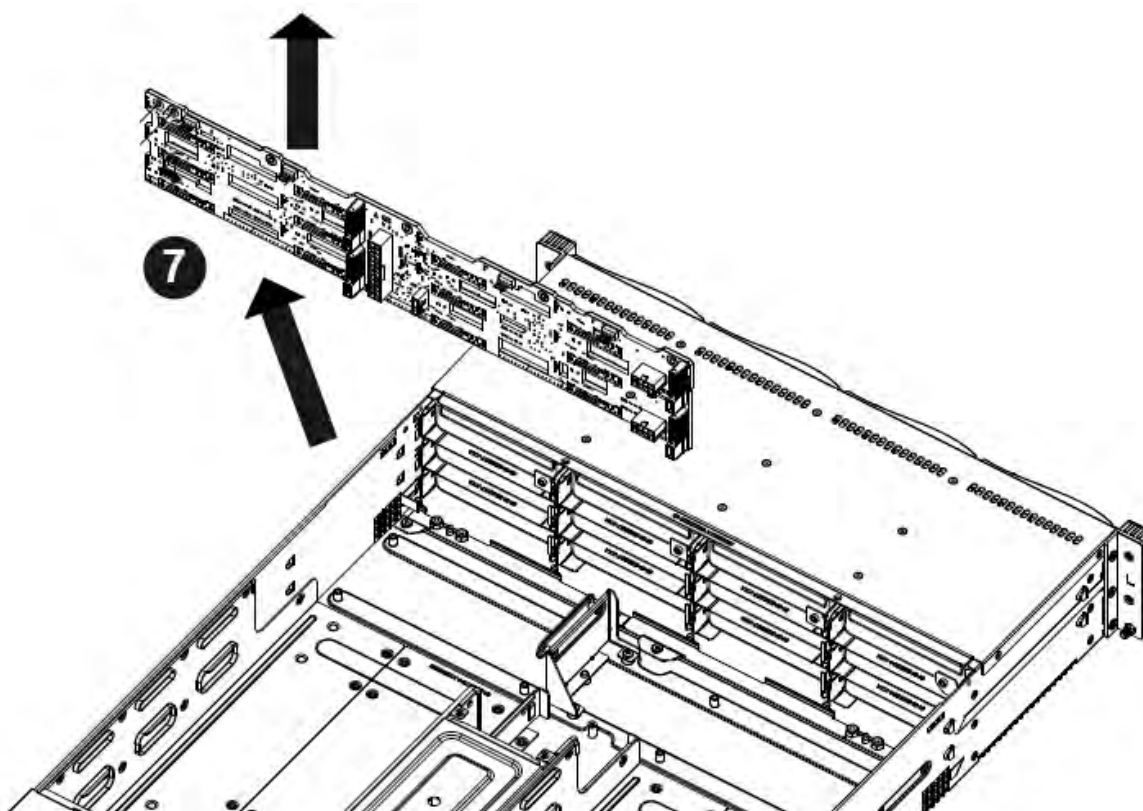
Figure 6-10. Removing the Backplane from the Chassis

7. Gently ease the backplane up and out of the chassis at a slight angle.

Installing the Backplane

Installing the Backplane into the Chassis

1. Ensure that all of the hard drive trays have been removed from the bays in the front of the chassis and that the spring bar has been loosened as directed in the previous section.

2. Secure the side mounting bracket to the backplane with the two screws provided.

3. Slide the backplane into the chassis at a slight angle, pushing it up against the side of the chassis.

4. Ease the backplane forward, against the front of the chassis. This will aid in the alignment of the mounting holes.

5. Align the mounting holes in the backplane with the holes in the chassis. Re-place the four screws at the top of the backplane and the screw on the side of the chassis.

6. Adjust the spring bar, then tighten the spring bar screws in the oor of the chassis.

7. Reconnect all cables and return the hard drive trays to their bays in the front of the chassis.
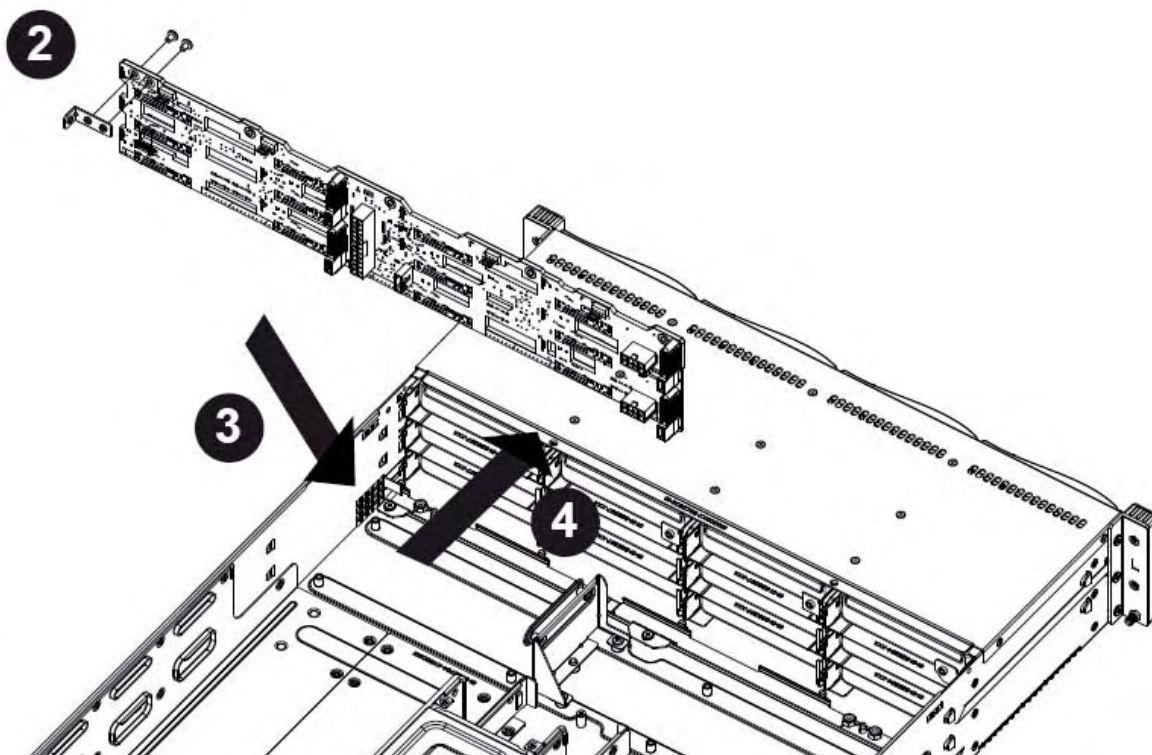
Figure 6-11. Installing the Backplane

6-4   Installing the Serverboard
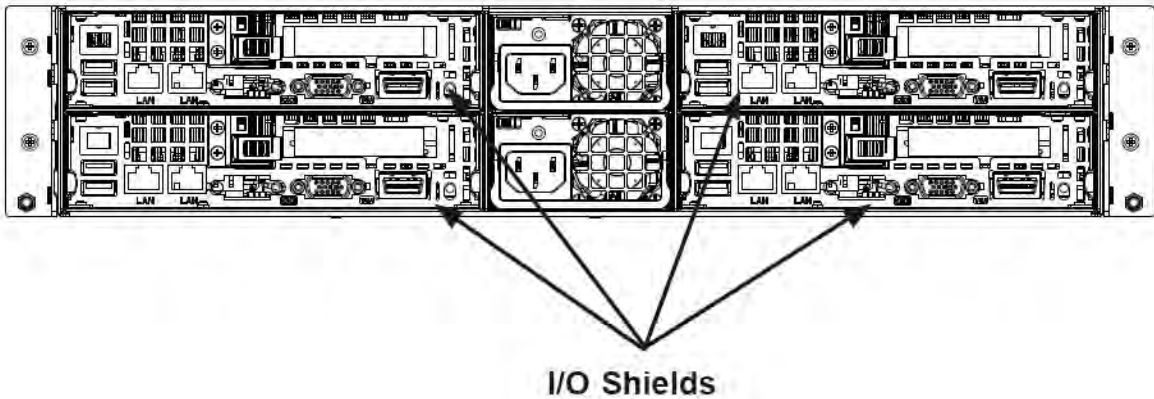
I/O Shields

Figure 6-12. I/O Shield Placement

Permanent and Optional Standoffs

Standoffs prevent short circuits by securing space between the serverboard and the chassis surface. The R424-E2 chassis includes permanent standoffs in locations used by the serverboards. These standoffs accept the rounded Phillips head screws included in the R424-E2 accessories packaging.

Some serverboards require additional screws for heatsinks, general components and/or non-standard security. Optional standoffs are used for these serverboards.

To use an optional standoff, you must place a hexagon screw through the bottom the chassis and secure the screw with the hexagonal nut (rounded side up).

Depending upon the con guration of the serverboard being used, it is also possible that some of the optional standoffs which are pre-installed in the chassis, may need to be removed.

Figure 6-13. Installing he Serverboard in the Serverboard Node Drawer

Installing the Serverboard

1. Review the documentation that came with your serverboard. Become familiar with component placement, requirements, precautions, and cable connections.

2. Pull the serverboard node drawer out of the back of the chassis. 2.

3. Remove the add-on card brackets:
    3a. Remove screw securing the add-on card bracket to the back of the node drawer.
    3b. Lift the bracket out of the node drawer.

4. Lay the serverboard in the node drawer aligning the standoffs with the serverboard.

5. Secure the serverboard to the node drawer using the rounded, Phillips head screws included for this purpose.

6. Install the adapter card associated with the serverboard if the chassis is a hot-swappable version. Refer to the next section for instructions on installing the adapter card

7. Secure the CPU(s), heatsinks, and other components to the serverboard as described in the serverboard documentation.

8. Connect the cables between the serverboard, backplane, chassis, front panel, and power supply, as needed. Also, fans may be temporarily removed to allow access to the backplane ports.

9. Replace the add-on card bracket and secure the bracket with a screw.

10. Repeat steps 3 - 5 for the remaining nodes.

6-4   Installing and Replacing Adapter Cards

Adapter cards provide hot-swappable functionality to the chassis.
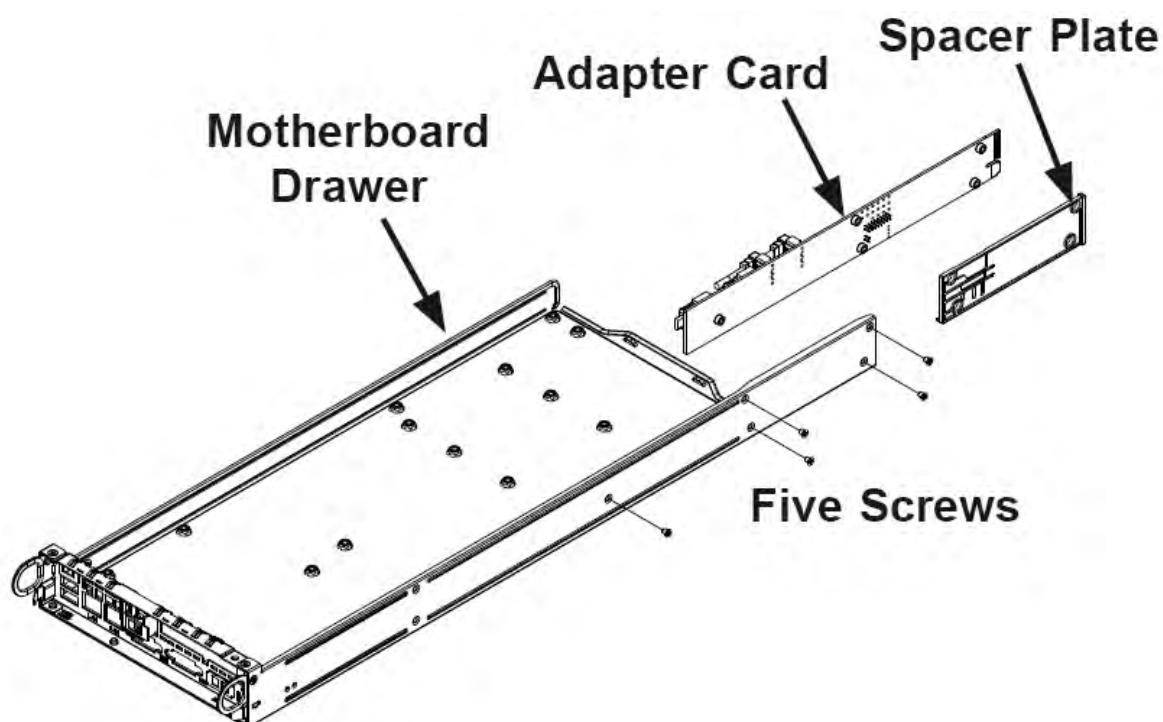
Figure 6-14. Adapter Card Installlation

Removing the Adapter Card

1. Remove the motherboard drawer from the chassis.

2. Disconnect the wiring, connecting the adapter card to the motherboard if any is present.

3. Remove the ve screws securing the adapter card and the spacer plate to the drawer and set them aside for later use.

4. Remove the adapter card and spacer plate from the motherboard drawer.

5. Set the spacer plate aside for later use.

Installing the Adapter Card

1. Make sure the motherboard has been installed properly in the node drawer before installing the adapter card

2. Place the adapter card and spacer plate in the motherboard drawer, aligning the holes in the spacer and the adapter card with the holes in the motherboard drawer.

3. Secure the adapter card and spacer plate to the motherboard drawer, using the ve M3 athead screws which were previously set aside.

4. Reconnect the wiring from the motherboard to the adapter card if necessary.

5. Return the motherboard drawer to the closed position in the chassis.

Add-on Card/Expansion Slot Setup

The R424-E2 chassis supports one low-pro le expansion slot for each node, for a total of four slots in the chassis. To install a low-pro le PCI card, follow the instructions below.
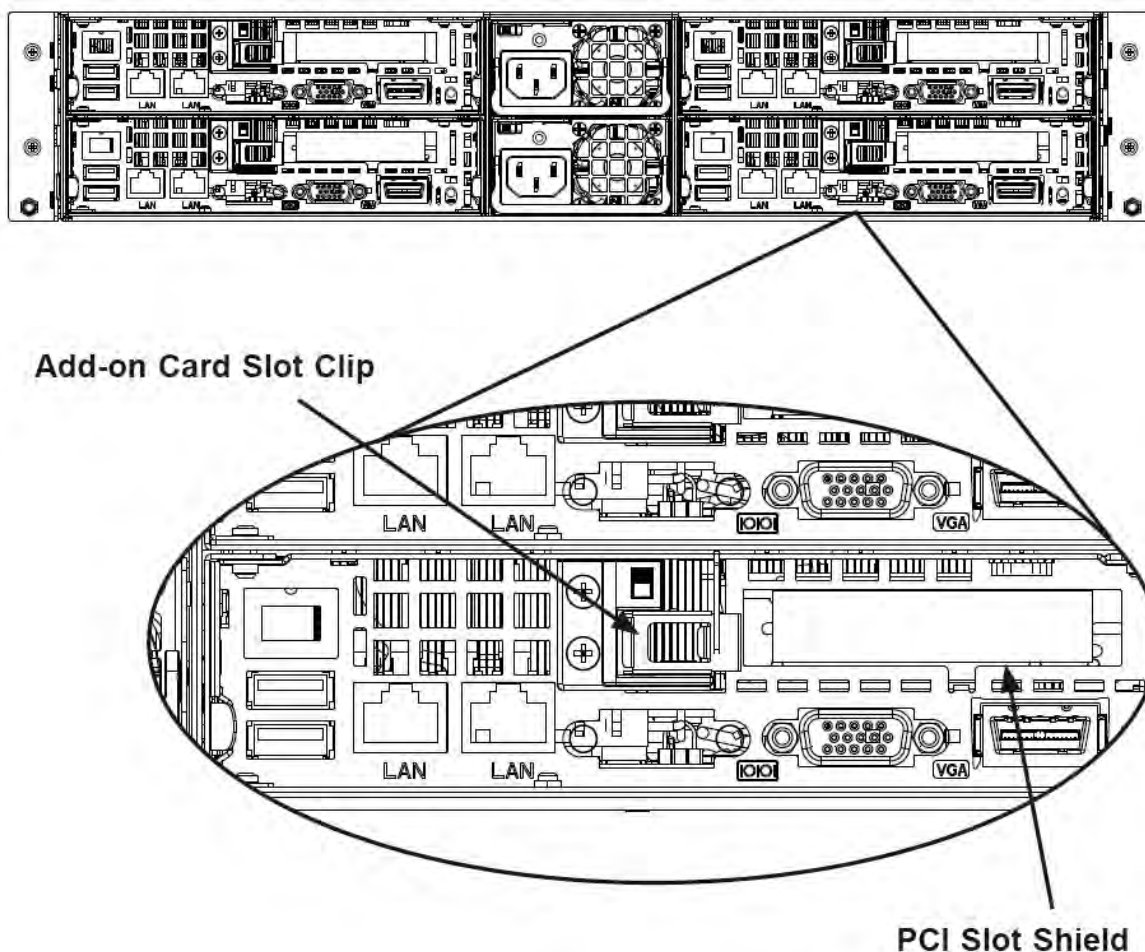
Figure 6-15. I/O Shield Configuration

Installing the Riser Card

1. Disconnect the power supply and lay the chassis on a at surface.

2. Pull the serverboard node drawer from the chassis.

3. Remove the add-on card bracket.
   3a. Remove the screw securing the add-on bracket to the back of the drawer.
   3b. Lift the bracket out of the serverboard node drawer.

4. Align the riser card mounting hole to the bracket standoff and secure the riser card to the bracket using the two screws included in the accessory box.

5. Insert the riser card along with the riser bracket into the serverboard.

6. Secure the riser bracket to the serverboard node drawer's rear window.
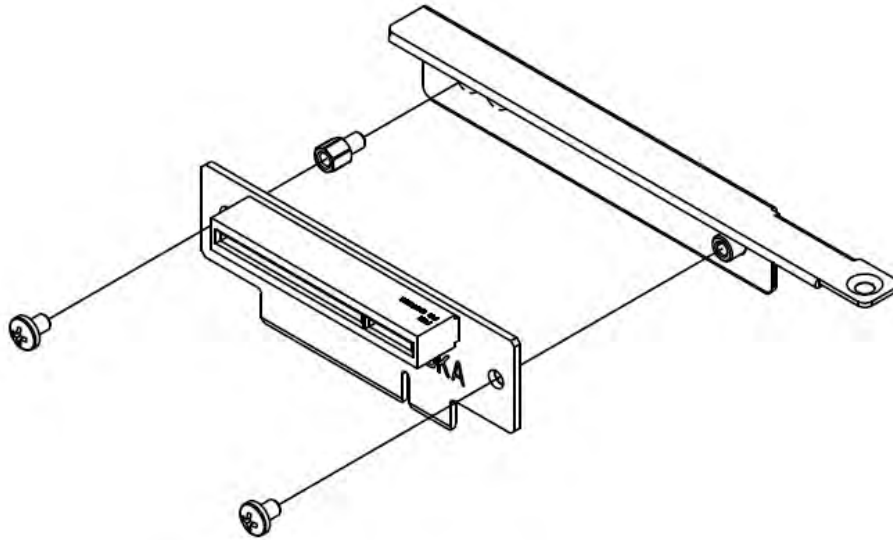
Figure 6-16. Installing the Riser Card

Installing Add-on Cards

1. Disconnect the power supply, lay the chassis on a at surface, and open the chassis cover.

2. Pull out the serverboard node drawer from the chassis.

3. Pull open the add-on card slot clip in the rear of the serverboard node drawer.

4. Remove the PCI slot shield.

5. Place the add-on card into the serverboard node drawer.

6. Slide the add-on card into the rear riser card slot and t the add-on card bracket with the opening in the rear of the serverboard node drawer.

