HP Integrity rx3600 Server User Service Guide

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About This Document

This document describes how to troubleshoot and diagnose server problems, and remove and replace server components for the HP Integrity rx3600, Regulatory Model Number: RSVLA-0404.

The document publication date and part number indicate the document's current edition. The publication date changes when a new edition is published. Minor changes may be made without changing the publication date. The document part number will change when extensive changes are made.

Document updates may be issued between editions to correct errors or document product changes. To ensure that you receive the updated or new editions, you should subscribe to the appropriate product support service. See your HP sales representative for details.

The latest version of this document can be found online at http://www.hp.com/go/Integrity_Servers-docs.

Intended Audience

This document is intended to provide technical product and support information for authorized service providers, customer system administrators, and HP support personnel.

New and Changed Information in This Edition

This document has been updated with the following:

- Updated environmental specifications, including system shutdown temperature thresholds

Publishing History

Table 1 lists the publishing history details for this document.

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Document Organization

The *HP Integrity rx3600 HP Service Guide* is divided into several chapters, each chapter contains information about servicing the HP Integrity rx3600. The appendixes contain supplemental information.

"Overview" (page 17) Use this chapter to develop a high-level understanding of the major server subsystems.

"System Specifications" (page 37) Use this chapter to learn about the system specifications.

"Installing the System" (page 42)	Use this chapter to learn how to install the system.
"Booting and Shutting Down the Operating System" (page 108)	Use this chapter to learn about booting and shutting down the operating system.
"Troubleshooting" (page 124)	Use this chapter to help troubleshoot and diagnose server problems.
"Removing and Replacing Server Components" (page 161)	Use this chapter to learn how to remove and replace server components.
"Customer Replaceable Units Information" (page 236)	Use this appendix for parts information.
Appendix C (page 261)	Use this appendix for instructions on how to configure core I/O cards.
"Utilities" (page 294)	Use this appendix to learn about utilities such as EFI and the iLO 2 MP.

Typographic Conventions

This document uses the following conventions.

`%`, `$`, or `#`	A percent sign represents the C shell system prompt. A dollar sign represents the system prompt for the Bourne, Korn, and POSIX shells. A number sign represents the superuser prompt.
`Command`	A command name or qualified command phrase.
`Computer output`	Text displayed by the computer.
Ctrl+x	A key sequence. A sequence such as **Ctrl+x** indicates that you must hold down the key labeled **Ctrl** while you press another key or mouse button.
`ENVIRONMENT VARIABLE`	The name of an environment variable, for example, `PATH`.
ERROR NAME	The name of an error, usually returned in the `errno` variable.
Key	The name of a keyboard key. **Return** and **Enter** both refer to the same key.
Term	The defined use of an important word or phrase.
`User input`	Commands and other text that you type.
`Variable`	The name of a placeholder in a command, function, or other syntax display that you replace with an actual value.
[]	The contents are optional in syntax. If the contents are a list separated by `|`, you must choose one of the items.
{}	The contents are required in syntax. If the contents are a list separated by `|`, you must choose one of the items.
...	The preceding element can be repeated an arbitrary number of times.
Three vertical periods	Indicates the continuation of a code example.
|	Separates items in a list of choices.
WARNING	A warning calls attention to important information that if not understood or followed will result in personal injury or nonrecoverable system problems.
CAUTION	A caution calls attention to important information that if not understood or followed will result in data loss, data corruption, or damage to hardware or software.

IMPORTANT	This alert provides essential information to explain a concept or to complete a task
NOTE	A note contains additional information to emphasize or supplement important points of the main text.

Related Documents

You can find other information on HP server hardware management and diagnostic support tools in the following publications.

HP Technical Documentation Website

http://www.hp.com/go/Integrity_Servers-docs

Windows Operating System Information

Find information about administration of the Microsoft Windows operating system at the following website:

http://www.microsoft.com/technet/

Diagnostics and Event Monitoring: Hardware Support Tools

Complete information about HP hardware support tools, including online and offline diagnostics and event monitoring tools, is on the HP website at:

http://www.hp.com/go/hpux-diagnostics-docs

Website for HP Technical Support

http://www.hp.com/go/bizsupport

Books About HP-UX Published by Prentice Hall

You can find the entire Prentice Hall Professional Series on HP at:

http://www.informit.com/imprint/series_detail.aspx?st=61305

Contacting HP

Before You Contact HP

Be sure to have the following information available before you contact HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error message
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP Contact Information

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- In the United States, see the HP US service locator webpage (http://welcome.hp.com/country/us/en/wwcontact.html.)
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  http://welcome.hp.com/country/us/en/wwcontact.html.

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  To contact HP by phone:

  - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
  - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, see the HP website: (http://www.hp.com/go/carepack).
- In other locations, see the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

Subscription Service

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Documentation Feedback

HP welcomes your feedback. To make comments and suggestions about product documentation, send a message to **docsfeedback@hp.com**.

Include the document title and manufacturing part number. All submissions become the property of HP.

1 Overview

The HP Integrity rx3600 server is a high performance, high availability server that provides the following features:

- Form factor - 4U rack- or pedestal-installed
- Internal peripherals - serial-attached SCSI (SAS) hard drives and a DVD or DVD+RW drive
- High availability components - hot-swappable dual-rotor N+1 fans, 1+1 hot-swappable power supplies, and hot-pluggable PCI-X or PCIe cards and SAS drives
- Processors - one or two dual-core Intel® Itanium® processors
- Memory - up to 192 GB of memory

This chapter addresses the following topics:

- "Server Subsystems" (page 17)
- "Firmware" (page 27)
- "Controls, Ports, and LEDs" (page 28)

Server Subsystems

I/O

The server may contain either a 10-slot PCI/PCI-X IOBP or a 10-slot PCI/PCI-X/PCIe IOBP. The PCI/PCI-X/PCIe interfaces are classified under two major categories: public and private.

Public interfaces

Public interfaces are PCI slot connectors that are left available to the customer for the I/O-card adapters which they wish to install, based on their application needs, provided the adapter is supported in the slot. All public slots support HP server traditional OL* hot-plug operations.

Private interfaces

Private interfaces are interfaces dedicated to meeting the core I/O system requirements. There are two types of core-I/O: fast-core and slow-core, also known as the UCIO (Unified Core-I/O). The Private slots and UCIO are not hot-pluggable.

Hot-plug

PCI/PCI-X/PCIe hot-pluggable operations enable you to add or remove a PCI/PCI-X/PCIe card while the server is powered on. Each slot is physically separated with a divider that contains a card extraction mechanism and a mechanical retention latch (MRL). Slots 3 - 10 on the 10 slot PCI/PCI-X IOBP and slots 5 - 10 on the 10 slot PCI/PCI-X/PCIe IOBP support HP-server traditional OL* "hot-plug" operations. PDHP slots rely on the facilities of DHPC (Dual Hot-plug Controller) FPGAs to enable OL* hot-plug functionality. See Table 2 (page 19) and Table 3 (page 19) for details.

LEDs

Attention LEDs, doorbell buttons, and power LEDs for each hot-pluggable PCI/PCI-X/PCIe slot are located on the PCI bulkhead at the rear of the server chassis.

Wake on LAN

Wake on LAN, a hardware feature that enables the remote power on of computers through special network packets, is enabled in core PCI/PCI-X slots one and two.

Ropes

Ropes is an HP-proprietary, custom bus interface. It clocks data packets across long-length nets using source synchronous clocking schemes. There are eighteen signals bundled per Ropes group, of which there are a total of 16 in the rx3600. Each group is capable of 0.5GB/s peak bandwidth.

Table 2 (page 19) and Table 3 (page 19) display the association of the Ropes group(s) to the PCI slot / HBA to which they connect.

Figure 1 (page 18) is a block diagram of the PCI/PCI-X I/O subsystem, and Figure 2 (page 18) is a block diagram of the PCI/PCI-X/PCIe I/O subsystem.

Figure 1 I/O Subsystem Block Diagram

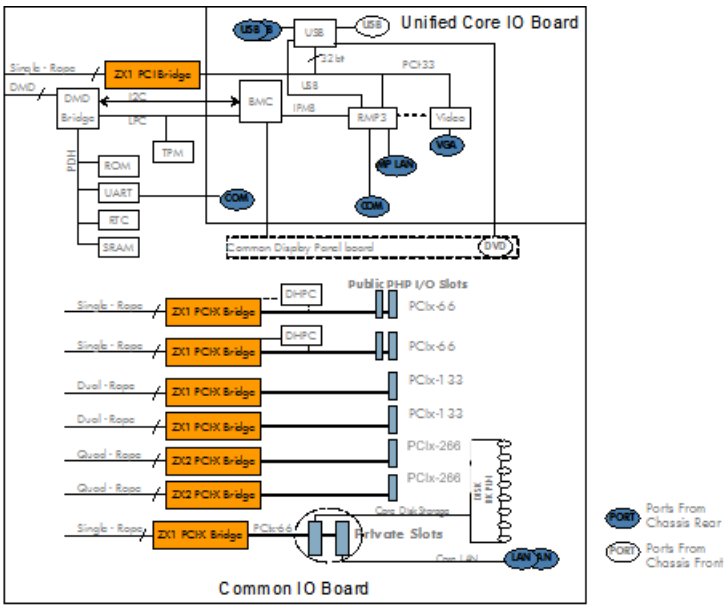
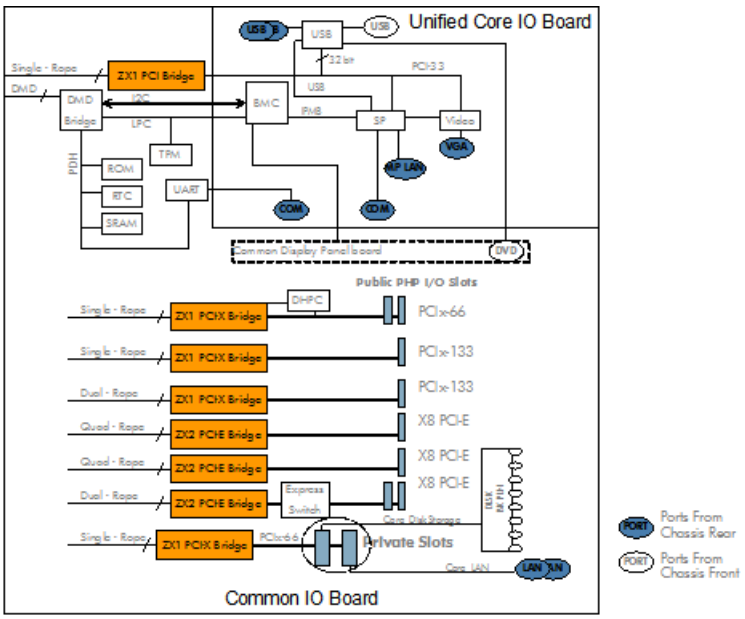


Figure 2 PCI/PCI-X/PCIe I/O Subsystem Block Diagram



PCI/PCI-X IOBP

On the 10 slot PCI/PCI-X IOBP there are a total 8 Public slots (PCI-X mode1/2), 2 Private Fast-core slots (PCI-X mode1), and 1 Private Slow-core UCIO slot (PCI 32-bit/33-MHz). The eight Public slots are further subdivided into three speed/bandwidth configurations:

- Four PDHP (Public Dual Hot-plug), which operate at 64-bit/66-MHz PCI-X
- Two PSHP-SDR (Public Single Hot-plug - Single Data Rate), operating at 64-bit/133-MHz PCI-X
- Two PSHP-DDR (Public Single Hot-plug - Double Data Rate), at 64-bit/266-MHz (133-MHz double clocked) PCI-X mode2

Four 66-MHz PCI/PCI-X slots are shared in groups of two. Shared slots have many speed and mode change restrictions during hot-plug add or remove operations. For more information on PCI/PCI-X card configuration and restrictions, see "PCI/PCI-X/PCIe Configurations" (page 51).

Four of the server PCI/PCI-X slots are not shared. Two of the nonshared slots are 133 MHz PCI/PCI-X, and two of the slots are 266-MHz PCI/PCI-X. Shared slots have many speed and mode change restrictions during hot-plug add or remove operations.

Table 2 PCI/PCI-X I/O Rope Groups

Slot #	Physical Rope Numbers	Logical Rope Numbers	PCI Bus	Bits	Speed	Function	Hot Swap / OL*
1, 2	8	4	1	64	66 MHz	Core I/O (Private)	N
3	12, 13, 14, 15 (Quad Bandwidth)	7	2	64	266 MHz	PCI-X 2.0, DDR (Public)	Y
4	4, 5, 6, 7 (Quad Bandwidth)	3	3	64	266 MHz	PCI-X 2.0, DDR (Public)	Y
5	10, 11 (Dual Bandwidth)	6	4	64	133 MHz	High-Speed PCI-X (Public)	Y
6	2, 3 (Dual Bandwidth)	2	5	64	133 MHz	High-Speed PCI-X (Public)	Y
7, 8	9	5	6	64	66 MHz	General PCI-X (Public)	Y
9, 10	1	1	7	64	66 MHz	General PCI-X (Public)	Y
-	0	0	0	32	33 MHz	UCIO (Private)	N

PCI/PCI-X/PCIe IOBP

On the 10 slot PCI/PCI-X/PCIe IOBP there are a total of eight Public slots (four PCI-X mode 1 and four PCIe), two Private Fast-core slots (PCI/PCI-X mode 1 64-bit/66-MHz), and one Private Slow-core UCIO slot (PCI 32-bit/33-MHz). The eight Public slots are further divided into three speed/bandwidth configurations:

- Two PDHP, which operate at 64-bit/66-MHz PCI-X
- Two PSHP, operating at 64-bit/133-MHz PCI-X
- Four PCIe 8-lane (x8) 2.5 Gbps, two of which are switched

The two 66 MHz PCI/PCI-X slots are shared. Shared slots have many speed and mode change restrictions during hot-plug add or remove operations.

Table 3 PCI/PCI-X/PCIe I/O Rope Groups

Slot #	Physical Rope Numbers	Logical Rope Numbers	Bits	Speed	Function	Hot Swap/OLR
1, 2	8	4	64	66 MHz	Core I/O (Private)	N
3, 4	10, 11	6	x8	2.5 Gbps	PCIe x8 (Public or Private depending upon Core I/O)	N
5	12, 13, 14, 15	7	x8	2.5 Gbps	PCIe x8 (Public)	Y
6	4, 5, 6, 7	3	x8	2.5 Gbps	PCIe x8 (Public)	Y

Table 3 PCI/PCI-X/PCIe I/O Rope Groups *(continued)*

Slot #	Physical Rope Numbers	Logical Rope Numbers	Bits	Speed	Function	Hot Swap/OLR
7	2, 3	2	64	133 MHz	High-Speed PCI-X (Public)	Y
8	9	5	64	133 MHz	High-Speed PCI-X (Public)	Y
9, 10	1	1	64	66 MHz	General PCI-X (Public)	Y
-	0	0	32	33 MHz	UCIO (Private)	N

PCIe MPS Optimization

For PCIe-based systems, each PCIe device has a configurable MPS (maximum payload size) parameter. Larger MPS values can enable the optimization to gain higher performance.MPS Optimization is supported on PCIe systems running HP-UX, Open VMS, and Linux. System firmware level greater than 02.03 performs an optimization during boot time to set the MPS value to the largest size supported by both a PCIe root port and the devices below it.

The default server state is optimization disabled. When disabled system firmware sets MPS to the minimum value on each PCIe device.

The `info io` command will display the current PCIe MPS optimization setting. See "info" (page 305).

To enable PCIe MPS optimization use the `ioconfig mps_optimize` command. See "ioconfig" (page 303).

For non-PCIe systems, `ioconfig` and `info io` will not display the MPS optimization policy setting. The **Set PCIe MPS Optimization** boot manager menu also will not be displayed. Running the `ioconfig mps_optimize [on|off]` command from a non-PCIe system, the following output will be displayed:

```
-------------
Shell> ioconfig mps_optimize
ioconfig: PCIe MPS optimization is not supported.

Shell> ioconfig mps_optimize on
ioconfig: PCIe MPS optimization is not supported.
Exit status code: Unsupported

Shell>
-----------------
```

To restore MPS to the default values, use the `default clear` command. See "default" (page 304).

Processor

The server processor subsystem accommodates one or two dual-core Itanium® processor modules. The processor subsystem consists of the following elements:

- zx2 CEC front side bus, memory, and I/O controller
- System clock generation and distribution
- Circuitry for manageability and fault detection

The zx2 CEC and the processor modules are located on the processor board assembly. Each processor connects to the processor board through a zero insertion force (ZIF) socket. The processor board is mounted on a removable carrier tray that is attached to the processor board access door. Access the assembly through the front of the server after the memory carrier is removed.

Memory

The server DIMMS are seated on memory boards that are enclosed in an extractable memory carrier assembly. The memory boards plug directly into sockets on the processor board when the memory carrier assembly is fully seated.

Table 4 lists the two types of supported memory carriers and the memory configurations of each carrier.

Table 4 Supported Memory Configurations

Memory Carrier Type	Memory Boards Installed	Minimum Memory Configuration	Maximum Memory Configuration
8-DIMM memory carrier (standard)	Two 4-DIMM memory boards	2 GB (one pair: two 1-GB DIMMs)	64 GB (eight 8-GB DIMMs)
24-DIMM memory carrier (optional, high-capacity)	Two 12-DIMM memory boards	2 GB (one quad: four 512-MB DIMMs)	192 GB (24x8-GB DIMMs)

The server supports the following DIMM sizes:

- 512 MB
- 1 GB
- 2 GB
- 4 GB
- 8 GB

Figure 3 is a block diagram of the 8-DIMM memory carrier that shows data, addresses, and controls that flow through the CEC and to and from the processors.

Figure 3 8-DIMM Memory Carrier Block Diagram

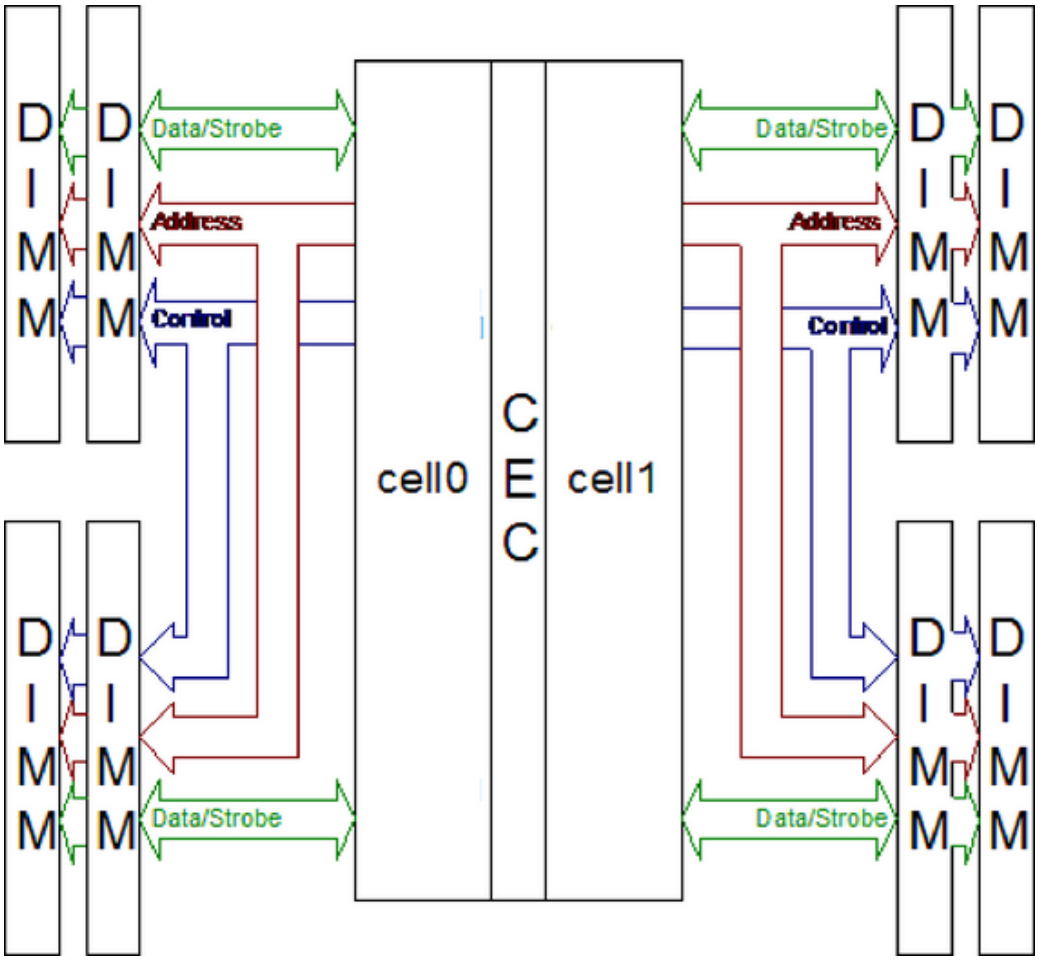
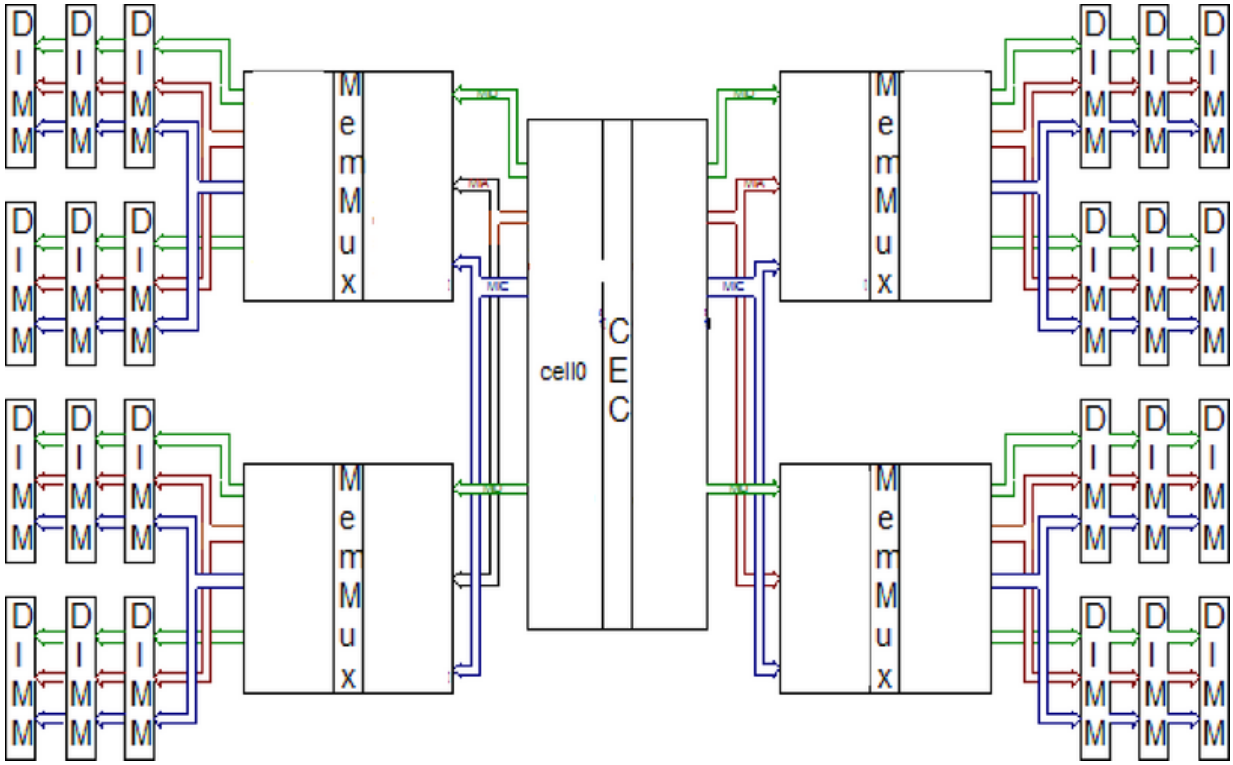


Figure 4 is a block diagram of the 24-DIMM memory carrier that shows data, addresses, and controls that flow from the processors through the CEC and memory mux to the DIMMs.

Figure 4 24-DIMM Memory Carrier Block Diagram



Add-On Memory

To locate the HP part number, look at the HP Security/CT Label located on the DIMM.

AB565A (4 x 2 GB DIMMs) memory with the HP part number AB565DX cannot be mixed on the same physical rank as 2 GB memory with the AB565BX or or AB565AX HP part number.

IMPORTANT: Earlier versions of system firmware do not support the installation of this replacement memory and can result in de-allocation of the entire quad or pair.

Firmware Updates

HP Integrity servers require system firmware version 03.01 or later to support the following Memory Add-On products:

- AH350A 2 GB DDR2 Memory Pair (2 x 1 GB DIMMs)*
- AB564A 4 GB DDR2 Memory Pair (4 x 1 GB DIMMs)
- AB565A 8 GB DDR2 Memory Pair (4 x 2 GB DIMMs)
- AB566A 16 GB DDR2 Memory Pair (4 x 4 GB DIMMs)

  * supported in HP Integrity rx3600 servers with 8-DIMM memory carrier only

Before installing any of these memory products, verify the server firmware version is equal to or higher than the version listed above for your product. On HP Integrity servers, you can determine the firmware version using the following EFI Shell `info fw` command:

```
Shell> info fw

FIRMWARE INFORMATION

*System Firmware A Revision: 3.02 [4819]

 System Firmware B Revision: 3.02 [4819]

 BMC Revision: 5.20
```

```
Management Processor Revision: T.02.17

Updatable EFI Drivers:
  Floating Point Software Assistance Handler: 00000118

  Broadcom Gigabit Ethernet Driver: 00090404

  SCSI Bus Driver: 00000031

  SCSI Disk Driver: 00000020

  SCSI Tape Driver: 00000030

  Usb Ohci Driver: 00000040

  USB Bus Driver: 00000020

  USB Bot Mass Storage Driver: 00000020

  Generic USB Mass Storage Driver: 00000020

  CLPrelay App: 00000100
```

* Indicates active system firmware image. In this case =>3.02 indicates that this server does not need system firmware updated to use the memory modules described in this document.

The firmware upgrade instructions are included in the Release Notes on the firmware package download page for your server product. To locate the Release Notes and download the firmware, follow these steps:

1. Go to http://www.hp.com/bizsupport.
2. Select **Download Drivers and Software**.
3. Select **HP Integrity Servers**.
4. Select the link for your server product.

After the firmware has been downloaded, you can install the memory. To install DIMMs, see "Installing Memory" (page 194).

Cooling

There are three dual-rotor system fans assemblies that cool the server. The fans are hot-swappable, interchangeable, and serviced through the top of the chassis. The fan rotors are N+1, meaning that the server has six fan rotors (three fans), but can operate for a limited time with one or two fan rotors disabled, see Table 5 (page 24). If the time threshold is reached, the server automatically shuts down to prevent an overtemperature condition.

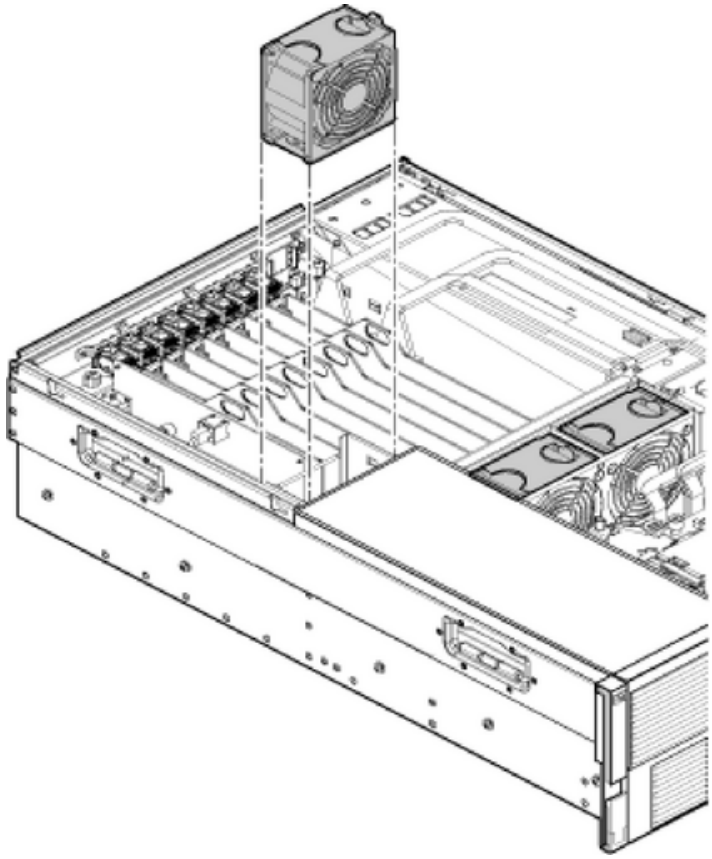
Table 5 Fan Events

Event	Action
Server chassis top cover removed	All rotors to maximum speed[1]
One fan rotor fails or is too slow	All remaining rotors to maximum speed
Two or more fan motors fail or are too slow	All remaining rotors to maximum speed and hard shut down after two minutes of continuous failure
One or more fan units removed	All remaining rotors to maximum speed and hard shut down after two minutes of continuous failure[2]

[1] **NOTE:** Although the fans speed up to provide cooling when the top cover is removed, HP recommends replacing the top cover within 15 seconds.

[2] **NOTE:** HP recommends replacing fans within 20 seconds.

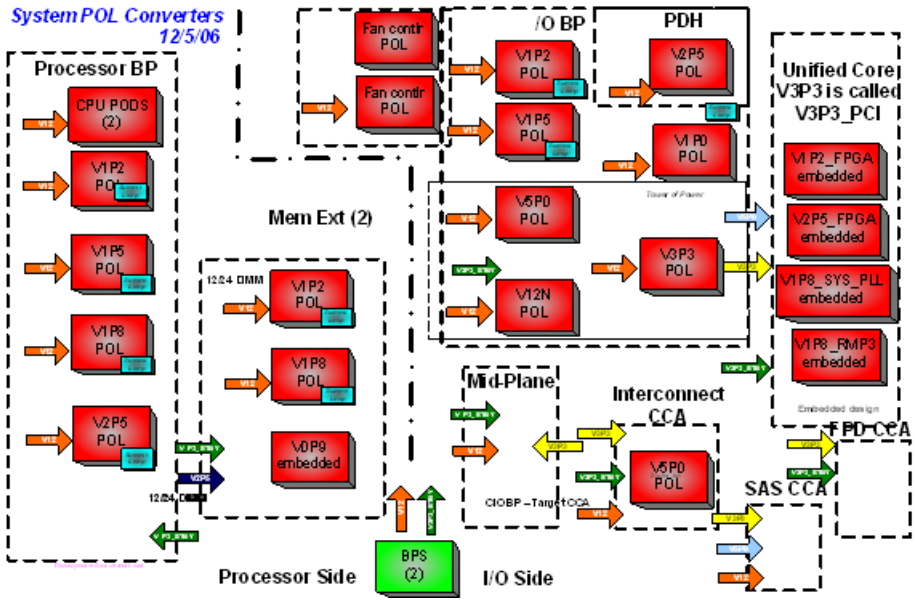
Figure 5 Cooling Fans



Power

The server power subsystem is designed to provide high availability with 1+1 power supply redundancy. Figure 6 is a block diagram of the power subsystem, including voltage labels for each main server subsystem that requires power.

Figure 6 Power Subsystem Block Diagram



Two hot-swappable AC/DC power supplies generate main system power, and a standby power voltage. One active power supply is sufficient to operate the system at maximum load. Each power supply receives AC power through the integrated AC inlet. The system can operate at 100-240

VAC and achieve 1+1 redundancy. The power supplies are power factor corrected and the maximum DC power output of the power system is 1095 watts. Service the hot-swappable power supplies are serviced by sliding them out the rear of the chassis.

Applying system power in normal customer usage, the rx3600 runs on 100 to 240 V. Standby power will be supplied on either; hence the BMC will power up when the power supplies are plugged in. The BPS0_AC_OK and BPS1_AC_OK signals indicate whether the AC voltage to the power supplies is within the required range. If neither BPS0_AC_OK nor BPS1_AC_OK is asserted, then the BMC should log an event and prevent the system from turning on.

Power Button

The Power button on the rx3600 is a momentary contact push button. The BMC polls the front panel Power button at a rate of at least 2 Hz. The Power button is an input to the System Power State Management. If the system is off, a single button press will turn on the system. If the system has booted to an OS, and a short button press is detected, a graceful-shutdown request will be sent to the system by pulsing ACPI_PWR_BTN_L; when the ACPI bits are set to note the O/S has shut down, the BMC will perform a hard power down. If the system has not booted to an OS, or if a long (five second) button press is detected, the system will do an immediate hard power off.

System Power State Management

The system power may be controlled from the Power button, an IPMI Chassis command, Wake-On-LAN, loss or gain of AC.

Power On Sequence:

1. Update the cache of DIMM SPD information.
2. Ensure that the memory board is detected and that the cpu board has a processor in socket 0. If these FRUs are not detected the BMC logs an event against the Missing Device sensor (sensor 0x15).
3. Check for a BPS0_AC_OK or a BPS1_AC_OK signal. If neither is asserted, then the AC supply has a problem.
4. If any FRUs are missing or both AC supplies are not valid, then return to power off state.
5. Initialize I/O Expander settings prior to turning on power.
6. Set Power Sequencer Order. Set system frequency in Power Sequencer.
7. Pulse BMC_PWR_CMD to tell the Power Sequencer to enable the voltages in the system.
8. Wait for SEQ_MPON to know the power sequencer has finished and check if SEQ_STATUS=0 for a fault condition. If a fault has occurred, scan sensors for the cause and generate events.
9. Perform any pre-Reset Hardware Setup needed while power is on.
10. Release Reset by setting MPON=1.

Front Display Panel, DVD, and Diagnostic Panel

The front display panel, DVD, and diagnostic panel are supported on a single board, called the display board, located in the front of the chassis. Service the display board from the top of the chassis.

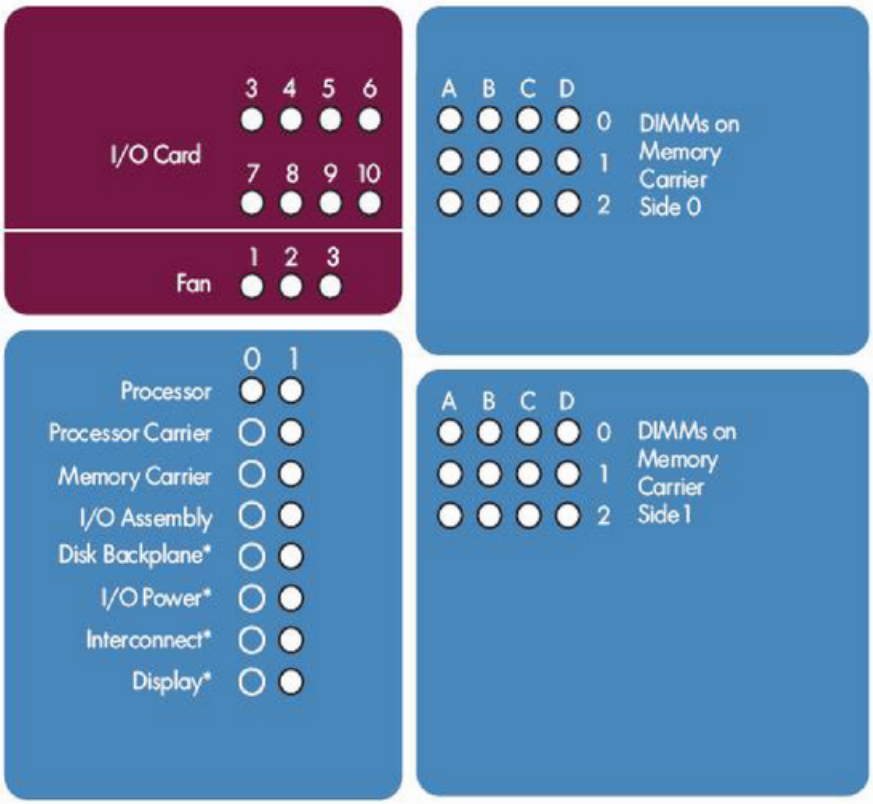
The front display panel consists of the system status LEDs and a power switch. Use the front display panel to determine the power status of the server, monitor the server as it progresses through the boot cycle, and use the various LED states to assist with troubleshooting system problems.

A slimline DVD drive, or optional DVD+RW drive, is located above the hard disk drives in the horizontal orientation of the front panel.

There is a USB 2.0 port positioned between the DVD drive and the front display panel.

Each customer replaceable unit (CRU), with the exception of the power supplies, has a unique set of status indicators located on a diagnostic panel that you view through the top cover. CRUs include components such as individual memory DIMMs, processors, and fans. LEDs that correspond to each CRU illuminate when there is a problem.

Figure 7 Diagnostic Panel



Mass Storage

The server mass storage subsystem (SAS) features the following SAS components:

- Hard drives
- Cables
- Backplane board
- Core I/O cards

The server can contain up to eight SAS disk drives. The drives have LEDs that indicate activity and device status, and an LED used to locate each drive. Additionally, there is a set of slot availability LEDs positioned in the middle of the disk drive bays on the front of the chassis. The illuminated LEDs indicate connection and power from a SAS controller to the bank of SAS disk drive slots.

The disk drives plug directly into the SAS backplane board. There is one SAS backplane board in the server.

Two cables connect from the SAS backplane board to the SAS core I/O card. Service the SAS backplane board and SAS core I/O card from the top of the chassis.

Firmware

Firmware consists of many individually linked binary images that are bound together by a single framework at run time. Internally, the firmware employs a software database called a device tree to represent the structure of the hardware platform and to provide a means of associating software elements with hardware functionality.

The firmware incorporates the following main interfaces:

Processor Abstraction Layer (PAL)	PAL provides a seamless firmware abstraction between the processor and system software and platform firmware.

System Abstraction Layer (SAL)	SAL provides a uniform firmware interface, and initializes and configures the platform.
Extensible Firmware Interface (EFI)	EFI provides an interface between the operating system and the platform firmware. EFI uses data tables that contain platform-related information, and boot and run-time service calls that are available to the operating system and its loader to provide a standard environment for booting.
Advanced Configuration and Power Interface (ACPI)	ACPI provides a standard environment for configuring and managing server systems. ACPI moves system power configuration and management from the system firmware to the operating system, and abstracts the interface between the platform hardware and the operating system software. This enables each to evolve independently of the other.

The firmware supports HP-UX 11i version 2, June 2006 release, Linux®, Windows®, and OpenVMS 8.3 operating systems through the Itanium processor family standards and extensions, and has no operating system-specific functionality included. All operating systems are presented with the same interface to system firmware, and all features are available to the operating system.