7. Close the add-on card slot clip.
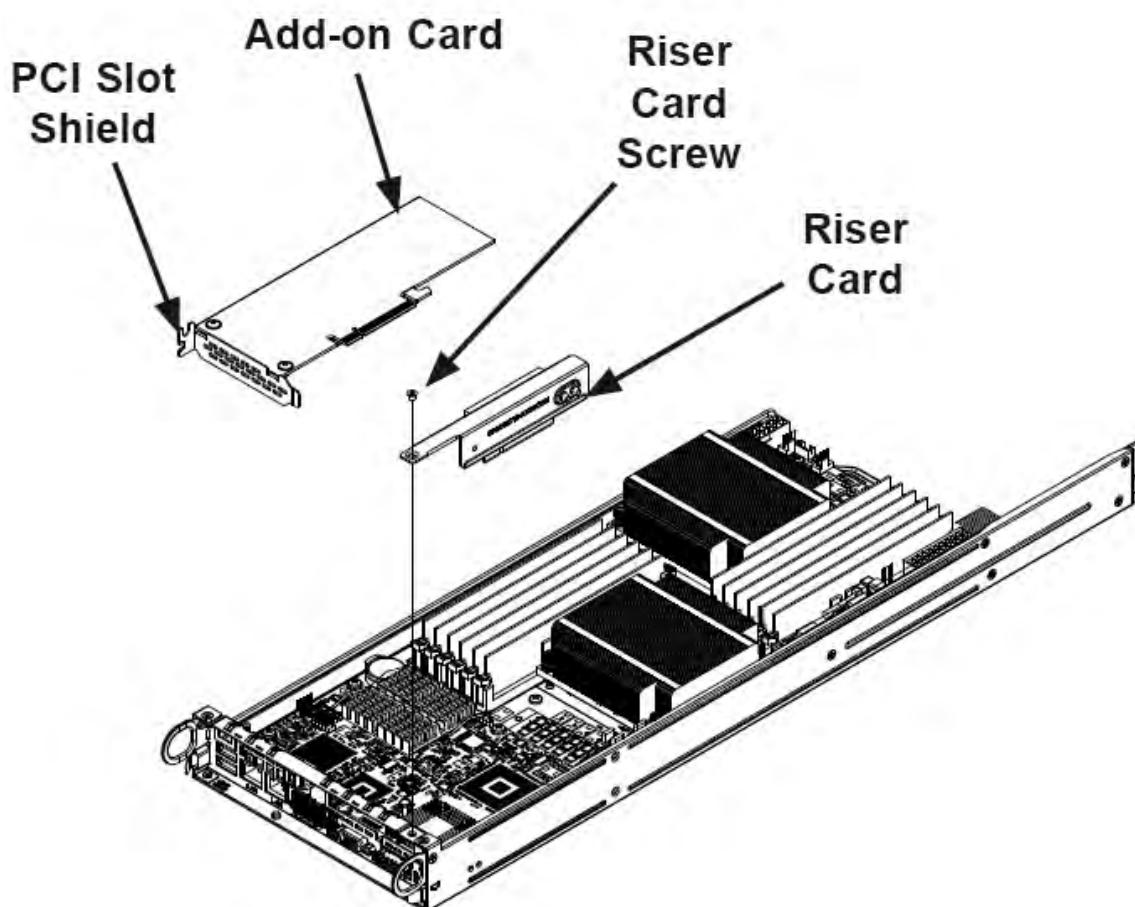
Figure 6-17. Installing the Add-on Card

6-5   Installing the Air Shrouds

Air shrouds concentrate air ow to maximize fan ef ciency. The R424-E2 chassis requires air shrouds for each serverboard node. Air shrouds vary depending uopn the serverboard used. See the illustrations below.

Installing an Air Shroud

1. Make sure that the serverboard adapter card (if any) and all components are properly installed in each motherboard node.

2. Place the rst air shroud over the serverboard, as shown below. The air shroud sits behind the system fans and goes over the top of the serverboard and its components.

3. Repeat the procedure for the remaining three serverboard nodes.

Figure 6-18. Air Shroud
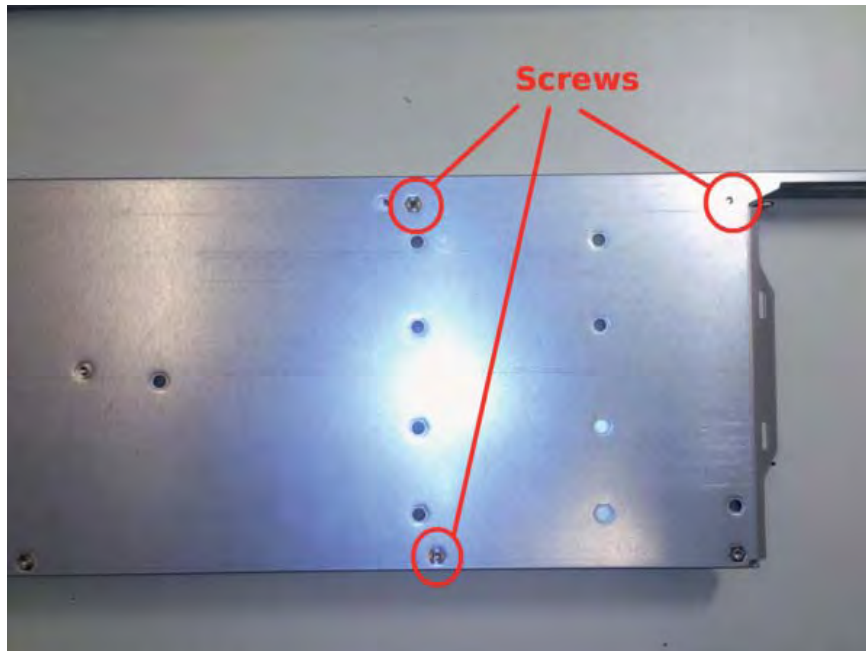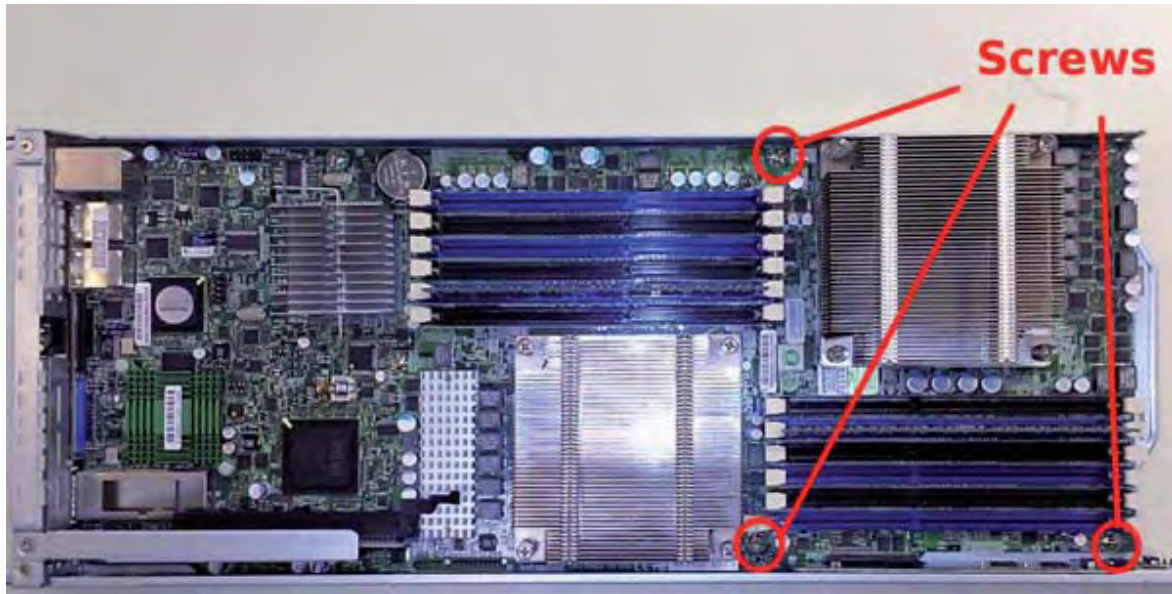
6-6   Checking the Air Flow

Checking Airflow

1. Make sure there are no objects to obstruct air ow in and out of the
    server. In addition, if you are using a front bezel, make sure the
    bezel's lter is replaced periodically.

2. Do not operate the server without drives or drive trays in the drive
    bays. Use only recommended server parts.

3. Make sure no wires or foreign objects obstruct air ow through the
    chassis. Pull all excess cabling out of the air ow path or use shorter
    cables.

4. The control panel LEDs inform you of system status. See "Chapter
    3. System Interface" for details on the LEDs and the control panel
    buttons.

Installation Complete

In most cases, the chassis power supply and fans are pre-installed. If you
need to install fans or power supplies, continue to the Systems Fan and

6-7   Replacing System Fans

Four fans provide cooling for the chassis. These fans circulate air through the chas-
sis as a means of lowering the chassis internal temperature. The R424-E2 system
fans are easy to change modules. There is no need to uninstall any other parts inside
the system when replacing fans, and no tools are required for installation.

Optional Fan Configurations

The R424-E2 model chassis is designed so that the default con guration of the
system is for each motherboard to control two fans. Each motherboard node in
the chassis is connected to the backplane through the adapter card, mounted in
the motherboard node drawer. In the event that one of the motherboard drawers is
removed, then the remaining motherboard will operate both fans.

The R424-E2 model chassis has a default con guration with one fan wired directly
to each motherboard. In the event that one of the motherboard drawers is removed,

then the fan associated with that motherboard will not function until the drawer is replaced. If multiple controls are desired in the R424-E2, an optional cable must be purchased separately to connect from the backplane to each motherboard node

Fan Configurations Options
R424-E2 Default Con guration
Fan A wired directly to Node A
Fan B wired directly to Node B
Fan C wired directly to Node C
Fan D wired directly to Node D
R424-E2 Optional Hot-Swappable Con guration (Requires optional cable)
Fans A and B connected to backplane, backplane cabled to Nodes A and B
Fans A and B connected to backplane, backplane cabled to Nodes A and B
R424-INF-E2 Hot-Swappable Default Con guration
Fans A and B connected to backplane, backplane connected to Node A and B by adapter card
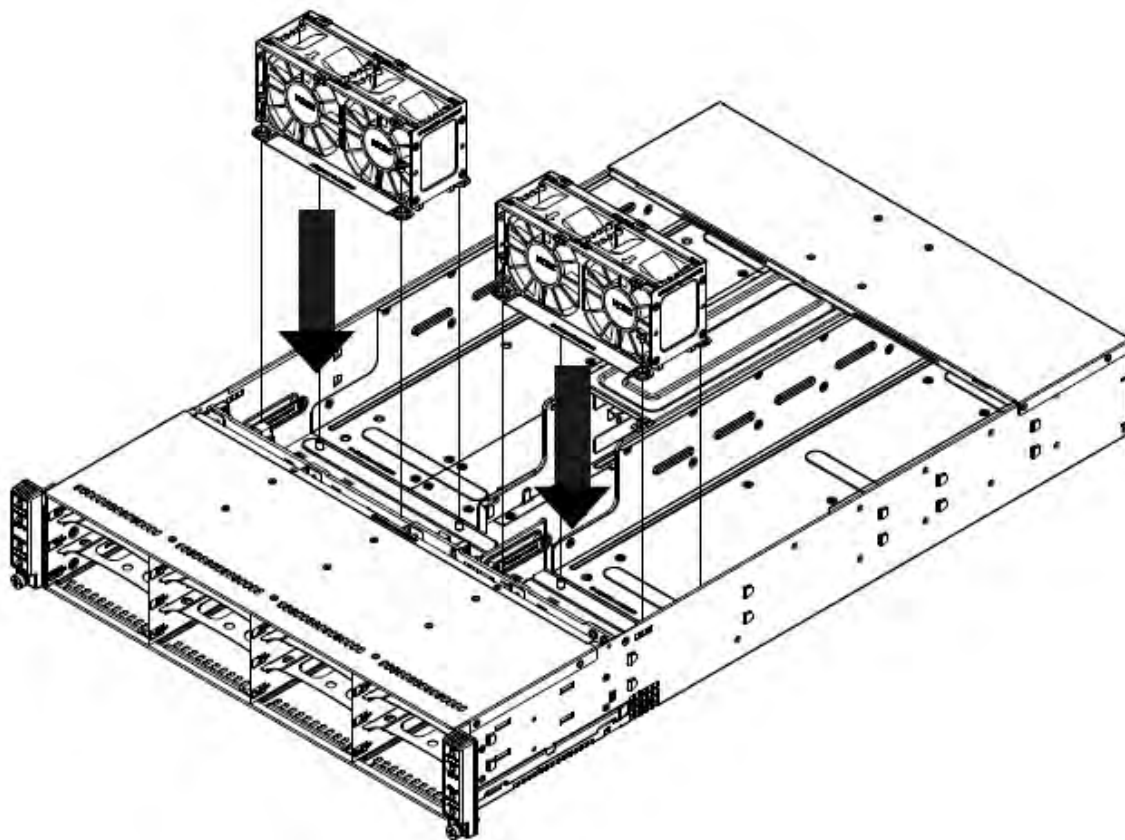
Figure 6-19. System Fan Placement

Changing a System Fan

1. If necessary, open the chassis while the power is running to determine which
   1. fan has failed. (Never run the server for an extended period of time with
   the chassis cover open.)

2. Remove the failed fan's power cord from the backplane.

3. Lift the fan housing up and out of the chassis.

4. Push the fan up from the bottom and out of the top of the housing.

5. Place the replacement fan into the vacant space in the housing while making
   sure the arrows on the top of the fan (indicating air direction) point in the
   same direction as the arrows on the other fans.

6. Put the fan back into the chassis and reconnect the cable.

7. Con rm that the fan is working properly before replacing the chassis cover.
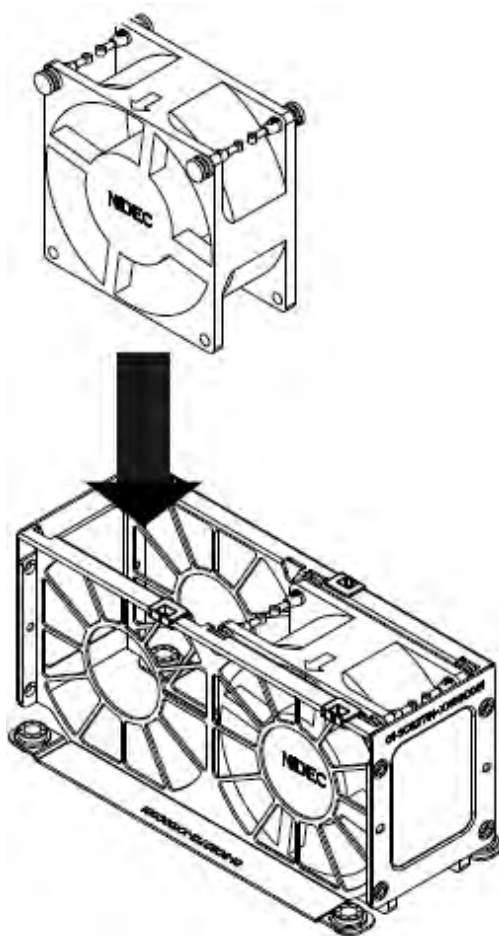
Figure 6-20. Replacing a System Fan in the Fan Housing

6-8   Power Supply

Depending on your chassis model, the R424-E2 chassis will include a 1200W or 1400W power supply. This power supply is auto-switching capable. This enables it to automatically sense and operate at a 100v to 240v input voltage. An amber light will be illuminated on the power supply when the power is off. An illuminated green light indicates that the power supply is operating.

Power Supply Replacement

The R424-E2 chassis utilizes two redundant power supplies. In the unlikely event that the power supply unit needs to be replaced, one power supply can be removed, without powering down the system. Replacement units can be ordered directly from Bull.
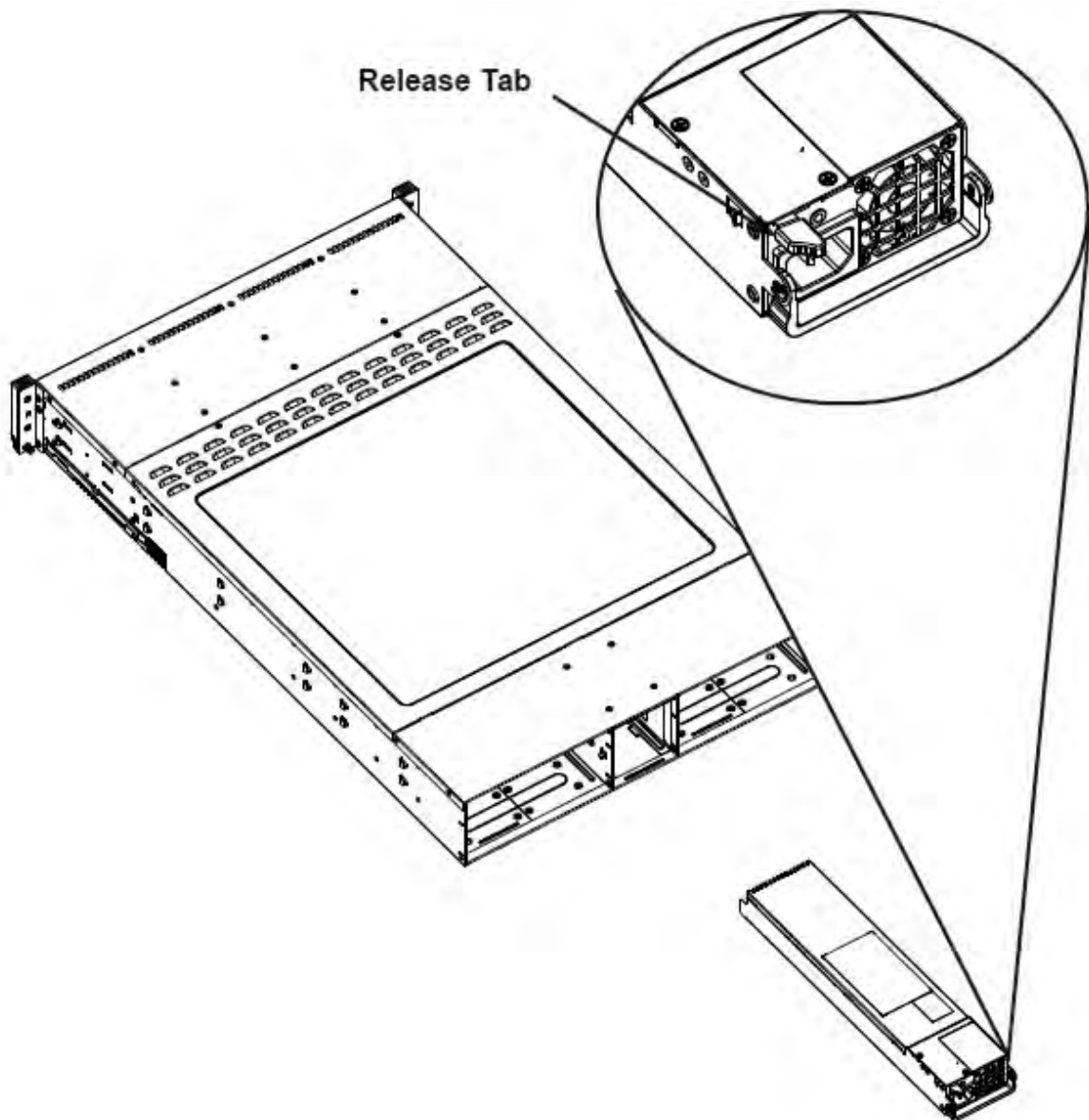
Figure 6-21. Changing the Power Supply

Changing the Power Supply

1. Power down all four nodes and unplug the power cord. (Not necessary with redundant power supplies)

2. Unplug the AC power cord from the failed power supply.

3. Push the release tab (on the back of the power supply) as illustrated.

4. Pull the power supply out using the handle provided.

5. Push the new power supply module into the power bay until you hear a click.

6. Plug the AC power cord back into the module and power up the nodes.

6-22

Chapter 7. Troubleshooting

Use the following procedures to troubleshoot your system. If you have followed all of the procedures below and still need assistance, contact Bull's Technical Support.

Note: Always disconnect the power cord before adding, changing or installing any hardware components.

Before Power On

1. Make sure that there are no short circuits between the motherboard and chassis.

2. Disconnect all ribbon/wire cables from the motherboard, including those for the keyboard and mouse.

3. Remove all add-on cards.

4. Install CPU 1 rst (making sure it is fully seated) and connect the chassis speaker and the power LED to the motherboard. (Check all jumper settings as well.)

No Power

1. Make sure that no short circuits between the motherboard and the chassis.

2. Make sure that all jumpers are set to their default positions.

3. Check that the 115V/230V switch on the power supply is properly set.

4. Turn the power switch on and off to test the system.

5. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one.

No Video

1. If the power is on but you have no video, remove all the add-on cards and cables.

2. Use the speaker to determine if any beep codes exist. Refer to the Appendix A for details on beep codes.

Losing the System's Setup Configuration

1. Make sure that you are using a high quality power supply. A poor quality power supply may cause the system to lose the CMOS setup information.

2. The battery on your motherboard may be old. Check to verify that it still supplies ~3VDC. If it does not, replace it with a new one.

3. If the above steps do not x the Setup Con guration problem, contact your vendor for repairs.

Memory Errors

When a No_Memory_Beep_Code is issued by the system, check the following:

1. Make sure that the DIMM modules are properly and fully installed.

2. Check if different speeds of DIMMs have been installed. It is strongly recommended to use the same RAM speed for all DIMMs in the system.

3. Make sure you are using the correct type of DDR3 Registered ECC 1333 MHz/1066 MHz/800 MHz SDRAM (recommended by the manufacturer.)

4. Check for bad DIMM modules or slots by swapping a single module between all memory slots and check the results.

5. Make sure that all memory modules are fully seated in their slots. Make sure to follow the instructions given in Section 5-6 in Chapter 5.

6. Check the position of the 115V/230V switch on the power supply.

7. Please follow the instructions given in the DIMM Population Tables listed on pages 5-11 and 5-12 to install your memory modules.

Chapter 8. BIOS

8-1   Introduction

This chapter describes the AMI BIOS Setup Utility for the R424-E2/R424-INF-E2. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily updated. This chapter describes the basic navigation of the AMI BIOS Setup Utility setup screens.

Starting BIOS Setup Utility

To enter the AMI BIOS Setup Utility screens, press the <Delete> key while the system is booting up.

> **Note**: In most cases, the <Delete> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F1>, <F2>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be con gured. Grayed-out options cannot be con gured. Options in blue can be con gured by the user. The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it. (**Note**: the AMI BIOS has default text messages built in. Supermicro retains the option to include, omit, or change any of these text messages.)

The AMI BIOS Setup Utility uses a key-based navigation system called "hot keys". Most of the AMI BIOS setup utility "hot keys" can be used at any time during the setup navigation process. These keys include <F1>, <F10>, <Enter>, <ESC>, arrow keys, etc.

> **Note**: Options printed in Bold are default settings.

How To Change the Configuration Data

The con guration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Del> at the appropriate time during system boot.

Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test.

As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup Utility. From the main menu, you can access the other setup screens. An AMI BIOS identi cation string is displayed at the left bottom corner of the screen below the copyright message.

⚠️ **Warning:** Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

8-2   Main Setup

When you rst enter the AMI BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown below.

System Overview

The following BIOS information will be displayed:

System Time/System Date

Use this option to change the system time and date. Highlight System Time or System Date using the arrow keys. Key in new values through the keyboard and press <Enter>. Press the <Tab> key to move between elds. The date must be entered in Day MM/DD/YY format. The time is entered in HH:MM:SS format. (**Note**: The time is in the 24-hour format. For example, 5:30 P.M. appears as 17:30:00.)

bullx R424-E2/R424-INF-E2 serverboard

- BIOS Build Version: This item displays the BIOS revision used in your system.

- BIOS Build Date: This item displays the date when this BIOS was completed.

- AMI BIOS Core Version: This item displays the revision number of the AMI BIOS Core upon which your BIOS was built.

Processor

The AMI BIOS will automatically display the status of the processor used in your system:

- CPU Type: This item displays the type of CPU used in the motherboard.

- Speed: This item displays the speed of the CPU detected by the BIOS.

- Physical Count: This item displays the number of processors installed in your system as detected by the BIOS.

- Logical Count: This item displays the number of CPU Cores installed in your system as detected by the BIOS.

- Micro_code Revision: This item displays the revision number of the BIOS Micro_code used in your system.

Memory

This displays the size of memory available in the system:

- Size: This item displays the memory size detected by the BIOS.

8-3   Advanced Setup Configurations

Use the arrow keys to select Boot Setup and hit <Enter> to access the submenu items:

▶**Boot Features**

Quick Boot

If Enabled, this option will skip certain tests during POST to reduce the time needed for system boot. The options are **Enabled** and Disabled.

Quiet Boot

This option allows the bootup screen options to be modi ed between POST messages or the OEM logo. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** and Disabled.

AddOn ROM Display Mode

This sets the display mode for Option ROM. The options are **Force BIOS** and Keep Current.

Bootup Num-Lock

This feature selects the Power-on state for Numlock key. The options are Off and **On**.

Wait For 'F1' If Error

This forces the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled**.

Hit 'Del' Message Display

This feature displays "Press DEL to run Setup" during POST. The options are **Enabled** and Disabled.

Interrupt 19 Capture

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Enabled, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at boot and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Disabled, the ROM BIOS of the host adaptors will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are Enabled and **Disabled**.

Power Configuration

Power Button Function

If set to Instant_Off, the system will power off immediately as soon as the user hits the power button. If set to 4_Second_Override, the system will power off when the user presses the power button for 4 seconds or longer. The options are **Instant_Off** and 4_Second_Override.

Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Power-Off for the system power to remain off after a power loss. Select Power-On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before a power loss. The options are Power-On, Power-Off and **Last State**.

Watch Dog Timer

If enabled, the Watch Dog Timer will allow the system to reboot when it is inactive for more than 5 minutes. The options are Enabled and **Disabled**.

▶**Processor and Clock Options**

This submenu allows the user to con gure the Processor and Clock settings.

Ratio CMOS Setting

This option allows the user to set the ratio between the CPU Core Clock and the ESB Frequency. (**Note**: if an invalid ratio is entered, the AMI BIOS will restore the setting to the previous state.) The default setting depends on the type of CPU installed on the motherboard. The default setting for the CPU installed in your motherboard is **[16].** Press "+" or "-" on your keyboard to change this value.

C1E Support

Select Enabled to use the feature of Enhanced Halt State. C1E signi cantly reduces the CPU's power consumption by reducing the CPU's clock cycle and voltage during a "Halt State." The options are Disabled and **Enabled**.

Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware pre fetcher will pre fetch streams of data and instructions from the main memory to the L2 cache in the forward or backward manner to improve CPU performance. The options are Disabled and **Enabled**.

Adjacent Cache Line Prefetch (Available when supported by the CPU)

The CPU fetches the cache line for 64 bytes if this option is set to Disabled. The CPU fetches both cache lines for 128 bytes as comprised if **Enabled**.

Intel® Virtualization Technology (Available when supported by the CPU)

Select Enabled to use the feature of Virtualization Technology to allow one platform to run multiple operating systems and applications in independent partitions, creating multiple "virtual" systems in one physical computer. The options are **Enabled** and Disabled. **Note**: If there is any change to this setting, you will need to power off and restart the system for the change to take effect. Please refer to Intel's web site for detailed information.

Execute-Disable Bit Capability (Available when supported by the OS and the CPU)

Set to Enabled to enable the Execute Disable Bit which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from ooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled**. (Refer to Intel and Microsoft Web Sites for more information.)

Simultaneous Multi-Threading (Available when supported by the CPU)

Set to Enabled to use the Simultaneous Multi-Threading Technology, which will result in increased CPU performance. The options are Disabled and **Enabled**.

Active Processor Cores

Set to Enabled to use a processor's Second Core and beyond. (Please refer to Intel's web site for more information.) The options are **All**, 1 and 2.

Intel® EIST Technology

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency in an effort to reduce power consumption and heat dissipation. **Please refer to Intel's web site for detailed information**. The options are Disable (Disable GV3) and **Enable (Enable GV3)**.

Intel® TurboMode Technology

Select Enabled to use the Turbo Mode to boost system performance. The options are **Enabled** and Disabled.

Intel® C-STATE Tech

If enabled, C-State is set by the system automatically to either C2, C3 or C4 state. The options are Disabled and **Enabled**.

C-State package limit setting

If set to Auto, the AMI BIOS will automatically set the limit on the C-State package register. The options are **Auto**, C1, C3, C6 and C7.

C1 Auto Demotion

When enabled, the CPU will conditionally demote C3, C6 or C7 requests to C1 based on un-core auto-demote information. The options are Disabled and **Enabled**.

C3 Auto Demotion

When enabled, the CPU will conditionally demote C6 or C7 requests to C3 based on un-core auto-demote information. The options are Disabled and **Enabled**.

Clock Spread Spectrum

Select Enable to use the feature of Clock Spectrum, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are **Disabled** and Enabled.

▶**Advanced Chipset Control**

The items included in the Advanced Settings submenu are listed below:

▶**CPU Bridge Configuration**

QPI Links Speed

This feature selects QPI's data transfer speed. The options are Slow-mode, and **Full Speed**.

QPI Frequency

This selects the desired QPI frequency. The options are **Auto**, 4.800 GT, 5.866GT, 6.400 GT.

QPI L0s and L1

This enables the QPI power state to low power. L0s and L1 are automatically selected by the motherboard. The options are **Disabled** and Enabled.

Memory Frequency

This feature forces a DDR3 frequency slower than what the system has detected. The available options are **Auto**, Force DDR-800, Force DDR-1066, and Force DDR-1333.

Memory Mode

The options are **Independent**, Channel Mirror, Lockstep and Sparing.

Independent - All DIMMs are available to the operating system.

Channel Mirror - The motherboard maintains two identical copies of all data in memory for redundancy.

Lockstep - The motherboard uses two areas of memory to run the same set of operations in parallel.

Sparing - A preset threshold of correctable errors is used to trigger fail-over. The spare memory is put online and used as active memory in place of the failed memory.

Demand Scrubbing

A memory error-correction scheme where the Processor writes corrected data back into the memory block from where it was read by the Processor. The options are Enabled and **Disabled**.

Patrol Scrubbing

A memory error-correction scheme that works in the background looking for and correcting resident errors. The options are Enabled and **Disabled**.

NUMA Support

Select Enabled to use the feature of Non-Uniform Memory Access to improve CPU performance. The options are **Enabled** and Disabled.

Memory ECC Error Thresholdt

This feature allows the user to set the threshold for the ECC memory errors. The default setting is **2047**.

Throttling - Closed Loop/Throttling - Open Loop

Throttling improves reliability and reduces power in the processor by automatic voltage control during processor idle states. Available options are **Disabled** and Enabled. If Enabled, the following items will appear:

Hysteresis Temperature

Temperature Hysteresis is the temperature lag (in degrees Celsius) after the set DIMM temperature threshold is reached before Closed Loop Throttling begins. The options are Disabled, **1.5° C**, 3.0° C, and 6.0° C.

Guardband Temperature

This is the temperature which applies to the DIMM temperature threshold. Each step is in 0.5° C increment. The default is **[006]**. Press "+" or "-" on your keyboard to change this value.

Inlet Temperature

This is the temperature detected at the chassis inlet. Each step is in 0.5° C increment. The default is **[070]**. Press "+" or "-" on your keyboard to change this value.

Temperature Rise

This is the temperature rise to the DIMM thermal zone. Each step is in 0.5oC increment. The default is **[020]**. Press "+" or "-" on your keyboard to change this value.

Air Flow

This is the air ow speed to the DIMM modules. Each step is one mm/ sec. The default is **[1500]**. Press "+" or "-" on your keyboard to change this value.

Altitude

This feature de nes how many meters above or below sea level the system is located. The options are **Sea Level or Below**, 1~300, 301~600, 601~900, 901~1200, 1201~1500, 1501~1800, 1801~2100, 2101~2400, 2401~2700, 2701~3000.

DIMM Pitch

▶North Bridge Configuration

This feature allows the user to con gure the settings for the Intel IOH chip.

Crystal Beach/DMA (Direct Memory Access)

This feature works with the Intel I/O AT (Acceleration Technology) to accelerate the performance of TOE devices. (Note: A TOE device is a specialized, dedicated processor that is installed on an add-on card or a network card to handle some or all packet processing of this add-on card.) When this feature is set to Enabled, it will enhance overall system performance by providing direct memory access for data transferring. The options are Enabled and **Disabled**.

Intel VT-d

Select Enabled to enable Intel's Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to VMM through the DMAR ACPI Tables. This feature offers fully-protected I/O resource-sharing across the Intel platforms, providing the user with greater reliability, security and availability in networking and data-sharing. The settings are Enabled and **Disabled**.

IOH PCIE Max Payload Size

Some add-on cards perform faster with the coalesce feature, which limits the payload size to 128 MB; while others, with a payload size of 256 MB which inhibits the coalesce feature. Please refer to your add-on card user guide for the desired setting. The options are 256MB and **128MB**.

PCI-E Port 1 Link Select

This feature allows the user to con gure the IOH link settings for the PCI-E Port 1. The options are X4X4X4X4, X4X4X8, X8X4X4, X8X8, and **X16**

▶**South Bridge Configuration**

This feature allows the user to con gure the settings for the Intel ICH South Bridge chipset.

USB Functions

This feature allows the user to decide the number of onboard USB ports to be enabled. The Options are: Disabled and **Enabled**.

Legacy USB Support

Select Enabled to use Legacy USB devices. If this item is set to Auto, Legacy USB support will be automatically enabled if a legacy USB device is installed on the motherboard, and vise versa. The settings are Disabled, **Enabled** and Auto.

USB 2.0 Controller

Select Enabled to activate the onboard USB 2.0 controller. The options are **Enabled** and Disabled.

USB 2.0 Controller Mode

This setting allows you to select the USB 2.0 Controller mode. The options are **Hi-Speed (480 Mbps)** and Full Speed (12 Mbps).

BIOS EHCI Hand-Off

Select Enabled to enable BIOS Enhanced Host Controller Interface support to provide a workaround solution for an operating system that does not have EHCI Hand-Off support. When enabled, the EHCI Interface will be changed from the BIOS-controlled to the OS-controlled. The options are Disabled and **Enabled**.

▶IDE/SATA/Floppy Configuration

When this submenu is selected, the AMI BIOS automatically detects the presence of the IDE devices and displays the following items:

SATA#1 Configuration

If Compatible is selected, it sets SATA#1 to legacy compatibility mode, while selecting Enhanced sets SATA#1 to native SATA mode. The options are Disabled, **Compatible** and Enhanced.

Configure SATA#1 as

This feature allows the user to select the drive type for SATA#1. The options are **IDE**, RAID and AHCI. (When the option-RAID is selected, the item-ICH RAID Code Base will appear. When the option-AHCI is selected, the item-SATA AHCI will be available.)

ICH RAID Code Base (This feature is available when the option-RAID is selected)

Select Intel to enable Intel's SATA RAID rmware to con gure Intel's SATA RAID settings. Select Adaptec to enable Adaptec's SATA RAID rmware to con gure Adaptec's SATA RAID settings. The options are **Intel** and Adaptec.

SATA AHCI (This feature is available when the option-AHCI is selected)

Select Enable to enable the function of Serial ATA Advanced Host Interface. (Take caution when using this function. This feature is for advanced programmers only.)The options are Enabled and **Disabled**. If the option-Enabled is selected, the following item will display.

Hot Plug (This feature is available when the option-Enabled is selected)

Select Enable to enable the hot plug function for the SATA devices. The options are **Enabled** and Disabled.

SATA#2 Configuration

Selecting Enhanced will set SATA#2 to native SATA mode. The options are Disabled, and **Enhanced**

Primary IDE Master/Slave, Secondary IDE Master/Slave, Third IDE Master, and Fourth IDE Master

These settings allow the user to set the parameters of Primary IDE Master/ Slave, Secondary IDE Master/Slave, Third and Fourth IDE Master slots. Hit <Enter> to activate the following submenu screen for detailed options of these items. Set the correct con gurations accordingly. The items included in the submenu are:

Type

Select the type of device connected to the system. The options are Not Installed, **Auto**, CD/DVD and ARMD.

LBA/Large Mode

LBA (Logical Block Addressing) is a method of addressing data on a disk drive. In the LBA mode, the maximum drive capacity is 137 GB. For drive capacities over 137 GB, your system must be equipped with a 48-bit LBA mode addressing. If not, contact your manufacturer or install an ATA/133 IDE controller card that supports 48-bit LBA mode. The options are Disabled and **Auto**.

Block (Multi-Sector Transfer)

Block Mode boosts the IDE drive performance by increasing the amount of data transferred. Only 512 bytes of data can be transferred per interrupt if Block Mode is not used. Block Mode allows transfers of up to 64 KB per interrupt. Select Disabled to allow data to be transferred from and to the device one sector at a time. Select Auto to allow data transfer from and to the device occur multiple sectors at a time if the device supports it. The options are **Auto** and Disabled.

PIO Mode

The IDE PIO (Programmable I/O) Mode programs timing cycles between the IDE drive and the programmable IDE controller. As the PIO mode increases, the cycle time decreases. The options are **Auto**, 0, 1, 2, 3, and 4.

Select Auto to allow the AMI BIOS to automatically detect the PIO mode. Use this value if the IDE disk drive support cannot be determined.

Select 0 to allow the AMI BIOS to use PIO mode 0. It has a data transfer rate of 3.3 MBs.