User Interface

The Itanium processor family firmware employs a user interface defined by an HP standard called Pre-OS System Startup Environment (POSSE). The POSSE shell is based on the EFI standard shell. Several commands were added to the standard EFI Shell to support HP value-added functionality.

Event IDs for Errors and Events

The system firmware generates event IDs for errors, events, and forward progress to the iLO 2 MP through common shared memory. The iLO 2 MP interprets and stores event IDs. Reviewing these events helps you diagnose and troubleshoot problems with the server. For more information, see Chapter 5 (page 124).

Controls, Ports, and LEDs

This section provides a basic description of the controls, ports, and LEDs found on the front panel and rear panel of the HP Integrity rx3600. For more information on LED functions and descriptions, see Chapter 5 (page 124).

Front Panel

The front panel of the server includes controls, ports, and LEDs commonly used when the server is operational.

Figure 8 shows the control, port, and LED locations on the server front panel.

Figure 8 Front Panel Control, Port and LED Locations

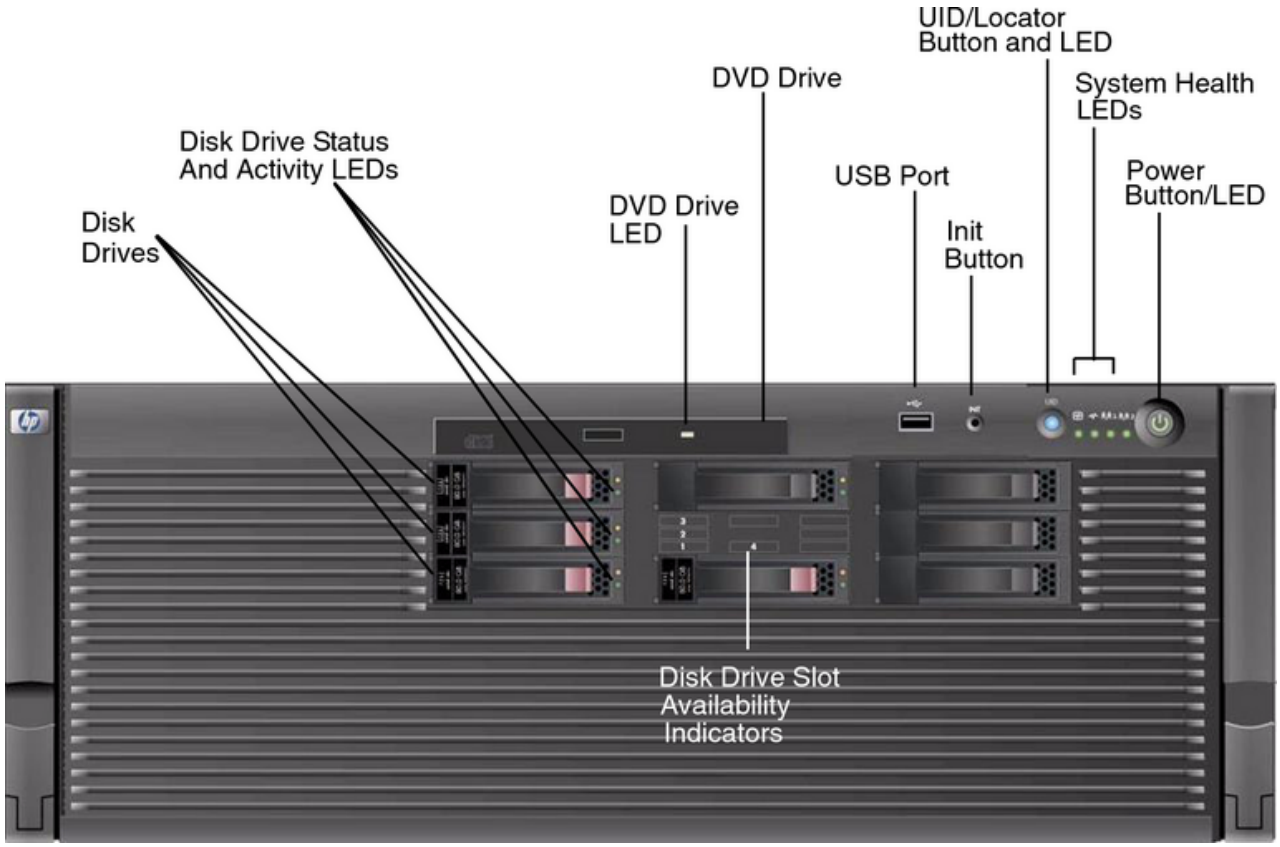


Table 6 lists the front panel controls and LED states.

Table 6 Front Panel Controls and LEDs

LED	Function	States	Status
Power Button	Manually powers the server on and off.	Off	No AC power
		Green	Full power is on
		Yellow	Standby power is on
UID Button	Helps locate a particular server within a rack of servers. You can remotely activate this button using various system utilities.[1]	Off	UID button is not activated
		Blue	UID button is activated
Init Button	Resets the system; irrecoverably halts all system processing and I/O activity and restarts the server.	—	—
System Health LED	Provides information about the system status.	Off	System is off
		Green	Normal operation
		Flashing amber	Warning
		Flashing red	System fault
Internal Health LED	Indicates the status of internal serviceable components. This LED maintains its state when the system is in standby mode	Off	System is off
		Green	System health is good
		Flashing amber	System health is degraded

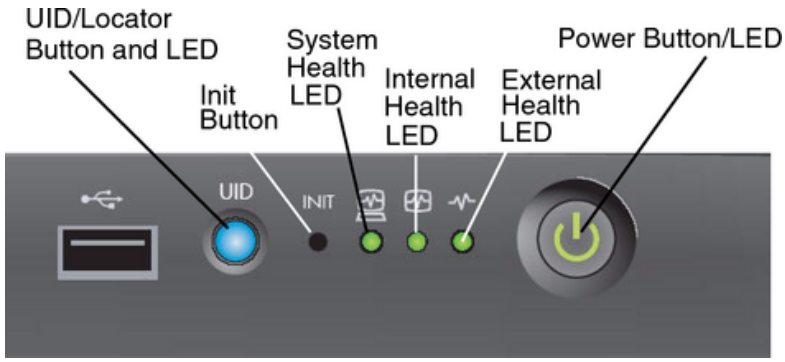
Table 6 Front Panel Controls and LEDs *(continued)*

LED	Function	States	Status
	(system power turned off but AC power still applied to the system). When the internal health LED is lit, the corresponding failed component LED illuminates on the diagnostic panel. See Chapter 5 (page 124) for more details on the internal health LEDs.	Flashing red	System health is critical
External Health LED	Indicates the status of external serviceable components. When the external health LED is lit, the corresponding failed component LED illuminates.	Off	System is off
		Green	System health is good
		Flashing amber	System health is degraded
		Flashing red	System health is critical

[1] There is an additional UID LED and button located on the rear panel of the server. Both UID LEDs illuminate when you activate either the front or rear UID buttons.

Figure 9 shows the front control panel LEDs.

Figure 9 Front Control Panel LEDs



Storage and Media Devices

The server can contain up to eight hot-pluggable SAS disk drives and one DVD or DVD-RW drive. Storage and media devices have LEDs that indicate activity and device status. Hot-pluggable SAS disk drives also have an LED used to locate a particular drive.

Hot-Pluggable Disk Drive LEDs

The hot-pluggable disk drives have two LEDs per drive (Figure 10):

- Drive Status LED:
- Drive Activity LED

Figure 10 shows the hot-pluggable disk drive LEDs.

Figure 10 Hot-Pluggable Disk Drive LEDs

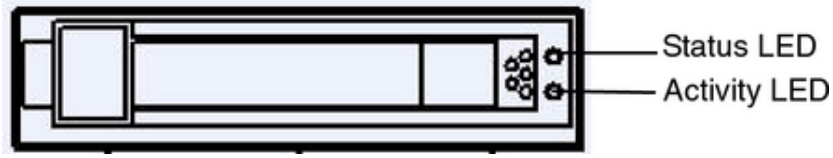


Table 7 lists the hot-pluggable disk drive LEDs and states shown in Figure 10.

Table 7 Behaviour of Hot-Pluggable Disk Drive LEDs in RAID mode

Activity LED	Status LED	Disk Drive State
Off	Off	Offline or not configured
Solid green	Off	Normal operation; no activity
Flickering green	Off	Normal operation; disk read or write activity
Off	Flashing amber at constant 1 Hz	Offline, no activity; predictive failure
Solid green	Flashing amber at constant 1 Hz	Online, no activity; predictive failure
Flickering green	Flashing amber at constant 1 Hz	Disk activity; predictive failure
Off	Solid amber	Offline; no activity; critical fault
Off	Solid blue[1]	Offline; drive selected by locator function
Flashing green at constant 1 Hz	Off	Drive rebuilding

[1] The drive status LED is blue when you use various software utilities, such as online diagnostics and SAS drive configuration tools.

Table 8 Behaviour of Hot-Pluggable Disk Drive LEDs in Standalone HBA mode

Activity LED	Status LED	Disk Drive State
Off	Off	Offline or not configured
Off	Off	Normal operation; no activity
Flickering green	Off	Normal operation; disk read or write activity
Off	Flashing amber at constant 1 Hz	Offline, no activity; predictive failure
Solid green	Flashing amber at constant 1 Hz	Online, no activity; predictive failure
Flickering green	Flashing amber at constant 1 Hz	Disk activity; predictive failure
Off	Solid amber	Offline; no activity; critical fault
Off	Solid blue[1]	Offline; drive selected by locator function
Flashing green at constant 1 Hz	Off	Drive rebuilding

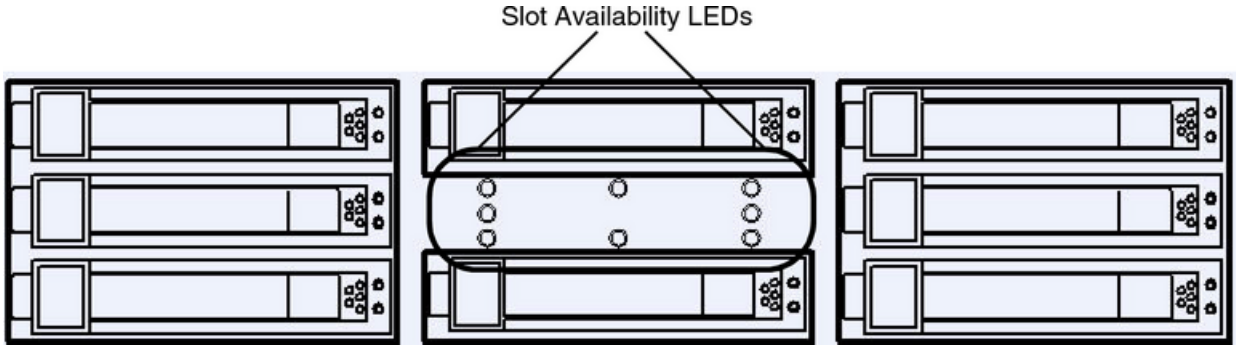
[1] The drive status LED is blue when you use various software utilities, such as online diagnostics and SAS drive configuration tools.

Hot-Pluggable Disk Drive Slot Availability LEDs

The hot-pluggable disk drive slot availability LEDs are located on the front bezel in the center of the disk drive slots (Figure 11). The illuminated LEDs indicate connection and power of the group of SAS disk drive slots to a SAS controller.

Figure 11 shows the hot-pluggable disk drive slot availability LEDs.

Figure 11 Hot-Pluggable Disk Drive Slot Availability LEDs



DVD Drive

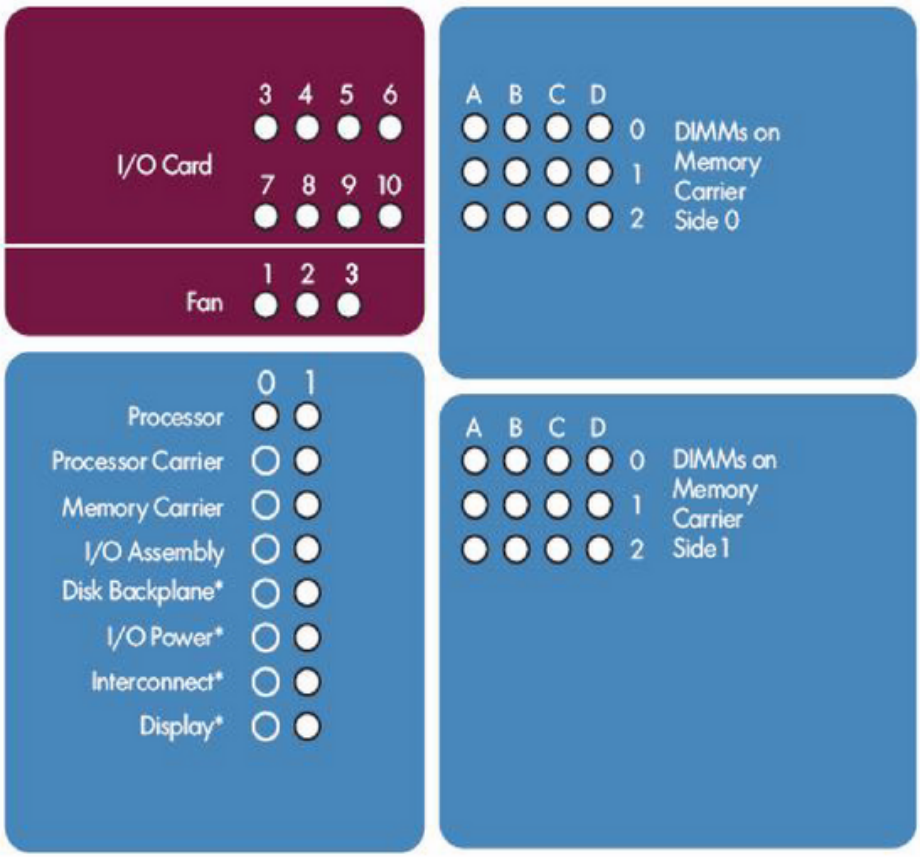
The server has one DVD drive or one DVD-RW drive. This device has one activity LED.

Diagnostic Panel

The diagnostics panel provides a single location to view the LEDs that provide location information for internal system components that have a detectable failure. The LEDs illuminate solid amber only when a failure occurs, and otherwise do not illuminate. The LEDs are visible through the diagnostic panel on the outside of the top cover. The diagnostics panel is oriented similar to the layout of the components in the system. Diagnostic LEDs are provided for each internal serviceable component in the system, including all DIMMs.

Figure 12 shows the diagnostic panel label and LEDs.

Figure 12 Diagnostic Panel Label and LEDs



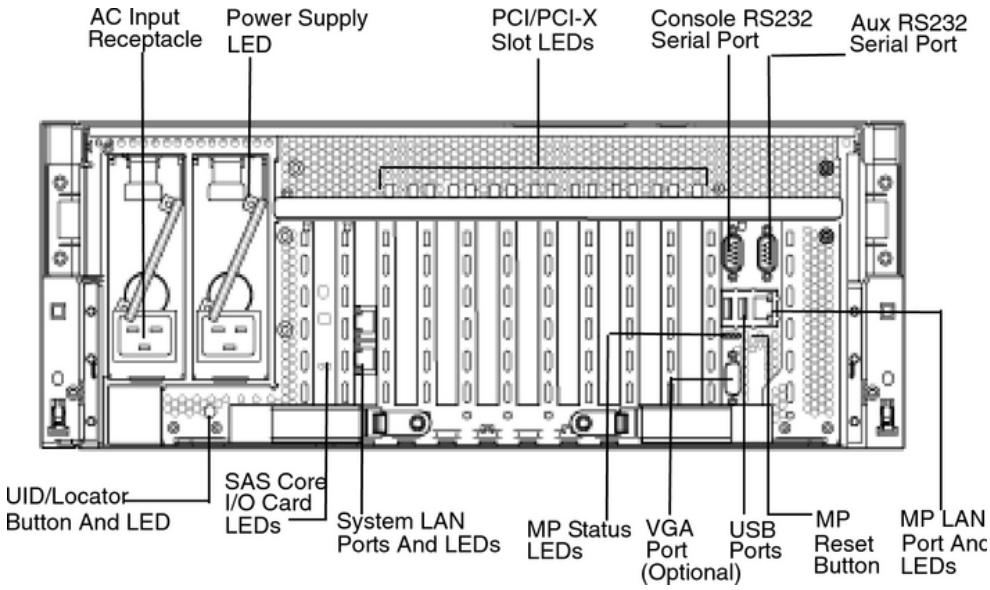
Rear Panel

The server rear panel includes communication ports, I/O ports, AC power connectors, and the locator LED/button. LEDs located on the rear panel of the server signal the operational status of the following components:

- iLO 2 MP
- System LAN
- Power supply
- PCI/PCI-X/PCIe slots

Figure 13 shows the rear panel control, port, and LED locations.

Figure 13 Rear Panel Control, Port, and LED Locations



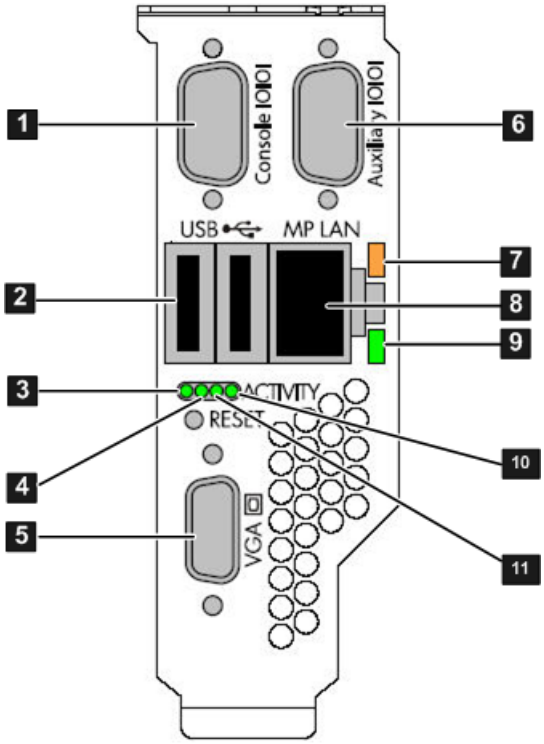
iLO 2 MP

The server contains an iLO 2 MP on the core I/O board that enables local and remote management of the server. The iLO 2 MP can function using standby power and is active when AC power is present and the front panel power switch is off. The iLO 2 MP is also active when AC power is present and the front power switch is on.

Figure 14 shows the controls, ports, and LEDs on the core I/O board.

NOTE: The Core I/O Board figure is oriented vertically to match the orientation of the core I/O board.

Figure 14 Core I/O Board Controls, Ports, and LEDs



1. iLO 2 MP RS-232 Serial Port (DB-9F to DB-9F cable)

   Connected to emulation terminal device (PC, laptop, or ASCII terminal)
2. USB 2.0 Ports

   (any USB device)
3. BMC Heartbeat
4. MP Heartbeat
5. VGA Port

   (No iLO 2 MP access; EFI only)
6. General Use Serial Port

   (Printers, etc.)
7. 10 Base-T/100 Base-T Mode LED
8. iLO 2 MP LAN Port

   (10/100 LAN)
9. Link and Activity LED
10. Standby Power
11. MP Self Test

iLO 2 MP Reset Button

The iLO 2 MP Reset button enables you to reset the iLO 2 MP, and optionally reset the user-specific values to factory default values. To soft reset the iLO 2 MP press the button momentarily, then release it. To restore the factory default settings and passwords, the button must be pressed and held for at least four seconds. The following values are reset to factory defaults when the button is held for at least four seconds:

- Serial terminal baud rate settings
- User names and passwords

Core I/O Board Ports

Table 9 lists a description of the core I/O board ports shown in Figure 14.

Table 9 Core I/O Board Ports

Port	Description
10 Base-T/100 Base-T LAN	LAN port dedicated for remote access to the iLO 2 MP
Auxiliary Serial	Local serial port

Table 9 Core I/O Board Ports *(continued)*

Port	Description
Console Serial (iLO 2 MP)	Local serial port that provides a console connection to the server
USB	Two public USB 2.0 ports used primarily to connect to a keyboard and mouse for console input functions (Windows and Linux operating systems only)
VGA (optional)	VGA port used primarily to connect to a monitor that displays console output (Windows and Linux operating systems only)

iLO 2 MP Status LEDs

Table 10 shows the states and status of the iLO 2 MP status and LAN LEDs.

Table 10 iLO 2 MP Status and LAN LEDs

iLO 2 MP LED	States	Status
Standby power	Solid green	Standby power is on
iLO 2 MP Self test	Amber	iLO 2 MP self test running[1]
	Off	Self test completed
iLO 2 MP Heartbeat	Flashing green	Operational and functional
BMC Heartbeat	Flashing green	Operational and functional
Link Status	Blinking green	Activity
	Solid green	Link with no activity
	Off	No link
Link Speed	Solid amber	100 Mb link
	Off	10 Mb link

[1] The LED is solid amber when AC power is first applied. It remains solid amber for a few seconds until the iLO 2 MP completes its self test; the LED then turns off.

System LAN

The system LAN functionality is provided by the LAN core I/O card. The ports on the LAN core I/O card are two RJ-45 style 10 Base-T/100 Base-T/1000 Base-T system LAN ports:

Table 11 show the system LAN link status and speed LEDs states and status.

Table 11 System LAN Link Status and Speed LEDs

LED	State	Link Status
Link status	Blinking green	Activity
	Solid green	Link with no activity
	Off	No link
Link speed	Solid orange	1000 Mb
	Solid green	100 Mb
	Off	10 Mb

Power Supply

The server can have one or two power supplies, labeled PS0 and PS1. Each power supply has an AC input receptacle and an LED that shows the power state of the server (Figure 13 (page 33)).

The server has three power states: standby power, full power, and off. Plug the power cord into the appropriate receptacle on the rear of the chassis to achieve the standby power state. To bring the server to full power either activate the power using the iLO 2 MP `PC` command, or push the Power button. To bring the server to the off state, unplug the power cords. For more information on power states, see "Power States" (page 81).

Table 12 lists the power supply LED states.

Table 12 Power Supply LED

Power Supply LED	Power Supply Condition
Off	No AC power
Blinking green	ac power; standby power on
Solid green	Full power on; normal operation
Blinking amber	Power supply failure

Rear Panel UID/Locator LED and Button

The UID/locator LED and button is used to help locate a particular server within a rack of servers (Figure 13 (page 33)). You can remotely activate this function using system utilities.

Table 13 lists the rear panel UID LED states.

Table 13 Rear Panel UID LED

States	Status
Off	UID button is not activated
Blue	UID button is activated[1]

[1] There is an additional UID LED and button located on the front control panel of the server. Both UID LEDs illuminate when you activate either of the front or rear UID buttons

PCI/PCI-X/PCIe Card Slot

The server has eight public, hot-pluggable PCI/PCI-X/PCIe slots and two private core I/O slots. Each slot has an attention LED that serves two purposes (Figure 13). It indicates a potential problem with the slot that requires immediate attention. Additionally, the LED can function as a locator used to identify a particular PCI/PCI-X/PCIe slot. Activate the locator functionality using software utilities.

△ **CAUTION:** Private core I/O slots one and two on the PCI/PCI-X IOBP and slots 1 - 4 on the PCI/PCI-X/PCIe IOBP are not hot-pluggable. Do not remove the cards in these slots without first powering off the server and unplugging the power cords.

2 System Specifications

This chapter provides the system specifications for the HP Integrity rx3600 server.

This chapter addresses the following topics:

- "Server Specifications" (page 37)
- "Dimensions and Values" (page 38)
- "Grounding" (page 38)
- "Electrical Specifications" (page 38)
- "Physical and Environmental Specifications" (page 39)

Server Specifications

Table 14 lists the server specifications for the HP Integrity rx3600.

Table 14 Server Specifications

Component	Specification	
	rx3600 with PCI/PCI-X IOBP	**rx3600 with PCI/PCI-X/PCIe IOBP**
Processors	One or two Itanium dual-core processors: • 1.4 GHz/12 MB cache • 1.6 GHz/18 MB cache • 1.42 GHz/12 MB cache • 1.67 GHz/24 MB cache	
Memory	8-DIMM memory carrier or 24-DIMM memory carrier Supported DDR2 DIMM sizes: • 512 MB • 1 GB • 2 GB • 4 GB • 8 GB	
Disk drives	One to eight hot-pluggable SAS hard drives.	
PCI slots	Two private PCI-X 66 MHz slots.	
	Eight public PCI-X slots: • Four PCI-X slots, 66 MHz • Two PCI-X slots, 133 MHz • Two PCI-X2 slots, 266 MHz	Eight Public slots: • Two PCI-X slots, 66 MHz • Two PCI-X slots 133 MHz • Four PCIe, x8
SAS core I/O Options	• Eight port SAS core I/O card (PCI-X) • Eight port SAS core I/O card with RAID (PCI-X)	• Eight port SAS core I/O card (PCI-X) • Eight port SAS core I/O card with RAID (PCI-X) • Eight port SAS core I/O card with RAID (PCIe) • Eight port SAS core I/O card with RAID able to connect to external storage (PCIe)
LAN core I/O	Two GigE LAN ports.	
Management core I/O	Two serial ports, two USB 2.0 ports, one 10 Base-T/100 Base-T LAN port, and one optional VGA port.	

Table 14 Server Specifications *(continued)*

Component	Specification	
	rx3600 with PCI/PCI-X IOBP	**rx3600 with PCI/PCI-X/PCIe IOBP**
Optical device	One DVD or DVD+RW drive	
Power supply	One 1200 watt power supply, 1+1 redundancy with second power supply.	

Dimensions and Values

Table 15 lists the dimensions and values of the HP Integrity rx3600 for a rack- or pedestal-installed configuration .

Table 15 Rack- or Pedestal-Installed Server Dimensions and Values

Dimension	Value
Server weight (loaded product weight range estimate)	34-40.8 kg (75-90 lbs.)
Rack	
Rack dimensions (depth x width x height)	69.6 cm (27.4 in.) x 44 cm (17.32 in.) x 17.24 cm (6.8 in.)
Rack weight	Max: 45.36 kg. (100 lbs.)
Rack unit	Server takes up 4U in a rack
Pedestal	
Pedestal dimensions (depth x width x height)	69.2 cm (27.2 in.) x 36.9 cm (14.5 in.) x 51.2 cm (20.2 in.)
Pedestal weight	10.9 kg (24 lbs.)
Minimum standalone configuration	44.9 kg. (99 lbs.)
Maximum standalone configuration	51.7 kg. (114 lbs.)

Grounding

The site building shall provide a safety ground/protective earth for each AC service entrance to all cabinets.

Install a PE (protective earthing) conductor that is identical in size, insulation material, and thickness to the branch-circuit supply conductors. The PE conductor must be green with yellow stripes. The earthing conductor is to be connected from the unit to the building installation earth or, if supplied by a separately derived system, at the supply transformer or motor-generator set grounding point.

Electrical Specifications

This section provides electrical specifications for the HP server.

System Power Specifications

Available power (output) is the maximum DC power that the power supply can supply to the system.

Maximum input power is what the power supply requires from the AC line to deliver that maximum DC output (given worst case efficiency and max loading)

Maximum input current is the worst case/highest current given the lowest input voltage and the maximum input power

Table 16 System Power Specifications

Parameter	Rating	
AC Voltage	100-127 V ac	200-240 V AC
Maximum DC Output Power	1200 W	1200 W
Maximum System Input Current	14 A[1]	7A[1]
Input frequency	47 to 63 Hz	47 to 63 Hz
Maximum per PCI/PCI-X/PCIe Socket	25 W per socket	25 W per socket
Maximum Configuration[2]	1095 W (3736 BTU/hr)	1056 W (3603 BTU/hr)
Minimum Configuration[3]	432 W (1474 BTU/hr)	422 W (1439 BTU/hr)
Typical Configuration[4]	685 W (2337 BTU/hr)	669 W (2283 BTU/hr)

[1] The infrastructure should be sized such that any single power supply can safely provide all the power required by the system.

[2] Maximum theoretical configuration: (2x) 1.8G/24M CPUs, (24x) 4GB DDRII DIMM memory, (8x) SAS Hard Drives, (8x) PCI/PCI-X/PCIe added to public I/O cards.

[3] Minimum possible configuration: (1x) Itanium 1.8G/24M CPU, (4x) 4GB DDRII DIMM memory, (0x) SAS Hard Drives, (0x) PCI/PCI-X/PCIeadded to public I/O cards.

[4] Half-loaded configuration: (1x) Itanium 1.8G/24M CPU, (12x) 4GB DDRII DIMM memory, (4x) SAS Hard Drives, (4x) PCI/PCI-X/PCIe added to public I/O cards.

If an overload triggers the power supply overload protection, the system is immediately powered off. To reset the power supply unit:

1. Disconnect the power cord
2. Determine what caused the overload by contacting an HP support representative
3. Reconnect the power cord, then reboot the system

If an overload occurs twice, there is an undetected short circuit somewhere.

When you use the front panel Power button to turn off the server, power consumption falls below the low power consumption, but doesn't reach zero. To reach zero power consumption in “off” mode, either unplug the server or use a power block with a switch.

Power Consumption and Cooling

Table 17 lists additional component power consumption.

Table 17 Additional Component Power Consumption

Additional Component	Power Consumption	
	100-127 V AC	200-240 V AC
Each additional CPU	+125 W (427 BTU/hr)	+122 W (417 BTU/hr)
Each Additional (4x) DIMM	+32 W (109 BTU/hr)	+31 W (106 BTU/hr)
Each additional SAS HD	+17 W (58 BTU/hr)	+17 W (58 BTU/hr)
Each additional I/O Card	+30 W (102 BTU/hr)	+29 W (99 BTU/hr)

Physical and Environmental Specifications

This section provides the temperature/humidity requirements, noise emission, and air flow specifications for the HP server.

Operating temperature and humidity ranges may vary depending on the installed mass storage devices. High humidity levels can cause improper disk operation. Low humidity levels can aggravate static electricity problems and cause excessive wear of the disk surface.

Table 18 Environmental Specifications (system processing unit with hard disk)

Parameter	Value
Operating temperature	+5° C to +35° C (+41° F to +95° F)
Storage temperature	- 40° C to +70° C (-40° F to +158° F)
Critical over-temperature[1]	+44° C (+111.2° F)
Fatal over-temperature shutdown[2]	+48° C (+118.4° F)
Operating humidity	15% to 80% relative (noncondensing)
Storage humidity	90% relative (noncondensing) at + 65° C
Acoustic Noise Emission (ISO 7779)	Sound Power Level[3]
Typical configuration (disk idle)[4]	L_{WA} =6.8 BA
Maximum configuration (disk idle)[5]	LWA =6.8 BA
Maximum configuration (disk active)[5]	LWA =6.9 BA
Altitude	
Operating altitude	0 to 3000 m (10,000 ft.) max
Storage altitude	0 to 4572 m (15,000 ft.) max

[1] If this temperature is reached, iLO enters a TEMPERATURE_HIGH_CRITICAL event in the system log, which might initiate a graceful OS shutdown, depending on OS configuration (HP-UX `envd(1)` might initiate a reboot or shutdown).

[2] If this temperature is reached, iLO enters a TEMPERATURE_HIGH_NON_RECOVERABLE event in the system log and automatically initiates a system shutdown via interruption of internal DC power (the OS halts immediately).

[3] Typical configuration at room temperature (25° C).

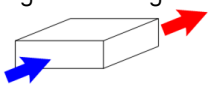
[4] Single processor, one to two SCSI hard disk drives and less than 8GB of memory.

[5] Dual processor, three SCSI hard disk drives and more than 8GB of memory.

Table 19 Physical and Environmental Specifications

	Condition						Weight			Overall System Dimensions (W X D X H)	
	Typical Heat Release		Airflow, Nominal		Airflow, Maximun at 35°C[1]						
	Voltage 100-127 V AC	Voltage 200-240 V AC					Server	Rack	Pedestal	Rack	Pedestal
Description	Watts	Watts	CFM	m^3/hr^2	CFM	m^3/hr^2	75-90 lbs.	Max: 45.36 kg. (100 lbs.)	10.9 kg (24 lbs.)	69.6 cm (27.4 in.) x 44 cm (17.32 in.) x 17.24 cm	69.2 cm (27.2 in.) x 36.9 cm (14.5 in.) x 51.2 cm
Minimum Configuration	432	669	173	294	218	371			44.9 kg. (99 lbs.)		
Maximum Configuration	1095	1056	173	294	218	371			51.7 kg.		

Table 19 Physical and Environmental Specifications *(continued)*

<table>
<tr><th rowspan="3"></th><th colspan="6">Condition</th><th colspan="3" rowspan="2">Weight</th><th colspan="2" rowspan="2">Overall System Dimensions (W X D X H)</th></tr>
<tr><th colspan="2">Typical Heat Release</th><th colspan="2" rowspan="2">Airflow, Nominal</th><th colspan="2" rowspan="2">Airflow, Maximun at 35°C[1]</th></tr>
<tr><th>Voltage 100-127 V AC</th><th>Voltage 200-240 V AC</th><th>Server</th><th>Rack</th><th>Pedestal</th><th>Rack</th><th>Pedestal</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="2"></td><td rowspan="2"></td><td>(114 lbs.)</td><td rowspan="2">(6.8 in.)</td><td rowspan="2">(20.2 in.)</td></tr>
<tr><td>Typical Configuration</td><td>685</td><td>669</td><td>173</td><td>294</td><td>218</td><td>371</td><td></td><td></td></tr>
<tr><td colspan="11"></td></tr>
<tr><td rowspan="3">ASHRAE Class 1</td><td colspan="5" rowspan="3">Air Flow Diagram Cooling Scheme (F - R)
 
Front to Rear (F-R)</td><td>Minimum Configuration</td><td colspan="5">(1x) Itanium 1.8G/24M CPU, (4x) 4GB DDRII DIMM memory, (0x) SAS Hard Drives, (0x) PCI/PCI-X/PCIe added to public I/O cards.</td></tr>
<tr><td>Maximum Configuration</td><td colspan="5">(2x) 1.8G/24M CPUs, (24x) 4GB DDRII DIMM memory, (8x) SAS Hard Drives, (8x) PCI/PCI-X/PCIe added to public I/O cards.</td></tr>
<tr><td>Typical Configuration</td><td colspan="5">Half-loaded configuration: (1x) Itanium 1.8G/24M CPUs, (12x) 4GB DDRII DIMM memory, (4x) SAS Hard Drives, (4x) PCI/PCI-X/PCIe added to public I/O cards.</td></tr>
</table>

[1] Derate maximum dry bulb temperature 1oC/300 m above 900 m.

[2] $m^3/hr=1.7 \times CFM$

3 Installing the System

This chapter covers the procedures for installing the HP Integrity rx3600 server.

This chapter addresses the following topics

- "Safety Information" (page 42)
- "Installation Sequence and Checklist" (page 43)
- "Unpacking and Inspecting the Server" (page 43)
- "Installing Additional Components" (page 45)
- "Installing the Server into a Rack or Pedestal Mount" (page 65)
- "Connecting the Cables" (page 66)
- "Console Setup" (page 69)
- "Accessing the Host Console" (page 78)
- "Powering On and Powering Off the Server" (page 81)
- "Core I/O Card Configuration" (page 82)
- "Installation Troubleshooting" (page 104)
- "Enabling the Trusted Platform Module" (page 107)

Safety Information

Use care to prevent injury and equipment damage when performing removal and replacement procedures. Voltages can be present within the server even when it is powered off. Many assemblies are sensitive to damage by electrostatic discharge (ESD).

Follow the safety precautions listed below to ensure safe handling of components, to prevent injury, and to prevent damage to the server:

- When removing or installing any server component, follow the instructions provided in this guide.
- If installing a hot-swappable or hot-pluggable component when power is applied (fans are running), reinstall the server cover immediately to prevent overheating.
- If installing a hot-pluggable component, complete the required software intervention prior to removing the component.
- If installing an assembly that is neither hot-swappable nor hot-pluggable, disconnect the power cable from the external server power receptacle.

⚠ **WARNING!** Ensure that the system is powered off and all power sources are disconnected from the server prior to removing or installing server hardware unless you are removing or installing a hot-swappable or hot-pluggable component.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is turned off.

Failure to observe this warning can result in personal injury or damage to equipment.

- Do not wear loose clothing that can snag or catch on the server or on other items.
- Do not wear clothing subject to static charge buildup, such as wool or synthetic materials.

- If installing an internal assembly, wear an antistatic wrist strap and use a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.

Installation Sequence and Checklist

Table 20 lists the server installation steps. Follow these steps in sequence to install the server.

Table 20 Installation Sequence Checklist

Step	Description	Completed
1	Unpack and inspect the server shipping container. Inventory the contents using the packing slip.	
2	Install additional components shipped with the server.	
3	Install the server into a rack or pedestal mount.	
4	Connect cables to the server.	
	a. Connect AC input power cable.	
	b. Connect LAN core I/O cable.	
5	Set up the console.	
6	Access the host console.	
7	Power on the server.	
8	Configure core I/O cards.	
9	Boot the operating system.	
10	Verify the server configuration.	

Unpacking and Inspecting the Server

This section describes procedures you perform before installation. Ensure that you have adequately prepared your environment for the new server and received all the components you ordered. Verify that the server and its containers are in good condition after shipment.

Verifying Site Preparation

Verifying site preparation is an essential part of a successful server installation. It includes the following tasks:

- Gather LAN information. Determine the IP addresses for the iLO 2 MP LAN and the system LAN.
- Establish a method to connect to the server console. For more information on console connection methods, see "Console Setup" (page 69).
- Verify electrical requirements. Ensure that grounding specifications and power requirements have been met.
- Validate server physical space requirements.
- Confirm environmental requirements.

For more information on server electrical, physical space, and environmental requirements, see the *HP Integrity rx3600 Site Preparation Guide*.

Inspecting the Shipping Containers for Damage

HP shipping containers protect their contents under normal shipping conditions. After the equipment arrives, carefully inspect each carton for signs of shipping damage. Shipping damage constitutes moderate to severe damage, such as punctures in the corrugated carton, crushed boxes, or large dents. Normal wear or slight damage to the carton is not considered shipping damage. If you find shipping damage to a carton, contact your HP customer service representative immediately.

Unpacking the Server

To unpack a server, follow these steps:

1. Read the instructions printed on the outside top flap of the carton; remove the banding and the outer carton from the server pallet.
2. Remove all inner accessory cartons and the top foam cushions, leaving only the server.

IMPORTANT: Inspect each carton for shipping damage as you unpack the server.

Checking the Inventory

The sales order packing slip lists all the equipment shipped from HP. Use this packing slip to verify that all the equipment has arrived.

NOTE: To identify each item by part number, see the sales order packing slip.

Returning Damaged Equipment

If the equipment is damaged, contact your HP customer service representative immediately. The service representative initiates appropriate action through the transport carrier or the factory and assists you in returning the equipment.

Unloading the Server with a Lifter

WARNING! Use caution when using a lifter. Because of the weight of the HP Integrity rx3600 server, you must center the server on the lifter forks before lifting it off the pallet to avoid injury.

NOTE: HP recommends that you follow local guidelines when lifting equipment.

To unload the server from the pallet using a lifter, follow these steps:

1. Unpack the server.
2. Unroll the bottom corrugated tray on the side where you will place the lifter, and slide the server as close to that edge of the pallet as possible.
3. Break off any foam packaging that can prevent you from fully inserting the lifter under the server.

IMPORTANT: Do not remove the foam packaging from the corners of the server. This foam is required to elevate the server and enable the forks of the lifter to be inserted under the server.

4. Insert the lifter forks under the server.
5. Roll the lifter forward carefully until it is fully positioned against the side of the server.
6. Raise the server slowly off the pallet until it clears the pallet cushions.
7. Roll the lifter and server away from the pallet. Do not raise the server any higher than necessary when moving it to the rack.

Installing Additional Components

This section describes how to install components into the server that are not factory integrated. Most servers are pre-configured with all components installed prior to shipping from the HP factory. If you do not have additional components to install, go on to "Installing the Server into a Rack or Pedestal Mount" (page 65).

Removing and Replacing the Top Cover

This section describes how to remove and replace the server top cover.

Removing the Top Cover

To remove the top cover, follow these steps:

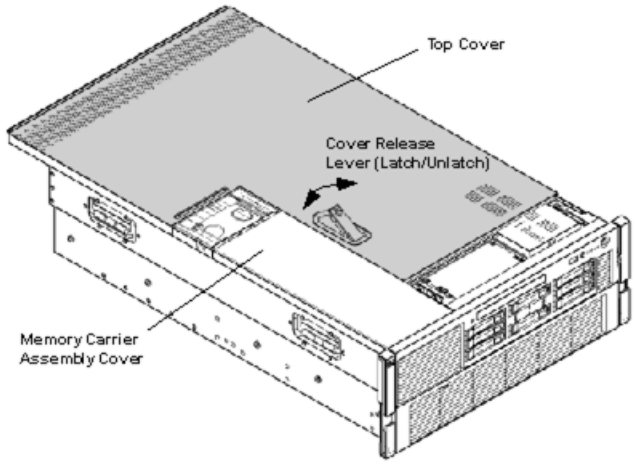
1. Unlock the cover release lever (Figure 15) by turning the cam approximately 90 degrees counterclockwise.
2. Pull up on the cover release lever to disengage the top cover from the chassis (Figure 15 (page 45)).

   NOTE: The cover release lever also disengages the memory carrier assembly cover.

   The memory carrier assembly cover can remain in place while servicing any components except for the memory carrier assembly and the processor board assembly.

3. Slide the cover toward the rear of the server until the tabs release from the slots in the chassis.
4. Lift the cover off the chassis.

Figure 15 Removing and Replacing the Top Cover



Replacing the Top Cover

NOTE: Always replace the memory carrier assembly cover before replacing the top cover.

To replace the top cover, follow these steps:

1. Ensure the memory carrier assembly cover is in place.
2. Ensure the cover release lever is in the open position and that the memory cover is firmly seated or the top cover cannot be installed (Figure 15).
3. Align the tabs of the top cover with the corresponding slots in the chassis. Insert the tabs into the slots.
4. Slide the cover forward until it is flush with the front of the chassis.
5. Push the cover release lever down into the latched position (Figure 15).
6. Lock the cover release lever. Turning the cam 90 degrees clockwise.

Removing and Replacing the Memory Carrier Assembly Cover

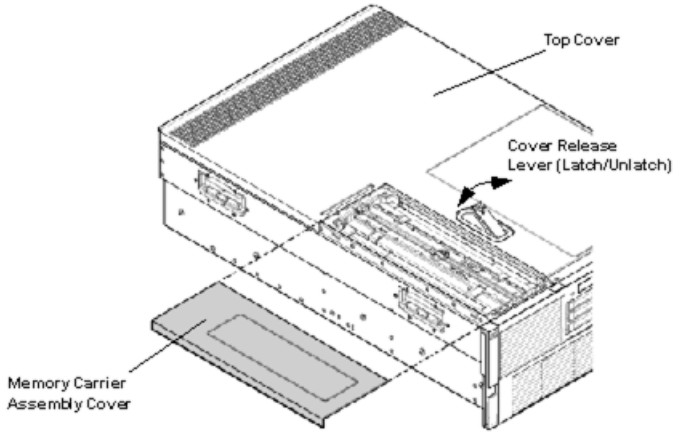
This section describes how to remove and replace the memory carrier cover.

Removing the Memory Carrier Assembly Cover

To remove the memory carrier assembly cover, follow these steps:

1. Unlock the cover release lever. Turn the cam 90 degrees counterclockwise.
2. Pull up on the cover release lever to disengage the top cover and memory carrier assembly cover from the chassis (Figure 15).
3. Slide the memory carrier assembly cover toward the left side of the server to free it from the center of the chassis. Lift the cover off the chassis (Figure 16).

Figure 16 Removing and Replacing the Memory Carrier Assembly Cover



Replacing the Memory Carrier Assembly Cover

To replace the memory carrier assembly cover, follow these steps:

1. Position the cover onto the opening above the memory carrier assembly.
2. Slide the cover toward the right side of the server until it is flush with the center chassis wall; push firmly.
3. Slide the top cover forward until it is flush with the front of the chassis.
4. Push the cover release lever down into the latched position (Figure 15).
5. Lock the cover release lever by turning the cam 90 degrees clockwise.

Installing a Hot-Swappable Power Supply

The server can have one or two hot-swappable power supplies. These power supplies are located at the rear of the server. The supported configuration of the server requires a minimum of one power supply. You can install or replace a hot-swappable power supply using the procedures in this section when power is on or off.

△ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

NOTE: A hot-swappable device does not require interaction with the operating system before the device is removed from or installed into the server.

The DC power to the server does not have to be off to install or replace a hot-swappable power supply.

Power Supply Loading Guidelines

The supported configuration of the server requires a minimum of one power supply installed in either slot P0 or slot P1. You can install a second, optional hot-swappable power supply to provide 1+1 capability. The left side (viewed from the rear of the chassis) hot-swappable power supply is identified as P0, and the second hot-swappable power supply is identified as P1 (Figure 17).

CAUTION: When a second power supply is not used, the empty power supply slot must remain covered with the supplied metal filler panel. Failure to observe this caution can result in damage due to overheating.

Install the hot-swappable power supply into the server before attaching the new power cord. Failure to observe this caution can result in damage to the server.

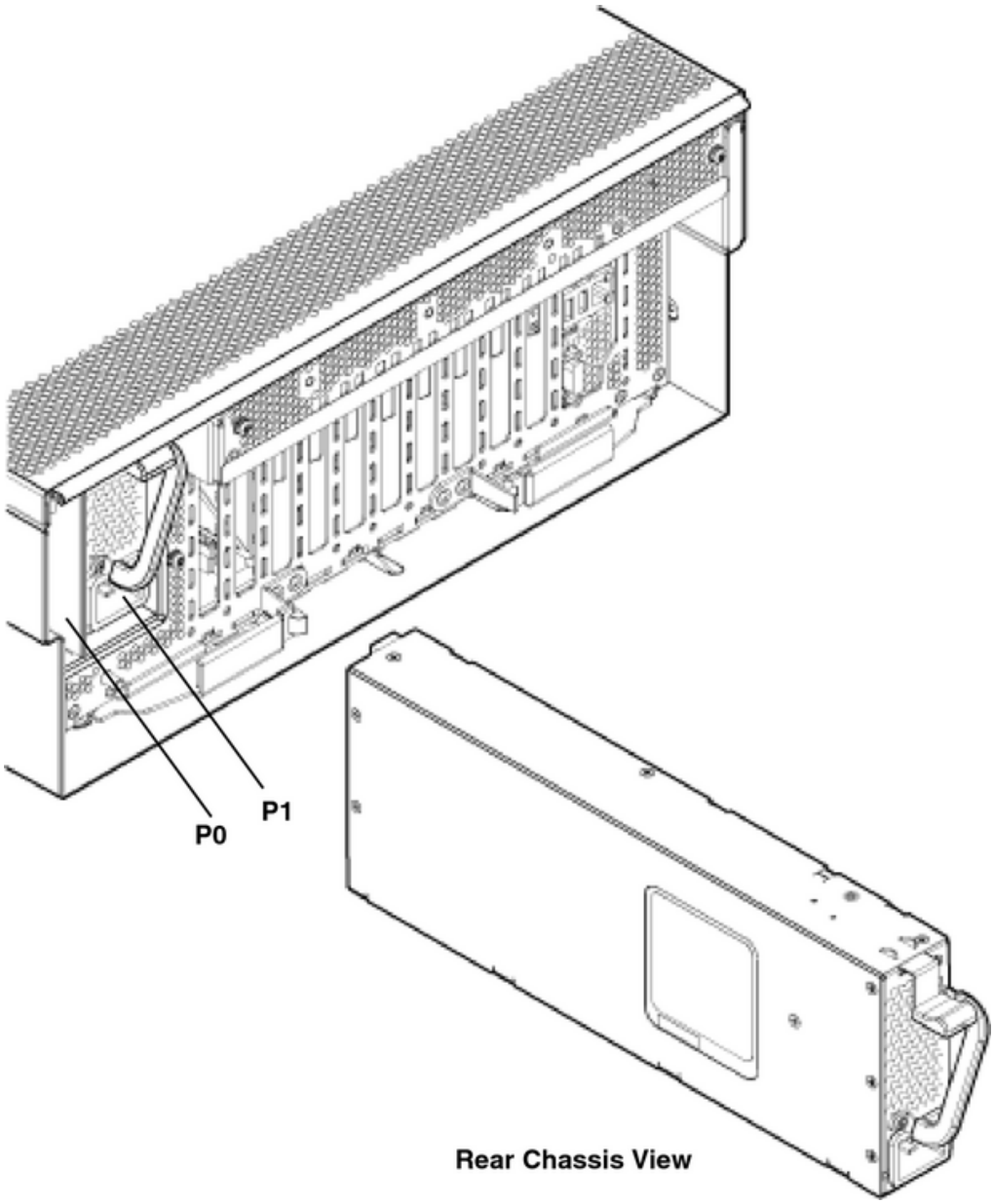
Installing a Hot-Swappable Power Supply

To install a hot-swappable power supply on the front of the server, follow these steps:

1. Remove the metal filler panel if necessary.
2. Support the power supply with both hands, and slide it into the empty slot until it clicks into place (Figure 17).

IMPORTANT: Ensure the power supply is flush with the adjacent power supply or metal filler panel.

Figure 17 Installing a Hot-Swappable Power Supply



Removing and Replacing Hot-Swappable Disk Drive Fillers

There are disk drive fillers installed on the front of the server for all slots that do not contain a disk drive.

IMPORTANT: For cooling purposes, always leave disk drive fillers in slots that do not contain a disk drive.

Removing a Hot-Swappable Disk Drive Filler

To remove a hot-swappable disk drive filler, follow these steps:

1. Squeeze the tabs on the front of the filler to release it from the slot in the drive bay.
2. Pull gently until the filler slides out of the chassis.

Replacing a Hot-Swappable Disk Drive Filler

To replace a hot-swappable disk drive filler, follow these steps:

1. Orient the disk drive filler so that the release tab is on the left side of the filler and the airflow holes are on the right side of the filler.
2. Insert the filler into the slot guides, and slide the filler into the slot until it clicks into place and is fully seated.

Installing a Hot-Pluggable Disk Drive

There are eight hot-pluggable disk drives located in the front of the server. You can replace the hot-pluggable disk drives using the procedures in this section when the server power is on or off.

CAUTION: Drives are loaded in the factory, starting with number 8, working from right to left and bottom to top. If you have never changed your SAS configuration before, you can safely move SAS devices downwards as a block. If you have bays 6, 7, and 8 occupied you can move them down to bays 1, 2, and 3 without having the hardware paths change during a cold-install or recovery while the system is shut down, but you **must** move the disks in order and you cannot rearrange them. For example, you can move bay 6 to 1, 7 to 2, and 8 to 3. After doing this you can safely populate the SAS enclosure from bay 4 onwards. The same procedure can be performed on bays 9 to 16.

CAUTION: A hot-pluggable device may require interaction with the operating system before you can safely remove it from or install it into the server. Verify that the operating system supports removing and replacing disk drives while the operating system is running. If the operating system does not support this feature, shut down the operating system before attempting this procedure. Failure to observe this caution can result in system failure.

TIP: When you receive an HP Integrity rx3600 or HP Integrity rx6600 server from HP, if you ever plan to add other SAS devices into the system, you should consider moving the SAS devices so they start in bay 1 going upwards instead of Bay 8 going downwards.

Installing a Hot-Pluggable Disk Drive

NOTE: The replacement disk drive must have the same product number as the disk drive that you replace.

To install a hot-pluggable disk drive, follow these steps:

1. Use Figure 19 to determine the next available disk drive installation slot.
2. Remove the disk drive filler if required. See "Removing a Hot-Swappable Disk Drive Filler" (page 48).

   NOTE: Save the disk drive filler for future use. For cooling purposes, always place disk drive fillers in slots that do not contain a disk drive.

3. Insert the hot-pluggable disk drive into the slot guides, and slide the drive into the slot until it seats into the socket on the disk backplane.
4. Close the drive ejector handle by pushing it inward until it clicks into place.

Figure 18 Installing a Hot-Pluggable Disk Drive

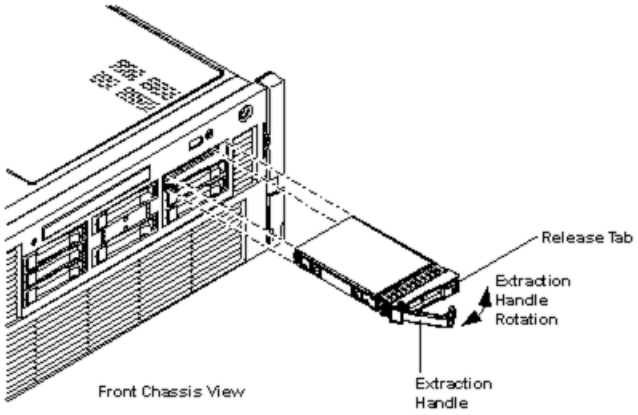
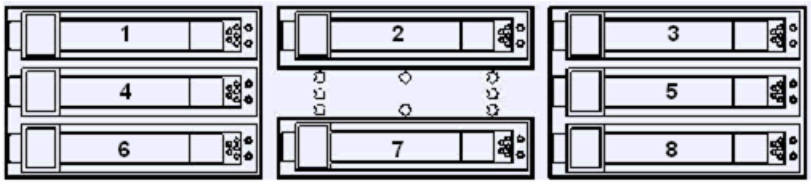


Figure 19 Disk Drive Slot IDs

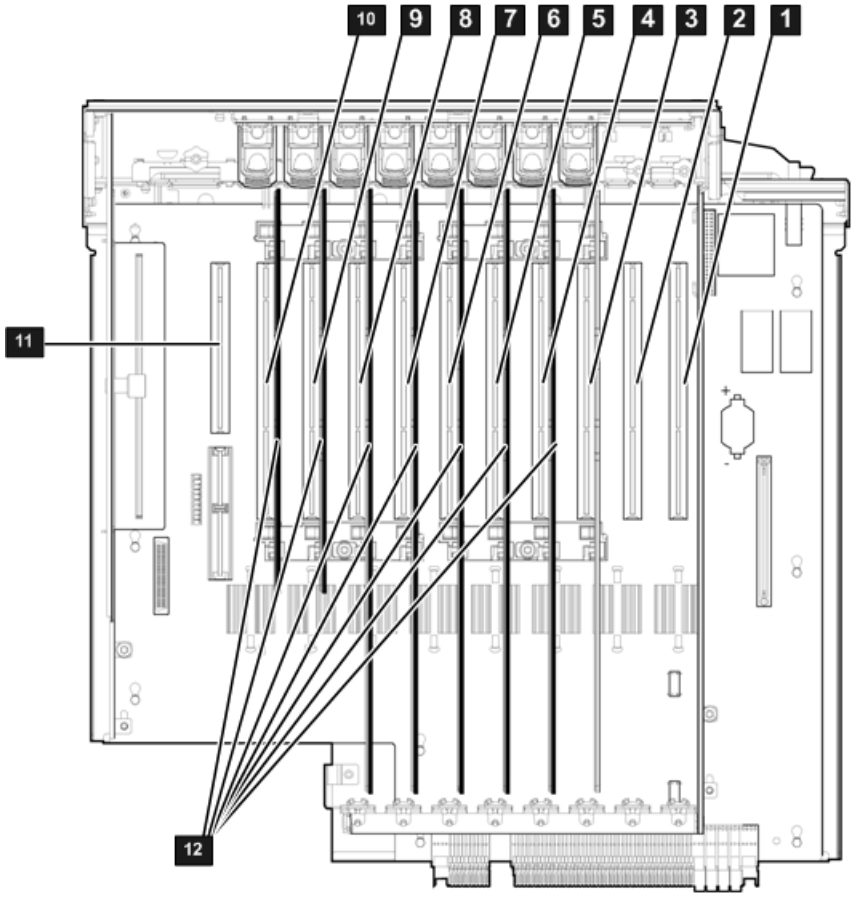


Installing a PCI/PCI-X/PCIe Card

Figure 20 shows the PCI/PCI-X/PCIe slot identification and card divider locations.

NOTE: Slots one through eight are full-length; slots nine and ten are short-length.

Figure 20 PCI/PCI-X Slot Identification and Card Divider Locations



1	Slot 1	5	Slot 5	9	Slot 9
2	Slot 2	6	Slot 6	10	Slot 10
3	Slot 3	7	Slot 7	11	Core I/O Board Slot
4	Slot 4	8	Slot 8	12	PCI/PCI-X/PXIe Card Dividers

PCI/PCI-X/PCIe Configurations

PCI/PCI-X/PCIe slots are numbered one through ten in the server (Figure 20).

The following describes configuration requirements for slots one through ten on the PCI/PCI-X I/O backplane:

- PCI-X slots 1 and 2 are reserved for use by the core I/O cards SAS core I/O card in slot 1 and Gigabit Ethernet LAN core I/O card in slot 2. Slots 1 and 2 are not hot-pluggable. Install only supported PCI-X SAS and LAN core I/O cards in slots 1 and 2. PCIe SAS core I/O is installed in slots 3 and 4 on the PCI/PCI-X/PCIe IOBP. Depending upon the number and type of SAS core I/O cards installed on the system, the Gigabit Ethernet LAN core I/O card may be installed in slot 10.
- Slots 3 and 4 are nonshared slots. The maximum speed for cards in slots 3 and 4 is PCI-X 266 MHz.
- Slots 5 and 6 are nonshared slots. The maximum speed for cards in slots 5 and 6 is PCI-X 133 MHz,
- Slots 7 and 8 are shared slots, and slots, 9 and 10 are shared slots. These four slots are limited by bus mode or frequency-related incompatibilities.

NOTE: Shared slots have card compatibility restrictions. If one of the shared slots is occupied, the card added to the second slot is limited by the configuration of the occupied slot. If the new card has a slower capability than the current bus configuration, it fails. If the new card has a faster capability than the current bus configuration, it only runs at the slower bus mode and frequency of the current bus configuration.

The following are common configuration scenarios for cards that use shared slots. These examples also apply to slots 9 and 10 because they are shared (both use a common bus).

1. If there is a PCI-X 66 MHz card in slot 7, and you hot-plug insert a PCI 33 MHz card into slot 8, the operation fails. The new PCI 33 MHz card does not initialize and the slot powers down because you cannot change bus speed during hot-pluggable operations. The new card has a slower bus speed than the current card.

   NOTE: If the server is rebooted in the new configuration, both cards initialize to run at PCI 33 MHz. This is because the system firmware can only change the bus capability down to the lowest common value.

2. If there is a PCI 33 MHz card in slot 7, and you hot-plug insert a PCI-X 66 MHz card into slot 8, the new card works but it runs at PCI 33 MHz.
3. If the server is powered off and you insert a PCI 33 MHz card into slot 7 with a PCI-X 66 MHz card is installed in slot 8), then both cards run at PCI 33 MHz when the server powers up.

The following describes configuration requirements for slots one through ten on the PCI/PCI-X/PCIe I/O backplane:

- PCI-X slots 1 and 2 are reserved for use by the core I/O cards SAS core I/O card in slot 1 and Gigabit Ethernet LAN core I/O card in slot 2. Slots 1 and 2 are not hot-pluggable. Install only supported SAS and LAN core I/O cards in slots 1 and 2.
- Slots 3 and 4 are swtiched PCIe x8
- Slots 5 and 6 are nonswitched PCIe x8.
- Slots 7 and 8 are nonshared slots. The maximum speed for cards in slots 7 and 8 is PCI-X 133 MHz.
- Slots 9 and 10 are shared slots. These two slots are limited by bus mode or frequency-related incompatibilities.

IMPORTANT: Slots 9 and 10 on the PCI/PCI-X/PCIe I/O backplane have the same configuration limitations as slots 9 and 10 on the PCI/PCI-X/ I/O backplane.

Table 21 lists the PCI/PCI-X card slot frequency and bus mode compatibility for shared slots.

Table 21 PCI/PCI-X Card Slot Frequency and Bus Mode Compatibility for Shared Slots[1]

Current PCI Bus Mode and Frequency for the Card in a Shared Slot	Cards to be Installed				
	PCI 33	PCI 66	PCI-X 66	PCI-X 133	PCI-X 266
PCI 33 MHz	Compatible[2]	Compatible[2] New card running at PCI 33	Compatible[2] New card running at PCI 33	Compatible[2] New card running at PCI 33	Compatible[2] New card running at PCI 33
PCI 66 MHz	Incompatible frequency[3]	Compatible[2] New card running at PCI 66	Compatible[2] New card running at PCI 66	Compatible[2] New card running at PCI 66	Compatible[2] New card running at PCI 66
PCI-X 66 MHz	Incompatible frequency[3]	Incompatible bus[4]	Compatible[2] New card running at PCI-X 66	Compatible[2] New card running at PCI-X 66	Compatible[2] New card running at PCI-X 66

[1] The conditions described in this table apply only to shared slots 7, 8, 9, and 10. Slots 1, 2, 3, 4, 5, and 6 are not shared slots.

[2] Compatible: card is accepted and runs at the frequency shown.

[3] Incompatible-frequency: card does not work. The new card does not initialize and powers down due to frequency mismatch.

[4] Incompatible bus: Card does not work. The new card does not initialize and powers down due to bus mode mismatch.

Offline Installation of a PCI Card

Ensure that you install the proper drivers for PCI/PCI-X/PCIe cards after you complete the server installation and power on the server.

To install a PCI/PCI-X/PCIe card with the power off, follow these steps:

1. Remove the top cover from the chassis. See "Removing the Top Cover" (page 45).
2. Select an empty slot that is appropriate for the card you are installing. To locate an appropriate slot, see "PCI/PCI-X/PCIe Configurations" (page 51) and Figure 20 for more information.
3. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead filler is fully exposed.
4. Remove the PCI/PCI-X/PCIe bulkhead filler.
5. Insert the PCI/PCI-X/PCIe card into the empty slot and exert firm, even pressure to seat the card in the slot.

> **CAUTION:** Ensure that you fully seat the card into the slot or the card can fail after power is reapplied to the slot.

6. Connect all internal and external cables to the PCI/PCI-X card.
7. Close the MRL.
   a. Rotate the MRL downward 90 degrees.
   b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.
8. Close the gate latch to secure the end of the card if it is full length.
9. Replace the top cover. See "Replacing the Top Cover" (page 45).

Removing and Replacing the Memory Carrier Assembly

The memory carrier assembly encloses the system DIMMs. There are two different memory carrier assemblies available for the server:

- 8-DIMM memory carrier assembly
- 24-DIMM memory carrier assembly

The 8- and 24-DIMM memory carrier assemblies have two sides, 0 and 1, each of which contain a memory board. System DIMMs seat onto the memory boards.

Table 22 lists the supported memory carrier assembly configurations.

Table 22 Supported Memory Carrier Assembly Configurations

Memory Carrier Configuration	Memory Boards Installed
8-DIMM memory carrier	Two 4-DIMM memory boards
24-DIMM memory carrier	Two 12-DIMM memory boards

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to moving DIMMs.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Memory Carrier Assembly

To remove the memory carrier assembly, follow these steps:

1. Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 46).

   NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open.

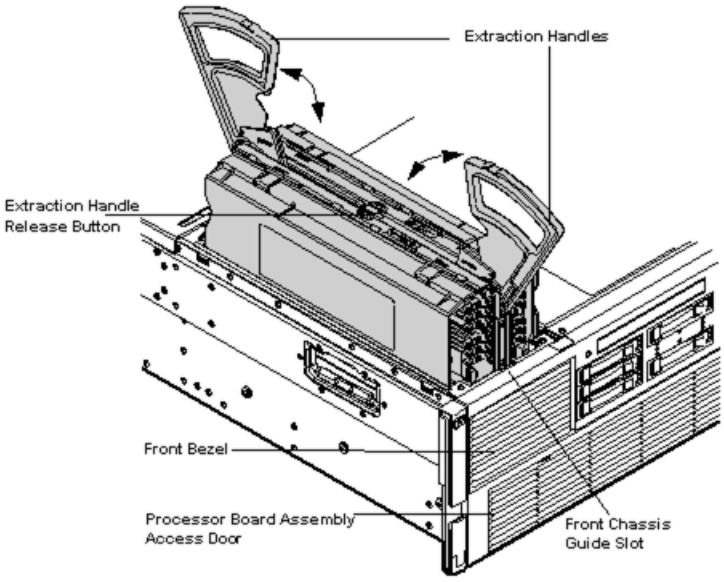
2. Press the button located in the center of the memory carrier assembly to release the extraction handles (Figure 21).

   CAUTION: Manipulate the extraction handles with care. Failure to observe this caution can result in damage to the extraction handles.

3. Pull up on the extraction handles and rotate them outward 90 degrees (Figure 21). The handles latch into the open position with an audible click.
4. Lift the memory carrier assembly out of the chassis (Figure 21).

   NOTE: To avoid damage to the handles, HP recommends rotating the handles inward and snapping them into place when servicing the system DIMMs, or any time the carrier is out of the chassis. Before replacing the memory carrier, press the button to release the extraction handles. Use the handles to replace the memory carrier into the chassis.

Figure 21 Removing and Replacing the Memory Carrier Assembly



Replacing the Memory Carrier Assembly

CAUTION: Ensure that the processor board assembly is fully seated before you replace the memory carrier assembly. The processor board assembly access door must be flush with the front bezel.

To replace the memory carrier assembly, follow these steps:

1. Ensure the extraction handles are positioned in the outward, unlocked position.
2. Align the memory carrier assembly with the front and rear chassis guide slots.

   NOTE: Assembly side 0 is on the left, and assembly side 1 is on the right as viewed from the front of the chassis.

3. Slide the memory carrier assembly into the chassis until it begins to seat into the socket located on the processor board.

CAUTION: Do not apply excessive force when closing the extraction handles and seating the memory carrier assembly into the socket on the processor board. Manipulate the extraction handles with care. Failure to observe these cautions can result in damage to the extraction handles and other server components.

4. Rotate the extraction handles inward and press the handles straight down until they snap into the locked position.
5. Replace the memory carrier assembly cover and latch the top cover release lever closed. See "Replacing the Memory Carrier Assembly Cover" (page 46).

Installing System Memory DIMMs

System memory or DIMMs are located on a pair of memory boards inside the memory carrier assembly.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

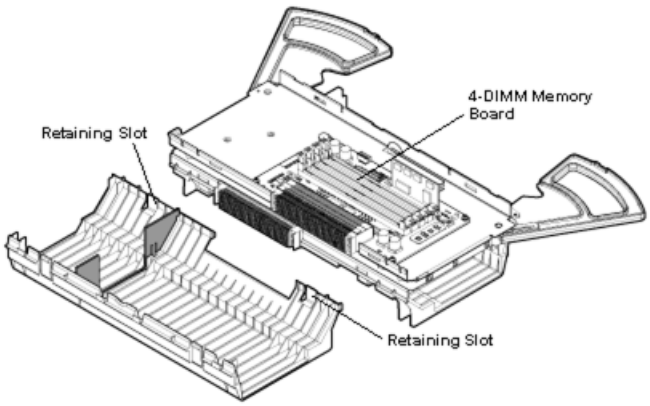
Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Figure 21 (page 55) shows the memory carrier assembly removed from the chassis.

Figure 22 shows the memory carrier with the side cover removed.

Figure 22 Memory Carrier Assembly with Side Cover Removed



Memory Installation Conventions

Before installing memory, read and understand the following memory installation conventions:

- Supported DIMM sizes and memory configurations
- DIMM load order
- DIMM slot IDs

Supported DIMM Sizes and Memory Configurations

The standard server configuration includes an 8-DIMM memory carrier which contains two 4-DIMM memory boards. An optional, high-capacity memory configuration is also available: a 24-DIMM memory carrier containing two 12-DIMM memory boards.

System DIMMs seat onto the memory boards. The minimum server configuration requires at least one memory pair in the 8-DIMM memory carrier, and one memory quad (group of four DIMMs) in the 24-DIMM memory carrier.

The following are the supported DIMM sizes for the server:

- 512 MB
- 1 GB
- 2 GB

- 4 GB
- 8 GB

Table 23 lists the supported memory configurations for the server.

Table 23 Supported Memory Configurations

Memory Carrier Type	Memory Boards Installed	Minimum Memory Configuration	Maximum Memory Configuration
8-DIMM memory carrier (standard)	Two 4-DIMM memory boards	2 GB (one pair: two 1-GB DIMMs)	64 GB (eight 8-GB DIMMs)
24-DIMM memory carrier (optional, high-capacity)	Two 12-DIMM memory boards	2 GB (one quad: four 512-MB DIMMs)	192 GB (24 8-GB DIMMs)

Memory Load Order

When installing memory, use a minimum of one pair in the 8-DIMM memory carrier, and one quad in the 24-DIMM memory carrier, of like-sized DIMMs. Insert additional DIMMs into the memory carriers in the next available pair or quad, in order of capacity from largest to smallest.

Install DIMMs into the appropriate slots on the memory carrier board; each slot has a unique ID. Use Figure 23 and Figure 24 to determine where to install DIMMs on the memory carrier board.

△ **CAUTION:** Do not mix DIMM sizes or types within a pair or quad. Load DIMM pairs and quads in order of capacity from largest to smallest. For example, if you have a quad of 2 GB DIMMs and a quad of 1 GB DIMMs, install the quad of 2 GB DIMMs first.

Failure to observe these cautions results in system degradation or failure

8-DIMM Memory Carrier Load Order

The 8-DIMM memory carrier has two sides labeled side 0 and side 1, each of which contains a memory carrier board. The 8-DIMM memory carrier can contain one to four pairs of memory. Pairs of memory are divided equally between the two sides of the memory carrier. For example, if you have two pairs of memory to install, load two DIMMs in slots 0A and 0B of side 0, and load two DIMMs in slots 0A and 0B of side 1.

Table 24 lists the 8-DIMM memory carrier load order.

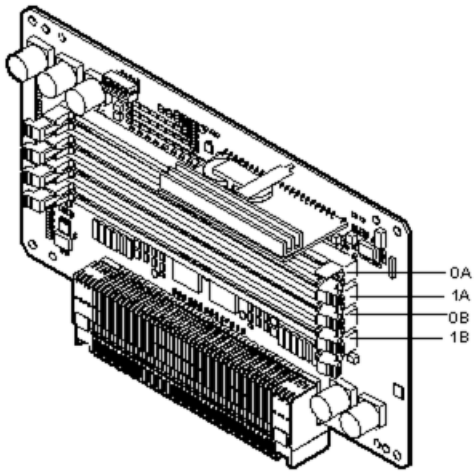
Table 24 8-DIMM Memory Carrier Load Order

Pair Number	Memory Carrier Side	Slot ID
1	Side 0	0A; 0B
2	Side 1	0A; 0B
3	Side 0	1A; 1B
4	Side 1	1A; 1B

The DIMM slot IDS are the same for both 8-DIMM memory carrier boards. Unique slots are identified within the carrier by the side in which they reside. For example, slot 0A is identified as slot 0A, side 0; or slot 0A, side 1.

Figure 23 shows the DIMM slot IDs for the 8-DIMM memory carrier board.

Figure 23 8-DIMM Memory Carrier Board Slot IDs



24-DIMM Memory Carrier Load Order

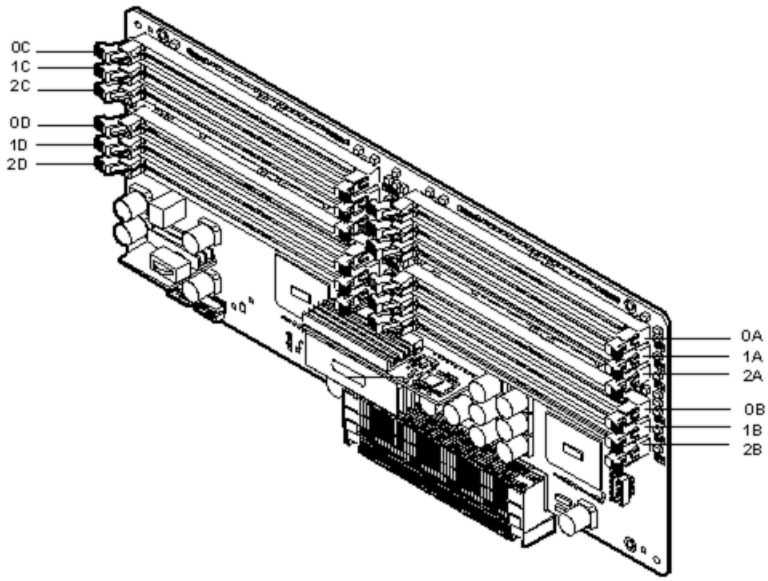
The 24-DIMM memory carrier has two sides, labeled side 0 and side 1, each of which contains a memory carrier board. The 24-DIMM memory carrier can contain up to six quads of memory. DIMM quads are loaded in order of size from largest to smallest capacity.

DIMM quads are loaded in a certain way to balance the memory capacity between the two sides of the memory carrier, starting with side 0. If you have more than two quads of memory to install, load the first quad into slots 0A-0D of side 0, and load the second quad into slots 0A-0D of side 1. For the third and remaining quads of memory see "Memory Loading Rules and Guidelines" (page 59).

The DIMM slot IDS are the same for both 24-DIMM memory carrier boards. Unique slots are identified within the carrier by the side in which they reside. For example, slot 0A is identified as slot 0A, side 0; or slot 0A, side 1.

Figure 24 shows the DIMM slot IDs for the 24-DIMM memory carrier board.

Figure 24 24-DIMM Memory Carrier Board Slot IDs



Memory Loading Rules and Guidelines

Use the following rules and guidelines when installing memory:

- Install DIMMs in pairs for the 8-DIMM memory carrier and quads in the 24 DIMM memory carrier.
- Ensure that all DIMMs within a pair or quad are identical.
- Install pairs or quads in order of capacity from largest to smallest. For example, install all 2 GB quads before 1 GB or smaller quads, and install all 1 GB quads before 512 MB quads.
- Side 0 must have equal or greater memory capacity than side 1.
- Install DIMM pairs or quads based on the following rules:
  1. Load pairs or quads into the memory carrier in order, starting with slot 0 and ending with slot 2.
  2. Install the first pair or quad in side 0.
  3. Install the second pair or quad in side 1.
  4. For the remaining pairs or quads:
     a. If both sides of the memory carrier contain the same capacity of memory, install the next pairs or quad in side 0.
     b. If side 0 contains more memory capacity, even though it may have less DIMMs than side 1, install the next pair or quad in side 1.
     c. If side 1 is full, install the remaining pairs or quads in side 0.

Table 25 shows several examples of proper memory carrier loading order.

NOTE: The number in parenthesis indicates the order in which the quads are loaded.

Table 25 24-DIMM Memory Carrier Loading Examples

	Quad Number	Quad Slot IDs	Memory Carrier Side 0	Memory Carrier Side 1
Example 1				
	0	0A 0B 0C 0D	2 GB (1)	2 GB (2)
	1	1A 1B 1C 1D	1 GB (3)	1 GB (4)
	2	2A 2B 2C 2D	512 MB (5)	512 MB (6)
Example 2				
	0	0A 0B 0C 0D	2 GB (1)	1 GB (2)
	1	1A 1B 1C 1D	512 MB (4)	1 GB (3)
	2	2A 2B 2C 2D		512 MB (5)
Example 3				
	0	0A 0B 0C 0D	2 GB (1)	1 GB (2)
	1	1A 1B 1C 1D		512 MB (3)
	2	2A 2B 2C 2D		512 MB (4)
Example 4				
	0	0A 0B 0C 0D	2 GB (1)	512 MB (2)
	1	1A 1B 1C 1D	512 MB (5)	512 MB (3)
	2	2A 2B 2C 2D	512 MB (6)	512 MB (4)

Installing Memory

IMPORTANT: You must pull the AC power plugs on the server every time you modify the DIMMs. If you do not pull the AC power plugs, the system does not display the correct DIMM information.

To install memory, follow these steps:

1. Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 46).

   NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open.

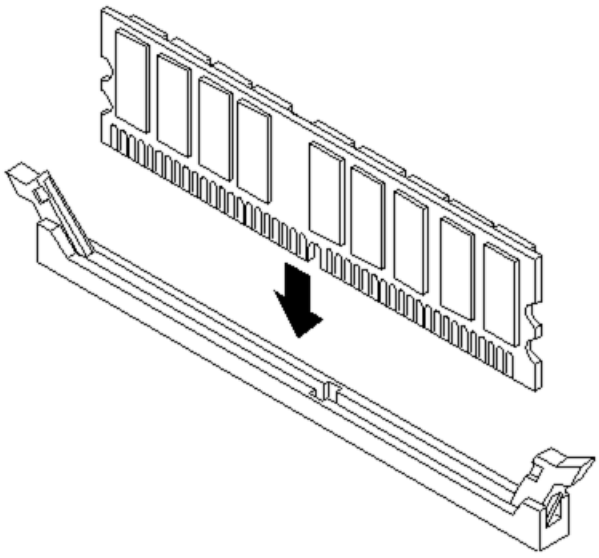
2. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 54).

   NOTE: To avoid damage to the handles, HP recommends rotating the handles inward and snapping them into place when servicing the system DIMMs or any time the carrier is out of the chassis. Before replacing the memory carrier, press the button to release the extraction handles. Use the handles to replace the memory carrier into the chassis.