Select 1 to allow the AMI BIOS to use PIO mode 1. It has a data transfer rate of 5.2 MBs.

Select 2 to allow the AMI BIOS to use PIO mode 2. It has a data transfer rate of 8.3 MBs.

Select 3 to allow the AMI BIOS to use PIO mode 3. It has a data transfer rate of 11.1 MBs.

Select 4 to allow the AMI BIOS to use PIO mode 4. It has a data transfer bandwidth of 32-Bits. Select Enabled to enable 32-Bit data transfer.

DMA Mode

Select Auto to allow the BIOS to automatically detect IDE DMA mode when the IDE disk drive support cannot be determined.

Select SWDMA0 to allow the BIOS to use Single Word DMA mode 0. It has a data transfer rate of 2.1 MBs.

Select SWDMA1 to allow the BIOS to use Single Word DMA mode 1. It has a data transfer rate of 4.2 MBs.

Select SWDMA2 to allow the BIOS to use Single Word DMA mode 2. It has a data transfer rate of 8.3 MBs.

Select MWDMA0 to allow the BIOS to use Multi Word DMA mode 0. It has a data transfer rate of 4.2 MBs.

Select MWDMA1 to allow the BIOS to use Multi Word DMA mode 1. It has a data transfer rate of 13.3 MBs.

Select MWDMA2 to allow the BIOS to use Multi-Word DMA mode 2. It has a data transfer rate of 16.6 MBs.

Select UDMA0 to allow the BIOS to use Ultra DMA mode 0. It has a data transfer rate of 16.6 MBs. It has the same transfer rate as PIO mode 4 and Multi Word DMA mode 2.

Select UDMA1 to allow the BIOS to use Ultra DMA mode 1. It has a data transfer rate of 25 MBs.

Select UDMA2 to allow the BIOS to use Ultra DMA mode 2. It has a data transfer rate of 33.3 MBs.

Select UDMA3 to allow the BIOS to use Ultra DMA mode 3. It has a data transfer rate of 66.6 MBs.

Select UDMA4 to allow the BIOS to use Ultra DMA mode 4. It has a data transfer rate of 100 MBs.

Select UDMA5 to allow the BIOS to use Ultra DMA mode 5. It has a data transfer rate of 133 MBs.

Select UDMA6 to allow the BIOS to use Ultra DMA mode 6. It has a data transfer rate of 133 MBs. The options are **Auto**, SWDMAn, MWDMAn, and UDMAn.

S.M.A.R.T. For Hard disk drives

Self-Monitoring Analysis and Reporting Technology (SMART) can help predict impending drive failures. Select Auto to allow the AMI BIOS to automatically detect hard disk drive support. Select Disabled to prevent the AMI BIOS from using the S.M.A.R.T. Select Enabled to allow the AMI BIOS to use the S.M.A.R.T. to support hard drive disk. The options are Disabled, Enabled, and **Auto**.

32Bit Data Transfer

Select Enable to enable the function of 32-bit IDE data transfer. The options are **Enabled** and Disabled.

IDE Detect Timeout (sec)

Use this feature to set the time-out value for the BIOS to detect the ATA, ATAPI devices installed in the system. The options are 0 (sec), 5, 10, 15, 20, 25, 30, and 35.

▶PCI/PnP Configuration

Clear NVRAM

This feature clears the NVRAM during system boot. The options are **No** and Yes.

Plug & Play OS

Selecting Yes allows the OS to con gure Plug & Play devices. (This is not required for system boot if your system has an OS that supports Plug & Play.) Select **No** to allow the AMI BIOS to con gure all devices in the system.

PCI Latency Timer

This feature sets the latency Timer of each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32, **64**, 96, 128, 160, 192, 224 and 248.

PCI IDE BusMaster

When enabled, the BIOS uses PCI bus mastering for reading/writing to IDE drives. The options are Disabled and **Enabled**.

Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM

Select Enabled to enable the onboard LAN1 or LAN2 Option ROM. This is to boot computer using a network interface. The options are Enabled and **Disabled**.

▶Super IO Device Configuration

Serial Port1 Address/ Serial Port2 Address

This option speci es the base I/O port address and the Interrupt Request address of Serial Port 1 and Serial Port 2. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port physically becomes unavailable. Select 3F8/IRQ4 to allow the serial port to use 3F8 as its I/O port address and IRQ 4 for the interrupt address. The options for Serial Port1 are Disabled, **3F8/IRQ4**, 3E8/IRQ4, 2E8/IRQ3. The options for Serial Port2 are Disabled, **2F8/IRQ3**, 3E8/IRQ4, and 2E8/IRQ3.

▶**Remote Access Configuration**

Remote Access

This allows the user to enable the Remote Access feature. The options are Disabled and Enabled. If Remote Access is set to Enabled, the following items will display:

Serial Port Number

This feature allows the user decide which serial port to be used for Console Redirection. The options are COM 1 and **COM 2**.

Serial Port Mode

This feature allows the user to set the serial port mode for Console Redirection. The options are **115200 8, n 1**; 57600 8, n, 1; 38400 8, n, 1; 19200 8, n, 1; and 9600 8, n, 1.

Flow Control

This feature allows the user to set the ow control for Console Redirection. The options are **None**, Hardware, and Software.

Redirection After BIOS POST

Select Disabled to turn off Console Redirection after Power-On Self-Test (POST). Select Always to keep Console Redirection active all the time after POST. (Note: This setting may not be supported by some operating systems.) Select Boot Loader to keep Console Redirection active during POST and Boot Loader. The options are Disabled, Boot Loader, and **Always**.

Terminal Type

This feature allows the user to select the target terminal type for Console Redirection. The options are **ANSI**, VT100, and VT-UTF8.

VT-UTF8 Combo Key Support

A terminal keyboard de nition that provides a way to send commands from a remote console. The options are **Enabled** and Disabled.

Sredir Memory Display Delay

This feature de nes the length of time in seconds to display memory information. The options are **No Delay**, Delay 1 Sec, Delay 2 Sec, and Delay 4 Sec.

▶Hardware Health Monitor

This feature allows the user to monitor system health and review the status of each item as displayed.

CPU Overheat Alarm

This option allows the user to select the CPU Overheat Alarm setting which determines when the CPU OH alarm will be activated to provide warning of possible CPU overheat.

Warning:
1.Any temperature that exceeds the CPU threshold temperature pre-de ned by the CPU manufacturer may result in CPU overheat or system instability. When the CPU temperature reaches this prede ned threshold, the CPU and system cooling fans will run at full speed.
2. To avoid possible system overheating, please be sure to provide adequate air ow to your system.

The options are:

- The Early Alarm: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered as soon as the CPU temperature reaches the CPU overheat threshold as prede ned by the CPU manufacturer.

- The Default Alarm: Select this setting if you want the CPU overheat alarm (including the LED and the buzzer) to be triggered when the CPU temperature reaches about 5° C above the threshold temperature as prede ned by the CPU manufacturer to give the CPU and system fans additional time needed for CPU and system cooling. In both the alarms above, please take immediate action as shown below.

CPU Temperature/System Temperature

This feature displays current temperature readings for the CPU and the System. The following items will be displayed for your reference only:

CPU Temperature

The CPU thermal technology that reports absolute temperatures (Celsius/Fahrenheit) has been upgraded to a more advanced feature by Intel in its newer processors. The basic concept is each CPU is embedded by unique temperature information that the motherboard can read. This 'Temperature Threshold' or 'Temperature Tolerance' has been assigned at the factory and is the baseline on which the motherboard takes action during different CPU temperature conditions (i.e., by increasing CPU Fan speed, triggering the Overheat Alarm, etc). Since CPUs can have different 'Temperature Tolerances', the installed CPU

can now send information to the motherboard what its 'Temperature Tolerance' is, and not the other way around. This results in better CPU thermal management.

Bull has leveraged this feature by assigning a temperature status to certain thermal conditions in the processor (Low, Medium and High). This makes it easier for the user to understand the CPU's temperature status, rather than by just simply seeing a temperature reading (i.e., 25oC). The CPU Temperature feature will display the CPU temperature status as detected by the BIOS:

Low – This level is considered as the 'normal' operating state. The CPU temperature is well below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as con gured in the BIOS (Fan Speed Control).

User intervention: No action required.

Medium – The processor is running warmer. This is a 'precautionary' level and generally means that there may be factors contributing to this condition, but the CPU is still within its normal operating state and below the CPU 'Temperature Tolerance'. The motherboard fans and CPU will run normally as con gured in the BIOS. The fans may adjust to a faster speed depending on the Fan Speed Control settings.

User intervention: No action is required. However, consider checking the CPU fans and the chassis ventilation for blockage.

High – The processor is running hot. This is a 'caution' level since the CPU's 'Temperature Tolerance' has been reached (or has been exceeded) and may activate an overheat alarm.

User intervention: If the system buzzer and Overheat LED has activated, take action immediately by checking the system fans, chassis ventilation and room temperature to correct any problems.

> **Notes**:
>
> 1. The system may shut down if it continues for a long period to prevent damage to the CPU.
>
> 2. The information provided above is for your reference only. For more information on thermal management, please refer to Intel's Web site at www.Intel.com.

System Temperature: The system temperature will be displayed (in degrees in Celsius and Fahrenheit) as it is detected by the BIOS.

Fan Speed Control Monitor

This feature allows the user to decide how the system controls the speeds of the onboard fans. The CPU temperature and the fan speed are correlative. When the CPU on-die temperature increases, the fan speed will also increase, and vice versa. Select Workstation if your system is used as a Workstation. Select Server if your system is used as a Server. Select "Disabled, (Full Speed @12V)" to disable the fan speed control function and allow the onboard fans to constantly run at the full speed (12V). The Options are: 1. **Disabled (Full Speed)**, 2. Server Mode, 3. Workstation Mode.

Fan1 ~ Fan 4 Reading

This feature displays the fan speed readings from fan interfaces Fan1 through Fan5.

Voltage Monitoring

The following items will be monitored and displayed:

CPU1 Vcore, CPU2 Vcore, +5Vin, +12Vcc (V), VP1 DIMM, VP2 DIMM, 3.3Vcc (V), and Battery Voltage

▶ACPI Configuration

Use this feature to con gure Advanced Con guration and Power Interface (ACPI) power management settings for your system.

ACPI Version Features

The options are **ACPI v1.0**, ACPI v2.0 and ACPI v3.0. Please refer to ACPI's website for further explanation: http://www.acpi.info/.

ACPI APIC Support

Select Enabled to include the ACPI APIC Table Pointer in the RSDT (Root System Description Table) pointer list.The options are **Enabled** and Disabled.

APIC ACPI SCI IRQ

When this item is set to Enabled, APIC ACPI SCI IRQ is supported by the system. The options are Enabled and **Disabled**.

Headless Mode

This feature is used to enable system to function without a keyboard, monitor or mouse attached The options are Enabled and **Disabled**.

High Performance Event Timer

Select Enabled to activate the High Performance Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback and reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are Enabled and **Disabled**.

▶General WHEA Configuration

WHEA Support

Select Enabled to enable Windows Hardware Error Architecture (WHEA) support which will provide a common infrastructure for handling hardware errors on Windows platforms in order to reduce system crashes due to hardware errors and improve system recovery and health monitoring. The default setting is **Enabled**.

▶IPMI Configuration

Intelligent Platform Management Interface (IPMI) is a set of common interfaces that IT administrators can use to monitor system health and to manage the system as a whole. For more information on the IPMI speci cations, please visit Intel's website at www.intel.com.
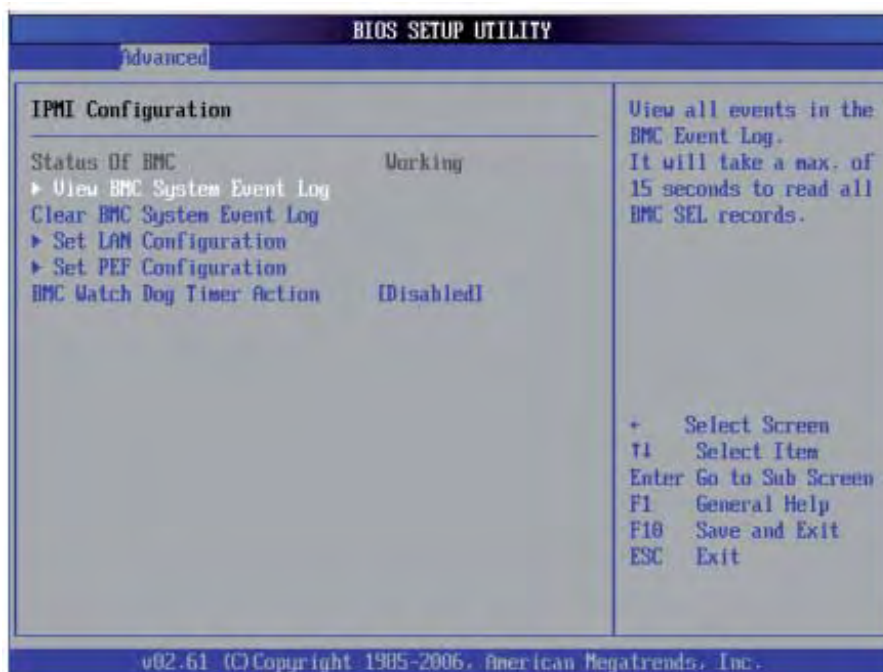
Status of BMC

Baseboard Management Controller (BMC) manages the interface between system management software and platform hardware. This is an informational feature which returns the status code of the BMC micro controller.

IPMI Firmware Revision

This item indicates the revision number of the current IPMI Firmware.

▶View BMC System Event Log

This feature displays the BMC System Event Log (SEL). It shows the total number of entries of BMC System Events. To view an event, select an Entry Number and pressing <Enter> to display the information as shown in the screen..

```
                        BIOS SETUP UTILITY
    Advanced

Total Number Of Entries:          16           Use +/- to traverse
                                               the event log.
SEL Entry Number:               [ 1]
SEL Record ID:                  0001
SEL Record Type:                02 (System Event)
Event Timestamp:                Mar 2, 2009 17:57:31
Generator ID:                   0020
Event Message Format Ver:       04 (IPMI ver 2.0)
Event Sensor Type:              04 (Fan)
Event Sensor Number:            0F
Event Dir Type:                 01
Event Data:                     50 00 07

                                               ←     Select Screen
                                               ↑↓    Select Item
                                               +-    Change Option
                                               F1    General Help
                                               F10   Save and Exit
                                               ESC   Exit


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```

• Total Number of Entries

• SEL Entry Number

• SEL Record ID

• SEL Record Type

• Timestamp

• Event Message Format User

• Event Sensor Type

• Event Sensor Number,

• Event Dir Type

• Event Data.

Clear BMC System Event Log

Clear BMC System Log

Select OK and press the <Enter> key to clear the BMC system log. Select to keep the BMC System log. The options are **OK** and Cancel..

⚠ **Caution**: Any cleared information is unrecoverable. Make absolutely sure that you no longer need any data stored in the log before clearing the BMC Event Log.

▶**Set LAN Configuration**

Set this feature to con gure the IPMI LAN adapter with a network address as shown in the following graphics..

Channel Number - Enter the channel number for the SET LAN Con g command. This is initially set to **[1]**. Press "+" or "-" on your keyboard to change the Channel Number.

Channel Number Status - This feature returns the channel status for the Channel Number selected above: "Channel Number is OK" or "Wrong Channel Number".

▶**IP Address Configuration**

Enter the IP address for this machine. This should be in decimal and in dotted quad form (i.e., 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255 as shown in the screen below..

```
                        BIOS SETUP UTILITY
   Advanced

IP Address Configuration.                        Enter IP address in
                                                 decimal in the form of
Parameter Selector           [03]                XXX.XXX.XXX.XXX
IP Address                   [192.168.001.173]   (XXX less than 256
Current IP address in BMC:    192.168.001.173    and in decimal only).




                                              ►     Select Screen
                                              ↑↓    Select Item
                                              F1    General Help
                                              F10   Save and Exit
                                              ESC   Exit


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```

Parameter Selector

Use this feature to select the parameter of your IP Address con guration. IP Address

IP Address Source

Select the source of this machine's IP address. If Static is selected, you will need to know and enter manually the IP address of this machine below. If DHCP is selected, the BIOS will search for a DHCP (Dynamic Host Con guration Protocol) server in the network it is attached to, and request the next available IP address. The options are **DHCP** and Static.

The following items are assigned IP addresses automatically if DHCP is selected under IP Address Source above:

IP Address

The BIOS will automatically enter the IP address of this machine; however it may be overridden. IP addresses are 6 two-digit hexadecimal numbers separated by dots.

Current IP Address in BMC

This item displays the current IP address used for your IPMI connection.

▶ MAC Address Configuration

Enter the Mac address for this machine. This should be in decimal and in dotted quad form (i.e. 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255 as shown in the screen below.

Parameter Selector

Use this feature to select the parameter of your Mac Address con guration.

Mac Address

The BIOS will automatically enter the Mac address of this machine; however it may be over-ridden. Mac addresses are 6 two-digit hexadecimal numbers separated by dots.

Current Mac Address in BMC

This item displays the current Mac address used for your IPMI connection.

▶ Subnet Mask Configuration

Subnet masks tell the network which subnet this machine belongs to. The value of each three-digit number separated by dots should not exceed 255..

Parameter Selector

Use this feature to select the parameter of your Subnet Masks con guration.

Subnet Mask

This item displays the current subnet mask setting for your IPMI connection.

Current Subnet Mask in BMC

This item displays the current subnet mask used for you IPMI connection.

▶ Gateway Address Configuration Log

Enter the gateway address for this machine. This should be in decimal and in dotted quad form (i.e. 192.168.10.253). The value of each three-digit number separated by dots should not exceed 255.

Parameter Selector

Use this feature to select the parameter of your Gateway Address settings.

Gateway Address

The BIOS will automatically enter the Gateway address of this machine; however it may be over-ridden. Gateway addresses are 6 two-digit hexadecimal numbers separated by dots.

Current Gateway Address in BMC

▶DMI Event Log

View Event Log

Use this option to view the System Event Log.

Mark all events as read

This option marks all events as read. The options are OK and **Cancel**.

Clear event log

This option clears the Event Log memory of all messages. The options are OK and **Cancel**.

8-4   Security Settings

The AMI BIOS provides a Supervisor and a User password. If you use both pass-words, the Supervisor password must be set rst.

Supervisor Password

This item indicates if a Supervisor password has been entered for the system. "Not Installed" means a Supervisor password has not been used.

User Password

This item indicates if a user password has been entered for the system. "Not In-stalled" means that a user password has not been used.

Change Supervisor Password

Select this feature and press <Enter> to access the submenu, and then type in a new Supervisor Password.

User Access Level (Available when Supervisor Password is set as above)

Available options are Full Access: grants full User read and write access to the Setup Utility, View Only: allows access to the Setup Utility but the elds cannot be changed, Limited: allows only limited elds to be changed such as Date and Time, No Access: prevents User access to the Setup Utility.

Change User Password

Select this feature and press <Enter> to access the submenu , and then type in a new User Password.

Clear User Password (Available only when User Password has been set)

This item allows you to clear a user password after it has been entered.

Password Check

This item allows you to check a password after it has been entered. The options are **Setup** and Always.