3. Complete the following memory installation prerequisite tasks before installing the memory:
   a. Determine the DIMM load order as appropriate for the 8-DIMM or 24-DIMM memory carrier. For more information, see "Memory Load Order" (page 57).
   b. Use Figure 23: "8-DIMM Memory Carrier Board Slot IDs" (page 58), or Figure 24: "24-DIMM Memory Carrier Board Slot IDs" (page 58), to determine the DIMM slots to populate.
   c. Read, understand, and follow the general guidelines to install memory in the server. See "Memory Loading Rules and Guidelines" (page 59).
4. Lay the memory carrier assembly on side 0 or side 1 so that the memory carrier side that contains the DIMM slots that you will install DIMMs into faces upward.
5. Remove the memory carrier assembly side cover.
   a. Press the release tabs (Figure 21 (page 55)) on both sides of the extraction handle release button until the side cover releases from the top center of the assembly.
   b. Rotate the side cover slightly to free the tabs from the retaining slots at the base of the assembly (Figure 22 (page 56)).
   c. Lift the side cover off the assembly.

6. Install the DIMMs (Figure 25).
   a. Align the DIMM with the slot located on the memory board, and align the key in the connector with the notch in the DIMM.
   b. Push on each end of the DIMM firmly and evenly until it seats into the slot.
   c. Ensure that the extraction levers are in the fully closed position.

Figure 25 Inserting a DIMM into the Memory Board Connector



7. Replace the memory carrier assembly side cover.
   a. Insert the side cover tabs into the retaining slots at the base of the assembly (Figure 22).
   b. Insert the tabs into the slots on both sides of the extraction handle release button until the side cover snaps into place.

NOTE: To install DIMMs into slots on the other side of the memory carrier, turn the carrier over to the opposite side (side 0 or side 1) and repeat the installation procedure.

8. Replace the memory carrier assembly and latch the top cover release lever. See "Replacing the Memory Carrier Assembly" (page 55).

Removing and Replacing the Processor Board Assembly

The processor board assembly holds one or two dual-core Itanium processors and is located beneath the disk drives and memory carrier assembly in the bottom service bay. The processor board is mounted onto a removable carrier tray which is retained in the service bay by a hinged access door.

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Processor Board Assembly

To remove the processor board assembly, follow these steps:

1. Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 46).

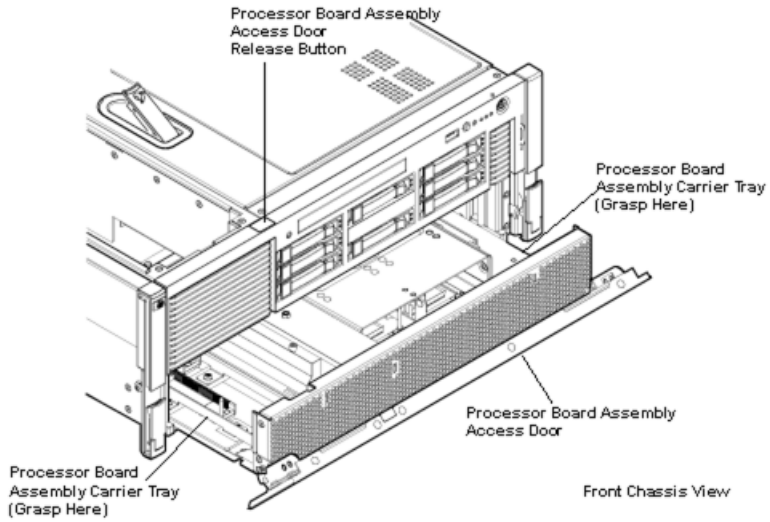
   NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open. You must remove the memory carrier because it attaches directly to the processor board.

2. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 54).
3. Press the button located on top of the bezel directly in front of the memory carrier assembly to release the processor board access door (Figure 26).

CAUTION: The processor board access door opens at a 30 degree angle. Do not force the door to open to a greater angle. Failure to observe this warning results in damage to server components.

4. Use the processor board assembly access door as a handle and gently slide the assembly out of the chassis approximately six inches.
5. Grasp the handholds on the assembly carrier tray with both hands and carefully slide the assembly out of the chassis (Figure 26).

Figure 26 Removing the Processor Board Assembly



Replacing the Processor Board Assembly

To replace the processor board assembly, follow these steps:

1. Align the edges of the processor board assembly with the assembly guides in the chassis.
2. Slide the processor board assembly into the chassis until it begins to seat into the socket located on the midplane board.
3. Push the processor board access door upward until it locks into position.
4. Replace the memory carrier assembly. See "Replacing the Memory Carrier Assembly" (page 55).
5. Replace the memory carrier assembly cover and latch the top cover release lever closed. See "Replacing the Memory Carrier Assembly Cover" (page 46).

Installing a Dual-Core Processor

The server uses dual-core processors. Each processor contains two cores that function as separate processors. Dual-core processors double the processing power of the server while maintaining the physical dimensions of a single processor.

The server can contain one or two dual-core processors that provide the following configuration options:

- 1P/2C (One processor/two cores)
- 2P/4C (Two processors/four cores)

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:** Ensure that processor speed and cache size are identical for all processors. Failure to observe this caution results in performance degradation or system failure.

To ensure compatibility, use dual-core processors with identical part numbers.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Processor Load Order

The server can have up to two dual-core processors on the processor board. The slots on the processor board are labeled Module 0 and Module 1.

Table 26 lists the processor load sequence.

Table 26 Processor Load Order

Dual-Core Processor	Slot
1	Module 0
2	Module 1

Required Tools

To install processors, use the processor install tool fastened to the processor board.

Installing a Dual-Core Processor

To install a dual-core processor, follow these steps:

1. Remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 46).

   NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open.

2. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 54)

   NOTE: You must remove the memory carrier because it attaches directly to the processor board.

3. Remove the processor board assembly. See "Removing the Processor Board Assembly" (page 61).

4. Open the processor cage (Figure 27).
   a. Grasp the processor cage handle and rotate the handle upward.
   b. Use the handle to rotate the cage closure 90 degrees toward the front of the assembly until it stops.

IMPORTANT: Ensure the processor slot is entirely exposed. The processor must clear the cage closure for proper installation.

5. Locate the appropriate processor slot (Module 0 or Module 1) to install the processor into (Figure 27).
6. Remove the plastic airflow blocker covering the processor slot.
7. Remove the protective dust cover from the processor socket.
8. Ensure that the cam on the processor socket lock is in the unlocked, counterclockwise position. The zero insertion force (ZIF) socket for the processor is locked and unlocked by half of a full turn of the processor install tool. Rotate the cam counterclockwise 180 degrees (half turn) unlocks the socket. A clockwise 180 degree rotation locks the socket.

CAUTION: Attempting to turn the locking mechanism more than 180 degrees can severely damage the socket.

9. Remove any protective packaging from the processor.

NOTE: Protective covers are installed to protect connector pins. Save the covers for future use.

10. Inspect the processor pins and verify that the pins are not bent.
11. Align the alignment holes on the processor with the alignment posts on the processor cage, and carefully lower the processor onto the processor socket (Figure 28).

CAUTION: Do not press the processor into the socket. When properly aligned, the processor pins seat into the socket. No additional pressure is required. You can damage pins if too much pressure is applied.

12. Lock the processor into the socket on the processor board (Figure 28).
    a. Unfasten the processor install tool (2.5-mm driver) from the tool holder on the processor board.
    b. Insert the processor tool into the hole that runs down the side of the heatsink.
    c. Rotate the processor tool clockwise 180 degrees.

    CAUTION: Attempting to turn the locking mechanism more than 180 degrees can severely damage the socket.

    d. Refasten the processor install tool to the tool holder on the processor board.
13. Reconnect the processor power cable into the connector cable that attaches directly to the processor board.
14. Close the processor cage (Figure 27).
    a. Grasp the processor cage handle and rotate the cage closure inward toward the rear of the assembly until it is completely closed.
    b. Push the handle down until it is flush with the cage.
15. Replace the processor board assembly. See "Replacing the Processor Board Assembly" (page 62).
16. Replace the memory carrier assembly. See "Replacing the Memory Carrier Assembly" (page 55).

17. Replace the memory carrier assembly cover and latch the top cover release lever closed. See "Replacing the Memory Carrier Assembly Cover" (page 46).

Figure 27 Processor Board Assembly (Front View)

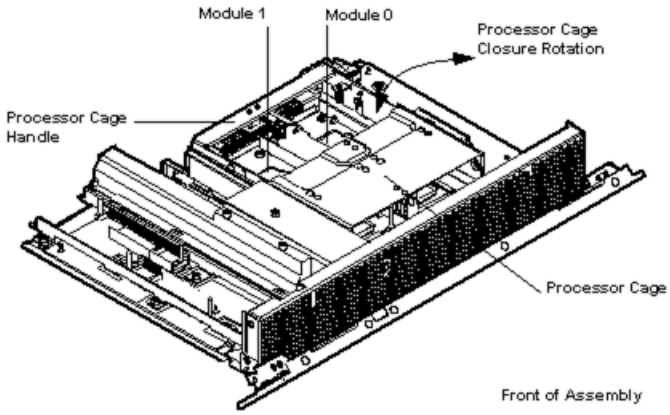
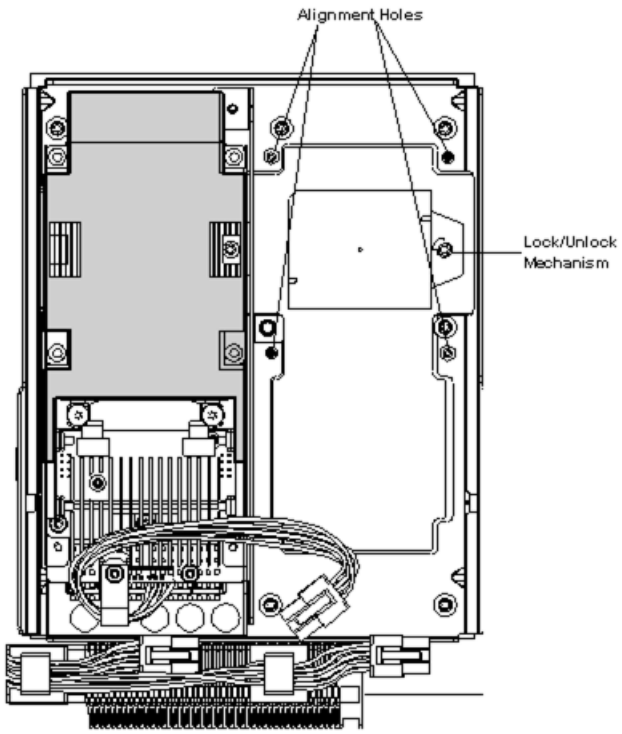


Figure 28 shows the power connectors, the processor lock / unlock mechanism location and the alignment holes. One processor is installed in the illustration.

Figure 28 Processor Alignment Holes and Lock/Unlock Mechanism



Installing the Server into a Rack or Pedestal Mount

This section provides instructions on how to install the server into a rack or a pedestal mount.

Installing the Server into a Rack

The following information describes how to install the server into an HP rack or an approved non-HP rack.

HP Rack

HP servers that are installed into racks are shipped with equipment mounting slides. An installation guide comes with each set of slides: *HP 3-7U Quick Deploy Rail System Installation Instructions for HP Products*. Follow the steps in this installation guide to determine where and how to install the server into the rack.

The following are additional instructions for installing the HP Integrity rx3600 server into the rack:

1. The cable management arm (CMA) is factory configured to mount on the left side of the server as viewed from the rear of the chassis. You must switch the CMA from a left to a right-mount configuration. The CMA is mounted on the right side of the server to ensure easy removal of the power supplies.
2. Remove two T25 screws with the orange tags from the server bezel; one screw from the same location on each side of the server. The screws are located behind the pull handles.
3. Remove the large orange screws from the rear of the rack located on the left and right server slide rails. The server will not slide forward if these screws are not removed.

Non-HP Rack

The guide Mounting in non-HP racks enables you to evaluate the installation of HP equipment into non-HP racks. Use this guide when you need to qualify whether you can install, maintain, and service any HP equipment in a non-HP rack.

The guide is located on the web at:

http://www.hp.com/go/rackandpower

Select **mounting information** from the menu, then select *Mounting in non-HP racks*.

Installing the Server into a Pedestal Mount

The server ships with a pedestal mount if you order the rackless configuration option. The pedestal mount is packaged in a separate carton that is attached to the server carton.

To change the server from a rack mount to a rackless configuration, you need a Server Rackless Mount Kit. The rackless mount kit comes with the *HP Integrity rx3600 Rack to Pedestal Conversion Guide*. Follow the steps in the *HP Integrity rx3600 Rack to Pedestal Conversion Guide* to attach the pedestal mount to the server.

Connecting the Cables

This section provides information on the cables that power the server and provide LAN connectivity for the server.

AC Input Power

The server can receive AC input from two different AC power sources. If two separate power sources are available, you can plug the server into the separate power sources, increasing system reliability if one power source fails. The power receptacles are located at the rear of the chassis. They are labeled PWR 0 and PWR 1.

You can install a maximum of two bulk power supplies (BPS) in the server. Installing two BPSs in the server provides 1+1 redundancy, meaning that if one BPS fails, there is still enough power supplied to the server for it to remain operational. You must promptly replace the failed BPS to restore 1+1 functionality.

A minimum of one BPS is required to power the server. There is no 1+1 capability if only one BPS is present.

Power States

The server has three power states:

- standby power
- full power
- off

To get to standby power state plug the power cord into the appropriate receptacle on the rear of the chassis. The front panel Power button is not turned on.

Full power occurs when the power cord is plugged into the appropriate receptacle and either the power is activated through the iLO 2 MP `PC` command, or the Power button is activated.

In the off state, the power cords are not plugged in.

Table 27 lists the server power states.

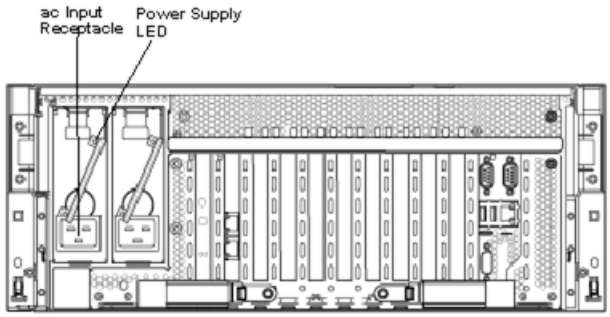
Table 27 Power States

Power States	Power Cable Plugged Into Receptacle	Power Activated through the iLO 2 MP `PC` Command; or Front Panel Power Button Activated	ac Voltage Applied	dc Voltage Applied
Standby power	Yes	No	Yes	No
Full power	Yes	Yes	Yes	Yes
Off	No	No	No	No

NOTE: If the power restore feature is set to **Always On** through the iLO 2 MP `PR` command, the server can automatically power on to the full power state.

Figure 29 shows the rear panel power receptacles and power supply LEDs.

Figure 29 Rear Panel Power Receptacles and Power Supply LEDs



Attaching the Hook-and-Loop Strap to the Bulk Power Supply and Power Cord

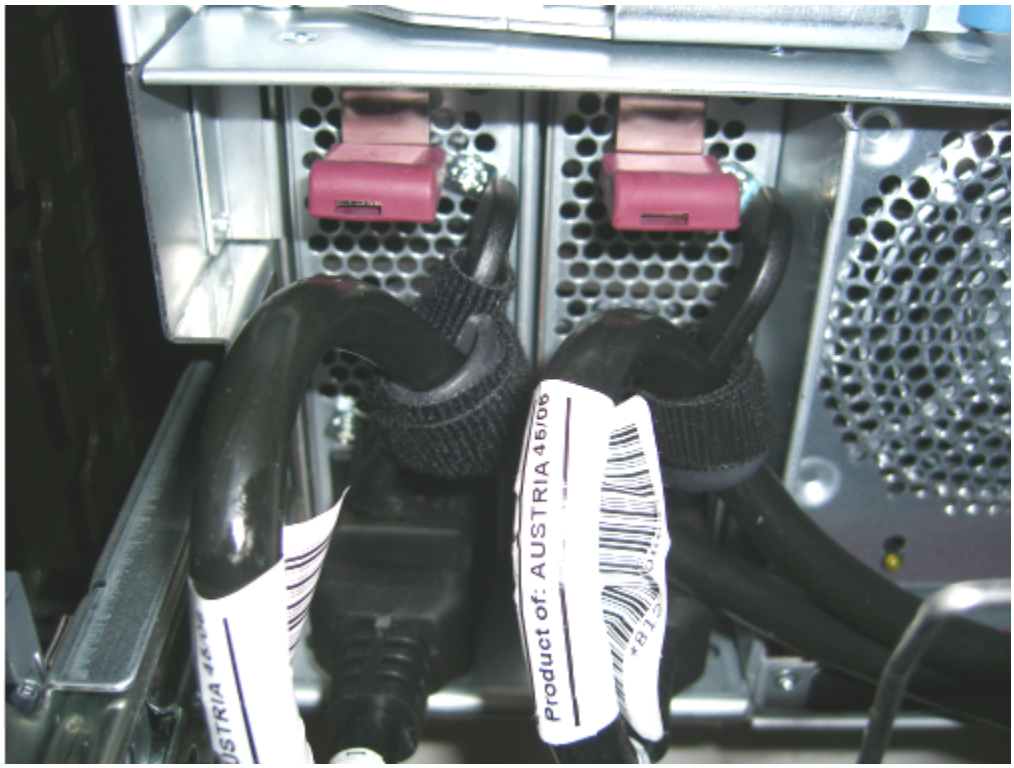
CAUTION: If you do not fasten the hook-and-loop strap to the bulk power supply and the power cord, the power cord might pop off the back.

To attach the hook-and-loop strap to the bulk power supplies and power cord, follow these steps:

1. Attach the hook-and-loop strap to the handle on the bulk power supply.

2. Attach the other end of the strap to the power cord (Figure 30).

Figure 30 Fastening the Power Supply



Applying Standby Power to the Server

To apply standby power to the server, follow these steps:

IMPORTANT: If the server has one BPS, plug the power cable into the receptacle labeled PWR 1.

1. Locate the appropriate receptacle on the rear of the chassis. Plug the power cord into the receptacle.
2. Observe the following LEDs at two different intervals to ensure the server is in the standby power state:

   INTERVAL ONE

   After you plug the power cord into the server, the BPS flashes green and an no light is present on the hard disk drives.

   INTERVAL TWO

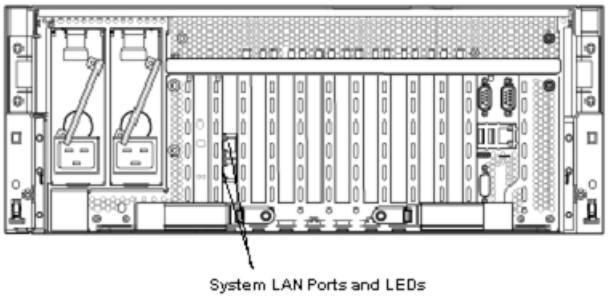
   Approximately 30 seconds later, the BPS is green and no light is present on the hard disk drives. Standby power is now on.

LAN

The server has two LAN ports that can provide network connectivity.

Figure 31 shows the available LAN ports for the server.

Figure 31 Rear Panel LAN Ports



To enable general network connectivity for the server, follow these steps:

1. Obtain valid IP addresses for each LAN port you plan to activate.
2. Connect the LAN cable from an available LAN port to a live connection on the network.

Console Setup

Setting up the console involves the following:

1. Determining the physical access method to connect cables. There are two physical connections to the Integrity iLO 2:
   - RS-232 serial port
   - iLO 2 MP LAN port
2. Configuring the Integrity iLO 2 MP and assigning an IP address if necessary. Though there are several methods to configuring the LAN, DHCP with DNS is the preferred one. DHCP with DNS comes preconfigured with default factory settings, including a default user account and password. Other options include:
   - ARP-Ping
   - RS-232 serial port

Overview

A console is a tool consisting of display and input devices used to locally and remotely monitor and control the server. The console enables interaction with the following manageability, configuration, and diagnostic tools:

- Integrated Lights-Out 2 Management Processor (iLO 2 MP). Provides a way to connect to the server and perform administration or monitoring tasks for the server hardware. It controls power, reset, and Transfer of Control (TOC) capabilities; provides console access; displays and records system events; and displays detailed information about internal subsystems. The iLO 2 is available whenever the system is connected to a power source, even if the server main power switch is turned off.

  NOTE: For more information on iLO 2, see the *HP Integrity Integrated Lights-Out 2 Operations Guide*.

- Extensible Firmware Interface (EFI). Provides an interface between the operating system and the firmware. Use the EFI to configure options, such as the server boot order, before the server loads an operating system.

Table 28 lists the elements required to start a console session.

Table 28 Elements Required to Start a Console Session

Console Element	Description
AC power (standby power)	The server must have AC power to provide console functionality. See "Applying Standby Power to the Server" (page 68).
Server hardware components	Includes the iLO 2 MP and console cable connectors.
Console cable	Links the server console to the console device.
Console device	Provides display and input functionality using components such as monitors, keyboards, and mouse devices.
Console emulation software	Emulates the output from the server console and displays the output on the console device screen.

Setup Checklist

Use the checklist in Table 29 to assist you with the console setup process.

Table 29 Setup Checklist

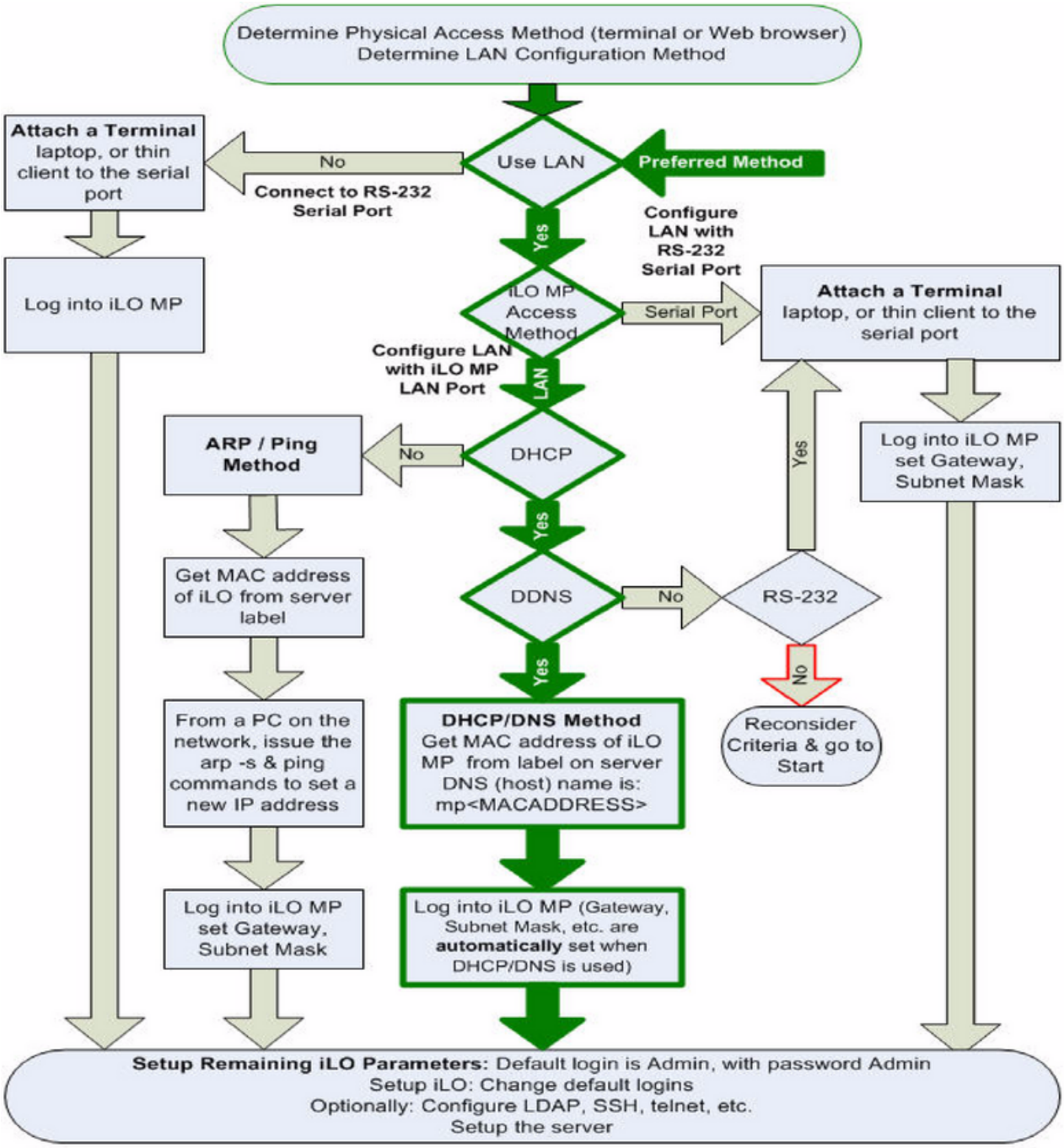
	Step	Action	X
	Standard and Advanced		
1	Preparation	1. Determine access method to select and connect cables. 2. Determine LAN configuration method and assign IP address if necessary.	
2	Configure the iLO 2 MP LAN	There are three methods to configure the LAN for iLO 2 MP access: • DHCP with DNS • ARP Ping • RS-232 serial port	
3	Log on to the iLO 2 MP	Log in to the iLO 2 MP from a supported web browser or command line using the default user name and password.	
4	Change default user name and password	Change the default user name and password on the administrator account to your predefined selections.	
5	Set up user accounts	Set up the user accounts if using the local accounts feature.	
6	Set up security access	Set up the security access settings.	
7	Access the host console	Access the host console using method of choice.	
	Advanced		
	Activate Advanced Pack Features[1]	Activate advanced features by entering a license key.	

[1] For details on Advanced Pack Features see the *HP Integrity iLO 2 Operations Guide*.

Console Setup Flowchart

Use this flowchart as a guide to assist in the console setup process.

Figure 32 Console Setup Flowchart



Preparation

There are several tasks to perform before you can configure the iLO 2 MP LAN.

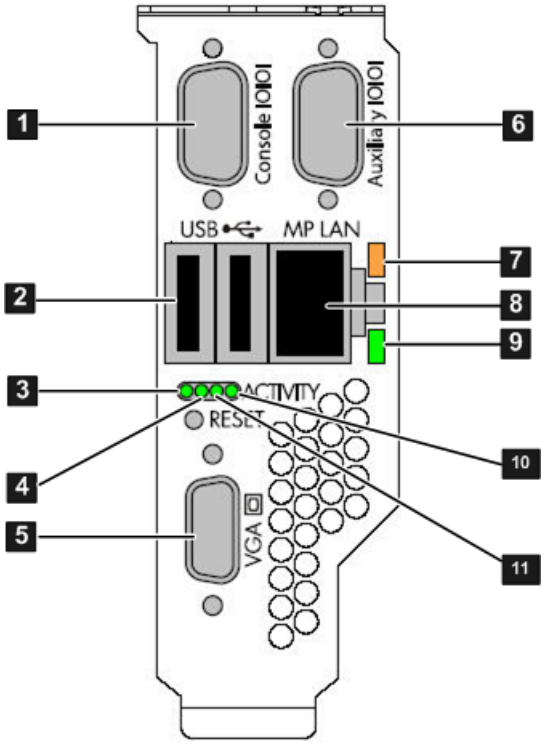
- Determine the physical access method to select and connect cables.
- Determine the iLO 2 MP LAN configuration method and assign an IP address if necessary.

Determining the Physical iLO 2 MP Access Method

Before you can access the iLO 2 MP, you must first determine the correct physical connection method. The iLO 2 MP has a separate LAN port from the system LAN port. It requires a separate LAN drop, IP address, and networking information from that of the port used by the operating system.

Figure 33 shows the server rear ports.

Figure 33 Server Rear Ports



1. iLO 2 MP RS-232 Serial Port (DB-9F to DB-9F cable)

   Connected to emulation terminal device (PC, laptop, or ASCII terminal)
2. USB 2.0 Ports

   (any USB device)
3. BMC Heartbeat
4. MP Heartbeat
5. VGA Port

   (No iLO 2 MP access; EFI only)
6. General Use Serial Port

   (Printers, etc.)
7. 10 Base-T/100 Base-T Mode LED
8. iLO 2 MP LAN Port

   (10/100 LAN)
9. Link and Activity LED
10. Standby Power
11. MP Self Test

Table 30 lists the appropriate connection method, required connection components, and connectors to the host console. Use this table to determine your physical connection method.

Table 30 Physical Connection Matrix

Connection Method	Required Connection Components
RS-232 serial port	1. Host console 2. RS-232 serial port DB-9F to DB-9F cable 3. Emulation terminal device (for example, a PC, laptop, or ASCII terminal)
LAN port	10/100 LAN cable

Determining the iLO 2 MP LAN Configuration Method

To access the iLO 2 MP through the iLO 2 MP LAN, the iLO 2 MP must acquire an IP address. The way the iLO 2 MP acquires an IP address is dependent upon whether DHCP is enabled or disabled on the server, and if DHCP and DNS services are available to the server. (See Table 31 for possible scenarios.)

Once you have determined the iLO 2 MP access, you must determine how you will configure the iLO 2 MP LAN in order to acquire an IP address. There are three methods available.

- DHCP/DNS
- ARP Ping
- RS-232 serial port

Table 31 provides all the possible scenarios to consider. Use this table to help you select the appropriate LAN configuration method to obtain an IP address.

Table 31 LAN Configuration Methods

DHCP	DNS	RS-232 Serial Port (MP `LC` command)	LAN Configuration Method
Yes	Yes	No	DHCP
Yes	Yes	Yes	DHCP or RS-232 serial port
No	No	No	ARP Ping
No	Yes	No	ARP Ping
No	Yes	Yes	ARP Ping or RS-232
Yes	No	Yes	RS-232 serial port
No	No	Yes	RS-232 serial port or ARP Ping
Yes	No	No	Cannot set up the LAN. Reconsider your criteria.

Once you have determined how you will configure the iLO 2 MP LAN in order to acquire an IP address, you must configure the iLO 2 MP LAN using the selected method.

Configuring the iLO 2 MP LAN Using DHCP and DNS

DHCP automatically configures all DHCP-enabled servers with IP addresses, subnet masks, and gateway addresses. All HP Integrity entry class servers with iLO 2 are shipped from the factory with DHCP enabled.

HP recommends using the DHCP and DNS method to simplify access to iLO 2.

NOTE: You can use ARP Ping regardless of the status of DHCP unless an IP address has ever been acquired using DHCP. Once an IP address is assigned using DHCP, ARP Ping is permanently disabled.

When you use DHCP and DNS, you can connect to iLO 2 by typing the default host name in your browser rather than an IP address only if the following applies:

- DHCP must be enabled (DHCP is enabled by default).
- You are using a DHCP server that provides the domain name.
- The primary DNS server accepts dynamic DNS (DDNS) updates.
- The primary DNS server IP address has been configured through the DHCP server.

IMPORTANT: You must know the DNS domain name, which is served out by the DHCP server, unless it's domain is local or the same domain.

To configure the iLO 2 MP using DHCP and DNS, follow these steps:

1. Obtain the factory-set host name from the iLO 2 MP Media Access Protocol (MAC) address label on the server. The default host name is 14 characters long, consisting of the letters **mp** followed by the 12 characters of the MAC address as in this example:

   `mp0014c29c064f`

   This address is assigned to the iLO 2 MP core IO board. The core IO board has a unique MAC address that identifies the hardware on the network.

IMPORTANT: Make sure you obtain the MAC address to the core IO board and not the MAC address to the server core LAN card.

2. Connect the LAN cable from the server to an active network port.
3. Apply AC power to the server.
4. Open a browser, telnet, or SSH client and enter the default host name. The default host name is the letters **mp** followed by the 12 characters of the MAC address. The **iLO 2 MP Log In** window opens.
5. Log in using the default user name and password.

CAUTION: When DHCP is enabled, the system is vulnerable to security risks because anyone can access the iLO 2 MP until you change the default user name and password.

HP strongly recommends you assign user groups and rights before proceeding.

Configuring the iLO 2 MP LAN Using ARP Ping

NOTE: You can use ARP Ping regardless of the status of DHCP unless an IP address has ever been acquired using DHCP. Once an IP address is assigned using DHCP, ARP Ping is permanently disabled. Some DHCP server options can cause the apparent issuance of ARP Ping to the iLO 2 MP which will negate the DHCP/DDNS method.

The Address Resolution Protocol (ARP) and Packet Internet Grouper (Ping) utility uses ARP packets to ping, or discover, a device on the local network segment. The IP address you assign to the server must use the same network segment, or subnet, as the computer assigning the address. ARP does not work across routed or switched networks.

Use the ARP Ping utility to assign a static IP address when you do not have access to the RS-232 serial port or when DHCP is not available.

NOTE: ARP Ping operational issues:

- The PC and the server must be on the same physical subnet.
- When a new server is first booted, DHCP is automatically available (factory-set default); but ARP Ping does not start for three minutes after the iLO 2 MP is booted. This applies to every subsequent boot of the iLO 2 MP until an IP address is obtained by DHCP or has been assigned by using the `LC` command.
- Upon successfully assigning an IP address using ARP Ping, DHCP is automatically disabled.

There are two methods to use the ARP Ping utility:

1. Connect a PC to the network that is on the same physical subnet as the server and run the ARP Ping commands from the PC.
2. Locate an existing server on the network, log into it, and run the ARP Ping commands from the server.

Table 32 lists the ARP Ping commands.

Table 32 ARP Ping Commands

ARP Command	Description
`arp -s`	This command assigns the IP address to the iLO 2 MP MAC address. This ARP table entry maps the MAC address of the iLO 2 MP LAN interface to the static IP address designated for that interface.
`ping`	This command tests network connections. It verifies the iLO 2 MP LAN port is configured with the appropriate IP address.

The following procedure explains how to use the ARP Ping utility using a PC that is connected to the network that is on the same physical subnet as the server.

To configure a static IP address using the ARP Ping utility, follow these steps:

1. Obtain the iLO 2 MP MAC address. To set the IP address using ARP, you must know the MAC address of the iLO 2 MP LAN. You can find the MAC address of the iLO 2 MP LAN on a label on the server.

IMPORTANT: Make sure you obtain the MAC address to the iLO 2 MP LAN and not the MAC address to the server core LAN.

2. Verify that an active LAN cable on the local subnet is connected to the iLO 2 MP LAN port on the server.
3. Access a PC on the same physical subnet as the server.
4. Open a DOS window on the PC.
5. At the DOS prompt, enter **`arp -s`** to assign the IP address to the iLO MAC address.

   Syntax

   `arp -s <IP address you want to assign to the iLO MAC address> <iLO 2 MAC address>`

   Example from Windows

   `arp -s 192.0.2.1 00-00-0c-07-ac-00`
6. At the DOS prompt, enter **`ping`** followed by the IP address to verify that the iLO 2 MP LAN port is configured with the appropriate IP address. The destination address is the IP address that is mapped to the iLO MAC address. Perform this task from the PC that has the ARP table entry.

   Syntax

   `ping <IP address just assigned to the iLO MAC address>`

   Example from Windows

   `ping 192.0.2.1`
7. Use the IP address to connect to the iLO 2 MP LAN.
8. Use web or telnet access to connect to the iLO 2 MP from a host on the local subnet and complete the rest of the LAN parameter (gateway, subnet).

Configuring the iLO 2 MP LAN Using the RS-232 Serial Port

To configure the iLO 2 MP LAN using the RS-232 serial port, follow these steps:

IMPORTANT: Do not configure duplicate IP addresses on different servers within the same network. The duplicate server IP addresses conflict and the servers cannot connect to the network.

The `LC` command enables you to configure an IP address, host name, subnet mask, and gateway address.

IMPORTANT: Ensure you have a console connection through the RS-232 serial port or a network connection through the LAN to access the iLO 2 MP and use the `LC` command.

To assign a static IP address using the `LC` command, follow these steps:

1. Ensure the emulation software device is properly configured. The terminal emulation device runs software that interfaces with the server. The software emulates console output as it would appear on an ASCII terminal screen and displays it on a console device screen. To ensure the emulation software is correctly configured, follow these steps:
   a. Verify that the communication settings are configured as follows:
      - 8/none (parity)
      - 9600 baud
      - None (receive)
      - None (transmit)
   b. Verify that the terminal type is configured appropriately. Supported terminal types are:
      - hpterm
      - vt100
      - vt100+
      - vt-utf8

   IMPORTANT: Do not mix hpterm and vt100 terminal types at the same time.

   There are many different emulation software applications. Consult the help section of the emulation software application for instructions on how to configure the software options.
2. Determine the required connection components, and the ports used to connect the server to the console device.
3. Connect the cables from the appropriate ports to the server.
4. Start the emulation software on the console device.
5. Log in to iLO 2. See "Logging In to iLO 2" (page 76).
6. At the **MP Main Menu**, enter **`CM`** and press **Enter** to select command mode.
7. At the command mode prompt, enter **`LS`** and press **Enter**. The screen displays the default LAN configuration values. Write down the default values, or log the information to a file. You may need the information for future troubleshooting.
8. Use the `LC` command to disable DHCP.
   a. From the `LC` command menu, type **`D`** and press **Enter**.
   b. Follow the instructions on the screen to change the DHCP status from Enabled to Disabled.
   c. Enter **`XD -R`** to reset the iLO 2 MP.
9. Use the `LC` command to enter information for the IP address, host, subnet mask, gateway parameters, and so on.
10. Enter **`XD -R`** to reset the iLO 2 MP.
11. After the iLO 2 MP resets, log in to the iLO 2 MP again and enter **`CM`** at the **MP:>** prompt.
12. Enter **`LS`** to confirm that DHCP is disabled and display a list of updated LAN configuration settings.

Logging In to iLO 2

To log in to iLO 2 , follow these steps:

1. Access iLO 2 using the LAN, RS-232 serial port, telnet, SSH, or web method. The iLO 2 login prompt displays.

2. Log in using the default the iLO 2 user name and password (Admin/Admin).

TIP: For security reasons, HP strongly recommends you modify the default settings during the initial login session. See "Modifying User Accounts and Default Password" (page 77).

Following is the **MP Main Menu**:

```
iLO MP MAIN MENU:
       CO:    Console
      VFP:    Virtual Front Panel
       CM:    Command Menu
       CL:    Console Logs
       SL:    Show Event Logs
    SMCLP:    Server Management Command Line Protocol
       HE:     Main Menu Help
        X:     Exit Connection
```

See the *HP Integrity Integrated Lights-Out 2 Operations Guide* for information on the iLO 2 MP menus and commands.

When logging in using the local or remote RS-232 serial ports, the login prompt may not display if another user is logged in through these ports. Use **Ctrl-B** to access the **MP Main Menu** and the iLO 2 MP prompt (`MP>`).