Boot Sector Virus Protection

When Enabled, the AMI BOIS displays a warning when any program (or virus) issues a Disk Format command or attempts to write to the boot sector of the hard disk drive. The options are Enabled and **Disabled**.

8-5   Boot Configuration

Use this feature to con gure boot settings..

▶**Boot Device Priority**

This feature allows the user to specify the sequence of priority for the Boot Device.

The settings are 1st boot device, 2nd boot device, 3rd boot device, 4th boot device, 5th boot device and Disabled.

• 1st Boot Device - [USB: XXXXXXXXX]

• 2nd Boot Device - [CD/DVD: XXXXXXXXX]

▶Hard Disk Drives

This feature allows the user to specify the boot sequence from all available hard disk drives. The settings are Disabled and a list of all hard disk drives that have been detected (i.e., 1st Drive, 2nd Drive, 3rd Drive, etc).

• 1st Drive - [SATA: XXXXXXXXX]

▶Removable Drives

This feature allows the user to specify the boot sequence from available Removable Drives. The settings are 1st boot device, 2nd boot device, and Disabled.

• 1st Drive - [USB: XXXXXXXXX]

• 2nd Drive

▶CD/DVD Drives

This feature allows the user to specify the boot sequence from available CD/DVD Drives (i.e., 1st Drive, 2nd Drive, etc).

8-6   Exit

Select the Exit tab from the AMI BIOS Setup Utility screen to enter the Exit BIOS Setup screen.
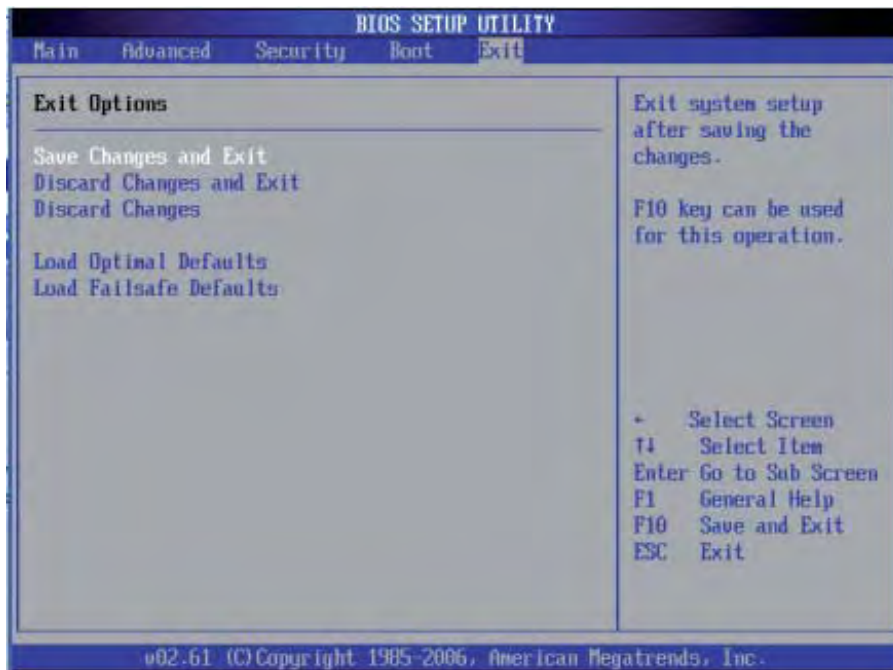
Save Changes and Exit

When you have completed the system con guration changes, select this option to leave the BIOS Setup Utility and reboot the computer, so the new system con-guration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system con guration, and reboot the computer. Select Discard Changes and Exit from the Exit menu and press <Enter>.

Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

Load Optimal Defaults

To set this feature, select Load Optimal Defaults from the Exit menu and press <Enter>. Then, select OK to allow the AMI BIOS to automatically load Optimal De-faults to the BIOS Settings. The Optimal settings are designed for maximum system performance, but may not work best for all computer applications.

Load Fail-Safe Defaults

To set this feature, select Load Fail-Safe Defaults from the Exit menu and press <Enter>. The Fail-Safe settings are designed for maximum system stability, but not for maximum performance.

8-7   BIOS Recovery

Warning! Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall Supermicro be liable for direct, indirect, special, incidental, or consequential damages arising from a BIOS update. If you need to update the BIOS, do not shut down or reset the system while the BIOS is updating. This is to avoid possible boot failure.

How to Recover the AMIBIOS Image (-the Main BIOS Block)

An AMIBIOS ash chip consists of a boot sector block, and a main BIOS code block (a main BIOS image). The boot sector block contains critical BIOS code, including memory detection and recovery code to be used to ash a new BIOS image if the original BIOS Image is corrupted. When the system is powered on, the boot sector code executes rst. Once it is completed, the main BIOS code will continue with system initialization and complete the bootup process.

Notes: BIOS Recovery described below is used when the main BIOS block crashes. However, when the BIOS Boot sector crashes, you will need to send the mother-board back to Supermicro for RMA repairs.

Boot Sector Recovery from a USB Device

This feature allows the user to recover a BIOS image using a USB device without additional utilities needed. A user can download the BIOS image into a USB ash device, and name the le "SUPER.ROM" for the recovery process to load the le.

A USB ash device such as a USB Flash Drive, a USB CDROM or a USB CDRW device can be used for this purpose,

1. Insert the USB device that contains the new BIOS image (the ROM les) saved in a root directory into your USB drive.

2. While turning the power on, press and hold <Ctrl> and <Home> at the same time until the USB Access LED Indicator comes on. This might take a few seconds.

3. Once the USB drive LED is on, release the <Ctrl> and <Home> keys. AMIBIOS will issue beep codes to indicate that the BIOS ROM le is being updated.

4. When BIOS ashing is completed, the computer will reboot. Do not interrupt the ashing process until it is completed.

Boot Sector Recovery from an IDE CD-ROM

This process is almost identical to the process of Boot Sector Recovery from a USB device, except that the BIOS image le is loaded from a CD-ROM. Use a CD-R or CD-RW drive to burn a CD with the BIOS image le in it, and name the le "SUPER.ROM" for the recovery process to load the le.

Boot Sector Recovery from a Serial Port ("Serial Flash")

This process, also known as "Serial Flash," allows the user to use a serial port to load a BIOS image for Boot Sector recovery. This feature is usually used for embedded systems that rely on a serial port for remote access and debugging.

Requirements

In order to use Serial Flash for Boot Sector Recovery, you will need to meet the following requirements.

- The "Target system," the system that needs BIOS updates, must have a serial port and "Serial Flash" support embedded in the BIOS image le.
- The "Host system" should also have a serial port and a terminal program that supports XModem Transfer protocol (Hyper Terminal for the Windows operating systems, and minicom for Linux/FreeSBD, etc.).
- A Null_modem serial cable

How to use Serial Flash for Boot Sector Recovery

1. Connect a Null_modem serial cable between the target system and the host system that runs the terminal program.

2. Make sure that the new BIOS Image le is accessible for the host system.

3. Start the terminal program on the host system and create a new connection. Use the following communication parameters for the new connection.

   - Bits per second: 115200 bits/sec.

   - Data Bits: 8

   - Parity: None

   - Stop Bit: 1

   - Flow Control: None

4. Power on your system and click the <Connect> button in the Hyper Terminal. The terminal screen will display the following messages.

```
Press <SpaceBar> to update BIOS.
Confirm update BIOS? (y/n) y
Begin remote BIOS flash? (y/n) y
Starting remote flash.
Upload new BIOS file using Xmodem protocol.
```

5. Following the instructions given on the screen to update the BIOS. These instructions are also shown below.

    a. At the prompt, press the <SpaceBar> to update the BIOS.

    b. When asked to con rm BIOS updating, press <y> to con rm BIOS updates.

    c. Press <y> again to begin ashing BIOS remotely.

    Note: Be sure to complete Steps a~c above quickly because you have a second or less to do so.

6. Once you've completed the instructions given, a screen will display to indicate that remote ashing is starting and the new BIOS le is being uploaded.

7. To use Hyper Terminal to transfer the XModem protocol by using the "Send File" dialog under the "Transfer" menu, follow the instructions below to complete XModem transfers.

    a. Select the "Transfer" menu and enter <Send>.
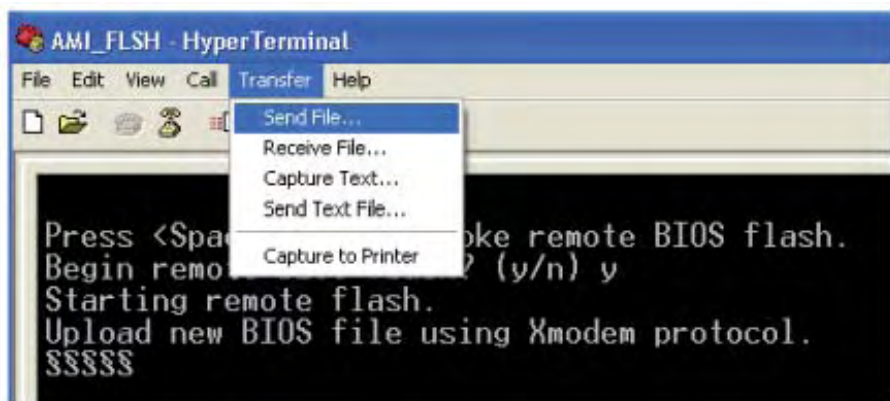
    b. Specify the location of the ROM le and select the proper protocol (XModem).

    c. Press <Send> to start ROM File extraction. (See the picture below.)
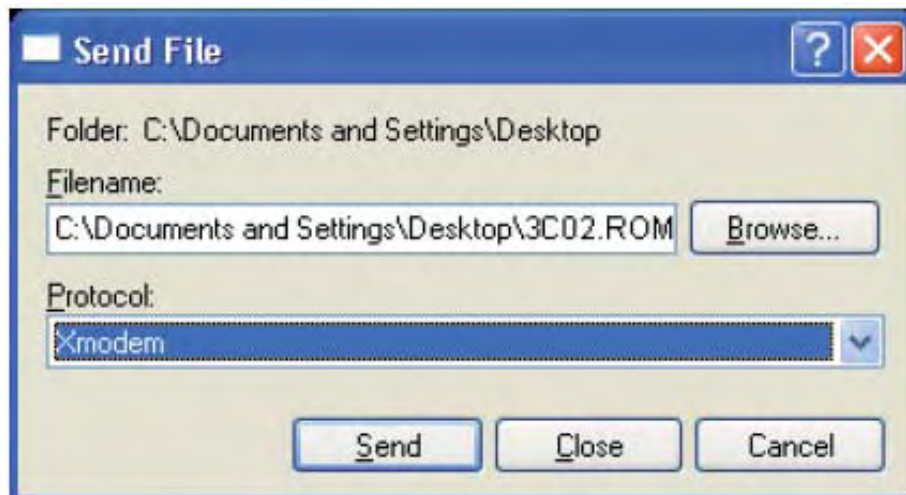
d. Once the ROM le extraction is completed, the message: "New BIOS received OK" will display.

```
Starting FLASH Recovery.
NVRAM data will be destroyed
CMOS data will be preserved
.............................................
.................
Ending FLASH Recovery
FLASH update completed successfully
Rebooting...
```

8. Once remote BIOS ash is completed, the system will reboot.

Note: AMIBIOS Serial Flash will work with any terminal communications program that supports VT-100 and XModem protocols, including protocols designed for GNU/LINUX & BSD operating systems such as minicom. It is recommended that the terminal program be con gured to use the 'CR/ LF' style of line termination.

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Appendix A. BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed each time the system is powered on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot-up process. The error messages normally appear on the screen.

Fatal errors are those which will not allow the system to continue the boot-up procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

A-1   BIOS Error Beep Codes

BIOS Error Beep Codes		
Beep Code	**Error Message**	**Description**
1 beep	Refresh	Circuits have been reset. (Ready to power up)
5 short beeps + 1 long beep	Memory Error	No memory detected in the system
8 beeps	Display memory read/write error	Video adapter missing or with faulty memory
1 continuous beep (with the front panel OH LED on)	System Overheat	1 continuous beep with the front panel OH LED on

Notes

A-2

Appendix B. Intel HostRAID Setup Guidelines

After all the hardware has been installed, you must first configure Intel's IOH-36D SATA RAID before you install the Windows Operating System and other software drivers.

Important Notes to the User

- If you do not wish to configure onboard SATA RAID functions, please go directly to Section B-3 and Appendix C for OS and other software installation instructions.

- This chapter describes RAID Configuration Instructions for the Intel IOH-36D RAID controller designed for the Windows OS.

B-1 Introduction to Serial ATA and Parallel ATA

To configure the SATA RAID functions, you must first use the Intel IOH-36D SATA RAID Utility program to configure the RAID Level that you desire before installing the Windows XP/2000/2003 operating system and other software drivers. (The necessary drivers are all included on the CD that came packaged with your motherboard.) Note that the current version of the IOH-36D SATA RAID Utility can only support Windows XP/2000/2003 Operating Systems.

Serial ATA (SATA)

Serial ATA (SATA) is a physical storage interface that uses a single cable with a minimum of four wires to create a point-to-point connection between devices. It is a serial link, which supports transfer rates up to 3.0 Gbps. Because the serial cables used in SATA are thinner than the traditional cables used in Parallel ATA (PATA), SATA systems have better air flow and can be installed in smaller chassis than Parallel ATA. In addition, the cables used in PATA are limited to a length of 40cm, while Serial ATA cables can be up to one meter in length. Overall, SATA provides better functionality than PATA.

Introduction to the Intel IOH-36D Serial RAID

Located in the South Bridge of the 5520 chipset, the I/O Controller Hub (IOH-36D) provides the I/O subsystem with access to the rest of the system. It supports an 1-channel UltraATA/100 Bus Master IDE controller (PATA) and six Serial ATA (SATA) ports. The IOH-36D supports the following PATA and SATA device configurations: Legacy mode and Native mode.

The Intel HostRAID Con gurations

The following RAID levels are supported:

RAID 0 (Data Striping): this writes data in parallel, interleaved ("striped") sections of two hard drives. Data transfer rate is doubled over using a single disk.

RAID1 (Data Mirroring): an identical data image from one drive is copied to another drive. The second drive must be the same size or larger than the rst drive.

RAID 10 (Striping & Mirroring): RAID 0 and 1 schemes are combined (without parity information) to get the bene ts of both.

RAID 5: both data and parity information are striped and mirrored across three or more hard drives.

The Intel Matrix Storage

The Intel Matrix Storage, supported by the IOH-36D, allows the user to create RAID 0, RAID 1, RAID 10 and RAID 5 sets by using only six identical hard disk drives. The Intel Matrix Storage Technology creates two partitions on each hard disk drive and generate a virtual RAID 0, RAID 1, RAID 10 and RAID 5 sets. It also allows you the change the HDD partition size without any data.

Configuring BIOS Settings for SATA RAID Functions (Native Mode)

1. Press the <Del> key during system bootup to enter the BIOS Setup Utility. Note: If it is the rst time powering on the system, we recommend you load the Optimized Default Settings. If you have already done so, please skip to Step 3.

2. Use the arrow keys to select the "Exit" Settings. Once in the "Exit" settings, Scroll down to select "Load Optimized Default Settings" and press the <Enter> key. Select "OK" to con rm the selection. Press the <Enter> key to load the default settings for the BIOS.

3. Use the arrow keys to select the "Main" section in BIOS.

4. Scroll down to "SATA Controller Mode" and press the <Enter> key to select "Enhanced"

5. Scroll down to "SATA RAID Enabled" and press <Enter>. Then, select "Enabled."

6. Go to "Exit". Select "Exit Saving Changes" from the "Exit" menu. Press the <Enter> key to save the changes and exit the BIOS.

7. Once you've exited the BIOS Utility, the system will re-boot.

8. During the system boot-up, press the <Ctrl> and <I> keys simultaneously to run the Intel RAID Con guration Utility when prompted by the following message: *Press <Ctrl> <I> for the* Intel *RAID Configuration Utility*.

Note: The Intel RAID Con guration Utility is only available for systems with two or more drives installed. <u>The Intel RAID Utility screen will not display in systems with one drive installed</u>. <u>Due to each serverboard controlling two of the four SATA</u>

Using the Intel IOH-36D SATA RAID Utility Program

Creating, Deleting and Resetting RAID Volumes:

a. After the system exits from the BIOS Setup Utility, the system will automatically reboot. The following screen appears after Power-On Self Test.

b. When you see the above screen, press the <Ctrl> and the <I> keys simultaneously to have the main menu of the SATA RAID Utility appear:
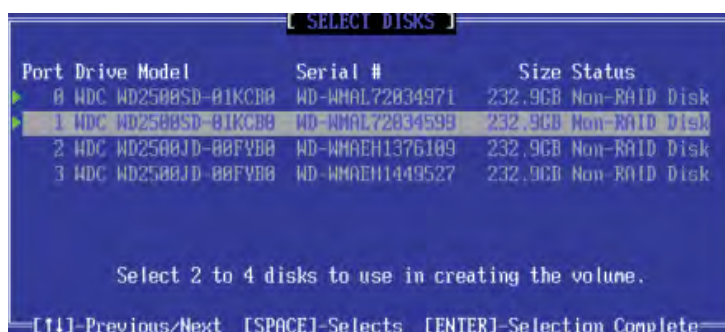
Note: All graphics and screen shots shown in the manual are for reference only. The screen shots shown in the manual do not imply Supermicro's endorsement or non-endorsement on any 3rd party's product. Your screens may or may not look exactly the same as the graphics shown in this manual.

Creating a RAID 0 Volume

a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:

```
Intel(R) Matrix Storage Manager option ROM v5.1.0.1013 ICH7R wRAID5
       Copyright(C) 2003-05 Intel Corporation.  All Rights Reserved.
══════════════════════[ CREATE VOLUME MENU ]══════════════════════

                    Name:  Volum0
              RAID Level:  RAID0(Stripe)
                   Disks:  Select Disks
              Strip Size:  128KB
                Capacity:  0.0   GB

                         Create Volume


═══════════════════════════[ HELP ]═══════════════════════════



    Enter a string between 1 and 16 characters in length that can be used
    to uniquely identify the RAID volume. This name is case sensitive and
                    can not contain special characters.
```

b. Specify a name for the **RAID 0** set and press the <Tab> key or the <Enter> key to go to the next   eld. (You can use the <Esc> key to select the previous menu.)

c. When RAID Level item is highlighted, press the <Up Arrow>, <Down Arrow> keys to select **RAID 0 (Stripe)** and hit <Enter>.

d. When the Disks item is highlighted, press <Enter> to select the HDD to con gure as RAID. The following pop-up screen displays (see note on page B-3) :

```
═══════════════════════[ SELECT DISKS ]═══════════════════════

Port Drive Model         Serial #            Size Status
►  0 WDC WD2500SD-01KCB0  WD-WMAL72034971   232.9GB Non-RAID Disk
►  1 WDC WD2500SD-01KCB0  WD-WMAL72034599   232.9GB Non-RAID Disk
   2 WDC WD2500JD-00FYB0  WD-WMAEH1376109   232.9GB Non-RAID Disk
   3 WDC WD2500JD-00FYB0  WD-WMAEH1449527   232.9GB Non-RAID Disk


         Select 2 to 4 disks to use in creating the volume.

═[↑↓]-Previous/Next  [SPACE]-Selects  [ENTER]-Selection Complete═
```

e. Use the <Up Arrow>, <Down Arrow> keys to highlight a drive and press <Space> to select it. A triangle appears to con rm the selection of the drive.

f. Use the <Up Arrow>, <Down Arrow> keys to select the stripe size, ranged from 4 KB to 128 KB for the RAID 0 array, and hit <Enter>. (Note: For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size. The default stripe size is 128 KB.)

g. Press <Enter> when the Create Volume item is highlighted. A warning message displays.

h. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

Creating a RAID 1 Volume

a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:

b. Specify a name for the **RAID 1** set and press the <Tab> key or the <Enter> key to go to the next eld. (You can use the <Esc> key to select the previous menu.)

c. When RAID Level item is highlighted, press the <Up Arrow>, <Down Arrow> keys to select **RAID 1 (Mirror)** and hit <Enter>.

d. When the Capacity item is highlighted, enter your RAID volume capacity and hit <Enter>. The default setting is the maximum capacity allowed.

e. Press <Enter> when the Create Volume item is highlighted. A warning message displays.

f. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.
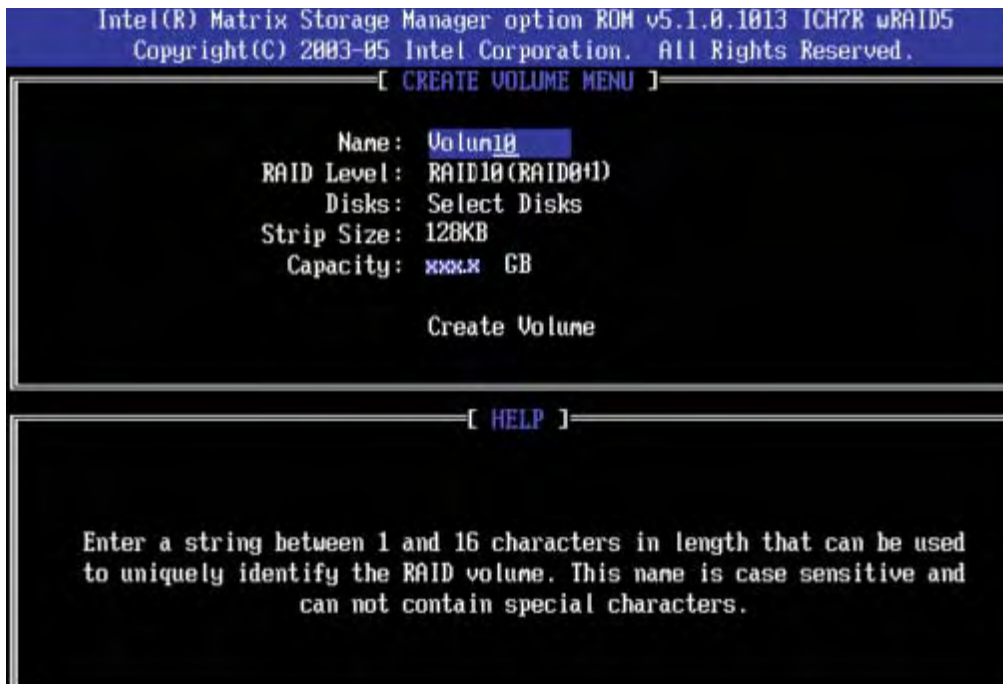
Creating a RAID 10 (RAID 1+ RAID 0)

a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:


b. Specify a name for the **RAID 10** set and press <Enter>.

c. When RAID Level item is highlighted, use the <Up Arrow>, <Down Arrow> keys to select **RAID 10 (RAID1 + RAID0)** and hit <Enter>.

d. When the Stripe Size is highlighted, use the <Up Arrow>, <Down Arrow> keys to select the stripe size from 4 KB to 128 KB for your RAID 10 and hit <Enter>. The default setting is 64 KB. (Note: For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size.)

e. When the RAID Volume Capacity item is highlighted, enter your RAID volume capacity and hit <Enter>. The default setting is the maximum capacity allowed.

f. Press <Enter> when the Create Volume item is highlighted. A warning message displays.

g. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

Creating a RAID 5 Set (Parity)

a. Select "Create RAID Volume" from the main menu and press the <Enter> key. The following screen will appear:

b. Specify a name for the **RAID 5** set and press <Enter>.

c. When the Raid Level is highlighted, use the <Up Arrow>, <Down Arrow> keys to select **RAID 5 (Parity)** and hit <Enter>.

d. When the Disk item is highlighted, press <Enter> to select the HDD to con gure as RAID. The following pop-up screen displays (see note on page B-3):
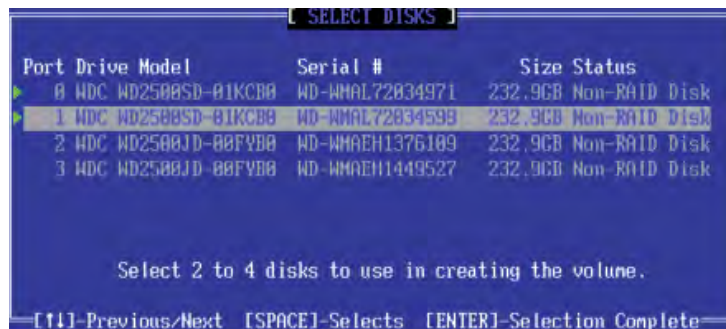
e. Use the <Up Arrow>, <Down Arrow> keys to highlight a drive and press <Space> to select it. A triangle appears to con rm the selection of the drive.

f. Use the <Up Arrow>, <Down Arrow> keys to select the stripe size, ranged from 4 KB to 128 KB for the RAID 5 array, and hit <Enter>. (Note: For a server, please use a lower stripe size, and for a multimedia system, use a higher stripe size. The default stripe size is 128 KB.)

g. Enter your desired RAID volume capacity and press <Enter> when the capacity item is highlighted. The default setting is the maximum capacity allowed.

h Press Enter when the Create Volume item is highlighted. A warning message displays.

i. When asked "Are you sure you want to create this volume (Y/N), press "Y" to create the RAID volume, or type "N" to go back to the Create Volume menu.

Deleting a RAID Volume

Warning: Make sure you back up your data before deleting a RAID set. You will lose all data on the disk drives when deleting a RAID set.

a. From the main menu, select item2-Delete RAID Volume, and press <Enter>.

b. Use the <Up Arrow>, <Down Arrow> keys to select the RAID set you want to delete and press <Del>. A warning message displays.

c. When asked "Are you sure you want to delete this volume (Y/N), press "Y" to delete the RAID volume, or type "N" to go back to the Delete Volume menu.

Resetting to Non-RAID and Resetting a RAID HDD

> ⚠ **Warning:** Be cautious when you reset a RAID volume HDD to non-RAID or Resetting a RAID HDD. Resetting a RAID volume HDD or Resetting a RAID HDD will reformat the HDD and delete the internal RAID structure on the drive.

 a. From the main menu, select item3-Reset Disks to Non- RAID, and press <Enter>. The following screen will appear:
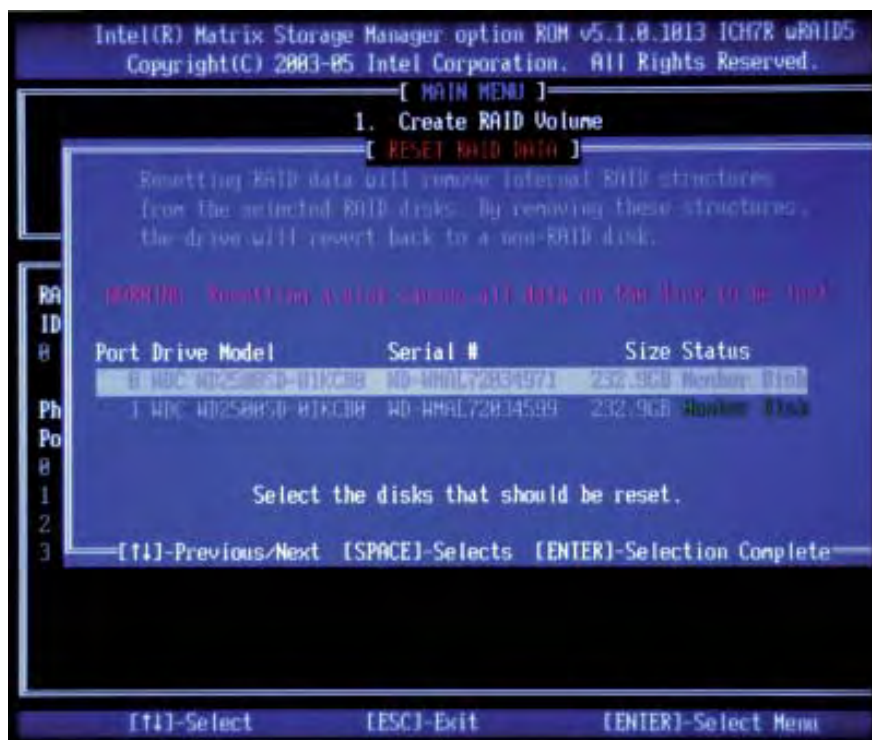
b. Use the <Up Arrow>, <Down Arrow> keys to highlight the RAID set drive to reset and press <Space> to select.

c. Press <Enter> to reset the RAID set drive. A Warning message displays.

d. Press "Y" to reset the drive, or type "N" to go back to the main menu.

Exiting the Intel Matrix Storage Manager Utility

a. From the main menu, select item4-Exit, and press <Enter>. A warning message will appear.

b. Press "Y" to reset the drive, or type "N" to go back to the main menu.

Appendix C. Adaptec HostRAID Setup Guidelines

After all the hardware has been installed, you must rst con gure the Adaptec Embedded Serial ATA RAID before you install the Windows operating system. The necessary drivers are all included on the bootable CDs that came packaged with your motherboard. Note: The following section provides information on the Adaptec SATA RAID Driver based on the Intel Enterprise South Bridge 2 (IOH-36D) controller.

C-1   Adaptec Embedded SATA Controller

Serial ATA (SATA)

Serial ATA (SATA) is a physical storage interface. It uses a single cable with a minimum of four wires to create a point-to-point connection between devices. It is a serial link which supports SATA Transfer rates up to 3.0 Gbps. Because the serial cables used in SATA are thinner than the traditional cables used in Parallel ATA (PATA), SATA systems have better air ow and can be installed in smaller chassis than PATA. In addition, the cables used in PATA can only extend to 40cm long, while SATA cables can extend up to one meter. Overall, SATA provides bet-ter functionality than PATA.

Introduction to the Intel IOH-36D I/O Controller Hub

Located in the South Bridge of the Intel 5520 Chipset, the IOH-36D I/O controller Hub provides the I/O subsystem with access to the rest of the system. It supports 1-channel Ultra ATA/100 Bus Master IDE controller (PATA) and one Adaptec SATA Host Controller, which support up to six SATA drives, up to two RAID volumes and up to four drives in RAID con gurations. (See the table below for details.)

* Adaptec's SATA HostRAID Controller Firmware supports:	
Drives supported	Six
Number of RAID Volumes supported	Two
Total Drives in RAID Configurations	Four
Examples of Valid RAID Configurations:	
Two drives of RAID 1 + two drives of RAID 0	
Two drives of RAID 1 + two drives of RAID 1	
Three drives of RAID 0	
Four drives of RAID 0	
Examples of Invalid RAID Configurations:	
Three drives of RAID 0 + two drives of RAID 1	
(***Note**: this table is applicable to Adaptec's HostRAID Controller Firmware only.)	

Configuring SATA RAID

1. Press the <Del> key during system bootup to enter the BIOS Setup Utility.

Note: If it is the rst time powering on the system, we recommend you load the Optimized Default Settings. If you have already done so, please skip to Step 3.

2. Use the arrow keys to select the "Exit" Settings. Once in the "Exit" settings, Scroll down to select "Load Optimized Default Settings" and press the <Enter> key. Select "OK" to con rm the selection. Press the <Enter> key to load the default settings for the BIOS.

3. Use the arrow keys to select the "Main" section in BIOS.

4. Scroll down to "SATA Control Mode" and press the <Enter> key to select "Enhanced"

5. Scroll down to "SATA RAID Enabled" and press <Enter>. Then, select "En-abled."

6. Scroll down to "ICH RAID Codebase" and select "Adaptec". Then press <En-ter>. (For ICH RAID Codebase: Change the setting from Intel to Adaptec.)

7. Go to "Exit". Select "Exit Saving Changes" from the "Exit" menu. Press the <Enter> key to save the changes and exit the BIOS.

8. Once you've exited the BIOS Utility, the system will re-boot.

9. During the system boot-up, press the <Ctrl> and <A> keys simultaneously to run the Intel RAID Con guration Utility when prompted by the following message: Press <Ctrl> <A> for Intel RAID Con guration Utility.

Adaptec SATA with HostRAID

The Adaptec Embedded Serial ATA RAID Controller adds SATA/RAID functionality and performance enhancements to a motherboard. RAID striping (RAID 0) allows data to be written across multiple drives, greatly improving hard disk I/O performance. RAID mirroring (RAID 1) allows data to be simultaneously written to two drives, improving data security even if a single hard disk fails. A Stripe of Mirrors (RAID 10) provides multiple RAID 1 mirrors and a RAID 0 stripe, maximizing data security and system ef ciency. By incorporating the Adaptec Embedded Serial ATA into the motherboard design, bullx R424-E1/R424-INF-E1 serverboard offers the user the bene ts of SATARAID without the high costs associated with hardware RAID applications.

Using the Adaptec RAID Configuration Utility (ARC)

The Adaptec RAID Con guration Utility, an embedded BIOS Utility, includes the following:

Array Con guration Utility: Use this utility to create, con gure and manage arrays.

Disk Utilities: Use this option to format or verify disks.

To run the Adaptec RAID Con guration Utility, you will need to do the following:

1. Enable RAID functions in the system BIOS (refer to Chapter 4 for System BIOS Con gurations).

2. Press the <Ctrl> and <A> keys simultaneously when prompted to do so during system boot. (Refer to the previous page for detailed instructions.)

Using the Array Configuration Utility (ACU)

When you press <Ctrl> and <A> keys simultaneously at the prompt during system bootup, the main menu will appear.

Note: To select an option, use the arrow keys to highlight the item and then press the <Enter> key to select it. To return to the previous menu, press the <ESC> key. Press the <Insert> key to select a drive. When a drive is highlighted (selected), press the <Delete> key to de-select it.
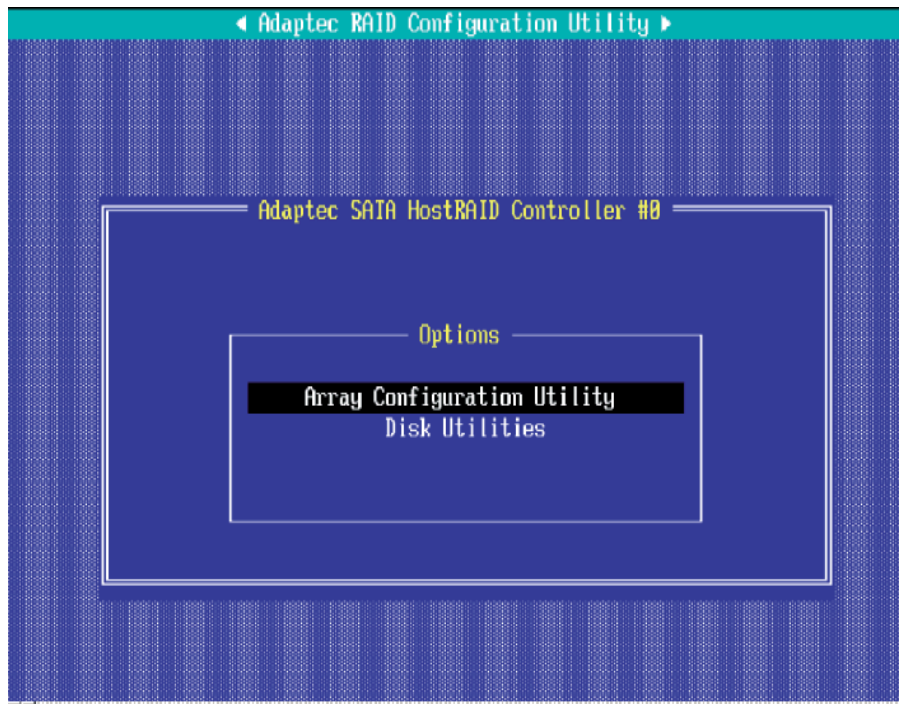
Managing Arrays

Select this option to view array properties, and configure array settings.

To select this option, using the arrow keys and the <enter> key, select "Managing Arrays" from the main menu as shown above.

Configuring Disk Drives

You may need to configure a disk drive before you can use it.

Caution: Configuring a disk may overwrite the partition table on the disk and may make any data on the disk inaccessible. If the drive is used in an array, you may not be able to use the array again.

<u>Do not configure</u> a disk that is part of a boot array. To determine which disks are associated with a particular array, please refer to Viewing Array Properties.

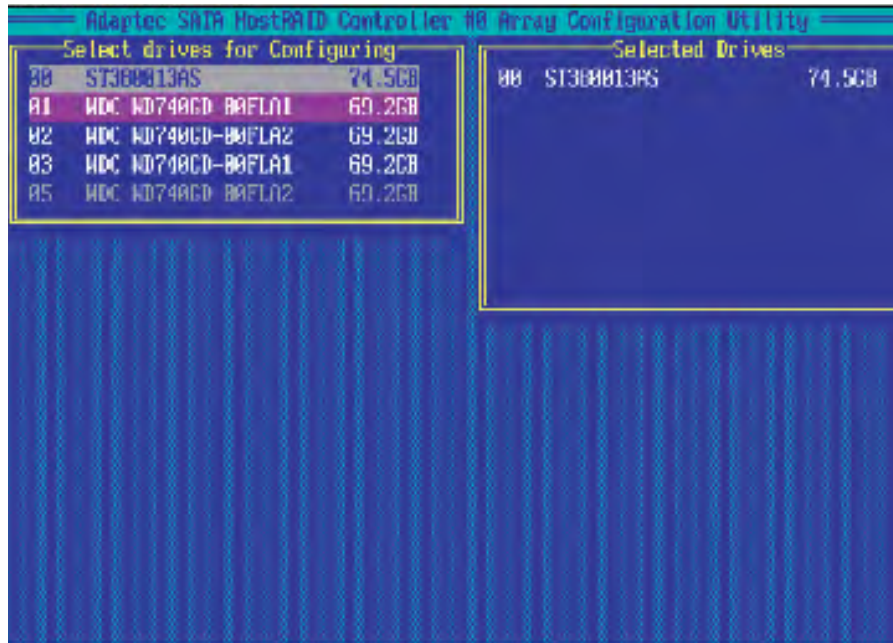**To configure a disk drive:**

1. From the main menu (shown on Page C-4), select Configure Drives and hit <Enter> (as shown below.)

2. From the "Select Drives for Configuring" List (shown below,) select the drives you want to configure and press <Insert>.
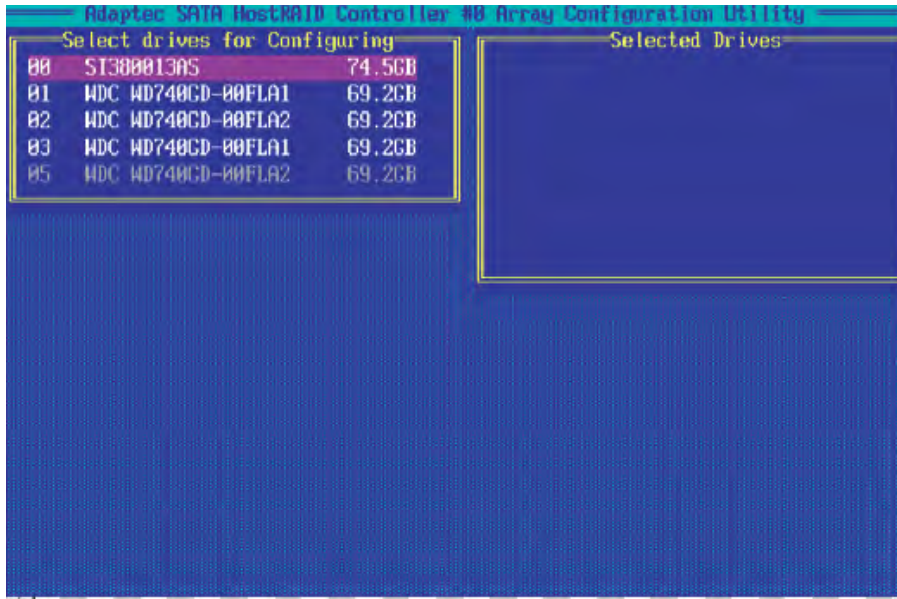
3. The drive you've selected will appear in the "Selected Drives Dialog Box" on the right (as shown below.) Repeat the same steps until all drives that you want to configure appear in the selected drives box.