Additional Setup

This section provides additional information to setup the iLO 2 MP.

Modifying User Accounts and Default Password

The iLO 2 MP comes preconfigured with default factory settings, including a default user account and password. The two default user accounts on initial login are:

- All Rights (Administrator) level user:

  login = **`Admin`**

  password = **`Admin`**

- Console Rights (Operator) level user:

  login = **`Oper`**

  password = **`Oper`**

  Login and password are case sensitive.

TIP: For security reasons, HP strongly recommends you modify the default settings during the initial login session.

Make the following changes using any of the iLO 2 MP user interfaces.

To modify default account configuration settings, follow these steps:

1. Log in as the administrator. You must log in as the administrator in order to modify default user configuration settings
2. To modify default passwords:
   a. Access the **MP Main Menu**.
   b. Enter **`CM`** at the `MP>` prompt.
   c. Enter **`UC`** at the `MP:CM>` prompt and follow the prompts to modify default passwords.

3. To setup user accounts:
   a. Access the **MP Main Menu**.
   b. Enter `CM` at the `MP>` prompt.
   c. Enter `UC` at the `MP:CM>` prompt and follow the prompts to modify user accounts.

Setting Up Security

For greater security and reliability, HP generally recommends that iLO 2 MP management traffic be on a separate dedicated management network and that only administrators be granted access to that network. This not only improves performance by reducing traffic load across the main network, it also acts as the first line of defense against security attacks. A separate network enables administrators to physically control which workstations are connected to the network.

HP also strongly recommends you modify the default settings during the initial logon session and determine the security access required and what user accounts and privileges are needed. Create local accounts or use directory services to control user access. See "Modifying User Accounts and Default Password" (page 77).

Security Access Settings

Determine the security access required and what user accounts and privileges are needed. The iLO 2 MP provides options to control user access. Select one of the following options to prevent unauthorized access to the iLO 2 MP:

- Change the default user name and password. See "Modifying User Accounts and Default Password" (page 77)).

△ **CAUTION:** When DHCP is enabled, the system is vulnerable to security risks because anyone can access the iLO 2 MP until you change the default user name and password.

HP strongly recommends you assign user groups and rights before proceeding.

- Create local accounts. You can store up to 19 user names and passwords to manage iLO 2 MP access. This is ideal for small environments such as labs and small-to-medium sized businesses.
- Use directory services. Use the corporate directory to manage iLO 2 MP user access. This is ideal for environments with a large number of frequently changing users. If you plan to use directory services, HP recommends leaving at least one local account enabled as an alternate method of access.

Accessing the Host Console

This section provides information on the different methods of accessing the host console of an HP Integrity server.

Accessing iLO 2 With the Web Browser

Web browser access is an embedded feature of the iLO 2 MP.

The iLO 2 MP has a separate LAN port from the system LAN port. It requires a separate LAN drop, IP address, and networking information from that of the port used by the operating system.

IMPORTANT: Make sure you use the MAC address to the iLO 2 MP LAN and not the MAC address to the server core LAN.

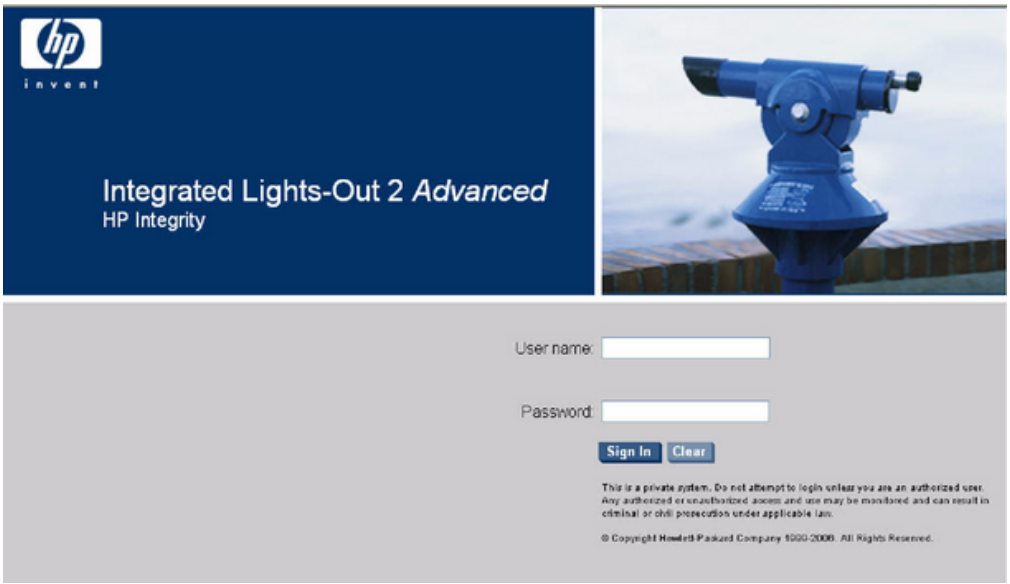
Before starting this procedure, you must have the following information:

- IP address for the iLO 2 MP LAN
- Host name (this is used when messages are logged or printed)

To interact with iLO 2 through the web GUI, follow these steps:

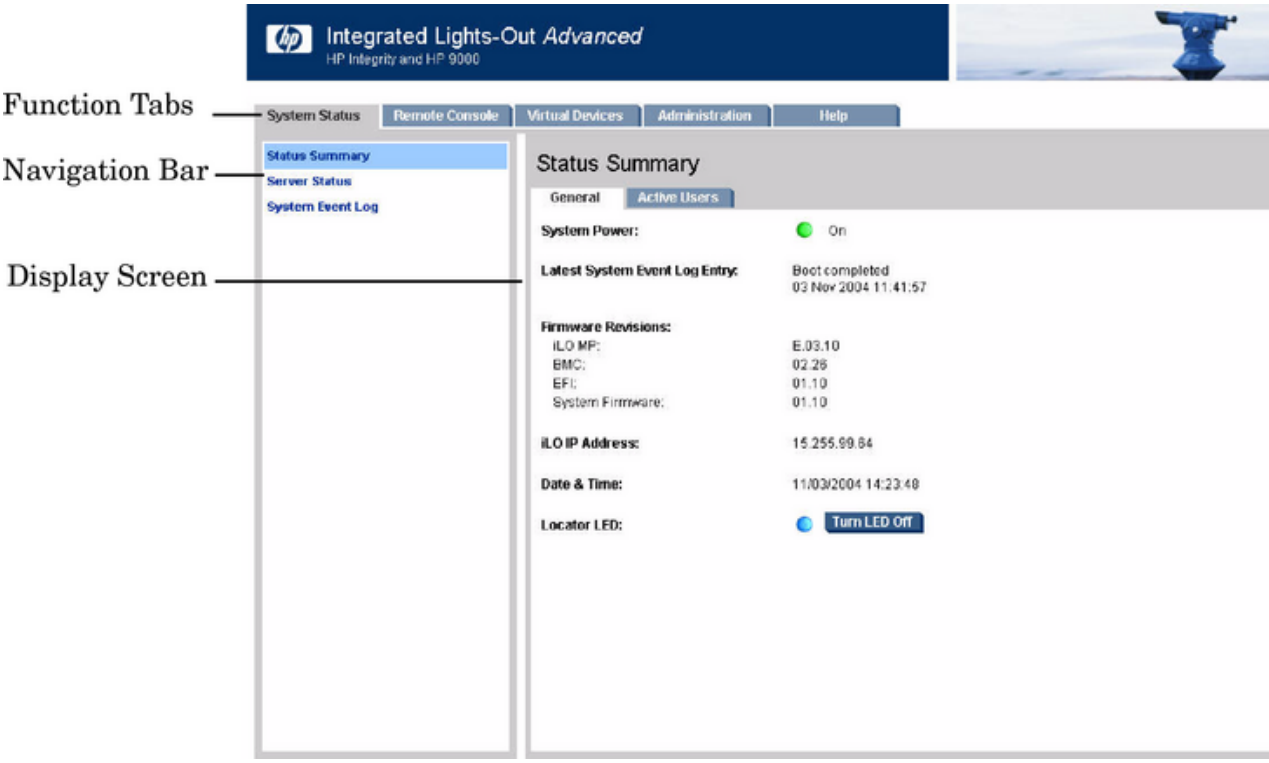
1. Open a web browser and enter the host name or the IP address for the iLO 2 MP.
2. Log in using your user account name and password at the login page. (Figure 34).

Figure 34 Web Login Page



3. Click **Sign In**. The **Status Summary** page (Figure 35) displays after login.

Figure 35 Status Summary Page



1. Select the web interface functions by clicking the **Function** tabs at the top of the page. Each function lists options in the **Navigation Bar** on the left side of the page.
2. Click an option link to display data in the **Display** screen; and click **Refresh** to update the display.

3. Click the **Remote Console** tab. The remote console provides the following options to access the console:
   - A serial console that behaves similarly to the TUI of the following section
   - The virtual KVM console

Help

The iLO 2 web interface has a robust help system. To launch iLO 2 help, click the **Help** tab in the **Display** screen or click the **?** at the top right corner of each page to display help about that page.

Accessing the Host Console With the TUI - CO Command

This section provides the steps to access the host console using the text user interface (TUI).

To access the host console through the iLO 2 MP, follow these steps:

1. Log in using your user account name and password at the login page.
2. At the iLO 2 MP login prompt (`MP>`), enter the `CO` command to switch the console terminal from the **MP Main Menu** to mirrored/redirected console mode. All mirrored data is displayed.
3. To return to the iLO 2 MP command interface, type **Ctrl-B**, or **Esc** and **+**.

Accessing the Host Console With vKVM - Integrated Remote Console

For information on how to access the host console using the vKVM feature through the Integrated Remote Console (IRC), see the *HP Integrity Integrated Lights-Out 2 Operations Guide*.

Accessing the Host Console with the SMASH SM CLP

For information on how to access the host console using the SMASH SM CLP, see the *HP Integrity Integrated Lights-Out 2 Operations Guide*.

Accessing the Graphic Console Using VGA

VGA is a method you can use to access the graphic console.

NOTE: You cannot access iLO 2 using VGA.

This method requires three elements:

- Monitor (VGA connector)
- Keyboard (USB connector)
- Mouse (USB connector)

The graphic console output displays on the monitor screen.

IMPORTANT: The server console output does not display on the console device screen until the server boots to the EFI Shell. Start a console session using the RS-232 serial port method to view console output prior to booting to the EFI Shell or to access the iLO 2 MP. See "Configuring the iLO 2 MP LAN Using the RS-232 Serial Port" (page 75).

To access the graphic console with VGA, follow these steps:

1. Perform preparation tasks.
2. Connect the cables. See your user service guide for specific port information.
   a. Connect the monitor VGA cable to the appropriate VGA port on your server.
   b. Connect the keyboard USB cable to the appropriate USB port on your server.
   c. Connect the mouse USB cable to the appropriate USB port on your server.
3. Power on the server. The EFI Shell prompt displays.

Powering On and Powering Off the Server

This section provides information and procedures for powering off and powering on the server.

Power States

The server has three power states:

Standby power — Plug the power cord into the appropriate receptacle on the rear of the chassis; the front panel Power button is not turned on.

Full power — Full power occurs when you plug the power cord into the appropriate receptacle, and either activate the power using the iLO 2 MP `PC` command, or press the Power button.

Off — Unplug the power cords.

Table 33 lists the server power states.

Table 33 Power States

Power States	Power Cable Plugged into Receptacle	Powered On With the iLO 2 MP `PC` Command; or Front Panel Power Button Pressed	AC Voltage Applied	DC Voltage Applied
Standby power	Yes	No	Yes	No
Full power	Yes	Yes	Yes	Yes
Off	No	No	No	No

NOTE: If the power restore feature is set to **Always On** through the iLO 2 MP `PR` command, the server can automatically power on to the full power state.

Powering On the Server

Power on the server to full power using the following methods:

- iLO 2 MP `PC` command
- Power button

Powering On the Server Using the iLO 2 MP

NOTE: If the power restore feature is set to **Always On** through the iLO 2 MP `PR` command, the server can automatically power on to the full power state.

To power on the server using the iLO 2 MP, follow these steps:

1. Plug all power cables into the receptacles on the rear panel of the server.
2. Initiate a console session and access the **MP Main Menu**.
3. Enter **`CM`** to enable command mode.
4. Enter **`PC`** to use the remote power control command.
5. Enter **`ON`** to power on the server, and enter **`YES`** when prompted to confirm the action.
6. Start the operating system. For more information see the operating system documentation.

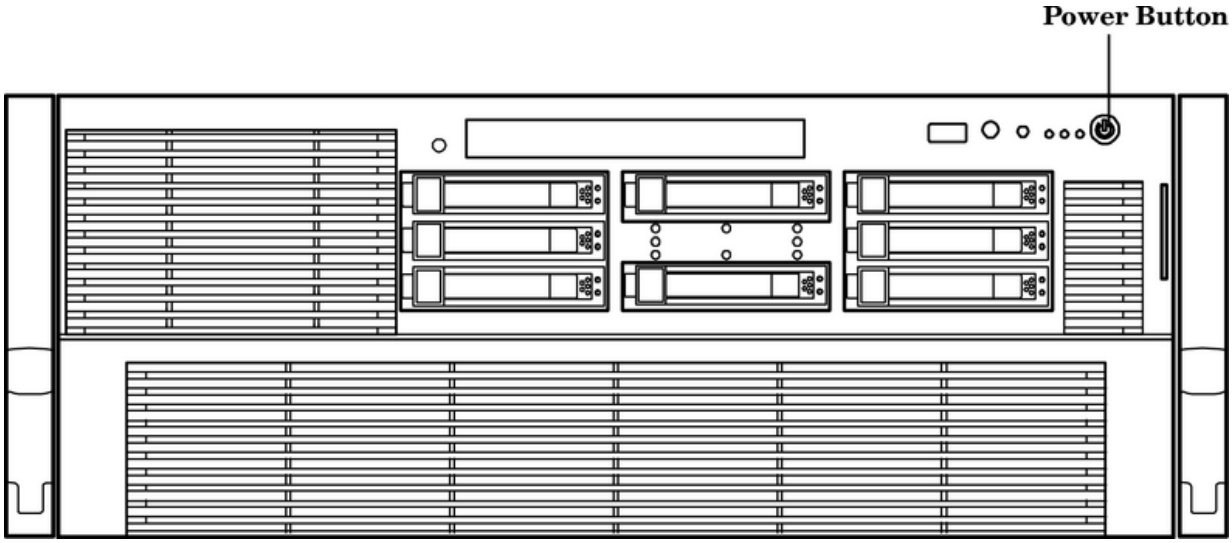
Powering On the Server Manually

NOTE: If the power restore feature is set to **Always On** through the iLO 2 MP `PR` command, the server may automatically power on to the full power state.

To manually power on the server, follow these steps:

1. Plug all power cables into the receptacles on the rear panel of the server.
2. Press the Power button to start the server.

Figure 36 rx3600 Power Button



3. Start the operating system. For more information see the operating system documentation.

Powering Off the Server

Power off the server using the following methods:

- iLO 2 MP `PC` command
- Power button

Powering Off the Server Using the iLO 2 MP

To power off the server using the iLO 2 MP, follow these steps:

1. Gracefully shut down the operating system. For more information see the operating system documentation.
2. Initiate a console session and access the **MP Main Menu**.
3. Enter **`CM`** to enable command mode.
4. Use the remote power control command with the graceful shutdown option.
5. Enter **`OFF`** to power off the server, and enter **`YES`** when prompted to confirm the action.

IMPORTANT: The main DC voltage is now removed from the system; however, AC voltage for standby power is still present in the server.

6. Unplug all power cables from the receptacles on the rear panel of the server.

Powering Off the Server Manually

A momentary push on the Power button will gracefully shut down the operating system. For more information see the operating system documentation.

IMPORTANT: The main DC voltage is now removed from the system; however, AC voltage for standby power is still present in the server.

Core I/O Card Configuration

This section provides information on core I/O cards that need to be configured during installation.

Integrated RAID

Use Integrated RAID (IR) where either storage capacity, redundancy, or both of a RAID configuration are required. Two components of IR are:

- Integrated Mirror (IM)
- Global Hot Spare

Integrated Mirror

The advantage of an IM is there is always a mirrored copy of the data. An IM provides data protection for the system boot volume to safeguard critical information such as the operating system on servers and high performance workstations. An IM supports two simultaneous mirrored volumes, making an array, providing fault-tolerant protection for critical data. Typically, one of these volumes is the boot volume. If a disk in an IM fails, the hot swap capability enables the volume to be easily restored by replacing the failed disk. The firmware then automatically re-mirrors to the replaced disk.

Global Hot Spare

Each SAS controller can have one global hot spare disk available to automatically replace a failed disk in the one or two IM volumes configured on the controller. The hot spare makes the IM array more fault tolerant. Up to two IM volumes are supported per SAS controller plus the hot spare.

HP 8 Internal Port SAS HBA (SAS Controller)

The following information is provided to assist you in configuring the 8 Internal Port SAS HBA controller during installation.

To flash firmware, use the `MPTUTIL` command. To configure and maintain the IR functionality of the SAS controller on the HP Integrity server, use the `drvdfg` and `cfggen` EFI commands. If you are scripting multiple devices, use the`cfggen`command.

MPTUTIL Utility

The `mptutil` utility enables you to update the adapter flash memory with the EFI driver and HBA firmware. New versions of these images are released periodically.

IMPORTANT: Do not store the files in this package on a SAS device. If you store these files on a SAS device and the update fails, these files will not be accessible.

To update firmware, follow these steps:

1. Insert the *HP IPF Offline Diagnostics and Utilities CD* in the drive and boot to the EFI Shell.

   NOTE: You can also download the firmware image file and update utility from the HP website at: http://www.hp.com in the **Driver Downloads** section.

   IMPORTANT: When you boot the EFI enabled systems, the CD containing the utility must be in the drive to allow device mapping. The EFI utility and firmware image files are located in the root directory or in a subdirectory on the CD.

2. The CD drive displays in the list of mapped devices as **fs0**. To change to this device, enter **`fs0:`**

   ```
   shell> fs0:
   fs0:\
   ```

3. To determine the current version of the firmware, follow these steps.
   a. At the EFI Shell, enter **mptutil** from the directory that contains mptutil.efi. The following example indicates that the EFI Serial Attached SCSI card utility version is 1.01.12.00:

```
fs0:\EFI\HP\TOOLS\NETWORK> mptutil
MPTUTIL-1.01.12.00
         Vendor  Device
Choice    ID      ID    Bus Device
 ------  ------  ------  --- ------
    0     1000h   0054h  14h  01h  LSI Logic SAS1068 Host Adapter
    1  -  Refresh
```

   b. Press **Enter**.
4. To update the firmware, use the mptutil command.
5. Reset the controller.

```
fs0:\> reset
```

The mptutil commands and functions are listed in Table 34 and described in the following sections.

Table 34 MPTUTIL Commands and Functions

Command	Function
mptutil -f <firmware_file>	Updating HBA RISC firmware on the controller
mptutil -o -g <x86_file> <fcode_file>	Updating EFI driver on first controller
mptutil -o -vpd -c 0	Viewing VPD information
Parameters in < > are optional. A space is required between command line options and their parameters.	

The following sections describe the mptutil commands and functions.

Flashing Firmware on First Controller

To update the HBA RISC firmware on the first controller, follow these steps:

1. At the fx0:\> prompt, enter **mptutil -f <firmware_file> -c 0**.
2. At the fs0:\> prompt, enter **reset**.

The filename is optional and you are prompted for a filename if omitted.

Another way for the firmware to be flashed is done without your knowledge. When mptutil is executed, and a SAS HBA is in any state other than ready or operational, mptutil immediately performs a firmware download boot. The firmware provided by you to do the firmware download boot is immediately flashed after the firmware download boot has completed. The mptutilcommand does this because the firmware only moves to the operational state if it is running from flash and not memory. Operational state is needed to do everything else provided in the utility.

Flashing BIOS and EFI Driver on the First Controller

To update the EFI driver on the first controller, follow these steps:

1. At the fs0:\> prompt, enter **mptutil -o -g <Bios_File> <EFI_driver_file> -c 0**.
2. At the fs0:\> prompt, enter **reset**.

The filename is optional and you are prompted for a filename if omitted.

Common Questions About Flashing Firmware

Question After I update firmware on my SAS HBA, why doesn't the version string change in the menu?

Answer — The firmware you just flashed on the HBA does not run until a diagnostic reset occurs. If you exit the utility and reenter it, the version string is updated.

Question — This image does not contain a valid `nvdata` when I try to flash the firmware, why?

Answer — You are expected to concatenate a proper `nvdata` image on to the firmware. `MPTUTIL` keeps you from flashing an image without one. To concatenate `nvdata` and firmware you need to run the `mptutil -o -d 64it__l.fw,sas106x.dat,output.fw` command. .

- 64it__l.fw is the firmware image without a `nvdata` image
- `sas106x.dat` is the `nvdata` image. This file depends on the type/rev of HBA on which the firmware is used
- `output.fw` is the name of the file created with the firmware and `nvdata` concatenated. This concatenated image can be used for all boards of this type or revision.

Question — How do I program multiple cards in a system from the command line?

Answer — `MPTUTIL` (EFI) does not support this.

Question — Can I program a new flash and option ROM in the same command line argument?

Answer — Yes. Run the `mptutil -f <firmware_name> -b <option_rom_name>` command.

Viewing the VPD Information for EFI Driver and RISC Firmware

To view the VPD information for the EFI driver and RISC firmware, enter **`mptutil -o -vpd -c 0`** at the `fs0:\>` prompt.

EFI Commands

To configure an Integrated Mirror (IM) Array on the SAS Controller, use the following EFI commands:

- `DRVCFG` (GUI interface)
- `CFGGEN` (command line interface)

NOTE: If you are not using the IM functionality, do not follow these procedures.

DRVCFG Utility

To configure an IM on the SAS controller, follow these steps:

Starting the DRVCFG Utility

To start the`drvdfg`configuration utility, follow these steps:

1. Select the EFI Shell from the console menu.
2. Type **`drvcfg -s`** and press **Enter**.

Using the DRVCFG Utility

The configuration utility uses several input keys (**F1**, **F2**, **HOME**, **END**, and so on) that may not be supported by all terminal emulation programs. Each of these keys has an alternate key that performs the same function. Review the terminal emulation program documentation to verify which input keys are supported. If problems occur using any of the function keys or **HOME/END/PGUP/PGDN,** it is recommended that the alternate keys be used.

There are general key inputs throughout the configuration utility that apply on all screens:

F1 Help — Context sensitive help for the cursor-resident field.

Arrow Keys — Select Item - Up, down, left, right movement to position the cursor.

Home/End — Select Item - Up, down, left, right movement to position the cursor.

+/-	Change Item - Items with values in [ ] brackets are modifiable. Numeric keypad + and numeric keypad - (minus) update a modifiable field to its next relative value.
Esc	Abort/Exit - Escape aborts the current context operation and/or exits the current screen. User confirmation is solicited as required if changes have been made by user. If you are using a serial console, pressing **Esc** causes a delay of several seconds before it takes effect. This is normal system behavior and is not an error.
Enter	Execute <item> - Executable items are indicated by highlighted text and a different background color. Press **Enter** to execute the field's associated function.

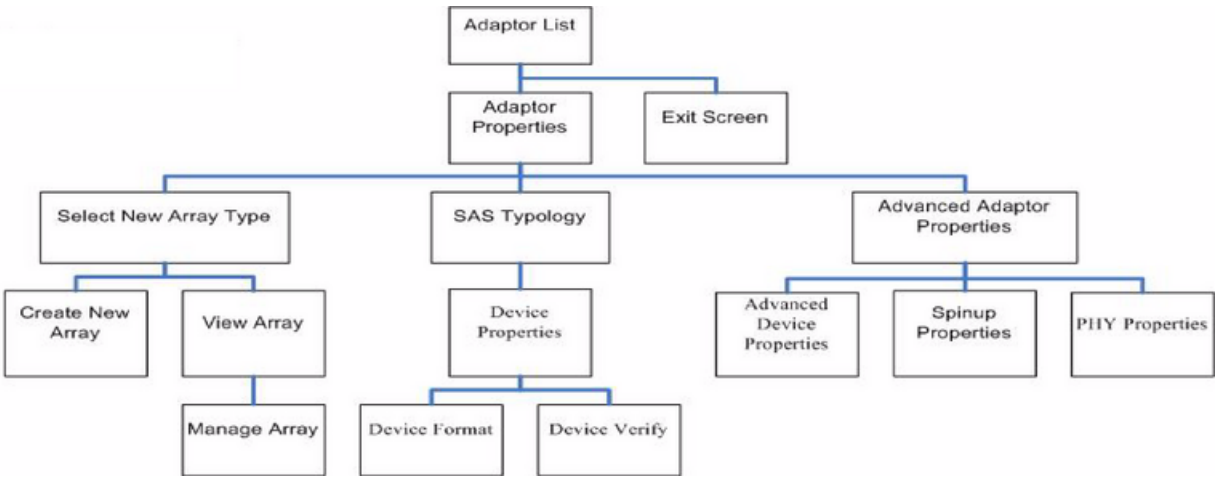
Configuration Utility Screens

All SAS BIOS configuration utility screens contain the following areas, starting at the top of the screen:

Header area	Identifies the utility and version number.
Menu area	Gives the title of the current screen, and on screens other than the **Adapter List** screen also identifies the adapter.
Main area	The main area for presenting data. This area has a cursor for item selection, and horizontal and vertical scroll bars if necessary.
Footer area	Provides general help information text.

Figure 37 (page 86) provides a map of how screens are accessed in the `drvdfg` utility.

Figure 37 Accessed Screens in the `drvdfg` Utility



DRVCFG Screens

Adapter List Screen

The **Adapter List** screen displays when the configuration utility is first started. This screen displays a scrolling list of up to 256 SAS controllers in the system, and information about each of them. Use the arrow keys to select a SAS controller, and press **Enter** to view and modify the selected SAS controller's properties.

You can view and modify the SAS controller whether it is enabled or disabled. You can use the **Boot Support** setting in the **Adapter Properties** menu to change the status of this setting. You must reconnect the EFI Driver in order for a new **Boot Support** setting to take effect.

The following are the descriptions for the **Adapter List** screen.

Adapter	Indicates the specific SAS Controller type.
PCI Bus	Indicates the PCI Bus number assigned by the system BIOS to an adapter (0x00 - 0xFF, 0 - 255 decimal)

PCI Dev — Indicates the PCI Device assigned by the system BIOS to an adapter (range 0x00 - 0x1F, 0 - 31 decimal)

PCI Fnc — Indicates the PCI Function assigned by the system BIOS to an adapter (range 0x00 - 0x7, 0 - 7 decimal)

FW Revision — Displays the Fusion MPT firmware version and type (IR or IT)

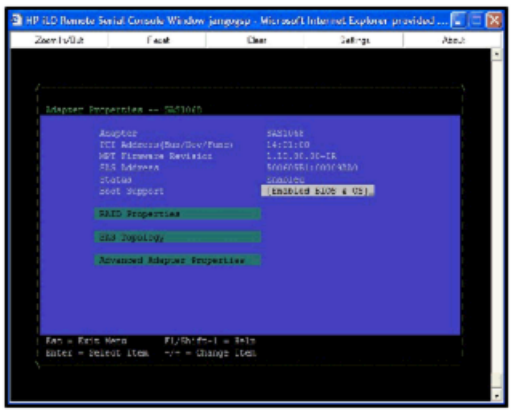
Status — Indicates whether the adapter is or is not eligible for software control (enabled, disabled or error)

- Enabled — Indicates the EFI Driver is either currently controlling the adapter, or will attempt to control the adapter upon reload.
- Disabled — Indicates the EFI Driver is either not controlling the adapter, or will discontinue control of the adapter upon reload.
- Error — Indicates that the EFI Driver encountered a problem with the adapter. Viewing and modifying settings for the adapter is allowed but the information and functionality available may be limited.

Adapter Properties Screen

The **Adapter Properties** screen enables you to view and modify adapter settings. To scan the SAS controller's devices, select a SAS controller and press **Enter**. The **Adapter Properties** screen displays.

Figure 38 Adapter Properties Screen



Use the arrow keys to select **RAID Properties**, and press **Enter** to view the **Select New Array Type** screen.

To access the following screens, use the arrow keys to select the screen, and press **Enter** on the appropriate field:

- RAID Properties
- SAS Topology
- Advanced Adapter Properties

The following are the descriptions for the **Adapter Properties** screen.

Adapter — Indicates the specific SAS Controller type.

PCI Address — Displays the PCI Address assigned by the system BIOS to the adapter.

- Bus value range 0x00 - 0xFF, 0 - 255 decimal
- Device value range 0x00 - 0x1F, 0 - 31 decimal
- Function range 0x00 - 0x7, 0 - 7 decimal

FW Revision — Displays the MPT firmware version and type in the format (x.xx.xx.xx- yy), where **x.xx.xx.xx** refers to the FW version and **yy** refers to the type. The currently supported type is IR.I).

SAS Address — Displays the SAS Address assigned to this adapter.

FW Revision — Displays the Fusion MPT firmware version and type (IR or IT)

Status — Indicates whether an adapter is eligible for configuration utility software control or is reserved for control by other software (Enabled, Disabled or Error).

- Enabled — Indicates the EFI Driver is either currently controlling the adapter, or will attempt to control the adapter upon reload.
- Disabled — Indicates the EFI Driver is either not controlling the adapter, or will discontinue control of the adapter upon reload.
- Error — Indicates that the EFI Driver encountered a problem with the adapter. Viewing and modifying settings for the adapter is allowed but the information and functionality available may be limited.

Boot Support — Specifies whether an adapter is eligible for configuration utility software control or is reserved for control by other software (Enabled BIOS & OS, Enabled BIOS Only, Enabled OS Only or Disabled).

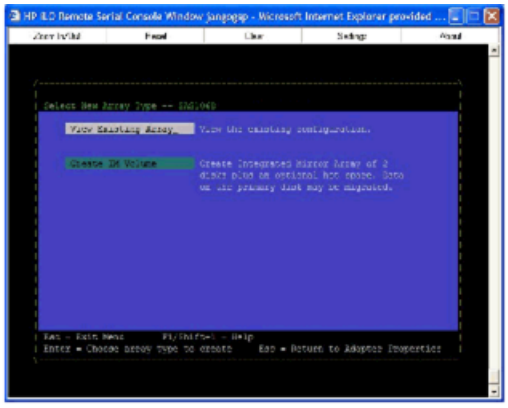
- Enabled BIOS & OS - SAS controller is controlled by both the BIOS and OS driver.
- Enabled BIOS Only - SAS controller is controlled only by the BIOS. This setting may not be supported by all OS drivers. For example, it is not possible to disable an adapter in a Windows driver.
- Enabled OS Only - SAS controller is controlled only by the OS driver.
- Disabled - SAS controller is not controlled by the BIOS when the SAS controller is loaded. However, the adapter is still visible through the configuration protocol.

Changes to the **Boot Support** setting are reflected in the **Status** field of the **Adapter List** menu. The new setting will do not take effect until the BIOS is reloaded (system reboot).

RAID Properties Screens

There are four screens within RAID properties. To access the screens, select RAID Properties from the **Adapter Properties** screen. The **Select New Array Type** screen displays.

Figure 39 Select New Array Type Screen



Select New Array Type Screen

The **Select New Array Type** screen enables you to view an existing array or create an Integrated Mirror array of two disks, plus an optional hot spare.

- To go to the **Create New Array** screen, select Create IM Volume.
- To go to the **View Array** screen, select View an Existing Array.

Create New Array Screen

The **Create New Array** screen enables you to create a new array. To access the **Create New Array** screen, press **Enter** on the **Create IM Volume** field from the **Select New Array Type** screen.

To create a new array, follow these steps:

1. Select one of the following options:

   To migrate to an IM array, press `M`. This keeps the existing data, and the disk is synchronized.

   To delete all data on all the disks in the array, press `D`. This overwrites existing data when creating a new IM array, and the disk is not synchronized.
2. To create the array after the volume is configured, press `C`. The system prompts you to save changes, which creates the array. During the creation process, the utility pauses. You are then taken back to the **Adapter Properties** screen.

The following are the descriptions for the **Create New Array** screen.

Array Type	Indicates the type of array being created.
Array Size	Indicates the size of the array in MegaBytes.
Bay	Displays the bay in which devices are located.
Device Identifier	Displays the device identifier.
RAID Disk	Specifies the devices (disks) that make up an IM array. If RAID Disk is **Yes**, the device is part of an IM array; if **No**, the device is not part of an IM array. This field is grayed out under the following conditions: • The device does not meet the minimum requirements for use in an IM array. • The device is not large enough to mirror existing data on the primary drive. • This disk has been selected as the hot spare for the IM array.
Hot Spr	Specifies whether a device is the hot spare for an IM array. If hot spare is Yes the device is used as a hot spare for the IM array; if No, the device is not used as a hot spare for the IM array. Only one hot spare per IM array is permitted. A hot spare is not required in an IM. You can specify a hot spare at array creation, or any time after creation, provided the array is made up of five disks or fewer. This field is grayed out under the following conditions: • The device does not meet the minimum requirements for use in an IM array. • The array already has a hot spare. • The array is made up of the maximum number of devices (six). • The device isn't large enough to mirror existing data on the primary. The hot spare drive must be greater than or equal to the size of any drive in any IM volume.
Drive Status	xxxx OK — Disk is online and fully functional.

Missing	Disk is not responding.
Failed	Disk has failed.
Initalizing	Disk is initializing.
CfgOffln	Disk is offline at host's request.
User Fail	Disk is marked failed at host's request.
Offline	Disk is offline for some other reason.
Inactive	Disk has been set inactive.
Not Syncd	Data on disk is not synchronized with the rest of the array.
Primary	Disk is the primary disk for a 2 disk mirror and is OK.
Secondary	Disk is the secondary disk for a 2 disk mirror and is OK.
Wrg Type	Device is not compatible for use as part of an IM array.
Too Small	Disk is too small to mirror existing data.
Max Dsks	Maximum # of disks allowed for this type of Array reached and/or Maximum # of total IM disks on a controller reached.
No SMART	Disk doesn't support SMART, cannot be used in an RAID array.
Wrg Intfc	Device interface (SAS) differs from existing IM disks.

Pred Fail	Indicates whether device SMART is predicting device failure (Yes, No).
Size(MB)	Indicates the size of the device in megabytes (megabyte = 1024 x 1024 = 1,048,576). If the device is part of a two-disk array, this field reflects the size of the array, not the size of the individual disk. If the device is part of a three or more disk array, this field is the size that the disk makes up within the array. When creating a striped array, the usable size of the array is determined by the number of drives times the size of the smallest drive in the array. In arrays consisting of different sized drives, excess space on larger drives are unusable.

View Array Screen

The **View Array** screen enables you to view the current array configuration. To access the **View Array** screen, press **Enter** on the **View Existing Array** field from the **Select New Array Type** screen.

You can perform the following actions on the **View Array** screen:

- To view the next array, press **N**.
- To create a new array, press **C**.

Array	Displays the number of this array.
Identifier	Displays the identifier of this array.
Type	Displays the RAID type.
Scan Order	Displays the scan order of the array.
Size (MB)	Displays the size of the array.
Status	Displays the status of the array.
Bay	Displays the bay in which devices are located.
Device Identifier	Displays the device identifier.

RAID Disk

Specifies the devices (disks) that make up an IM array. If RAID Disk is **Yes**, the device is part of an IM array, if **No**, the device is not part of an IM array. This field is grayed out under the following conditions:

- The device does not meet the minimum requirements for use in an IM array.
- The device is not large enough to mirror existing data on the primary drive.
- This disk has been selected as the hot spare for the IM array.

Hot Spr

Specifies whether a device is the hot spare for an IM array. If hot spare is Yes, the device is used as a hot spare for the IM array, if No, the device is not used as a hot spare for the IM array. Only one hot spare per IM array is permitted. A hot spare is not required in an IM. A hot spare can be specified at array creation, or any time after creation, provided the array is made up of five disks or fewer. This field is grayed out under the following conditions:

- The device does not meet the minimum requirements for use in an IM array.
- The array already has a hot spare.
- The array is made up of the maximum number of devices (6).
- The device isn't large enough to mirror existing data on the primary. The hot spare drive must be greater than or equal to the size of any drive in any IM volume.

Drive Status

xxxx

OK	Disk is online and fully functional.
Missing	Disk is not responding.
Failed	Disk has failed.
Initalizing	Disk is initializing.
CfgOffln	Disk is offline at host's request.
User Fail	Disk is marked failed at host's request.
Offline	Disk is offline for some other reason.
Inactive	Disk has been set inactive.
Not Syncd	Data on disk is not synchronized with the rest of the array.
Primary	Disk is the primary disk for a 2 disk mirror and is OK.
Secondary	Disk is the secondary disk for a 2 disk mirror and is OK.
Wrg Type	Device is not compatible for use as part of an IM array.
Too Small	Disk is too small to mirror existing data.
Max Dsks	Maximum # of disks allowed for this type of Array reached and/or Maximum # of total IM disks on a controller reached.
No SMART	Disk doesn't support SMART, cannot be used in an RAID array.
Wrg Intfc	Device interface (SAS) differs from existing IM disks.

Pred Fail	Indicates whether device SMART is predicting device failure (Yes, No).
Size(MB)	Indicates the size of the device in megabytes (megabyte = 1024 x 1024 = 1,048,576). If the device is part of a two-disk array, this field reflects the size of the array, not the size of the individual disk. If the device is part of a three or more disk array, this field is the size that the disk makes up within the array. When creating a striped array, the usable size of the array is determined by the number of drives times the size of the smallest drive in the array. In arrays consisting of different sized drives, excess space on larger drives are unusable.

Manage Array Screen

The **Manage Array** screen enables you to manage the current array. To access the **Manage Array** screen, select the appropriate field and press **Enter** on the **Manage Array** field from the **View Array** screen.

The **Manage Array** screen enables you to perform the following actions:

Manage Hot Spare

To display a **Hot Spare Management** screen that has the same layout as the **Create New Array** screen, press **Enter** on Manage Hot Spare. This field is grayed out under the following conditions:

- The array is inactive.
- The array is at its maximum number of devices.
- Non-IR firmware is used.
- IR is disabled. The array is inactive.

Synchronize Array

To perform a synchronization of the IM array, press **Enter** on Synchronize Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes or **N** for no. This field is grayed out under the following conditions:

- The array is inactive.
- The array does not need to be resynchronized.
- The adapter's MPT firmware does not support the feature
- Non-IR firmware is used.
- IR is disabled. The array is inactive.

Activate Array

To perform an activation of an IM array, press **Enter** on Activate Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes or **N** for no.