4. Once both drives display in the selected drive box, press <Enter>.

5. Read the warning message as shown in the screen below.
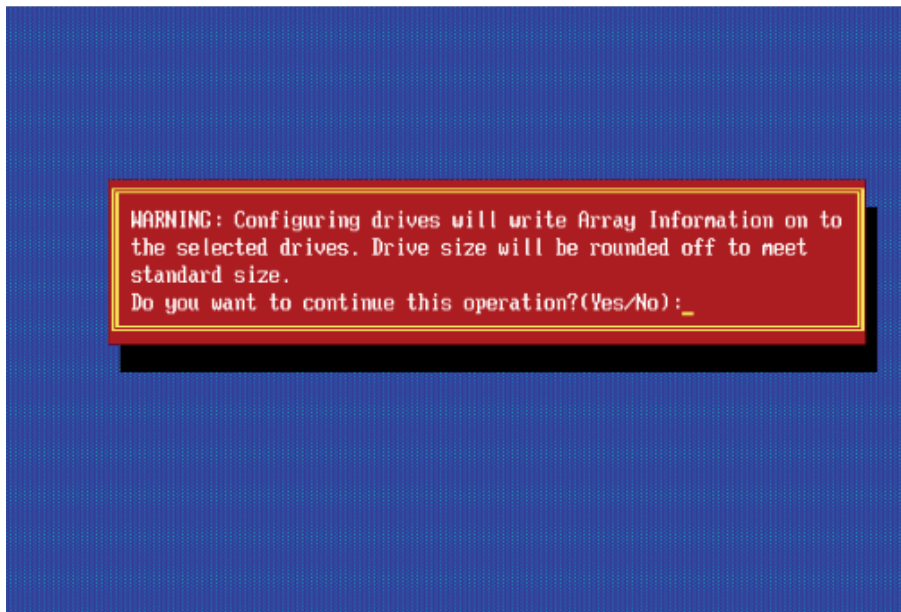
6. Make sure that you have selected the correct disk drives to configure. If correct, type Y to continue.

Creating Arrays

Before you create arrays, make sure that the disks for the array are connected and installed in your system. Note that disks with no usable space, or disks that are un-initialized or not formatted are shown in gray and cannot be used. (**Note**: It is recommended that you configure devices before you create arrays.)

To create an array:

1. From the main menu (shown on page C-4), select Create Array.

2. Select the disks for the new array and press Insert (as the screen shown below). (Note: To de-select any disk, highlight the disk and press Delete.)

3. The arrays you have selected will appear on the Selected Drives dialog box on the right (as shown below.)

4 Press Enter when both disks for the new array are selected. The Array Properties menu displays.
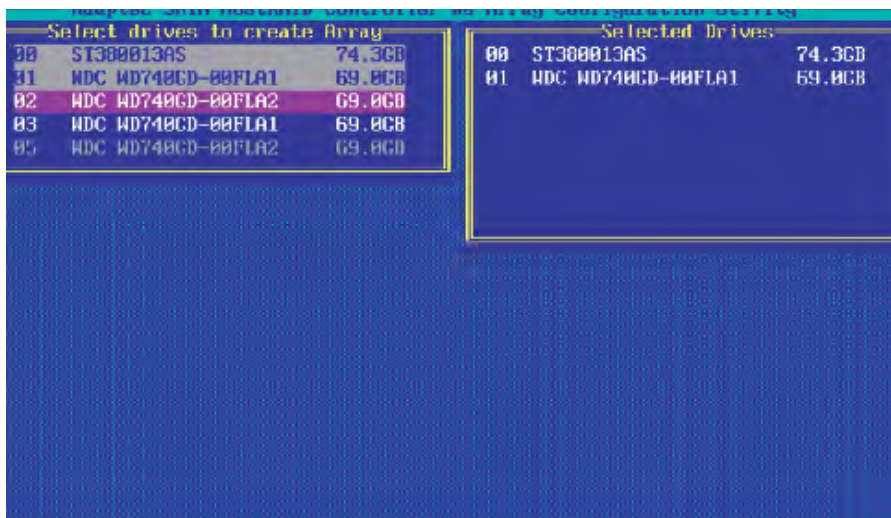
Assigning Array Properties

Once a new array is completed, you can assign properties to the array.

Caution: Once the array is created and its properties are assigned, and you cannot change the array properties using this utility.

To assign properties to the new array:

1. In the Array Properties menu (as shown in the screen below), select an array type and press Enter. Only the available array types will be displayed on the screen. (RAID 0 or RAID 1 requires two drives.)
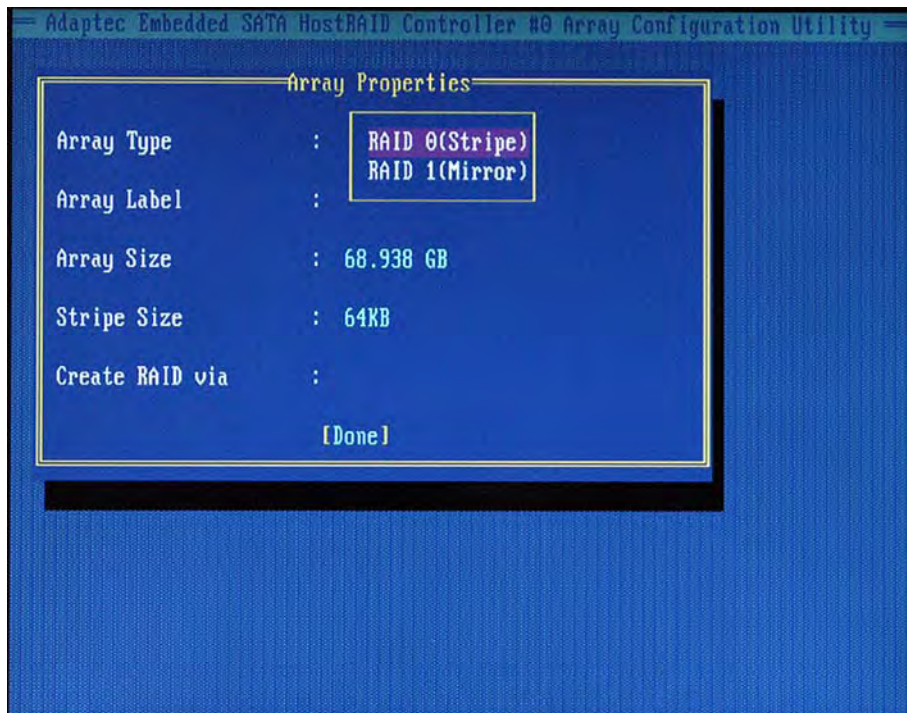
2. Under the item "Arrays Label", type in a label and press <Enter>. (Note: The label shall not be more than 15 characters.)

3. For RAID 0, select the desired stripe size. (Note: Available stripe sizes are 16, 32, and 64 KB. 64K is default. Please do not change the default setting.)
4. The item: "Create RAID via" allows you to select between the different ways of creating methods for RAID 0 and RAID 1.

The following table gives examples of when each is appropriate.

Raid Level	Create Via	When Appropriate
RAID 0	Quick Init	Creating a RAID 0 on new drives
RAID 0	Migrate*	Creating a RAID 0 from one new drive and one drive with data you wish to preserve
RAID 1	Build*	Any time you wish to create a RAID 1, but especially if you have data on one drive that you wish to preserve
RAID 1, RAID 10	Clear	Creating a RAID 1 or RAID 10 on new drives, or when you want to ensure that the array contains no data after creation.
RAID 1, RAID 10	Quick Init	Fastest way to create a RAID 1 or RAID 10 Appropriate when using new drives

(Note: If you select Migrate for RAID 0, or Build for RAID 1, you will be asked to select the source drive. The contents of the source drive will be preserved. However, the data on the new drive will be lost.)

5. When you are finished, press **<Done>** (as the screen shown below).
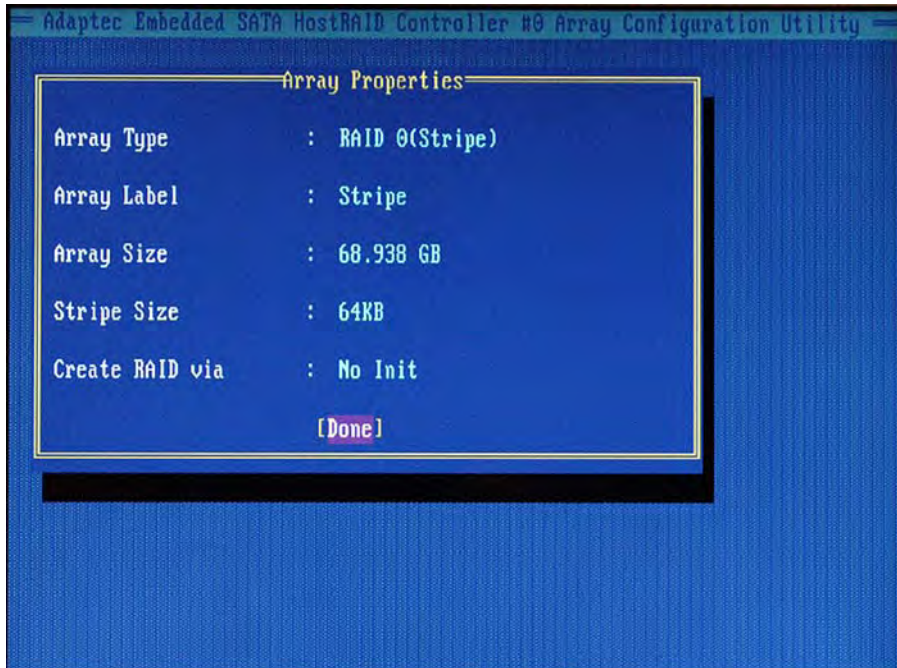
Notes:

1. Before adding a new drive to an array, be sure to back up any data stored on the new drive; otherwise, all data will be lost.

2. If you stop the Build or Clear process on a RAID 1, you can restart it by pressing <Ctrl> and <R>.

3. If you've used the Quick Init option to create a RAID1, it may return some data mis-comparison when you run a consistency check at a later time. This is normal.

4. The Adaptec Host RAID allows you to use drives of different sizes in a RAID. However, you can only select a smaller drive as the source or first drive during a build operation.

5. When migrating from single volume to RAID 0, migrating from a larger drive to a smaller drive is allowed. However, the destination drive must be at least half the capacity of the source drive.

6. It is not recommended that you migrate or build an array on Windows dynamic disks (volumes) because it will result in data loss.

Warning: Do not interrupt the process when you create a RAID 0 using the Migrate option. If you do, you will not be able to restart the system, or to recover the data that was on the source drive.

Adding a Bootable Array

To make an array bootable:

1. From the Main menu, select Manage Arrays.

2. From the List of Arrays, select the array you want to make bootable, and press <Ctrl> and <B>.

3. Enter Y to create a bootable array when the following message is displayed: "This will make all other existing bootable array non-bootable. Do you want to make this array bootable? (Yes/No):" Then, a bootable array will be created. An asterisk () will appear next to the bootable array (as shown in the picture below:)
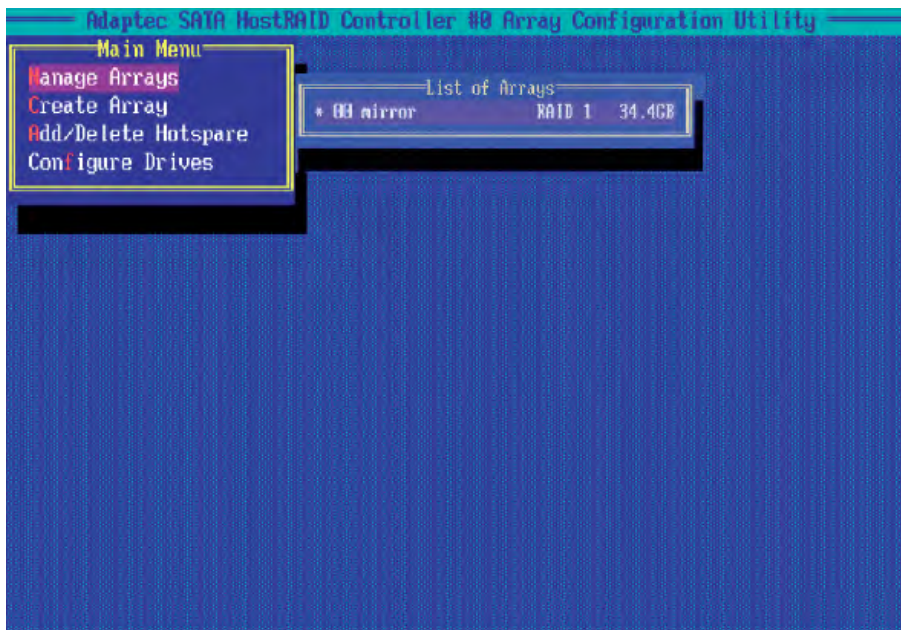
Deleting a Bootable Array

To delete a bootable array:

1. From the Main menu, select Manage Arrays.

2. From the List of Arrays, select the bootable array you want to delete, and press <Ctrl> and <B>. Note: a bootable array is the array marked with an asterisk   (as shown in the picture above.)

3. When the following message is displayed: "The array is already marked bootable. Do you want to make this array as not bootable? (Yes/No)," Enter Y to delete a bootable array. The bootable array will be deleted and the asterisk will disappear.

Note: Do not use the delete key to delete the bootable array.

Adding/Deleting Hotspares

To add a Hotspare:

(**Note**: In order to rebuild a RAID (RAID 0 or RAID 1), you would need to add a new HDD as a hotspare.)

1. From the main menu (shown on Page C-4), select Add/Delete Hotspares.

2. Use the up and down arrow keys to highlight and select the disk you want to designate as a hotspare, and press <Insert>, and then, press <Enter>.

3. Press Yes when the following prompt is displayed:

"Do you want to create spare?" (Yes/No?)

The spare you have selected will appear in the Selected drives Menu.
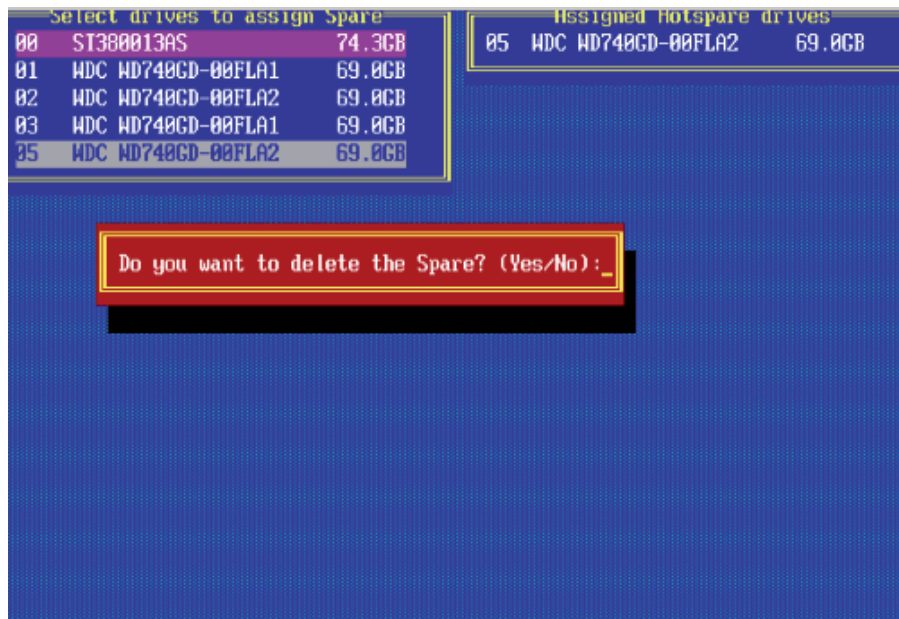
To delete a Hotspare:

1. From the main menu (shown on Page C-4), select Add/Delete Hotspares.

2. Use the up and down arrow keys to highlight and select the Hotspare you want to delete, and press <delete>, and then, press <Enter>.

3. When the following warning is displayed: "Do you want to delete the hot spare?" (Yes/No?), press Yes to delete the hotspare you have selected.

Viewing Array Properties

To view the properties of an existing array:

1. From the main menu, select Manage Arrays and hit <Enter> (as shown on the previous page.)

2. From the List of Arrays dialog box (shown below), select the array you want to view and press Enter.

The Array Properties dialog box appears (as shown below), showing detailed information on the array. The physical disks associated with the array are displayed here.
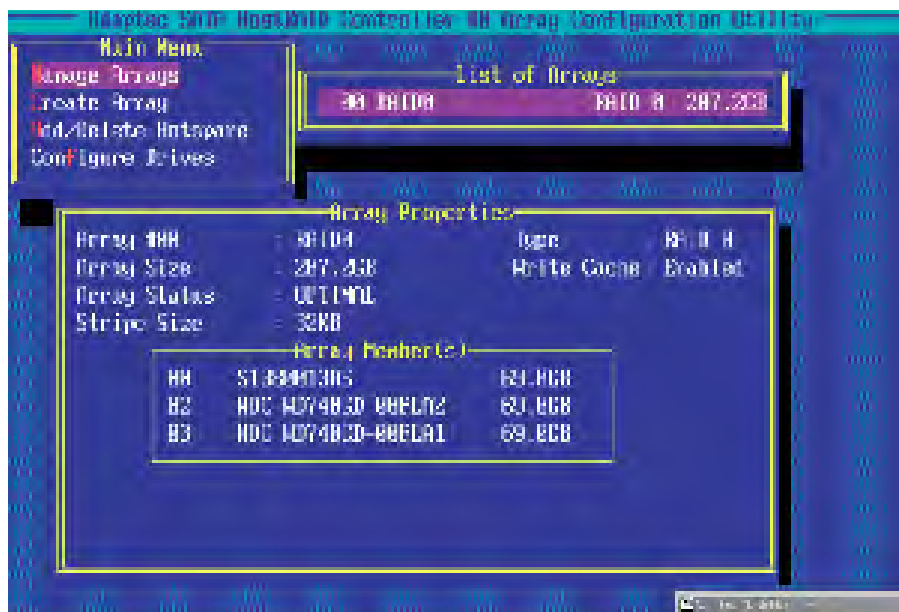
3. Press Esc to return to the previous menu.

Rebuilding Arrays

Note 1: Rebuilding applies to Fault Tolerant array (RAID 1) only.

If an array Build process is interrupted or when one critical member is missing, you must perform a Rebuild to restore its functionality. For a critical array rebuild operation, the optimal drive is the source drive.

Note 2: If no spare array exists and a hard disk drive fails, you need to create a spare before you can rebuild an array.

To Rebuild an array:

1 From the Main Menu, select Manage Arrays (as shown in the screen below). From the List of Arrays, select the array you want to Rebuild.

2 Press <Ctrl> and <R> to Rebuild.
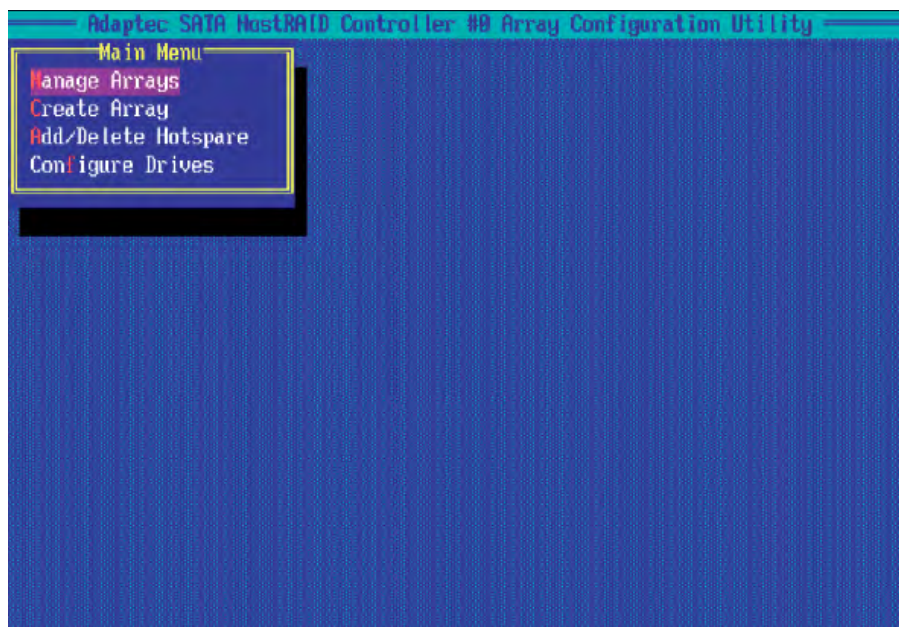
Deleting Arrays

Warning!! Back up the data on an array before you delete it to prevent data loss Deleted arrays cannot be restored.

To delete an existing array:

1. From the main menu (shown on Page C-4), select Manage Arrays.

2. Select the array you wish to delete and press <delete>.

3. In the Array Properties dialog box, select Delete and press <Enter>. The following prompt is displayed:

Warning!! Deleting the array will render array unusable. Do you want to delete the array? (Yes/No):

    RAID 1 only—the following prompt is also displayed:

Deleting the partition will result in data loss! Do you also want to delete the partition? (Yes/No):

4. Press Yes to delete the array and partition or No to return to the previous menu.

5. Press Esc to return to the previous menu.
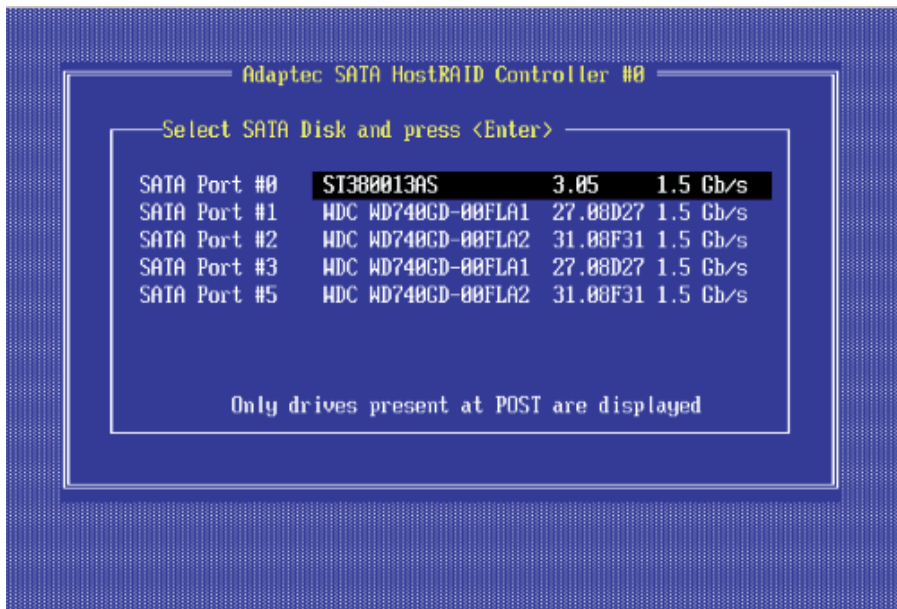
Using the Disk Utilities

The Disk Utilities enable you to format or verify the media of your Serial ATA hard disks.

To access the disk utilities:

1. From the Adaptec RAID Configuration Utility Menu, select Disk Utilities (as shown above) and press <Enter>. The following screen appears.
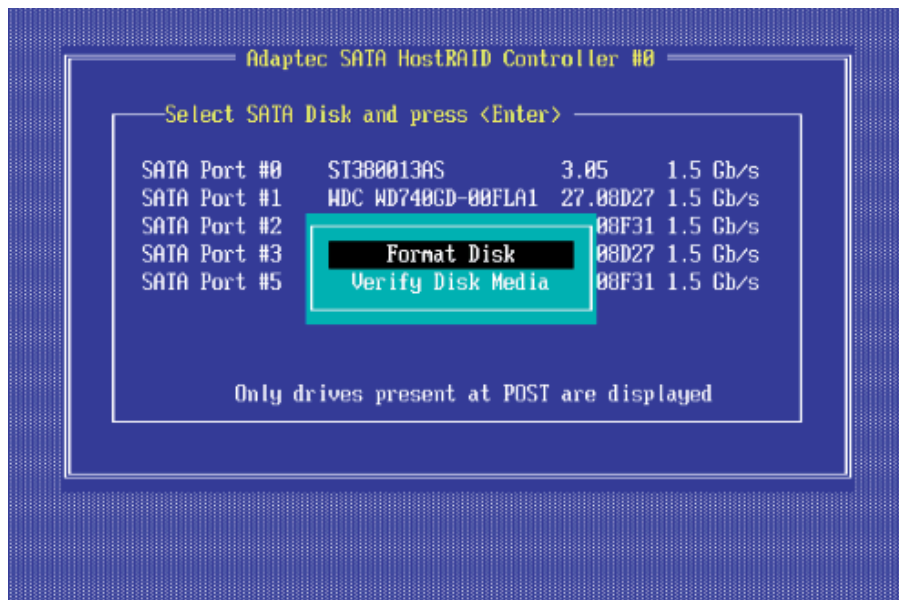

2. Select the desired disk and press <Enter>. The following screen appears:
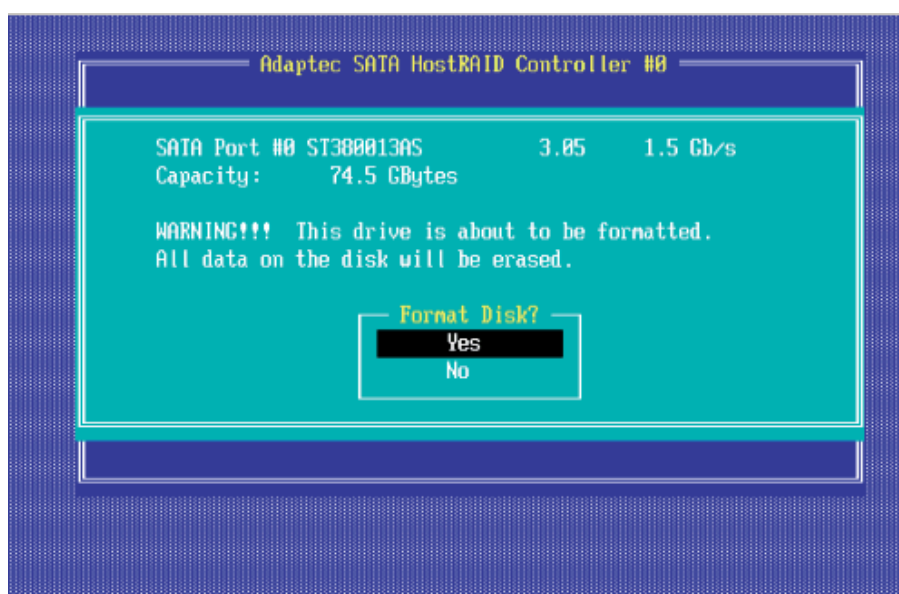
To format a disk:

Note: The operation of Formatting Disk allows you to perform a low-level formatting of a hard drive by writing zeros to the entire disk. Serial ATA drives are low-level formatted at the factory and do not need to be low-level formatted again.

3. When the screen shown below displays, select Format Disk and press <Enter>. The following screen appears:

```
┌──────── Adaptec SATA HostRAID Controller #0 ────────┐
│                                                      │
│  ┌─Select SATA Disk and press <Enter>──────────────┐ │
│  │                                                 │ │
│  │  SATA Port #0   ST380013AS        3.05    1.5 Gb/s │
│  │  SATA Port #1   WDC WD740GD-00FLA1 27.08D27 1.5 Gb/s │
│  │  SATA Port #2            ┌──────────┐ 08F31 1.5 Gb/s │
│  │  SATA Port #3            │Format Disk│ 08D27 1.5 Gb/s │
│  │  SATA Port #5            │Verify Disk Media│ 08F31 1.5 Gb/s │
│  │                         └──────────┘          │ │
│  │                                                 │ │
│  │       Only drives present at POST are displayed │ │
│  └─────────────────────────────────────────────────┘ │
│                                                      │
└──────────────────────────────────────────────────────┘
```
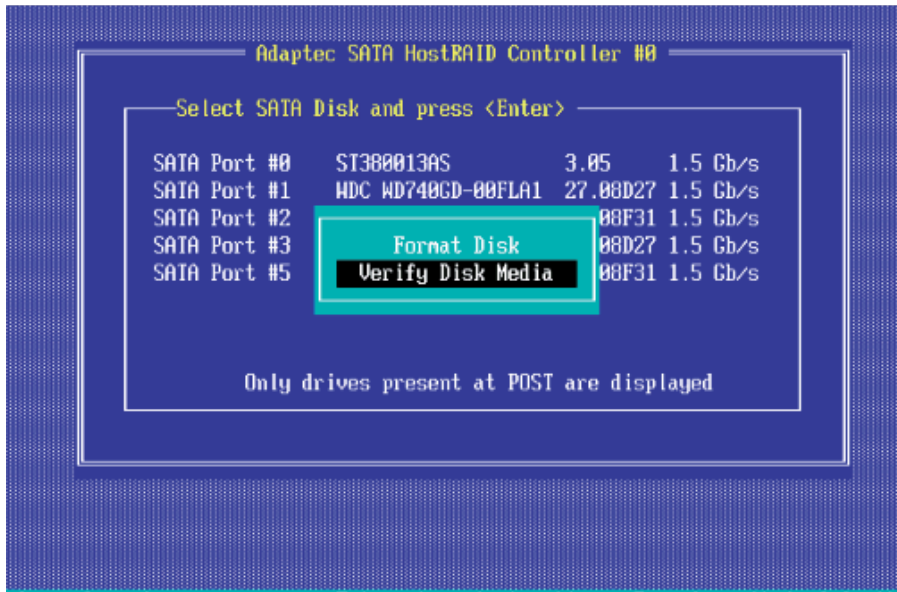
4. Read the warning message when it appears in the screen as shown below. To continue with disk formatting, select Yes and hit <Enter>. Otherwise, select No and press <Enter>.

(**Caution**: Formatting a disk destroys all data on the drive. Be sure to back up your data before formatting a disk.)

```
┌──────── Adaptec SATA HostRAID Controller #0 ────────┐
│                                                      │
│  ┌─────────────────────────────────────────────┐     │
│  │  SATA Port #0 ST380013AS      3.05    1.5 Gb/s │   │
│  │  Capacity:      74.5 GBytes                    │   │
│  │                                                │   │
│  │  WARNING!!!  This drive is about to be formatted. │ │
│  │  All data on the disk will be erased.          │   │
│  │                                                │   │
│  │            ┌─ Format Disk? ─┐                  │   │
│  │            │      Yes       │                  │   │
│  │            │      No        │                  │   │
│  │            └────────────────┘                  │   │
│  └────────────────────────────────────────────────┘  │
│                                                      │
└──────────────────────────────────────────────────────┘
```

To verify disk media:

3. When the screen shown above displays, select Verify Disk Media and press <Enter>.

4. A message will display, indicating that the selected drive will be scanned for media defects. Select Yes and hit <Enter> to proceed with disk verifying; otherwise, select No and hit <Enter>.
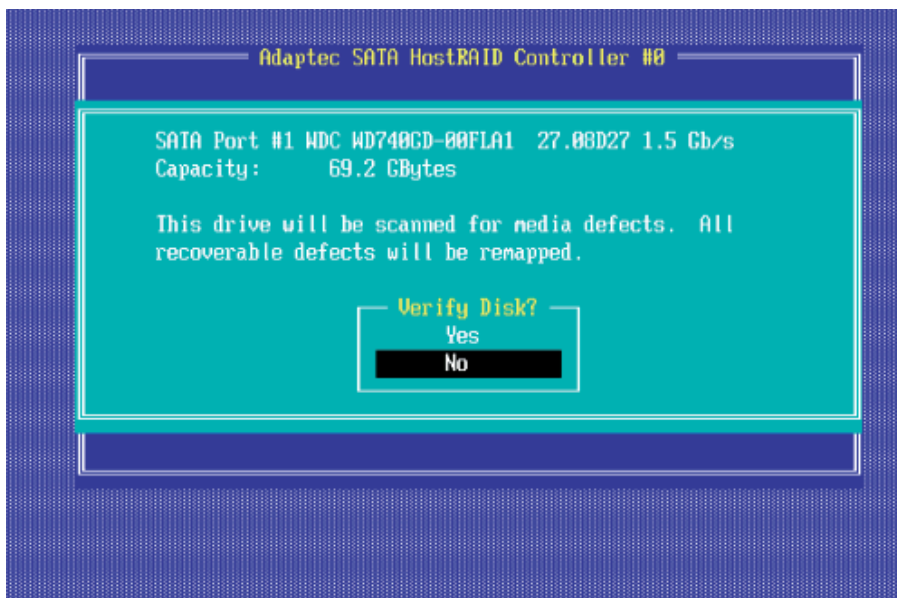
To Exit Adaptec RAID Configuration Utility

1. Once you have completed RAID array configurations, press ESC to exit. The following screen will appear.

2. Press Yes to exit the Utility.
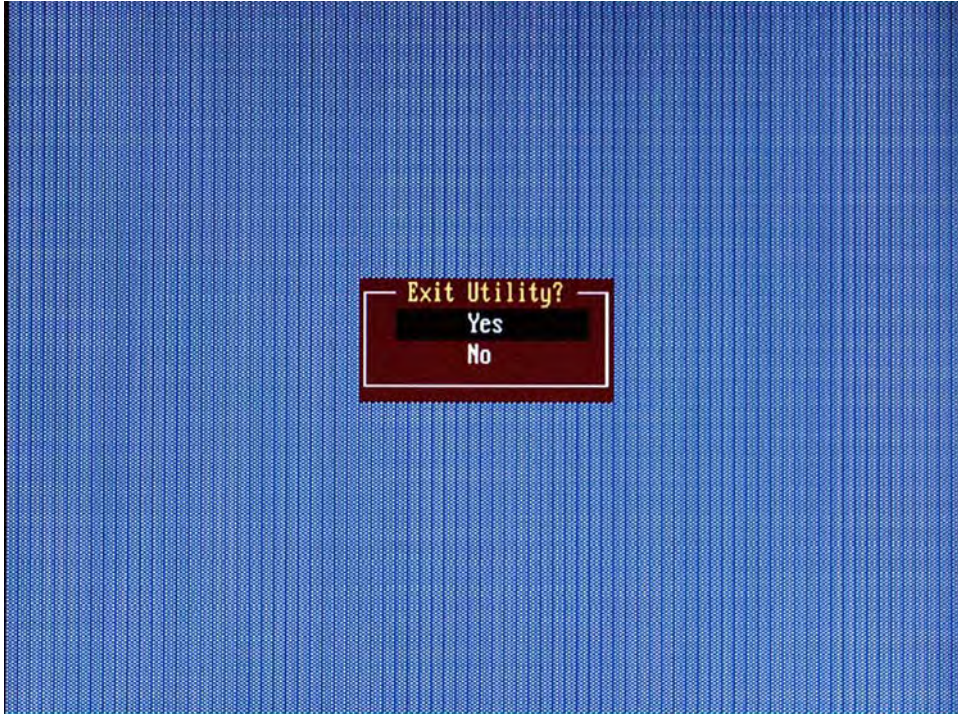
Appendix D. System Specifications

Note: <u>unless noted speci cations apply to a complete system (both server-boards</u>).

Processors

Two Intel® 5500 Series (LGA 1366) processors, each processor supporting two full-width Intel QuickPath Interconnect (QPI) links with a total of up to 51.2 GT/s Data Transfer Rate (6.4 GT/s per direction)

Chipset

Intel 5520

BIOS

- 32 Mb AMI SPI Flash ROM,
- ACPI 1.02/2.0/3.0, Plug and Plat (PnP), and USB Keyboard support.

Memory

Twelve 240-pin DIMM sockets support up to 48 GB of DDR3 Registered ECC 1333/1066/800 MHz Memory (with maximum of 4 GB per DIMM module).

Serial ATA Controller

Intel ESB2 on-chip controller to support four 3 Gb/s Serial ATA (RAID 0, 1)

SATA Drive Bays

Four (4) hot-swap drive bays to house four (4) standard SATA drives

PCI Expansion

Two (2) low-pro le PCI-Express 2.0 x16 slots (with pre-installed riser cards)

Serverboard

bullx R424-E2

bullx R424-INF-E2

Dimensions (both): 6.5 x 16.4 in (165 x 417 mm)

BULL CEDOC

357 AVENUE PATTON

B.P.20845

49008 ANGERS CEDEX 01

FRANCE

REFERENCE
86 A1 61FE 00