Delete Array

To perform the deletion of the currently displayed IM array, press **Enter** on Delete Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes and **N** for no.

Identifier	Displays the identifier of this array.
Type	Displays the RAID type.
Scan Order	Displays the scan order of the array.
Size (MB)	Displays the size of this array.
Status	Displays the status of this array.

Exit the SAS Configuration Utility Screen

As some changes only take effect when you exit the utility, it is important to always exit the utility properly. To exit the utility, follow these steps:

1. To return to the Adapter List from Adapter Properties, press **ESC**.
2. To exit the utility from the Adapter List, press **ESC**.

NOTE: A similar exit screen is used when exiting most other screens, and can be used to save settings.

The exit screen shows some options that are grey, indicating that they are not available. You can only select the available options. The exit choices are as follows:

- `Are you sure you want to exit?`
- `Cancel Exit`
- `Save changes and reboot`
- `Discard changes and reboot`
- `Exit the Configuration Utility and Reboot`

CFGGEN Utility

The `cfggen` utility is a command line utility that runs in the Linux, EFI, and Windows Pre-Installation (WinPE) environments. It is a minimally interactive program that you execute from a command line prompt, or a shell script. The results from invoking this utility are communicated through the program status value that is returned when the program exits. Use the `cfggen` utility to create IM storage configurations on SAS controllers. Some `cfggen` commands work only with SAS adaptors in the EFI environment.

Starting CFGGEN

The`cfggen`utility is located on the *HP IPF Offline Diagnostic and Utilities CD*. To use `cfggen`, follow these steps:

1. Insert the CD into the drive.
2. Boot the system to the EFI Shell prompt.
3. From the EFI Shell prompt, change to the CD drive.

   ```
   shell> fs0: Enter
   fs0:\>
   ```

4. Change to the directory that contains`cfggen.efi`.

   ```
   fs0:\> cd EFI\HP\TOOLS\NETWORK Enter
   fs0: EFI\HP\TOOLS\NETWORK>
   ```

   From this directory use `cfggen`.

CFGGEN Operation

The `cfggen` command is not case sensitive. You can enter `cfggen` commands and parameters in uppercase, lowercase, or a mixture of the two. Use the following conventions in the command descriptions:

- Text in italics must be entered exactly as shown on the command line
- Text surrounded by <> must be replaced with a required parameter
- Text surrounded by [ ] may be replaced by an optional parameter
- Parameters surrounded by {} must be entered one or more times, as appropriate for the executed command
- Do not enter the command line definition characters (<>, [ ], and {}) on the command line.

The `cfggen` command uses a command line interface.

Syntax: `cfggen <controller #> <command> <parameters>`

NOTE: The program name, controller number, command, and parameters fields must be separated by the ASCII space character. The format of the parameters is command specific.

The program return value is returned to the user when the program exits. A value of `0` is returned if the command is successful. Otherwise, a value of `1` is returned.

Rules for creating IM volumes and hot spare disks

The following rules apply when creating IM volumes and hot spare disks:

- All disks that are part of an IM volume or a hot spare for an IM volume must be on the same SAS controller.
- IM volumes are supported.
- Only two IM volumes (plus a global hot spare) per controller can be created.
- An IM array must have exactly two disks.
- A hot spare disk cannot be created without at least one IM volume already created.
- The utility does not allow adding a hot spare disk of type different from disk types in any of the volume.
- With the `AUTO` command all drives used are the same type as the first available disk found, and the size is limited to the size of the smallest disk.

CFGGEN Commands

Using the CREATE Command

The `CREATE` command creates IM volumes on the SAS controller. Firmware and hardware limitations for this family of cards limit the number of configurations that are possible.

Syntax

```
cfggen <controller #> create <volume type> <size> [qsync] [noprompt]
```

Parameters

<volume type>	Volume type for the volume to be created. Valid value is IM.
<size>	Size of the IM volume in Mbytes or “MAX” for the maximum size available.
[*qsync*]	Quick synchronization of the volume created.
[*noprompt*]	Eliminates warnings and prompts.

Operation

Once a disk has been added to an IM volume, all of its storage capacity may or may not be used depending on drive capacity and volume capacity. For example, if you add a 36 GB disk drive to a volume that only uses 9 GB of capacity on each disk drive, the remaining 27 GB of capacity on the disk drive is unusable.

The disk identified by the first SCSI ID on the command line is assigned as the primary disk drive when creating an IM volume. If the SAS controller is allowed to resync the disk drives, the data on the primary disk drive is available by accessing the newly created volume.

Using the AUTO Command

The `AUTO` command automatically creates an IM volume on the SAS controllers. The volume is created with the maximum number of disks available for use in the specified volume type. The main difference from the `CREATE` command is that with `AUTO` command user does not specify

SCSI ID values for disks to use in the volume. The `cfggen` utility automatically uses the first disks it finds that are usable in the IM volume. Firmware and hardware limitations for the family of controllers limit the number of configurations that are possible.

Syntax

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

Parameters

<volume type>	Volume type for the volume to be created. Valid value is IM.
<size>	Size of the RAID volume in Mbytes or "MAX" for the maximum size available.
[qsync]	Quick synchronization of the volume created.
[noprompt]	Eliminates warnings and prompts.

Operation

When `AUTO` creates an IM volume, the first disk found is assigned as the primary disk drive. If the controller is allowed to resync the disk drives, the data on the primary disk drive is available by accessing the newly created volume. Reply **`Yes`** if you want to complete the creation.

HOTSPARE

The `HOTSPARE` command creates a hot spare disk drive. The hot spare drive is added to hot spare pool 0.

Syntax

```
cfggen <controller #> HOTSPARE [DELETE] <Encl:Bay>
```

Parameters

<controller #>	A SAS controller number between 0 and 255.
[DELETE]	Specifies that the hot-spare is to be deleted (Omit the DELETE keyword to specify hot-spare creation).
<Encl>:<Bay>	Enclosure number and Bay number that identifying the disk drive that will become the hot spare.

Operation

The number of disk drives in an IM array plus the hot spare disk cannot exceed three. You can create only one hot spare disk. You must make sure the capacity of the hot spare disk is greater than or equal to the capacity of the smallest disk in the logical drive. An easy way to verify this is to use the `DISPLAY` command.

△ **CAUTION:** See "Rules for creating IM volumes and hot spare disks" (page 94).

Smart Array P400, P600 and P800 Controllers

The following information is provided to assist you in configuring the Smart Array P400, P600 and P800 controllers during installation.

Quick Installation Procedure

To install the controller, follow these steps:

1. Power off the server.
2. Install additional physical drives if necessary (see "Connecting External Storage" (page 96)). The number of drives in the server determines the RAID level that is auto configured when the server is powered on.
3. Power on the server.

4. Update the controller firmware (see "SAUPDATE Utility" (page 97)). When the firmware update process is complete, the server reboots and runs through a POST procedure. This POST procedure halts briefly during controller initialization and prompts you to open ORCA (Option ROM Configuration for Arrays).
5. Open ORCA. See "Configuring the Array" (page 101).
   - If using a headless console, press **Esc+8**.
   - Otherwise, press **F8**.
6. Configure the logical boot drive, and exit from ORCA.

Depending on the OS, additional device drivers and management agents must be installed. See the User guide for the specific HP Smart Array Controller at:

http://www.hp.com/go/integrity-iocards-docs under the specific HP Smart Array Controller product for installation procedures.

The latest firmware, drivers, utilities, software, and documentation for HP Integrity servers are available on the support page of the HP website at:

http://www.hp.com/support/itaniumservers

Connecting External Storage

IMPORTANT: Not all OSs support external drives.

To connect external storage, follow these steps:

1. Power off the server.
2. Connect an external SAS cable to the external port of the controller.

   NOTE: You do not have to disconnect any internal drives on shared internal port 1I because the controller preferentially discovers devices attached to port 1E. However, drives on the shared internal port are unavailable until you disconnect the external storage device.

3. Tighten the lock screws on the cable connector.
4. Attach the other end of the cable to the SAS input connector of the external storage enclosure.

IMPORTANT: Drives that are to be used in the same array must be of the same type, either all SAS or all SATA. (Parallel SCSI drives cannot be used with this controller.)

5. Tighten the lock screws on the cable connector.
6. Power on the enclosure.
7. Power on the server.

SAS Cable Part Numbers

If you require additional cables, order them by the option kit number listed in Table 35.

Table 35 SAS Cable Part Numbers

Cable Length	Option Kit Number	Cable Assembly Number
1.0 m (3.3 ft.)	389664-B21	361317-001
2.0 m (6.6 ft.)	389668-B21	361317-002
4.0 m (13 ft.)	389671-B21	361317-004
6.0 m (20 ft.)	389674-B21	361317-006

SAUPDATE Utility

Use `saupdate` from the EFI Shell to update the firmware image on the HP Smart Array Controller. Command line options are described below. Follow one of these two procedures to run saupdate:.

- If you are using `saupdate` from the Offline Diagnostic CD:

1. Download the firmware and copy it to the EFI partition.
2. The CD containing `saupdate.efi` must be in the drive before booting the system to allow device mapping.
3. Boot the system to the EFI Shell prompt. The CD drive should appear in the list of mapped devices as **fs0**.
4. Change to this device by typing fs0: under EFI Shell prompt.
5. If the EFI utility and firmware image files are not located in the root directory, move to the directory in which these files are located, for example:

   ```
   fs0:\>cd \EFI\HP\TOOLS\IO_CARDS\SmartArray
   ```

IMPORTANT: Both `saupdate.efi` and the firmware image file must be located in the same directory. If they are not, copy them both to the EFI partition. Run the `saupdate.efi` using the `fs0:\> saupdate` command.

- If you are not using the Offline Diagnostic CD:

1. Download the SA EFI update utility `saupdate.efi` and copy it to the EFI partition.
2. Download the firmware and copy it to the EFI partition.
3. Boot the system to the EFI Shell and change directories to the EFI partition.
4. Run the `saupdate.efi` using the using the `fs0:\> saupdate.efi` command.

   The following screen displays. The version of the utility displays on the second line:

```
************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00

(C) Copyright 2004 Hewlett Packard Development Company L.P.
************************************************************
```

Syntax

saupdate <operation> <parameters>

Commands

You can use the following operations with saupdate:

- `LIST`
- `UPDATE`
- `UPDATE all`
- `HELP or ?`

List

Use `LIST` to display all detected Smart Array controllers along with the active firmware versions.

```
fs0:\> saupdate LIST
************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00

(C) Copyright 2004 Hewlett Packard Development Company L.P.
************************************************************
```

```
Seg  Bus  Dev  Func        Description          Version
1    51   4    0       HP Smart Array P600      1.92
1    20   1    0       HP Smart Array 5300      3.54
```

The identification information from this list is used to designate which controller is to be updated.

UPDATE

NOTE: The saupdate utility program file (`saupdate.efi`) must be located in the same file system as the firmware files.

```
saupdate UPDATE [ <seg:bus:dev:func>] [smartarray_firmware_file]
```

For example, to update the controller at segment 1, bus 51, device 4, function 0 from the example output above, enter a command at the EFI Shell prompt as in this following example:

```
fs0:\> saupdate UPDATE 1:51:4:0 CYBORG234.BIN
```

Replace `CYBORG234.BIN` with the name of your firmware file.

The following screen displays:

```
*************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00

(C) Copyright 2004 Hewlett Packard Development Company L.P.
*************************************************************

Updating controller in Seg: 1, Bus: 51, Dev: 4, Func: 0
Current firmware version 1.92
Percentage completed: 100%
Activating firmware now, this may take several minutes.
Resetting and reinitializing controller.
Retrieving firmware version, this may take several minutes.
Current controller firmware version is 2.34.
The UPDATE command will not prevent downgrade to a lower firmware version.
```

After updating the firmware, cycle the power on the system and on any external JBODS connected to the Smart Array HBAs.

Exit status codes`0: Success`

UPDATE all

When “all” is specified, the utility downloads the firmware image to all the controllers to which the firmware image applies and updates the remaining controllers. If an update operation fails for a controller, the utility still updates the remaining controllers.

The example below shows the command to update all controllers for which the firmware image file applies. The controllers for which the firmware image is not applicable are skipped. In this example, the Smart Array P600 controller is updated, and the Smart Array 5300 is skipped:

```
fs0:\> saupdate UPDATE all CYBORG234.BIN
```

Replace `CYBORG234.BIN` with the name of your firmware file.

The following screen displays, showing the controllers that are updated and skipped:

```
*************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00

(C) Copyright 2004 Hewlett Packard Development Company L.P.
*************************************************************

Updating controller in Seg: 1, Bus: 51, Dev: 4, Func: 0
Current firmware version 1.92
```

```
Percentage completed: 100%
Activating firmware now, this may take several minutes.
Resetting and reinitializing controller.
Retrieving firmware version, this may take several minutes.
Current controller firmware version is 2.34.

************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00
(C) Copyright 2004 Hewlett Packard Development Company L.P.
************************************************************

Firmware Image is not suitable for HP Smart Array
5300 Controller at Seg: 1, Bus 20, Dev: 1, Func:0
```

After updating the firmware, cycle the power on the system and on any external JBODS connected to the Smart Array HBAs.

HELP or ?

Use HELP or ? to display usage text, program version number, and build date:

Enter: `saupdate HELP`

or

`saupdate ?`

Error Messages

The following is a list of error messages under various situations:

- When keyword LIST or `UPDATE` is misspelled or extra parameters are specified:

  Error: Syntax Error

  Usage: `saupdate LIST` or `saupdate UPDATE [ all ]`

- When the controller ID in the `saupdate UPDATE` command is not correct:

  No matching controller found

- When a firmware file does not exist in the `saupdate UPDATE` command, the example shows: CYBORG101.BIN does not exist.

  ```
  File CYBORG101.BIN: Not Found
  ```

- When an invalid firmware or corrupted file is specified in the `saupdate UPDATE` command, the example shows: CYBORG101.BIN does not exist.

  ```
  File CYBORG101.BIN: invalid or corrupted
  ```

EBSU Utility

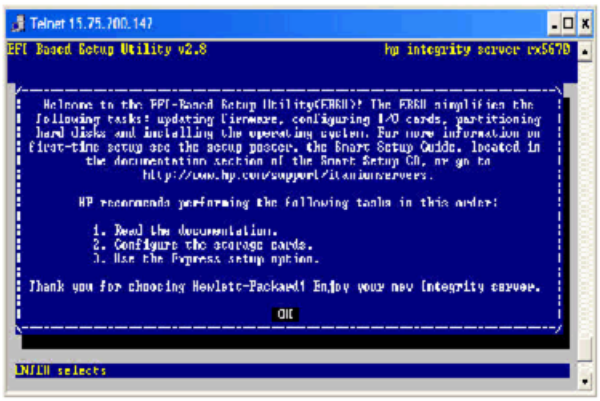
The EFI-based Setup Utility (EBSU) provides an easy-to-use interface for flashing firmware, partitioning the hard disk, installing diagnostic tools, configuring storage controllers, and running other EFI utilities.

NOTE: You can use EBSU to update firmware for many different devices in the system. A Smart Array Controller is shown as an example.

To update the Smart Array Controller firmware:

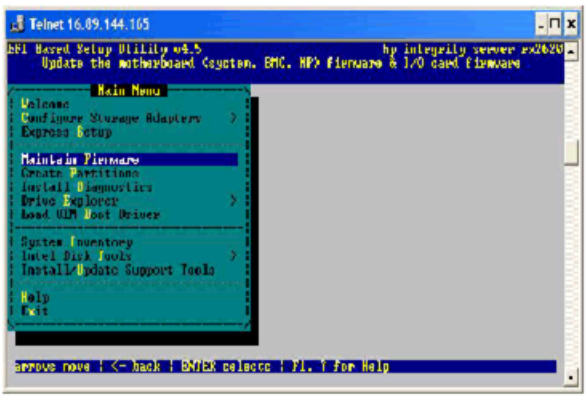
1. Power on the server. The server boots to EFI. The EFI Boot Manager may be used from the enhanced interface (grey background) or the legacy interface (black background).
2. Load the HP Smart Setup media into the server DVD drive.
3. From the EFI Boot Menu, select **Internal Bootable DVD** and press **Enter**. EBSU starts and displays the **Welcome** screen.

Figure 40 EBSU Welcome Screen



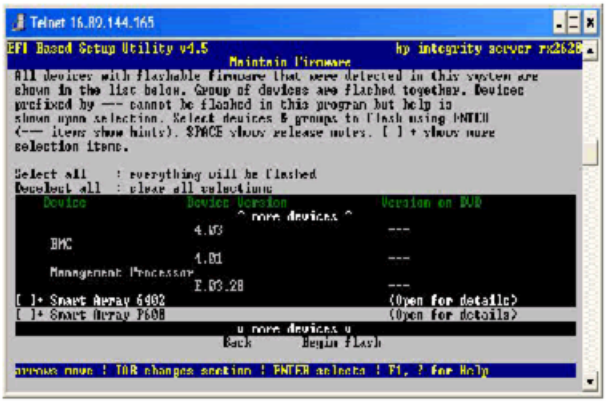
4. Select **OK** and press **Enter** to continue.
5. From the main menu, select **Maintain Firmware** and press **Enter**.

Figure 41 EBSU Main Menu



6. In the **Maintain Firmware** screen, use the tab key to scroll down to the **Device** section.
7. Use the down arrow key to scroll down to the Smart Array Controller item in the list.
8. Press **Enter** to display detailed information about the device.

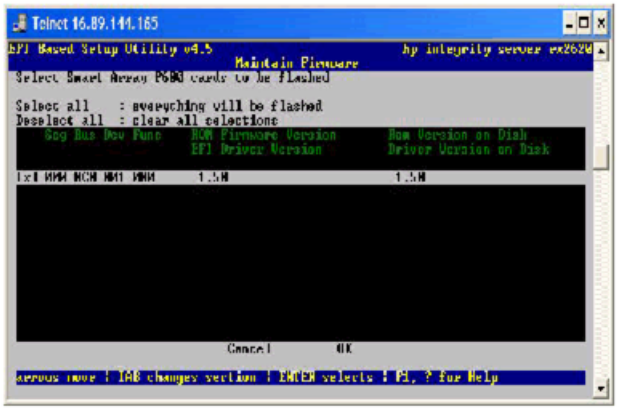
Figure 42 EBSU Maintain Firmware Screen



EBSU displays the firmware update screen for the selected device.

- The version number in the first column (ROM Firmware Version) is the one currently installed on your system.
- The version number in the second column (ROM Version on Disk) is the one available on your Smart Setup media.

Figure 43 EBSU Maintain Firmware Update Screen



9. Compare the two version numbers and perform one of the following options:
   - If the number in the first column is the same or higher than the number in the second column, your installed firmware is current. You do not need to update the firmware for this device! You can exit EBSU and quit this procedure.
   - If the number in the first column is less than the number in the second column, your installed firmware is older than the version on your Smart Setup media. You must update the firmware for this device! Proceed to Step 9 and continue from there.

   NOTE: The utility does not allow you to flash the firmware if the installed version is the same or higher than the version on the Smart Setup media.

10. Use the tab key to scroll down into the **Device** section and highlight the device name.
11. Press **Enter** to select the device (this puts an "X" inside the box on the left side of the device name).
12. Use the tab key to move to the **OK** selection and press **Enter**.

    The firmware update begins and proceeds automatically to completion.

Configuring the Array

HP provides two utilities for manually configuring an array on a Smart Array controller:

- ORCA, a simple ROM-based configuration utility.
- Array Configuration Utility (ACU), a versatile, browser-based utility that provides maximum control over configuration parameters

NOTE: To copy a particular array configuration to several other servers on the same network, use the Array Configuration Replicator (ACR) or the scripting capability of ACU. ACR is provided in the SmartStart Scripting Toolkit, available on the HP website at: http://www.hp.com/servers/sstoolkit.

Whichever utility you use, the following limitations apply:

- For the most efficient use of drive space, do not mix drives of different capacities within the same array. The configuration utility treats all physical drives in an array as if they have the

same capacity as the smallest drive in the array. The excess capacity of any larger drives is wasted because it is unavailable for data storage.

- The probability that an array will experience a drive failure increases with the number of physical drives in the array. If you configure a logical drive with RAID 5, keep the probability of failure low by using no more than 14 physical drives in the array.

For conceptual information about arrays, logical drives, and fault-tolerance methods, and for information about default array configuration settings, see the *HP Array Configuration Utility User Guide* at I/O Cards and Networking Software at:

http://www.hp.com/go/integrity-iocards-docs

Comparing the Utilities

Table 36 lists the supported features and procedures for the ACU and ORCA utilities.

Table 36 ACU and ORCA Supported Features and Procedures

	ACU	ORCA
Supported Features		
Uses a graphical interface	Yes	No
Available in languages other than English	Yes	No
Available on CD	Yes	No
Uses a wizard to suggest the optimum configuration for an unconfigured controller	Yes	No
Describes configuration errors	Yes	No
Suitable for configuration while online	Yes	No
Suitable for configuration while offline	No	Yes
Supported Procedures		
Creation and deletion of arrays and logical drives	Yes	Yes
Assignment of RAID level	Yes	Yes
Sharing of spare drives among several arrays	Yes	No
Assignment of multiple spare drives per array	Yes	No
Setting of stripe size	Yes	No
Migration of RAID level or stripe size	Yes	No
Configuration of controller settings	Yes	No
Expansion of an array	Yes	No
Creation of multiple logical drives per array	Yes	No

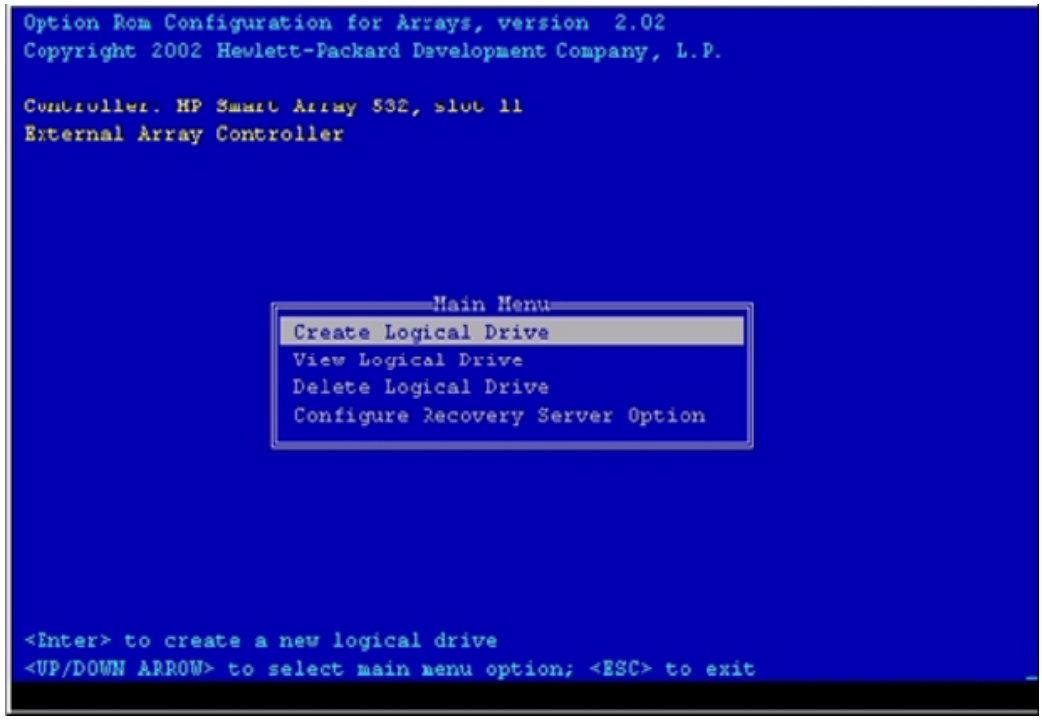
ORCA Utility

To use ORCA, follow these steps:

1. Power on the server. POST runs, and any array controllers that are in the server are initialized one at a time. During each controller initialization process, POST halts for several seconds while an ORCA prompt message displays.

2. At the ORCA prompt:
   - If you are connected using a headless console, press the **Esc+8** combination.
   - Otherwise, press **F8**. The **ORCA Main Menu** displays, enabling you to create, view, or delete a logical drive.

Figure 44 ORCA Main Menu



Creating a Logical Drive Using ORCA

To create a logical drive using ORCA, follow these steps:

1. Select **Create Logical Drive**. The screen displays a list of all available (unconfigured) physical drives and the valid RAID options for the system.
2. Use the **Arrow** keys, **Spacebar**, and **Tab** to navigate around the screen and set up the logical drive, including an online spare drive if one is required.

NOTE: You cannot use ORCA to configure one spare drive to be shared among several arrays. Only ACU enables you to configure shared spare drives.

3. Press **Enter** to accept the settings.
4. Press **F8** to confirm the settings and save the new configuration. After several seconds, the **Configuration Saved** screen displays.
5. Press **Enter** to continue. You can now create another logical drive by repeating the previous steps.

NOTE: Newly created logical drives are invisible to the operating system. To make the new logical drives available for data storage, format them using the instructions given in the operating system documentation.

ACU Utility

For detailed information about using ACU, see the *HP Array Configuration Utility User Guide* at I/O Cards and Networking Software at:

http://www.hp.com/go/integrity-iocards-docs

Installation Troubleshooting

This section provides basic server troubleshooting information. It is designed to help you diagnose common issues that can occur during server installation.

Troubleshooting Methodology

The server was tested prior to shipping. Failures encountered during installation can be due to damage that occurred in transit. Reseating connectors can clear problems that result from rough handling. If you are installing components or assemblies, compatibility problems or incorrect installations can be the cause of the problems. If you are installing components or assemblies, check that items are correctly installed and that all connectors are fully engaged. If the unit does not power on, check the power source before proceeding.

If a problem is encountered during initial operation, remove any add-in or optional components and retest the server before continuing. Verify basic server operation before installing additional cards and configuring software and hardware for the server requirements.

Troubleshooting is based on observation of server status indications and error messages, and by checking system event logs. You can observe the LED indicators on the front and rear of the server. Error messages are displayed on local and remote consoles. System history (console, event, and history logs) is available through the iLO 2 MP, and is accessed through the console. Additional information about troubleshooting is available in the *HP Integrity rx3600 User Service Guide*.

Offline troubleshooting programs are available on the HP website. To troubleshoot the server, you must be familiar with the Offline Diagnostics Environment (ODE) which runs in the Extensible Firmware Interface (EFI). Descriptions and user information about offline troubleshooting tools are available at:

http://www.hp.com/bizsupport

The offline tools are available for downloading at:

http://www.software.hp.com.

Troubleshooting Using the Server Power Button

The server Power button on the front panel operates differently depending on how long the button is held in, and on what the system is doing when the button is pressed. You must be aware of its uses to properly troubleshoot the system.

Table 37 describes what happens when the server is at EFI, and you press the Power button.

Table 37 Server Power Button Functions When Server is On

Action	Reaction
Push Power button and hold one-three seconds	System power turns off immediately at EFI Shell (hard power off). System powers off when OS is running (software controlled power off)
Push Power button and hold five seconds or longer	System power turns off immediately with EFI or OS running (hard power off).

If the server is off, and power is not connected to server power supplies, pressing the Power button has no effect.

If the server is off, and power is connected to server power supplies, the front panel power LED blinks at a 1 Hz rate. In this state, standby power is available to server circuits, but main power is off.

Table 38 describes what happens when the server is off, and you press the Power button.

Table 38 Server Power Button Functions When Server is Off

Action	Reaction
1-3 seconds	System power turns on.

Server Does Not Power On

The server Power button on the front panel operates differently depending on how long the button is held in, and on what the system is doing when the button is pressed. You must be aware of its uses to properly troubleshoot the system.

NOTE: If the server is off, and power is not connected to server power supplies, pressing the Power button has no effect.

Power problems during installation are usually related to the installation process. If the server does not power on, check the LED indicators on the power supply.

EFI Menu is Not Available

If you cannot access the EFI from either the main disk partition or the CD, use the following tools to help solve the problem:

- Front panel LEDs
- iLO 2 MP
  - Console messages
  - System event logs (SEL)

Operating System Does Not Boot

If the operating system does not boot, but you are able to reach the EFI from either the main disk partition or the CD, use the following tools to help solve the problem:

- Using the EFI Shell, check the system logs and analyze any error messages.
- Offline Diagnostic Environment (ODE)

Operating System Boots with Problems

If the operating system is running and you are experiencing problems, use the following tools to help solve the problem:

- LEDs
- Error Messages and event logs

Intermittent Server Problems

You can usually trace intermittent problems that occur during installation to power source problems, a loose connector, or some other hardware problem. If you are experiencing intermittent problems, follow these steps:

1. Check iLO 2 MP logs and analyze the problem. Determine if there is more than one symptom and if the problem is random.
2. Verify that the AC power source is stable.
3. Reseat all rear panel connectors.
4. Reseat all hot-swappable fans and power supplies.
5. Reseat all main memory DIMMs.
6. Reseat all cable harnesses and board connectors.

DVD Problems

DVD problems that occur during installation are usually related to faulty connections. If you are experiencing DVD problems, follow these steps:

1. Remove and reinsert the DVD.
2. Replace the DVD.
3. Remove and reinstall the DVD drive. Check that connectors are fully engaged.
4. Replace the DVD drive.

Hard Drive Problems

Hard drive problems that occur during installation are usually due to rough handling. The drive may not be correctly seated or may have been damaged in transit. If you are experiencing hard drive problems, follow these steps:

1. Remove and reinsert the faulty hard drive.
2. Swap the hard drive with one from another slot or with a known good spare.
3. Remove and reinstall the hard drive backplane. Check that connectors are fully engaged.
4. Replace the hard drive backplane.
5. Replace the SAS core I/O card.

Console Problems

Console problems during installations can be caused by faulty interconnections. If you are experiencing monitor, keyboard, or mouse problems, follow these steps:

1. Check the monitor controls. Adjust contrast and brightness as required.
2. Inspect all power and interconnecting cables. Check that all console connectors are fully engaged.
3. Check that all iLO 2 MP board connectors are fully engaged.
4. Exercise the appropriate self-test features of the console software.

Downloading and Installing the Latest Version of the Firmware

HP makes every effort to provide you with the most current version of firmware. However, there can be instances when this is not the case.

To ensure you have the latest version of the firmware running on the server, download the latest version of the firmware from the web, and create a CD to install the firmware on the server.

Downloading the Latest Version of the Firmware

To download the latest version of the firmware from the web, follow these steps:

1. Go to http://www.hp.com/go/bizsupport.
2. Select **download drivers and software**.
3. Select **Itanium-based servers** from the Server category.
4. Select your product from the servers listed.
5. Select your operating system.
6. Select the firmware category you want to download.
7. Download the firmware to a CD.

Installing the Latest Version of the Firmware

To install the latest version of the firmware on the server, follow these steps:

1. Initiate a server console session. See "Accessing the Host Console" (page 78).
2. Insert the CD with the copy of the latest version of the firmware.

3. Using the EFI Boot Manager menu, boot to the drive that contains the CD with the updated firmware.
4. Follow the instructions to update the firmware.

Enabling the Trusted Platform Module

This section provides instructions on how to enable the trusted platform module (TPM).

Introduction

The TPM is an optional security component which enhances security capabilities for the server if it is running the HP-UX operating system. The TPM is a security chip that is unique to the server. It performs key security processes independent of other hardware components. The TPM creates and stores additional encryption keys from the root key of the system. The encryption keys created by the TPM encapsulate system application encryption keys to provide an additional layer of security for sensitive system data.

The fundamental capabilities of the TPM include:

- Platform authentication
- Sensitive information protection
- Data integrity
- System privacy

IMPORTANT: You must run the supported version of the HP-UX operating system to utilize the TPM security component.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Enabling the TPM

Use the following procedures to enable the TPM.

To enable the TPM, follow these steps:

1. Power on the server. See "Powering On the Server" (page 81).
2. Enable the TPM.
   a. Access the EFI Shell.
   b. Enter **`info sec`** to display the server security settings on the screen. The TPM is disabled by default.
   c. Enter **`secconfig`** to display a list of configurable security settings.
   d. Enter **`secconfig tpm on`** to enable the TPM.
3. Reset the server.
4. Boot the operating system. See the operating system documentation for more information.
5. Restore the former TPM settings to the new TPM. See the HP-UX operating system documentation for more information.
6. Back up the TPM security information. See the HP-UX operating system documentation for more information.

4 Booting and Shutting Down the Operating System

This chapter covers procedures for booting and shutting down operating systems on entry class HP Integrity servers. HP supports the following operating systems:

- HP-UX 11i Version 2 (B.11.23)
- HP Open VMS I64
- Microsoft Windows Server 2003
- Red Hat Enterprise Linux 4
- SuSE Linux Enterprise Server 9

This chapter addresses the following topics:

- "Configuring System Boot Options" (page 108)
- "Booting and Shutting Down HP-UX" (page 110)
- "Booting and Shutting Down HP OpenVMS" (page 115)
- "Booting and Shutting Down Microsoft Windows" (page 118)
- "Booting and Shutting Down Linux" (page 121)

Configuring System Boot Options

This section discusses the configurable server boot options on entry-class HP Integrity servers, including the boot options list and the autoboot setting for the server. The version shown is EFI Boot Manager version 2.00.

- **Boot Options List**

  The boot options list is a list of loadable items available for you to choose from the **EFI Boot Manager** menu. Ordinarily the boot options list includes the EFI Shell and one or more operating system loaders.

  The following example includes boot options for HP-UX, Linux, and the EFI Shell.

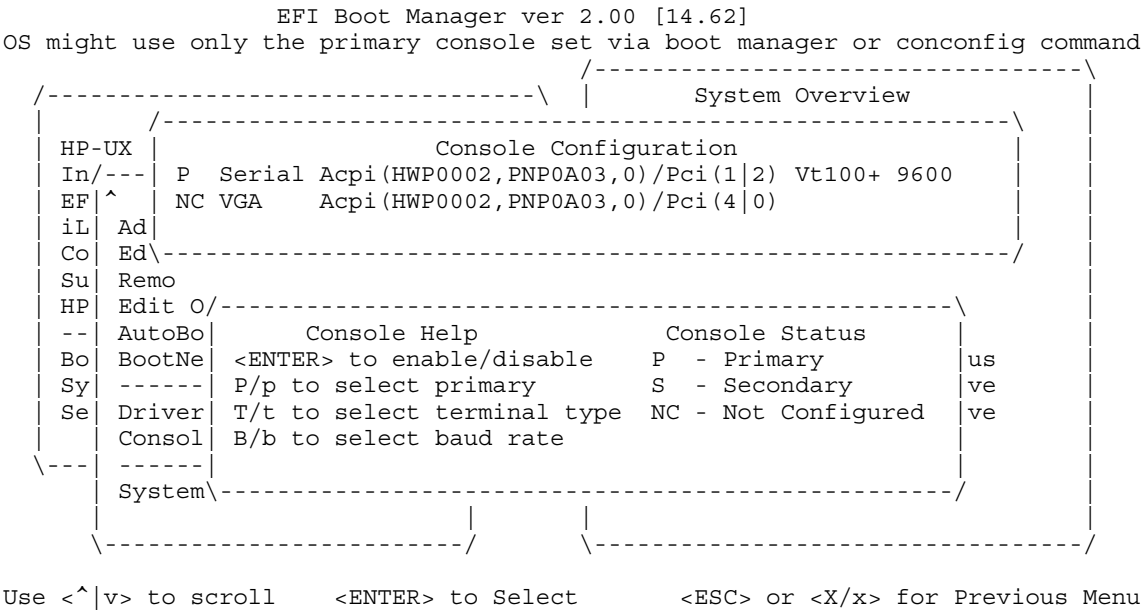
```
                    EFI Boot Manager ver 2.00 [14.62]
OS might use only the primary console set via boot manager or conconfig command
                                                 /-----------------------------------\
  /-----------------------------------\          |        System Overview            |
  |             Boot Menu             |          |   hp server BL870c                |
  | HP-UX Primary Boot: 0/2/1/0....   |          | Serial #:  USE7234MV8             |
  | Internal Bootable DVD             |          |                                   |
  | EFI Shell [Built-in]              |          | System Firmware:  3.01 [4739]     |
  | iLO Virtual Media                 |          | BMC Version:      5.20            |
  | Core LAN Port 1                   |          | MP Version:       T.02.17         |
  | SuSE on fs0:                      |          | Installed Memory: 6144 MB         |
  | HP-UX 11.31 from SAS disk         |          |                                   |
  | ----------------------------      |          |  CPU  Logical                     |
  | Boot Configuration                |          | Module CPUs   Speed  Status       |
  | System Configuration              |          |    0    2    1.4 GHz Active       |
  | Security Configuration            |          |    1    2    1.4 GHz Active       |
  |                                   |          |                                   |
  \-----------------------------------/          |                                   |
                                                 |                                   |
                                                 |                                   |
                                                 \-----------------------------------/

Use ^ and v to change option(s). Use Enter to select an option
```

  To correctly view the operating system console messages, go to the **Boot Configuration Menu** under the **EFI Boot Manager** menu.

  From the **Boot Configuration Menu**, select Console Configuration.

  The **Console Configuration** screen displays the current configuration of the system console.



Select the appropriate console configuration for your environment.

NOTE: When exiting the Console Configuration screen, be sure to save your changes and perform a server reset to activate your configuration changes.

IMPORTANT: When selecting a console as Primary, all other consoles **must** be set to NC to allow the OS console messages to display to the proper device. This applies to all operating systems.

To manage the boot options list for each server, use the EFI Shell, the EFI Boot Option Maintenance Menu, or operating system utilities.

At the EFI Shell, use the **`bcfg`** command to support list and manage the boot options list for HP-UX.

The EFI Boot Option Maintenance Menu provides the **Add a Boot Option**, **Delete Boot Option(s)**, and **Change Boot Order** menu items (use this method if you must add an EFI Shell entry to the boot options list).

Operating system utilities for managing the boot options list include the HP-UX **`setboot`** command.

NOTE: In some versions of EFI, the **Boot Configuration Menu** is listed as the **Boot Option Maintenance Menu**.

To manage the boot options list for each server, use the EFI Shell, the EFI **Boot Configuration Menu**, or operating system utilities.

At the EFI Shell, the **`bcfg`** command supports listing and managing the boot options list for all operating systems, except Microsoft Windows. On HP Integrity servers with Windows installed, the `\MSUtil\nvrboot.efi` utility is provided for managing Windows boot options from the EFI Shell. For HP Integrity servers with OpenVMS installed, the `\efi\vms\vms_bcfg.efi` and `\efi\vms\vms_show` utilities are provided for managing OpenVMS boot options.

The EFI **Boot Configuration Menu** provides the **Add a Boot Option**, **Delete Boot Option(s)**, and **Change Boot Order** menu items (use this method if you must add an EFI Shell entry to the boot options list).

Operating system utilities for managing the boot options list include the HP-UX **`setboot`** command, and the HP OpenVMS **`@SYS$MANAGER:BOOT_OPTIONS.COM`** command.

For details, see the following sections:

- Setting HP-UX boot options
- Setting OpenVMS boot options
- Setting Windows boot options
- Setting Linux boot options

- **Autoboot Setting**

  The **autoboot** setting determines at startup whether a server automatically loads the first item in the boot options list, or remains at the **EFI Boot Manager** menu. When **autoboot** is enabled, EFI loads the first item in the boot options list after a designated timeout period.

  Configure the **autoboot** setting for an HP Integrity server using either the **autoboot** EFI Shell command, or the **Set Auto Boot TimeOut** menu item from the **EFI Boot Configuration Menu**.

  For example:

  To disable **autoboot** from the EFI Shell, enter:

  ```
  autoboot off
  ```

  To enable **autoboot** with the default timeout value, enter:

  ```
  autoboot on
  ```

  To enable **autoboot** with a timeout of 60 seconds, enter:

  ```
  autoboot time 60
  ```

  To set **autoboot** from HP-UX, enter:

  ```
  setboot
  ```

  To enable **autoboot** from HP-UX, enter:

  ```
  setboot -b on
  ```

  To disable **autoboot**, enter:

  ```
  setboot -b off
  ```

Booting and Shutting Down HP-UX

This section covers booting and shutting down HP-UX on entry class HP Integrity servers.

- To add an HP-UX entry to the boot options list, see "Adding HP-UX to the Boot Options List" (page 110).
- To boot HP-UX, use the following procedures:
  - "Booting HP-UX From the EFI Boot Manager" (page 111) describes the standard ways to boot HP-UX. Typically this results in booting HP-UX in multi-user mode.
  - "Booting HP-UX in Single-User Mode" (page 113) describes how to boot HP-UX in single-user mode.
  - "Booting HP-UX in LVM-Maintenance Mode" (page 114) describes how to boot HP-UX in LVM-maintenance mode
- To shut down the HP-UX operating system, see "Shutting Down HP-UX" (page 114).

Adding HP-UX to the Boot Options List

This section describes how to add an HP-UX entry to the system boot options list.

You can add the `\EFI\HPUX\HPUX.EFI` loader to the boot options list from the EFI Shell or EFI Boot Configuration menu (or in some versions of EFI, the Boot Option Maintenance Menu).

NOTE: The operating system installer automatically adds an entry to the boot options list.

To add an HP-UX boot option when logged in to HP-UX, use the `setboot` command. For more information see the *setboot*(1M) manpage.

To add an HP-UX item to the boot options list from the EFI Shell, follow these steps:

1. Access the EFI Shell environment.
   a. Log in to the iLO 2 MP and enter the `CO` command to access the system console.
   b. Confirm that you are at the **EFI Boot Manager** menu (the main EFI menu). If you are at another EFI menu, select **Exit** option from the submenus until you return to the screen labeled `EFI Boot Manager`.
   c. From the **EFI Boot Manager** menu, select the **EFI Shell** to access the EFI Shell environment.
2. Access the EFI System Partition (`fs`*X*`:` where *X* is the file system number) for the device from which you want to boot HP-UX.
   For example, enter `fs2:` to access the EFI System Partition for the bootable file system number `2`. The EFI Shell prompt changes to reflect the file system currently accessed.
   The full path for the HP-UX loader is `\EFI\HPUX\HPUX.EFI` on the device you are accessing.
3. At the EFI Shell environment, use the `bcfg` command to manage the boot options list.
   The `bcfg` command includes the following options for managing the boot options list:

bcfg boot dump	Displays all items in the boot options list for the system.
bcfg boot rm #	Removes the item number specified by # from the boot options list
bcfg boot mv #a #b	Move the item number specified by #a to the position specified by #b in the boot list.
bcfg boot add # file.efi "Description"	Add a new boot option to the position in the boot options list specified by #. The new boot option references file.efi and is listed with the title specified by Description.

   For example, bcfg boot add1 \EFI\HPUX\HPUX.EFI “HP-UXi” adds an HP-UX 11i item as the first entry in the boot options list.
   See the `help bcfg` command for details.
4. Exit the console and iLO 2 MP interfaces if you are finished using them.
   a. Press **Control-B** to exit the system console and return to the **MP Main Menu**.
   b. To exit the iLO 2 MP, enter `X` at the **MP Main Menu**.

Booting HP-UX in Standard Mode

Use either of the following procedures to boot HP-UX:

- “Booting HP-UX From the EFI Boot Manager” (page 111)
- “Booting HP-UX From the EFI Shell” (page 112)

Booting HP-UX From the EFI Boot Manager

From the **EFI Boot Manager** menu, select an item from the boot options list to boot HP-UX.

1. Access the **EFI Boot Manager** menu for the system on which you want to boot HP-UX.
   a. Log in to the iLO 2 MP and enter `CO` to select the system console.
   b. Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled `EFI Boot Manager`.

2. At the **EFI Boot Manager** menu, select an item from the boot options list.

   Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments you use when booting the device.

3. Press **Enter** to initiate booting using the selected boot option.
4. Exit the console and iLO 2 MP interfaces when finished using them.

   a. Press **Control-B** to exit the system console and return to the **MP Main Menu**.

   b. To exit the iLO 2 MP, type `X` at the **MP Main Menu**.

Booting HP-UX From the EFI Shell

From the EFI Shell environment, to boot HP-UX on a device, follow these steps:

1. Access the EFI Shell environment for the system on which you want to boot HP-UX.

   a. Log in to the iLO 2 MP and enter `CO` to select the system console.

   b. Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled `EFI Boot Manager`.

   c. From the **EFI Boot Manager** menu, select the **EFI Shell** menu option to access the EFI Shell environment.

2. At the EFI Shell environment, issue the **`map`** command to list all currently mapped bootable devices.

   The bootable file systems you need are listed as `fs0:`, `fs1:`, and so on.

3. Access the EFI System Partition (`fs`*`X`*`:` where *`X`* is the file system number) for the device from which you want to boot HP-UX.

   For example, enter `fs2:` to access the EFI System Partition for the bootable file system number `2`. The EFI Shell prompt changes to reflect the file system currently accessed.

   The file system number can change each time it is mapped, for example, when the system boots or when the `map -r` command is issued.

4. When accessing the EFI System Partition for the desired boot device, issue the **`HPUX`** command to initiate the `HPUX.EFI` loader on the device you are accessing.

   The full path for the loader is `\EFI\HPUX\HPUX.EFI`. When initiated, the loader references the `\EFI\HPUX\AUTO` file and proceeds to boot HP-UX using the default boot behavior specified in the `AUTO` file.

   You have 10 seconds to interrupt the automatic booting of the default boot behavior. Press any key during this 10-second period to stop the HP-UX boot process and enables you to interact with the `HPUX.EFI` loader.

   a. To exit the loader (the `HPUX>` prompt) enter `exit` to return to the EFI Shell.

   b. To boot the HP-UX operating system, do not type anything during the 10-second period given for stopping at the `HPUX.EFI` loader. For example:

```
Shell> map
Device mapping table
  fs0  : Acpi(000222F0,269)/Pci(0 0)/Scsi(Pun8,Lun0)/HD(Part1,Sig72550000)
  blk0 : Acpi(000222F0,269)/Pci(0 0)/Scsi(Pun8,Lun0)
  blk1 : Acpi(000222F0,269)/Pci(0 0)/Scsi(Pun8,Lun0)/HD(Part1,Sig72550000)
  blk2 : Acpi(000222F0,269)/Pci(0 0)/Scsi(Pun8,Lun0)/HD(Part2,Sig72550000)
  blk3 : Acpi(000222F0,2A8)/Pci(0 0)/Scsi(Pun8,Lun0)
  blk4 : Acpi(000222F0,2A8)/Pci(0 1)/Scsi(Pun2,Lun0)

Shell> fs0:

fs0:\> hpux

(c) Copyright 1990-2002, Hewlett Packard Company.
All rights reserved
```

```
HP-UX Boot Loader for IA64  Revision 1.723

Press Any Key to interrupt Autoboot
\efi\hpux\AUTO ==> boot vmunix
Seconds left till autoboot -   9
```

5. Exit the console and iLO 2 MP interfaces when finished using them.

   Press **Control-B** to exit the system console and return to the **MP Main Menu**. To exit the iLO 2 MP, enter `X` at the Main Menu.

Booting HP-UX in Single-User Mode

To boot HP-UX in single-user mode, follow these steps:

1. Access the EFI Shell environment for the system on which you want to boot HP-UX in single-user mode.

   a. Log in to the iLO 2 MP and enter `CO` to select the system console.

   b. Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen with the `EFI Boot Manager` heading.

   c. From the **EFI Boot Manager** menu, select the **EFI Shell** to access the EFI Shell environment.

2. Access the EFI System Partition (`fs`*X*`:` where *X* is the file system number) for the device from which you want to boot HP-UX.
3. Issue the **`HPUX`** command to initiate the `\EFI\HPUX\HPUX.EFI` loader on the device you are accessing.
4. Boot to the HP-UX Boot Loader prompt (`HPUX>`) by pressing any key within the 10 seconds given for interrupting the HP-UX boot process.

   After you press a key, the `HPUX.EFI` interface (the HP-UX Boot Loader prompt, `HPUX>`) launches. For help using the `HPUX.EFI` loader, enter the `help` command. To return to the EFI Shell, enter `exit`.

```
fs0:\> hpux

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All rights reserved

HP-UX Boot Loader for IA64  Revision 1.723

Press Any Key to interrupt Autoboot
 efi hpux AUTO ==> boot vmunix
Seconds left till autoboot -   9
```

[User types a key to stop the HP-UX boot process and access the HPUX.EFI loader.]

```
   Type 'help' for help

HPUX>
```

5. At the `HPUX.EFI` (`HPUX>`) enter the `boot -is vmunix` command to boot HP-UX in single-user mode.

```
HPUX> boot -is vmunix
> System Memory = 4063 MB
loading section 0
.................................................. (complete)
loading section 1
........ (complete)
loading symbol table
loading System Directory(boot.sys) to MFS
....
loading MFSFILES Directory(bootfs) to MFS
......
Launching /stand/vmunix
SIZE: Text:25953K + Data:3715K + BSS:3637K = Total:33306K
```

```
Console is on a Serial Device
Booting kernel...
```

6. Exit the console and iLO 2 MP interfaces when finished using them.
   a. Press **Control-B** to exit the system console and return to the **MP Main Menu**.
   b. To exit the iLO 2 MP, type `X` at the **MP Main Menu**.

Booting HP-UX in LVM-Maintenance Mode

To boot HP-UX in LVM-maintenance mode, follow these steps:

1. Access the EFI Shell environment for the system on which you want to boot HP-UX in LVM-maintenance mode.
   a. Log in to the iLO 2 MP and enter `CO` to select the system console.
   b. Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen with the `EFI Boot Manager` heading.
   c. From the **EFI Boot Manager** menu, select the **EFI Shell** to access the EFI Shell environment.
2. Access the EFI System Partition (`fs`*`X`*`:` where *`X`* is the file system number) for the device from which you want to boot HP-UX.
3. Issue the **`HPUX`** command to initiate the `\EFI\HPUX\HPUX.EFI` loader on the device you are accessing.
4. Type any key within the 10 seconds given for interrupting the HP-UX boot process. This stops the boot process at the `HPUX.EFI` interface (the HP-UX Boot Loader prompt, `HPUX>`).
5. At the HPUX prompt, enter the **`boot -lm vmunix`** command to boot HP-UX in LVM-maintenance mode.
6. Exit the console and iLO 2 MP interfaces when finished using them.
   Press **Control-B** to exit the system console and return to the **MP Main Menu**. To exit the iLO 2 MP, type `X` at the **MP Main Menu**.

Shutting Down HP-UX

Use the `shutdown` command to shut down HP-UX running on a system, .

For more information see the *shutdown*(1M) manpage and the following procedure:

To shut down the HP-UX operating system, follow these steps:

1. Log in to HP-UX running on the system that you want to shut down.
   Log in to the iLO 2 MP for the server and use the Console menu to access the system console. Accessing the console through the iLO 2 MP enables you to maintain console access to the system after HP-UX has shut down.
2. Issue the **`shutdown`** command with the appropriate command-line options.
   The command-line options you specify dictate the way in which HP-UX shuts down, and whether the system is rebooted.
   - To shut down HP-UX and halt (power off) the system, issue the **`shutdown -h`** command.
     To reboot a halted system power on the system using the `PC` command at the iLO 2 MP Command menu.
   - To shut down HP-UX and reboot the system, issue the **`shutdown -r`** command.

Booting and Shutting Down HP OpenVMS

This section describes the procedures for booting and shutting down HP OpenVMS on entry class HP Integrity servers, and procedures for adding HP OpenVMS to the boot options list.

- To add an HP OpenVMS entry to the boot options list, see "Adding HP OpenVMS to the Boot Options List" (page 115).
- To boot HP OpenVMS on an entry class HP Integrity server, see "Booting HP OpenVMS from the EFI Boot Manager" (page 116).
- To shut down HP OpenVMS, see "Shutting Down HP OpenVMS" (page 117).

Adding HP OpenVMS to the Boot Options List

On HP Integrity servers, you can use the following procedures to manage boot options list entries for HP OpenVMS.

You can add the `\efi\vms\vms_loader.efi` loader to the boot options list from the EFI Shell or the EFI Boot Configuration menu (or in some versions of EFI, the Boot Option Maintenance Menu).

NOTE: The operating system installer automatically adds an entry to the boot options list.

To add an HP OpenVMS item to the boot options list from the EFI Shell, follow these steps:

1. Access the EFI Shell environment.

   a. Log in to the iLO 2 MP and enter `CO` to access the system console.

   b. Confirm that you are at the **EFI Boot Manager** menu (the main EFI menu). If you are at another EFI menu, select the **Exit** from the submenus until you return to the screen with the `EFI Boot Manager` heading.

   c. From the **EFI Boot Manager** menu, select **EFI Shell** to access the EFI Shell environment.

2. Access the EFI System Partition (`fs`*X*`:` where *X* is the file system number) for the device from which you want to boot HP OpenVMS.

   For example, enter `fs2:` to access the EFI System Partition for the bootable file system number `2`. The EFI Shell prompt changes to reflect the file system currently accessed.

   The full path for the HP OpenVMS loader is `\efi\vms\vms_loader.efi`. It is on the device you are accessing.

3. At the EFI Shell environment, use the `bcfg` command to manage the boot options list.

   The `bcfg` command includes the following options for managing the boot options list:

bcfg boot dump	Displays all items in the boot options list for the system.
bcfg boot rm #	Removes the item number specified by # from the boot options list
bcfg boot mv #a #b	Move the item number specified by #a to the position specified by #b in the boot list.
bcfg boot add # file.efi "Description"	Add a new boot option to the position in the boot options list specified by #. The new boot option references file.efi and is listed with the title specified by Description.

   For example, `bcfg boot add 1 \efi\vms\vms_loader.efi "HP OpenVMS"` adds an HP OpenVMS item as the first entry in the boot options list.

   See the `help bcfg` command for details.

NOTE: You can also accomplish this step by using the `\efi\vms\vms_bcfg.efi` and `\efi\vms\vms_show.efi` utilities, which are available on the EFI System Partition for HP OpenVMS. Both `vms_bcfg` and `vms_show` are unique utilities for OpenVMS I64. The `vms_bcfg` utility differs from the `bcfg` EFI command in that `vms_bcfg` enables you to specify boot devices using VMS-style device names.

4. Exit the console and iLO 2 MP interfaces if you are finished using them.

   Press **Control-B** to exit the system console and return to the **MP Main Menu**. To exit the iLO 2 MP, enter `X` at the **MP Main Menu**.

Booting HP Open VMS

To boot HP OpenVMS on an entry class HP Integrity server, use one of the following procedures:

- "Booting HP OpenVMS from the EFI Boot Manager" (page 116)
- "Booting HP OpenVMS from the EFI Shell" (page 116)

Booting HP OpenVMS from the EFI Boot Manager

From the **EFI Boot Manager**, follow these steps:

1. Access the **EFI Boot Manager** menu for the system on which you want to boot HP OpenVMS.

   a. Log in to the iLO 2 MP and enter `CO` to select the system console.

   b. Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled `EFI Boot Manager`.

2. At the **EFI Boot Manager** menu, select an item from the boot options list.

   Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments to use when booting the device.

3. Press **Enter** to initiate booting using the selected boot option.
4. Exit the console and iLO 2 MP interfaces when finished using them.

   Press **Control-B** to exit the system console and return to the **MP Main Menu**. To exit the iLO 2 MP, type `X` at the **MP Main Menu**.

Booting HP OpenVMS from the EFI Shell

To boot HP OpenVMS from the EFI Shell environment, follow these steps:

1. Access the EFI Shell environment for the system on which you want to boot HP OpenVMS.

   a. Log in to the iLO 2 MP and enter `CO` to select the system console.

   b. Confirm that you are at the **EFI Boot Manager** menu (the main EFI menu). If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled `EFI Boot Manager`.

   c. From the **EFI Boot Manager** menu, select **EFI Shell** menu to access the EFI Shell environment.

2. Issue the **`map`** command to list all currently mapped bootable devices.

   The bootable file systems are typically listed as `fs0:`, `fs1:`, and so on.

3. Access the EFI System Partition (`fs`*`X`*`:` where *`X`* is the file system number) for the device from which you want to boot HP OpenVMS.

   For example, enter `fs2:` to access the EFI System Partition for the bootable file system number `2`. The EFI Shell prompt changes to reflect the file system currently accessed.

   Also, the file system number can change each time it is mapped; for example, when the system boots, or when the `map -r` command is issued.

4. When accessing the EFI System Partition for the desired boot device, issue the **efi vms vms_loader** command to initiate the vms_loader.efi loader on the device you are accessing.

```
fs5:> \efi\vms\vms_loader.efi


   HP OpenVMS Industry Standard 64 Operating System, Version XAV1-D2Y
     Copyright 1976-2005 Hewlett-Packard Development Company, L.P.


%PKA0, Copyright (c) 1998 LSI Logic PKW V3.2.20 ROM 4.19
%PKA0, SCSI Chip is SYM53C1010/66, Operating mode is LVD Ultra3 SCSI
%SMP-I-CPUTRN, CPU #01 has joined the active set.
%SMP-I-CPUTRN, CPU #02 has joined the active set.
%STDRV-I-STARTUP, OpenVMS startup begun at 13-JUL-2005 14:54:36.25
%EWA0, Auto-negotiation mode set by console

...
```

5. Exit the console and iLO 2 MP interfaces when finished using them.

   Press **Control-B** to exit the system console and return to the **MP Main Menu**. To exit the iLO 2 MP, enter X at the **MP Main Menu**.

Shutting Down HP OpenVMS

To shut down the HP OpenVMS operating system, follow these steps:

1. Log in to HP OpenVMS running on the system that you want to shut down.
2. Log in to the iLO 2 MP for the server and use the Console menu to access the system console. Accessing the console through the iLO 2 MP enables you to maintain console access to the system after HP OpenVMS has shut down.
3. At the OpenVMS DCL command element prompt issue the **@SYS$SYSTEM:SHUTDOWN** command and specify the shutdown options in response to the prompts. For example:

```
>@SYS$SYSTEM:SHUTDOWN


        SHUTDOWN -- Perform an Orderly System Shutdown
                    on node RSNVMS

How many minutes until final shutdown [0]:
Reason for shutdown [Standalone]:
Do you want to spin down the disk volumes [NO]?
Do you want to invoke the site-specific shutdown procedure [YES]?
Should an automatic system reboot be performed [NO]? yes
When will the system be rebooted [shortly via automatic reboot]:
Shutdown options (enter as a comma-separated list):
 REBOOT_CHECK         Check existence of basic system files
 SAVE_FEEDBACK        Save AUTOGEN feedback information from this boot
 DISABLE_AUTOSTART    Disable autostart queues
 POWER_OFF            Request console to power-off the system

Shutdown options [NONE]:

%SHUTDOWN-I-OPERATOR, this terminal is now an operator's console
%%%%%%%%%%%  OPCOM  12-JUL-2005 18:47:51.01  %%%%%%%%%%%
Operator status for operator _RSNVMS$OPA0:
CENTRAL, PRINTER, TAPES, DISKS, DEVICES, CARDS, NETWORK, CLUSTER, SECURITY,
...
```

NOTE: HP OpenVMS I64 does not support the POWER_OFF shutdown option.

Booting and Shutting Down Microsoft Windows

This section describes how to boot and shut down Microsoft Windows on entry class HP Integrity servers and how to add Windows entries to the system boot options list.

- "Adding Microsoft Windows to the Boot Options List" (page 118)
- "Booting the Microsoft Windows Operating System" (page 119)
- "Shutting Down Microsoft Windows" (page 119)

Adding Microsoft Windows to the Boot Options List

NOTE: The operating system installer automatically adds an entry to the boot options list.

To add a Microsoft Windows entry to the system boot options list, follow these steps:

1. Access the EFI Shell environment.

   a. Log in to the iLO 2 MP and enter `CO` to access the system console.

   b. Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled `EFI Boot Manager`.

   c. From the **EFI Boot Manager** menu, select **EFI Shell** to access the EFI Shell environment.

2. Access the EFI System Partition (`fs`*X*`:` where *X* is the file system number) for the device from which you want to boot Microsoft Windows.

   For example, enter `fs2:` to access the EFI System Partition for the bootable file system number `2`. The EFI Shell prompt changes to reflect the file system currently accessed.

   The full path for the Microsoft Windows loader is `\efi\microsoft\winnt50\ia64ldr.efi` and it is on the device you are accessing.

   NOTE: You must only initiate this loader from the EFI Boot Menu, not from the EFI Shell.

3. List the contents of the `\EFI\Microsoft\WINNT50` directory to identify the name of the Windows boot option file (`Boot00nn`) that you want to import into the system boot options list.

```
fs0:\> ls EFI\Microsoft\WINNT50
Directory of: fs0:\EFI\Microsoft\WINNT50

  09/18/03  11:58a <DIR>          1,024  .
  09/18/03  11:58a <DIR>          1,024  ..
  12/18/03  08:16a                  354  Boot0001
          1 File(s)         354 bytes
          2 Dir(s)


fs0:\>
```

4. Issue the **`\MSUtil\nvrboot.efi`** command to launch the Microsoft Windows boot options utility. For example:

```
fs0:\> msutil\nvrboot

NVRBOOT: OS Boot Options Maintenance Tool [Version 5.2.3683]

   1. SUSE SLES 9
   2. HP-UX Primary Boot: 0/0/1/0/0.2.0
 * 3. Windows Server 2003, Datacenter
   4. EFI Shell [Built-in]

  * = Windows OS boot option

  (D)isplay (M)odify (C)opy E(x)port (I)mport (E)rase (P)ush (H)elp (Q)uit
```

```
Select>
```

5. Use the **Import** command to import the Window boot option file. For example:

```
Select> i
Enter IMPORT file path: \EFI\Microsoft\WINNT50\Boot0001
Imported Boot Options from file: \EFI\Microsoft\WINNT50\Boot0001

Press enter to continue
```

6. Type **Q** to quit the NVRBOOT utility.
7. Exit the console and iLO 2 MP interfaces if you are finished using them.

   Press **Control-B** to exit the system console and return to the **MP Main Menu**. To exit the iLO 2 MP, type `X` at the **MP Main Menu**.

Booting the Microsoft Windows Operating System

To boot the Windows Server 2003 operating system on an HP Integrity server, follow these steps:

1. Access the **EFI Boot Manager** menu for the system on which you want to boot Windows.

   a. Log in to the iLO 2 MP and enter the `CO` command to select the system console.

   b. Confirm that you are at the **EFI Boot Manager** menu. If you are at another EFI menu, select **Exit** from the submenus until you return to the screen labeled `EFI Boot Manager`.

2. Select an item from the boot options list.

   Each item in the boot options list references a specific boot device and provides a specific set of boot options or arguments to be used when booting the device.

3. Press **Enter** to initiate booting using the selected boot option.
4. Once Windows begins loading, wait for the Special Administration Console (SAC) to become available.

   The SAC interface provides a text-based administration tool that is available from the system console. For example.

```
Loading.: Windows Server 2003, Datacenter
Starting: Windows Server 2003, Datacenter


                                Starting Windows...
********************************************************************************

Computer is booting, SAC started and initialized.

Use the "ch -?" command for information about using channels.
Use the "?" command for general help.

SAC>
```

   For details see the SAC online help (type ? at the SAC> prompt)

5. Exit the console and iLO 2 MP interfaces when finished using them.

   Press **Control-B** to exit the console and return to the **MP Main menu**. To exit the iLO 2 MP, type `X` at the **MP Main menu**.

Shutting Down Microsoft Windows

△ **CAUTION:** Do not shut down Windows Server 2003 SAC `restart` or `shutdown` commands under normal circumstances. Issuing `restart` or `shutdown` at the `SAC>` prompt causes the system to restart or shut down immediately and can result in the loss of data.

Use the Windows **Start** menu or the `shutdown` command to shut down gracefully.

To shut down Windows Server 2003 use one of the following methods.

- "Shutting Down Windows from the **Start** Menu" (page 120)
- "Shutting Down Windows from the Command Line" (page 120)

Shutting Down Windows from the **Start** Menu

Select **Shut Down** from the **Start** menu and select either **Restart** or **Shut down** from the pull-down menu.

The **Restart** menu item shuts down and restarts the system. The **Shut down** menu item shuts down the system.

You can use this method when using a graphical interface to the system.

Shutting Down Windows from the Command Line

You can issue the **shutdown** command from a command prompt through the Special Administration Console (SAC) or from any other command line.

The Windows `shutdown` command includes the following options:

`/s` Shuts down and powers off the system. This is the equivalent of **Start—>Shut Down, Shut down**. To power on the system, use the iLO 2 MP `PC` command.

`/r` Shuts down and restarts the system. This is the equivalent of **Start—>Shut Down, Restart**.

`/a` Aborts a system shutdown.

`/t xxx` Sets the timeout period before shutdown to *xxx* seconds. The timeout period ranges from 0–600, with a default of 30.

See the `help shutdown` Windows command for details.

To shutdown Windows from the command line, follow these steps:

1. Log in to Windows running on the system that you want to shut down.

   For example, access the system console and use the SAC interface to start a command prompt, from which you can issue Windows commands to shut down the system.
2. Check to see whether any users are logged in. Use the `query user` or `query session` command.
3. Issue the **shutdown** command and the appropriate options to shut down the Windows Server 2003 on the system.

   Use one of the following options when shutting down Windows:

   - To shut down Windows and reboot, issue the following command:

     shutdown /r
   - To shut down Windows and power off server hardware, issue the following command:

     shutdown /s

     NOTE: To reboot a powered off system you must power on the system using the `PC` command at the iLO 2 MP Command menu
   - To abort a shutdown, issue the following command:

     shutdown /a

   For example:

   ```
   shutdown /r /t 60 /c "Shut down in one minute."
   ```

   This command initiates a Windows system shutdown and reboot after a timeout period of 60 seconds. The `/c` option specifies a message that is broadcast to any other users of the system.

Booting and Shutting Down Linux

This section covers booting and shutting down Linux on entry class HP servers. Procedures for Red Hat Enterprise Linux and SuSE Linux Enterprise Server are included in this section.

- To add a Linux entry to the boot options list, see "Adding Linux to the Boot Options List" (page 121).
- To boot Linux on entry class HP Integrity servers, use the following procedures.
  - See "Booting the Red Hat Enterprise Linux Operating System" (page 122).
  - See "Booting the SuSE Linux Enterprise Server Operating System" (page 122).
- To shut down either Red Hat Enterprise Linux or SuSE Linux Enterprise Server, see "Shutting Down Linux" (page 123).

Adding Linux to the Boot Options List

This section describes how to add a Linux entry to the system boot options list. The processes for adding both Red Hat Enterprise Linux and SuSE Linux Enterprise Servers are included.

NOTE: On HP Integrity servers, the operating system installer automatically adds an entry to the boot options list.

To add a Linux item to the boot options list, follow these steps:

1. Access the EFI Shell.

   a. Log in to the iLO 2 MP and enter the `CO` command to access the system console.

   b. Confirm that you are at the **EFI Boot Manager** menu (the main EFI menu). If you are at another EFI menu, select **Exit** from the submenus until you return to the screen with the `EFI Boot Manager`.

   c. Select the **EFI Shell** to access the EFI Shell environment.

2. Access the EFI System Partition (`fs`*`X`*`:` where *`X`* is the file system number) for the device from which you want to boot Linux.

   For example, enter `fs2:` to access the EFI System Partition for the bootable file system number `2`. The EFI Shell prompt changes to reflect the file system currently accessed.

   The full path for the Red Hat Enterprise Linux loader is `\EFI\redhat\elilo.efi` and it is on the device you are accessing.

   The full path for the SuSE Linux Enterprise Server loader is `\efi\SuSE\elilo.efi`, and it is on the device you are accessing.

3. Use the `bcfg` command to manage the boot options list.

   The `bcfg` command includes the following options for managing the boot options list:

   - `bcfg boot dump` — Displays all items in the boot options list for the system.
   - `bcfg boot rm #` — Removes the item number specified by `#` from the boot options list.
   - `bcfg boot mv #a #b` — Moves the item number specified by *`#a`* to the position specified by *`#b`* in the boot options list.
   - `bcfg boot add # file.efi "Description"` — Adds a new boot option to the position in the boot options list specified by `#`. The new boot option references *`file.efi`* and is listed with the title specified by *`Description`*.

     For example, `bcfg boot add 1 \EFI\redhat\elilo.efi "Red Hat Enterprise Linux"`adds a Red Hat Enterprise Linux item as the first entry in the boot options list.

Likewise, `bcfg boot add 1 \efi\SuSE\elilo.efi "SLES 9"` adds a SuSE Linux item as the first entry in the boot options list.

See the `help bcfg` command for details.

4. Exit the console and iLO 2 MP interfaces if you are finished using them.

   Press **Control-B** to exit the system console and return to the **MP Main Menu**. To exit the iLO 2 MP, enter `X` at the **MP Main Menu**.

Booting the Red Hat Enterprise Linux Operating System

You can boot the Red Hat Enterprise Linux operating system on HP Integrity servers using either of these methods:

- "Booting Red Hat Enterprise Linux from the EFI Boot Manager Menu" (page 122)
- "Booting Red Hat Enterprise Linux from the EFI Shell" (page 122)

Booting Red Hat Enterprise Linux from the EFI Boot Manager Menu

NOTE: If Red Hat is booted from the iLO 2 MP, set console=ttyS0 at the `elilo` prompt to redirect console output to the iLO 2 MP.

1. Select a Red Hat Enterprise Linux entry from the **EFI Boot Manager** menu.
2. To load the Red Hat Enterprise Linux operating system at the **EFI Boot Manager** menu, select its entry from the list of boot options.
3. Selecting a Linux entry from the boot options list boots the operating system using `ELILO.EFI` loader and the `elilo.conf` file.

Booting Red Hat Enterprise Linux from the EFI Shell

1. Access the EFI Shell.

   From the system console, select **EFI Shell** from the **EFI Boot Manager** menu to access the shell.

2. Access the EFI System Partition for the Red Hat Enterprise Linux boot device.

   Use the `map` EFI Shell command to list the file systems (`fs0`, `fs1`, and so on) that are known and mapped.

   To select a file system to use, enter its mapped name followed by a colon (`:`). For example, to operate with the boot device that is mapped as `fs3`, enter **`fs3:`** at the EFI Shell prompt.

3. Enter **`ELILO`** at the EFI Shell command prompt to launch the `ELILO.EFI` loader.

   If needed, you can specify the loader's full path by entering **`\EFI\redhat\elilo`** at the EFI Shell command prompt.

4. Allow the `ELILO.EFI` loader to proceed with booting the Red Hat Enterprise Linux kernel.

   By default, the `ELILO.EFI` loader boots the kernel image and options specified by the default item in the `elilo.conf` file.

   To interact with the `ELILO.EFI` loader, interrupt the boot process, for example, type a space at the `ELILO boot`

   prompt.To exit the loader, use the `exit` command.

Booting the SuSE Linux Enterprise Server Operating System

You can boot the SuSE Linux Enterprise Server 9 operating system on HP Integrity servers using either of these methods:

- "Selecting a SuSE Linux Enterprise Server entry from the EFI Boot Manager menu" (page 123)
- "Booting SuSE Linux Enterprise Server from the EFI Shell" (page 123).

Selecting a SuSE Linux Enterprise Server entry from the EFI Boot Manager menu

1. Access the **EFI Boot Manager** menu.
2. Select its entry from the list of boot options.
3. Choose a Linux entry from the boot options list to boot the operating system using `ELILO.EFI` loader and the `elilo.conf` file.

Booting SuSE Linux Enterprise Server from the EFI Shell

1. From the system console, select **EFI Shell** from the **EFI Boot Manager** menu to access the EFI Shell.
2. Access the EFI System Partition for the SuSE Linux Enterprise Server boot device.

   Use the `map` EFI Shell command to list the file systems (`fs0`, `fs1`, and so on) that are known and mapped.

   To select a file system to use, enter its mapped name followed by a colon (`:`). For example, to operate with the boot device that is mapped as `fs3`, enter **`fs3:`** at the EFI Shell prompt.
3. Enter **`ELILO`** at the EFI Shell command prompt to launch the `ELILO.EFI` loader.

   If needed, you can specify the loader's full path by entering **`\efi\SuSE\elilo`** at the EFI Shell command prompt.
4. Allow the `ELILO.EFI` loader to proceed with booting the SuSE Linux kernel.

   By default, the `ELILO.EFI` loader boots the kernel image and options specified by the default item in the `elilo.conf` file.

   To interact with the `ELILO.EFI` loader, interrupt the boot process, for example, type a space at the `ELILO boot` prompt. To exit the loader, use the `exit` command.

Shutting Down Linux

Use the `shutdown` command to shut down Red Hat Enterprise Linux or SuSE Linux Enterprise Server.

The Red Hat Enterprise Linux and SuSE Linux Enterprise Server `shutdown` command has the following options:

`-h` Powers off the server after shutdown.

Use the `PC` command at the iLO 2 MP command menu to manually power on or power off server hardware, as needed.

`-r` Reboots after shutdown.

`-c` Cancels a shutdown in progress.

`time` Determines when to shut down. (Required.) You can specify *`time`* in any of the following ways:

- Absolute time in the format *`hh`*:*`mm`*, in which *`hh`* is the hour (one or two digits) and *`mm`* is the minute (two digits).
- Number of minutes to wait in the format `+`*`m`*, in which *`m`* is the number of minutes.
- `now` to immediately shut down; this is equivalent to using `+0` to wait zero minutes.

For details see the *shutdown*(8) Linux manpage. Also see the Linux manpage for the `poweroff` command.

To shutdown Linux, follow these steps:

1. Log in to Linux running on the system you want to shut down.
2. Issue the **`shutdown`** command with the desired command-line options, and include the required *`time`* argument to specify when the operating system shutdown is to occur.

   For example, `shutdown -r +20` shuts down and reboots the system in twenty minutes.

5 Troubleshooting

This chapter provides preferred strategies, procedures, and tools for troubleshooting rx3600 server error and fault conditions.

This chapter addresses the following topics:

- "Methodology" (page 124)
- "Troubleshooting Tools" (page 131)
- "Errors and Reading Error Logs" (page 138)
- "Supported Configurations" (page 139)
- "CPU, Memory and SBA" (page 142)
- "System Power (BPS and I/O VRM)" (page 148)
- "Cooling Subsystem" (page 150)
- "Common I/O Backplane " (page 151)
- "Management Subsystem " (page 154)
- "I/O Subsystem " (page 155)
- "Booting " (page 156)
- "Firmware" (page 157)
- "Server Interface" (page 158)
- "Environment " (page 159)
- "Reporting Your Problems to HP" (page 159)

Methodology

General Troubleshooting Methodology

There are multiple entry points to the troubleshooting process, depending on your level of troubleshooting expertise; the tools, processes, and procedures available, and the type of system fault or failure.

Typically, you select from a set of symptoms, ranging from very simple (System LED is blinking) to the most difficult (Machine Check Abort, for example, MCA, has occurred). The following is a list of symptom examples:

- Front Panel LED blinking
- System Alert present on console
- System will not power on
- System will not boot
- Error or event message received
- Machine Check Abort (MCA) occurred

Next, you narrow down the observed problem to isolate the failure to a specific part of the server, so that you can perform more detailed troubleshooting. For example:

- Problem- Front Panel LED blinking

  NOTE: The Front Panel Health LEDs will be flashing amber with a warning indication, or flashing red with a fault indication.

  - System Alert on console?
  - Analyze the alert by using the system event log (SEL), to identify the last error logged by the server. Use the iLO 2 MP commands to view the SEL, using either the iLO 2 MP serial text interface, telnet, SSH, or web GUI on the iLO 2 MP LAN.

At this point, you will have a good idea about which area of the system requires further analysis. For example, if the symptom was "system will not power on", the initial troubleshooting procedure may have indicated a problem with the DC power rail not coming up after the power switch was turned on.

You have now reached the point where the failed Field Replaceable Unit (FRU or FRUs) has been identified and needs to be replaced. You must now perform the specific removal and replacement procedure, and verification steps. See Chapter 6: "Removing and Replacing Server Components" (page 161) for information.

NOTE: If multiple FRUs are identified as part of the solution, a fix cannot be guaranteed unless all identified failed FRUs are replaced.

There may be specific recovery procedures you must perform to finish the repair. For example, if the core I/O board FRU is replaced, restore customer specific information.

NOTE: Always check the iLO 2 MP system event logs (SEL) in the case of a blinking yellow or red front panel LED, before replacing any hardware.

NOTE: For system level 3-5 alerts, the attention condition on the system LED can be cleared by accessing the logs using the `sl` command, available in the MP Main Menu. To access the iLO 2 MP from the console serial port, enter **Control+B** or **ESC-(** .

Recommended Troubleshooting Methodology

The recommended methodology for troubleshooting a server error or fault is as follows:

1. Consult the system console for any messages, emails, or other information, pertaining to the server error or fault.
2. View the front panel LEDs (Power, External Health, Internal Health, and System Health), either locally, or remotely using the iLO 2 MP `vfp` command.
3. Compare the state of the server LEDs (off; flashing or steady; Red, Green, or Amber) with the LED states listed in Table 40.
4. Go to the step number of Table 41, specified in the rightmost column of Table 40, located in the row which corresponds to your front panel LED display state.
5. Read the symptom and condition information in the leftmost column of Table 41.
6. Perform the action(s) specified in the "Action" column.
7. If more details are required, see the appropriate subsection of this chapter, where this information is provided in the **Action** column. The action you are directed to perform may be to access and read one or more error logs (such as, Event Log and/or Forward Progress Log).

While we do suggest that all users follow the recommended troubleshooting methodology, and use the Basic and Advanced Troubleshooting Tables in the next subsection, as a more experienced troubleshooter you may elect to go directly to the subsection of this chapter (or section of this manual) which corresponds to your own entry point of choice. Table 39 provides the corresponding

subsection or location title for these different entry points (for example, if you would prefer to start by examining the logs, you can go directly to the subsection entitled "Errors and Reading Error Logs" (page 138).

Table 39 lists the troubleshooting entry points.

Table 39 Troubleshooting Entry Points

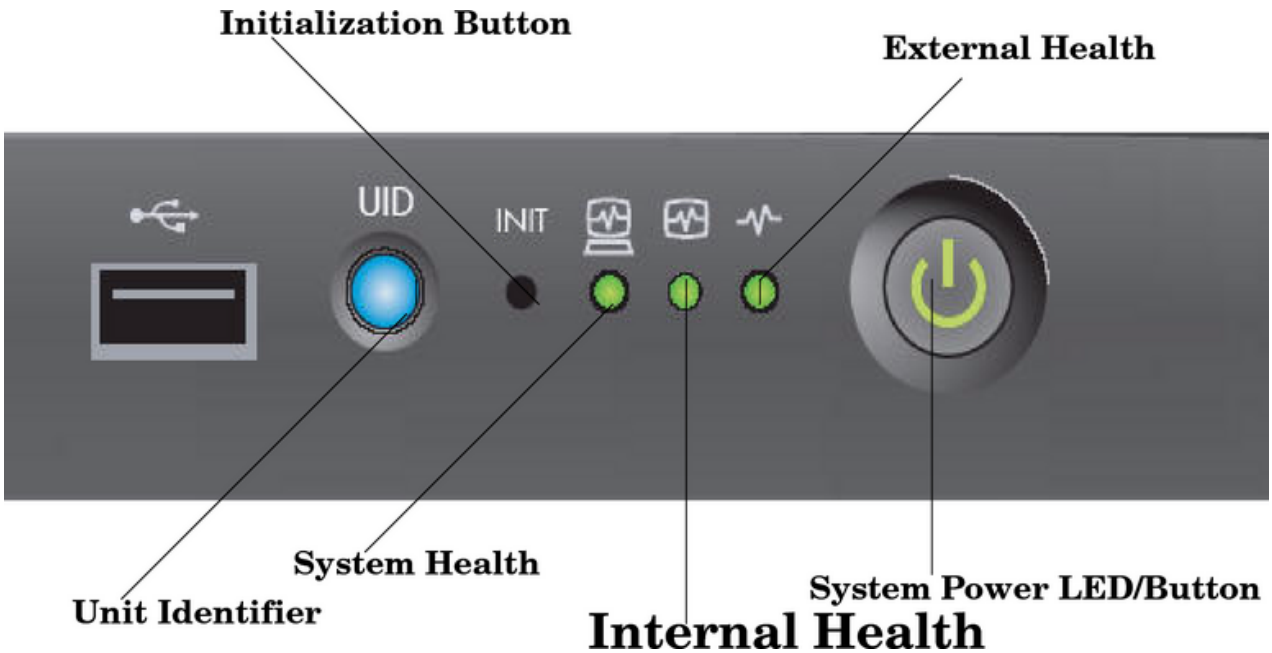
Entry Point	Subsection or Location
Front panel/Diagnostic panel LEDs	"Troubleshooting Tools" (page 131)
System Event Log and Forward Progress Logs	"Errors and Reading Error Logs" (page 138)
offline and online Diagnostics/INIT button	"Troubleshooting Tools" (page 131)
System Event Analyzer (SEA)	"Troubleshooting Tools" (page 131)

Basic and Advanced Troubleshooting Tables

The following troubleshooting tables are designed for use by both trained and untrained support personnel. They should be the first tool used to determine the symptom(s) or condition of a suspect server. Be aware that the state of the front panel LEDs can be viewed either locally, or remotely by using the `vfp` command from the iLO 2 MP.

The tables are designed to cover troubleshooting symptoms from AC power on up to booting the operating system (OS), specifically in Steps 1-5. In most cases, the Table 40 identifies the step number in Table 41 where troubleshooting should begin. Alternatively, you can skip Table 40, and start with Step 1 in Table 41, sequencing through the table steps to locate the symptom/condition most descriptive of your current server status; this will become the first step in your troubleshooting procedure. Where appropriate, an action or actions prescribed in the "Action" column of Table 41 will be followed by a reference to a corresponding subsection of this chapter for further information.

Figure 45 Front Panel LEDs



NOTE: The Unit Identifier (UID)/Locator LED has not been included in Table 40, because it is not used directly for troubleshooting rx3600 servers. However, indirectly, it can provide system information; for example, when it is blue, the BMC is working.

The INIT Button, a momentary switch with pinhole access, used to cause a system INIT or Transfer of Control (TOC), is not discussed in the following tables either. It is similar to a system reset, preserving the entire memory image, so that you can obtain a crash dump and receive OS error information. This button can be used to recover a hung system, and to obtain information useful for debugging -- it is less harsh than a power reset.

NOTE: In Table 40, LED states indicating error conditions are provided in bold, italic, uppercase (for example, "***FLASHING AMBER***").

Table 40 lists the front panel LED states.

Table 40 Front Panel LED States

System Health	Internal Health	External Health	System Power	Basic Entry Class Troubleshooting Table Step Number
Off	Off	Off	Off	1 in Table 41
Off	Off	Off	Steady amber	2a in Table 41
FLASHING AMBER OR RED	Steady green/off	***FLASHING AMBER***	Steady green	2b/2c in Table 41
Off	***FLASHING AMBER***	Steady green	Steady green	8b in Table 42
FLASHING AMBER OR RED	***FLASHING AMBER***	Steady green	Steady green	3a/3b in Table 41
Off	Steady green	Steady green	Steady green	4a, 4b, 4c, and 4d in Table 41
Steady green/off	Steady green	Steady green	Steady green	8a in Table 42
Steady green	Steady green	Steady green	Steady green	5, 6, and 7 in Table 41 and Table 42

Table 41 lists basic entry class server troubleshooting conditions and actions.

Table 41 Basic Entry Class Troubleshooting

Step	Condition	Action
1	Chassis appears dead -- no front panel LEDs are on and no fans are running.	Nothing is logged for this condition. 1. For new server installations, review the install procedures. 2. Verify that the power cords are connected to both the power supplies and to the AC receptacles. 3. Verify that acpower, at the proper AC voltage levels, is available to the receptacles. 4. Check the front panel connector and the cable to the rest of the system. 5. If the Power button integrated LED on front panel remains off, reseat the power supplies, replace the power cords, and replace the bulk power supplies, in that order. See"System Power (BPS and I/O VRM)" (page 148) for information.

Table 41 Basic Entry Class Troubleshooting *(continued)*

Step	Condition	Action
		The problem is fixed when the front panel LED states are as follows: system health is off; internal health is off; external health is off; and power is steady amber.
2a	Server does not power on after front panel Power button is depressed for less than four seconds. **NOTE:** This step assumes BMC is running.	A fatal fault has been detected and logged, attempting to power on the server (system health is off, internal health is off, external health is off, and power is steady amber). 1. Examine each power supply LEDs -- if the LED is not steady green, replace power supply. See "System Power (BPS and I/O VRM)" (page 148) for information. 2. Examine the iLO 2 MP logs for events related to bulk power supplies. See "System Power (BPS and I/O VRM)" (page 148) for information. The problem is fixed when the BMC's heartbeat LED is flashing green, and the front panel LEDs are as follows: system health is off, internal health is off, external health is off, and power is steady green.
2b	Both front panel system health and external health LEDs are flashing amber.	A warning or critical failure was detected and logged after the server powered on (system health is flashing amber, internal health is off /steady green, external health is flashing amber, and power is steady green). 1. Examine each power supply LED. If any power supply LED is not steady green, replace the power supply. See "System Power (BPS and I/O VRM)" (page 148) for information. The problem is fixed when the iLO 2 MP logs are read, and the front panel LED states are as follows: system health is off, internal health is off/ steady green, external health is steady green, and power is steady green.
2c	Front panel system health LED is flashing red and external health LED is flashing amber.	A fatal fault was detected and logged after server powered on (system health is flashing red, internal health is off/steady green, external health is flashing amber, and power is steady green). 1. Examine each power supplyLED. If any power supply LED is not steady green, replace that power supply. See "System Power (BPS and I/O VRM)" (page 148) for information. The problem is fixed when the iLO 2 MP logs are read, and the front panel LED states are as follows: system health is off, internal health is off/steady green, external health is steady green, power is steady green.
3a	Both front panel system health LED and internal health LED are flashing amber.	A warning or critical failure was detected and logged, while booting or running system firmware (system health is flashing amber, internal health is flashing amber, external health is steady green, and power is steady green). 1. Check the Diagnostic LED panel to identify the failed or faulty internal FRU. See "Troubleshooting Tools" (page 131) for information. The problem is fixed when a redundant, internal FRU is replaced, the iLO 2 MP logs are read, and the front panel LED states are as follows: system health is off, internal health is steady green, external health is steady green, and power is steady green.
3b	Front panel system health LED is flashing red and internal health LED is flashing amber.	A fatal fault was detected and logged, while booting or running system firmware (system health is flashing red, internal health is flashing amber, external health is steady green, and power is steady green). 1. Check the Diagnostic LED panel to identify the failed or faulty internal FRU. See "Troubleshooting Tools" (page 131) for information. The problem is fixed when a redundant, internal FRU is replaced, the iLO 2 MP logs are read, and the front panel LED states are as follows: system health is off, internal health is steady green, external health is steady green, and power is steady green.

Table 41 Basic Entry Class Troubleshooting *(continued)*

Step	Condition	Action
4a	Cannot see the iLO 2 MP prompt on the system console – server power is off/on.	Front panel LEDs indicate that the server is either booting or running system firmware, or is booting or running the OS (system health is off/steady green, internal health is steady green, external health is steady green, and power is steady green). Nothing may be logged for this condition. 1. Check the console cables and console configuration. 2. Examine the iLO 2 MP heartbeat LED. If the LED is off, the iLO 2 MP is not operational; if the LED is flashing amber, a ROM error exists. 3. Reset the iLO 2 MP using the pinhole Reset button on the core I/O card. 4. If the iLO 2 MP reset does not fix the problem, replace the core I/O FRU board. See"Management Subsystem " (page 154) for information. The problem is fixed when the iLO 2 MP heartbeat LED and the system health LED are steady green.
	Still no iLO 2 MP prompt on system console, and front panel LEDs indicate that the server is either booting or running the OS.	Nothing may be logged for this condition (Note: if the iLO 2 MP is off, the system health will be off as well). 1. Verify that the proper terminal type is set. Supported settings are hpterm, VT100+ (default), and VTUTF8. 2. Verify that the RS232C configuration matches between the server and the local console or modem. See "Supported Configurations" (page 139) for information. 3. Look for loose, damaged, or disconnected power and signal cables on the I/O backplane FRU. The problem is fixed when the MP Main Menu appears on the system console, and the system health is steady green.
4b	Cannot see the EFI prompt on the system console, and front panel LEDs indicate that the server is either booting or running the OS.	Nothing may be logged for this condition (system health is off, internal health is steady green, external health is steady green, and power is steady green). 1. Examine the state of the three LEDs, located in the back left corner of the chassis, visible through the perforations in the chassis. Server (logic and system firmware) stages are tracked by the PDH FPGA, using these three LEDs . See "Troubleshooting Tools" (page 131) for information. 2. Examine the iLO 2 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices. See "Errors and Reading Error Logs" (page 138) for information. The problem is fixed when the EFI menu appears on the system console, and system firmware booting completes.
4c	Cannot find a boot disk or removable media drive.	Nothing may be logged for this condition (system health is off, internal health is steady green, external health is steady green, and power is steady green). 1. Examine the boot device to determine if it is plugged into its drive bay properly. 2. Examine the drive cabling for any problems. 3. Examine the boot path settings. 4. Examine the iLO 2 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices. See "Errors and Reading Error Logs" (page 138) for information. The problem is fixed when all boot devices are found.

Table 41 Basic Entry Class Troubleshooting *(continued)*

Step	Condition	Action
4d	RAID channel redundancy failures.	Nothing is logged for this condition (system health is off, internal health is steady green, external health is steady green, and power is steady green). 1. Examine the LED next to each RAID connector. If this LED is either steady amber or steady red, it indicates the RAID drives are degraded or corrupted, respectively. 2. Replace the RAID HBA. The problem is fixed when all of these LEDs remain off after the next power on.
5	Cannot see the OS prompt on the system console.	Front panel LEDs indicate that the server's power is turned on, and that the server is either booting or running the OS. Nothing may be logged for this condition (system health is steady green, internal health is steady green, external health is steady green, power is steady green). 1. Examine the iLO 2 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices. See "Errors and Reading Error Logs" (page 138) for information. **NOTE:** Be sure to check the console settings from the Boot Manager for your OS. The problem is fixed when the OS prompt appears on the system console.

Table 42 Advanced Entry Class Troubleshooting

Step	Symptom/Condition	Action
6	Cannot read the system event log from the system console.	System event logging has stopped due to a presumed BMC malfunction (system health is steady green, internal health is steady green, external health is steady green, and power is steady green). 1. Examine the console messages for any EFI errors or warnings about BMC operation or communications. 2. Examine the BMC heartbeat LED; if it is not flashing green, replace the core I/O board FRU. See "Management Subsystem " (page 154) for information. 3. Test the operation of the BMC by toggling the UID locator switch LED on the front panel. The blue LED is turned on/off by the BMC when the switch is toggled The problem is fixed when the BMC heartbeat LED is flashing green, and the system event log resumes logging.
7	OS is non-responsive (hung).	Front panel LEDs indicate that the server power is turned on, and it is either booting or running the OS (system health is steady green, internal health is steady green, external health is steady green, and power is steady green). Nothing may be logged for this condition. 1. Reset the system using one of the following methods: a. Use the iLO 2 MP to reset the system: • From the command menu of the text interface through SSH or Telnet, use the `TC` command. • From the web GUI, **Reset through INIT or TOC signal** from the **Power & Reset** menu on the **Virtual Devices** tab. For more information see the *HP Integrity iLO 2 Operations Guide*. b. Use a tool (such as a ACX-10 Torx screwdriver or appropriately size allen wrench) to depress the INIT button on the front panel to start system initialization. 2. Reboot the OS.

Table 42 Advanced Entry Class Troubleshooting *(continued)*

Step	Symptom/Condition	Action
		3. Obtain the system hardware status dump for root cause analysis. 4. Examine the iLO 2 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices. See "Errors and Reading Error Logs" (page 138) for information. The problem is fixed when the root cause has been determined, and the OS is running normally.
8a	Machine Check Abort (MCA) occurs during server operation; the server reboots the OS.	Front panel LEDs indicate that the server detected a fatal error that it cannot recover from using OS recovery routines (system health is flashing red, internal health is steady green, external health is steady green, and power is steady green). 1. Capture the MCA dump with the EFI command:`errdumpmca` . If the system can boot the OS, you can capture binary MCA dump files online. 2. Examine the iLO 2 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices. See "Errors and Reading Error Logs" (page 138) for information. The problem is fixed when the MCA does not repeat, or the source of the MCA has been determined and repaired.
8b	Machine Check Abort (MCA) occurs during server operation; server reboot of OS is prevented. **NOTE:** The troubleshooting actions for this step are identical to those in Step 8a, except that the server in this step must be hard reset to begin the booting process **NOTE:** You must hard reset the server to clear the fatal condition and boot the OS.	The front panel LEDs indicate that the server detected a fatal, front side bus error caused by MBEs reading cache or DIMM, or by any parity in the I/O path between SBA, LBA, or HBA (system health is off, internal health is flashing amber, external health is steady green, and power is steady green). System firmware gathers and logs all error data for this MCA event. 1. Examine the iLO 2 MP logs for entries related to processors, processor power modules (PPMs), shared memory, and core I/O devices. See "Errors and Reading Error Logs" (page 138) for information. The problem is fixed when the MCA does not repeat.

Troubleshooting Tools

There are a number of tools available for troubleshooting HP Integrity rx3600 servers, including LEDs, online and offline diagnostics, and system fault management tools.

LEDs

The HP Integrity rx3600 server provides front panel LED, diagnostic panel LED, and FRU health LEDs, which allow you to monitor system health.

Front Panel

The front panel of the HP Integrity rx3600 server contains the Power button/System Power LED, Internal Health LED, External Health LED, System Health LED, UID Button/LED, and an INIT button. The server uses flashing states (for example, flashing amber or red) on these LEDs to indicate a warning or an error. See Figure 45 for a detailed layout of these front panel indicators and buttons.

When you power on the server, the LEDs light up as follows:

1. Power LED turns green when the system starts to power up
2. External health indicator turns green when the BMC powers on
3. Internal health indicator turns green when the `BOOT_START` event is received from system firmware

NOTE: `BOOT_START` can be determined by LED states on the I/O backplane board.

4. The system health indicator turns green when the firmware leaves `exit boot services` and the server starts to boot an OS.

The health LEDs are driven by the BMC; the System Power LED is driven solely by hardware. BMC code determines the state of the Internal and External Health LEDs. The iLO 2 MP code, examining incoming events using its event dictionary, determines the state of the System Health LED.

External Health LED

The front panel External Health LED indicates the status of the components that are externally serviceable. It is used to monitor the power supply. Whenever the external health LED is lit, the corresponding FRU for the failed component also lights.

NOTE: Failures that cause the External Health LED to light do not cause the Internal Health LED to light. These two LEDs cover failures of different components.

Table 43 lists the External Health LED states

Table 43 External Health LED States

LED Color	Flash Rate	State
Off	Off	Health good on all external CRUs or system power is off.
Green	Steady	System power is on; externally serviceable components (accessible from front or back, such as fans and power supplies) are healthy.
Amber	1 Hz	An externally accessible CRU failed. System is on or in standby mode. Usually, this is a power supply or fan failure. Check front/back LEDs for failed component.

This LED is cleared when all failed externally accessible entities are repaired and report that they are healthy, or when the system goes into AC/standby power cycle.

Table 44 lists the iLO 2 MP strings in the Virtual Front Panel (VFP) for the three states of the External Health LED

Table 44 VFP External Health Description

LED State	Description
Off	None.
Green	External parts, including fans and power supplies are healthy.
Flashing amber	A redundant, externally accessible CRU has failed. Check the front/back LEDs.

Internal Health LED

The front panel Internal Health LED indicates the status of the internal system chassis components. You must open the system to service these components. This LED maintains its state when the system is in standby mode (system power turned off but AC power still applied to the system).

The amber indicators on this LED correspond to internal health conditions that light other LEDs in the box, indicating which component must be serviced to correct the fault. For example, the Diagnostic LED board has a fault indicator lit when this LED shows amber. Failures that cause the Internal Health LED to light do not cause the External Health LED to light.

Table 45 lists the internal health LED states.

Table 45 Internal Health LED States

LED Color	Flash Rate	State
Off	Off	Health is good on all internal CRUs or system is off.
Green	Steady	Health good on all internal CRUs, and system firmware has passed `BOOT_START`.
Amber	1 Hz	An internally accessible CRU failed. The system is on or in standby mode. Check the Diagnostic Panel or internal system LEDs.

The Internal Health LED clears when all failed internally accessible entities are repaired and report that they are healthy, or on any AC/standby power cycle. For details on how each LED in the Diagnostic panel is cleared, see "Diagnostics Panel LEDs" (page 134) and the HP Integrity rx3600 system specification.

Table 46 lists the iLO 2 MP strings in the VFP for the three states of the internal health LED.

Table 46 VFP Internal Health Description

LED Color	State
Off	None.
Green	Internal parts, including CPUs and memory are healthy.
Flashing amber	An internally accessible CRU failed. Check the Diagnostic panel.

System Health LED

This LED indicates the overall health state of the system, including the state of system firmware and the OS. If the LED is amber or red, the system needs attention. Examine the event logs for details of the problem.

The System Health LED performs the following tasks:

- Carries forward the ATTENTION functionality of legacy Integrity and HP 9000 front panel designs
- Indicates whether the server is up or down. External and Internal Health LEDs do not indicate whether the server is booted.
- Covers the wide range of faults for which the software and firmware do not definitively state that a FRU must be reseated or replaced. External and Internal Health LEDs do not light unless the software or firmware makes a solid determination that a FRU must be reseated or replaced.

Table 47 lists the system health LED states.

Table 47 System Health LED States

LED Color	Flash Rate	State
Off	Off	System is off, or system is booting firmware with no failures since the SEL logs were last examined.
Green	Steady	System has finished the firmware boot, and an OS is booting or running with no failures since the SEL logs were last examined.
Amber	1 Hz	A warning or critical failure has been detected and logged.
Red	2 Hz	A fatal fault has been detected and logged.

Table 48 lists the iLO 2 MP strings in the VFP for the four states of the system health LED.

Table 48 VFP System Health Description

LED Color	State
Off	None.
Green	The OS is booting or running.
Flashing amber	Warning or critical fault. Check the logs for details.
Flashing red	Fatal fault. The system crashed or cannot boot. Check the logs for details.

Unit Identifier Button/LED

The UID Button/LED enables you to identify a specific system in a rack or data center environment. one UID Button/LED is located in the front panel and a second is located at the rear of the chassis. LEDs are incorporated into the pushbuttons to save space. Both buttons are toggle switches. Push it once to turn on the LED and push it again to turn off the LED. Press either the front panel UID Button/LED , or enter the `iLO 2 MP` and `LOC` commands to light both the rear panel LEDs.

Diagnostics Panel LEDs

The Diagnostics Panel improves serviceability by enabling you to look in a single location for the LEDs that provide failing FRU locating and mapping information. These amber LEDs are only lit when a failure occurs; otherwise, they are not lit. A label on the panel is oriented similarly to the orientation of the components within the server. A diagnostic LED exists for each FRU in the system, including all DIMMs.

Figure 46 displays the diagnostic panel LEDs.

Figure 46 rx3600 Diagnostic Panel LEDs

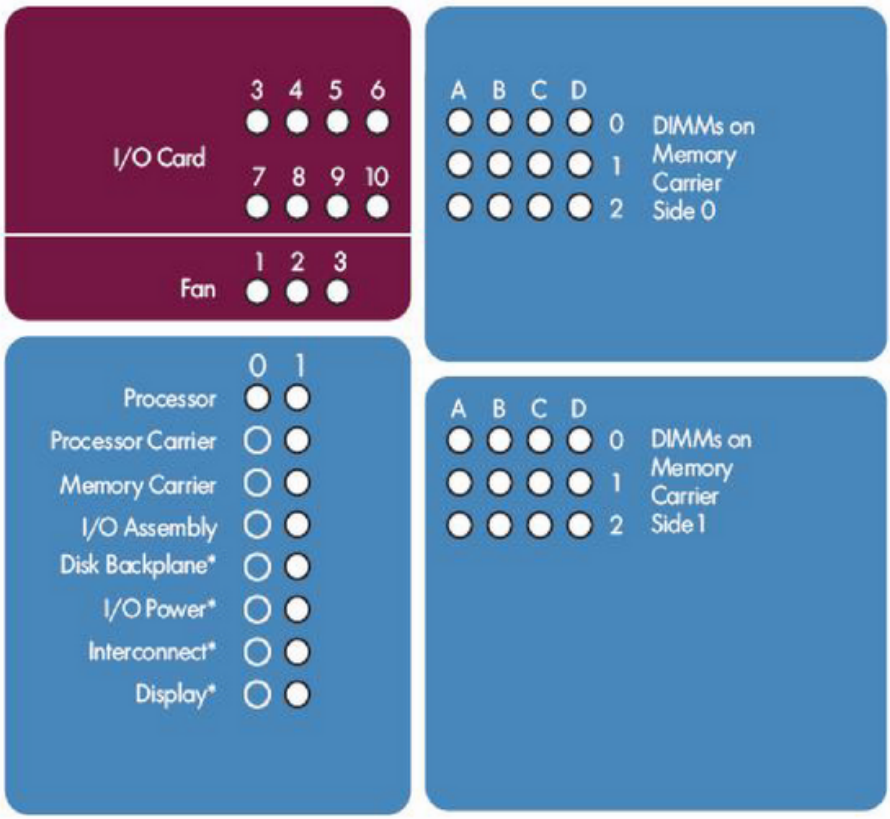


Table 49 lists diagnostic panel LED states.

Table 49 Diagnostics Panel LED States

LED Color	Flash Rate	Definition
Off	Off	CRU health is assumed good.
Amber	Steady	CRU health last known to be bad.

Customer Replaceable Unit Health LEDs

In addition to the front panel diagnostic LEDs, CRUs provide additional diagnostic LEDs. CRU LED order and layout is product dependent.

NOTE: If multiple error conditions occur, all applicable CRU lights activate. The most critical error determines the front panel LED state.

Diagnostics

A suite of offline and online support tools are available to help you to troubleshoot system problems. If the OS is already running, use the online support tools.

If the OS cannot be booted, use the offline support tools. If possible, shut down the OS only when online troubleshooting fails. The offline support tools are available either from the EFI partition or from the IPF offline Diagnostics and Utilities CD (IPF systems only). Once the problem preventing booting has been resolved, boot the OS; use the online support tools for any further testing.

If you cannot reach the EFI from either the main disk or from a CD, use the visual fault indicators, console messages, and system error logs to troubleshoot the problem.

Online Diagnostics and Exercisers

Online support tools enable centralized error archiving and hardware inventory, as long as the agents or providers that support them are installed on the managed server.

On HP-UX systems, the legacy tools within `OnlineDiag` are supported. The online support tools on HP-UX 11i v2, include the Support Tool Manager (STM) tools and the Web-Based Enterprise Management (WBEM) features added by SysFaultMgmt.

The STM suite of tools includes the following:

Information — Information modules create a log of information specific to one device, including:

- Product identifier
- Description of the device
- Hardware path to the device
- Vendor
- Onboard log information (if applicable)
- Miscellaneous information associated with the device
- The firmware revision code, if firmware is present in the device

Verifiers — Verifiers quickly determine whether or not a specific device is working by performing tasks similar to those that the applications perform using the device. No license is required to run the verifiers.

Exercisers — Exercisers stress devices to facilitate the reproduction of intermittent problems.

Diagnostics — Diagnostics are tools designed to identify faulty or failed FRUs.

Expert Tools — Expert tools are device-specific troubleshooting utilities for use by expert administrators only. Their functionality varies from tool to tool, but they are intended to be interactive, and rely on the administrator to provide information

necessary to perform a particular task. You must have the appropriate license to run expert tools.

Online Support Tool Availability

Online diagnostics are included in the HP-UX OE media, and are installed by default.

Online Support Tools List

The following online support tools are available on HP-UX 11i v2 systems. In some cases, tools such as disk exercisers is generic to many types of hardware. In other cases tools such as tape diagnostics are specific to a particular device or type of tape drive.

Table 50 lists the online support tools.

Table 50 Online Support Tools List

Functional Area	Information	Verifier	Exerciser	Diagnostic	Expert
System	Yes	No	No	No	No
CPU/FPU	No	No	Yes	No	Yes
Memory	Yes	No	Yes	No	No
Graphics	Yes	Yes	Yes	No	No
Core I/O LAN	Yes	Yes	Yes	Yes	No
Disks and Arrays	Yes	Yes	Yes	No	No
Tape	Yes	Yes	Yes	Yes	Yes
Magneto-optical drives	Yes	No	No	No	Yes
Add-on network I/O cards	Yes	Yes	Yes	No	Yes
Add-on mass storage I/O cards	Yes	No	No	No	No

Linux Online Support Tools

Online support tools are provided through Insight Manager (IM7) on Linux hosted systems. The exact coverage of these tools is the same as for the current IA-32 implementation. The IPF version of Insight Manager (IM7) has been re-architected to take advantage of current standards; for example, WBEM, WMI, CDM, CIM, XML.

Offline Support Tools List

Table 51 lists offline support tools.

Table 51 Offline Support Tools List

Offline Tool	Functional Area
`CPUDIAG`	Processor diagnostic
`MEMDIAG`	Memory diagnostic
`MAPPER`	System mapping utility
`TITANDIAG`	SBA/LBA chipset
`PERFVER`	Peripheral verifier
`DFDUTIL`	SAS/SCSI disk firmware update utility
`DISKUTIL`	Disk test utility (non-destructive)

Table 51 Offline Support Tools List *(continued)*

Offline Tool	Functional Area
COPYUTIL	Data copy utility
DISKEXPT	Disk expert utility
IODIAG	I/O diagnostics launch facility (Executes third party diagnostics and runs BIST, if available.)
CIODIAG2	Core I/O diagnostic
Specific Card I/O Diagnostics	Card-specific I/O diagnostics/BIST

General Diagnostic Tools

Table 52 lists genearl diagnostic tools.

Table 52 General Diagnostic Tools List

Diagnostic Tool	Description
IPMI Event Decoder	Provides detailed information about IPMI events, such as problem description, cause, and action.
System Event Analyzer (SEA)	Program that automatically analyzes system error logs and IPMI SEL events. Produces callout reports and CRU information. See http://www.compaq.com/support/svctools/webes/ for information about this tool.

Fault Management Overview

Fault management and monitoring increases system availability by moving from a reactive fault detection, diagnosis, and repair strategy to a proactive fault detection, diagnosis, and repair strategy. Fault management does the following:

- Detects problems automatically, as near as possible to when they actually occur.
- Diagnoses problems automatically, at the time of detection.
- Automatically reports a description of the problem in understandable text. This includes the likely causes of the problem, the recommended action(s) to resolve the problem, and detailed information about the problem.
- Ensures that tools are available to repair or recover from the fault.

HP-UX Fault Management

Proactive fault prediction and notification is provided on HP-UX by SysFaultMgmt WBEM indication providers, as well as by the Event Management System (EMS). The Event Management System and WBEM provide frameworks for monitoring and reporting events.

SysFaultMgmt WBEM indication providers and the EMS Hardware Monitors enable you to monitor the operation of a wide variety of hardware products, and alert you immediately if any failure or other unusual event occurs. By using hardware event monitoring, you can virtually eliminate undetected hardware failures that could interrupt system operation or cause data loss.

For complete information on installing and using EMS hardware event monitors, as well as a list of supported hardware, see the *EMS Hardware Monitors Users Guide* at http://www.hp.com/go/hpux-diagnostics-docs.

Hardware monitors are available on the HP-UX OE to monitor the following components:

- Chassis, fans, and environment
- CPU monitor
- UPS monitor
- FC hub monitor
- FC switch monitor
- Memory monitor
- Core electronics components
- Disk drives
- High availability disk array

NOTE: No SysFaultMgmt WBEM indication provider is currently available for the UPS monitor, the FC Hub monitor, or the FC switch monitor.

EMS HA Monitors

High availability monitors are also available through EMS at an additional cost to monitor disk, cluster, network, and system resources.

Errors and Reading Error Logs

The information provided by error logs is useful for troubleshooting HP Integrity rx3600 server faults and failures.

Event Log Definitions

The cause of an MCA event can be captured by system or BMC firmware in both the System Event Log (SEL) and Forward Progress Log (FP). Match these errors with MCA events using their timestamps. For example, the loss of a CPU VRM causes a CPU fault. The MCA log does not provide definitive diagnosis of the problem. Following are features and limitations of events and event logs:

- Event logs are the equivalent of chassis logs for status or error information output.
- Symbolic names are used in the source code; for example, `MC_CACHE_CHECK`
- The hex code for each event log is 128 bits long with an architected format:
  - Some enumerated fields can be mapped to defined text strings.
  - All fields can be displayed in hex, keyword, or text mode.
- Events are created by firmware or OS code and are sent over the PDH bus to the BMC for storage in either or both of the SEL and FP logs.
- The iLO 2 MP can display event logs. SEL events are sent from the BMC to the iLO 2 MP over the IPMB.
- Event logs can also be read back over the PDH bus by software for storage on disk.

Using Event Logs

To access the event logs, follow these steps:

1. Connect to the system console.
2. Enter **Control-B** to access the MP Main Menu.
3. Enter the `sl` command to view event logs.

Accessing iLO 2 MP Event Logs

The iLO 2 MP provides diagnostic and configuration capabilities. See the *HP Integrity Integrated Lights-Out 2 Operations Guide* for details on iLO 2 MP commands.

To access iLO 2 MP event logs, follow these steps:

NOTE: Your terminal console must be able to connect to the iLO 2 MP.

1. Login to the console with proper username and password.

   NOTE: The default operator login and password are as follows:

   login =

   password = **`oper`**.

2. Enter `cl` to display the console history log. The log displays console history from the oldest event to the newest event.
3. Enter `sl` to display the status logs. The status logs consist of the following:
   - SEL
   - FP
   - Current boot log
   - Previous boot log
   - Live events log
   - Clear SEL/FPL logs

For a complete explanation of configuring the iLO 2 MP and using the iLO 2 MP commands, see the *HP Integrity Integrated Lights-Out 2 Operations Guide*.

Supported Configurations

This section provides a system build-up procedure.

System Block Diagram

Figure 47 and Figure 48 display the major rx3600 server functional components and their interconnections. Core I/O is shown with a one SAS I/O card configuration. The Dual Gbit LAN may be installed in slot 10 depending on the core I/O configuration.

Figure 47 rx3600 with PCI/PCI-X I/O System Block Diagram

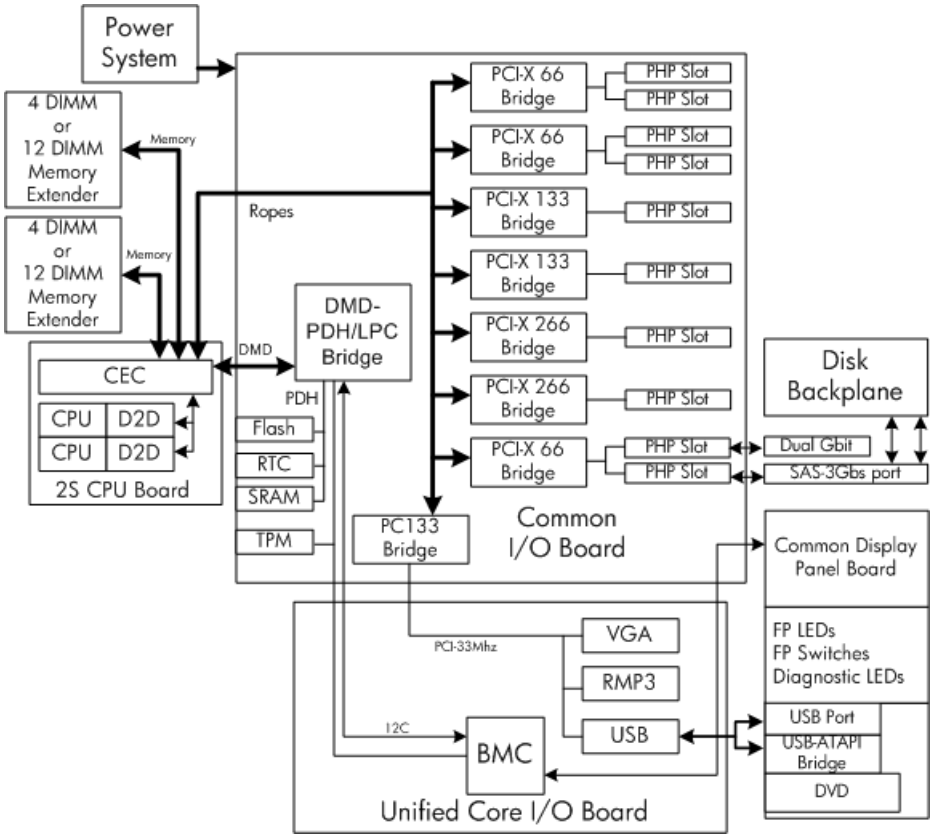
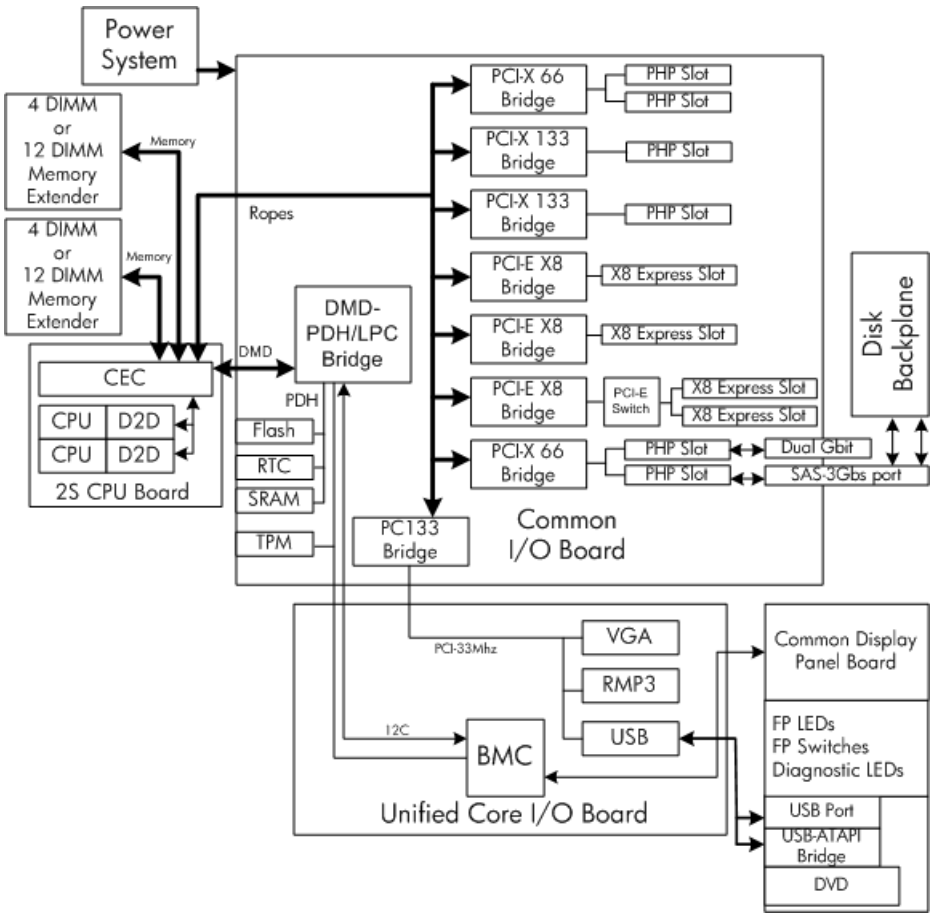


Figure 48 rx3600 with PCI/PCI-X/PCIe I/O System Block Diagram



There are two types of CRUs in the rx3600 server: externally accessible CRUs (eCRUs) and internally accessible CRUs (iCRUs):

The following are the eCRUs in the rx3600 server:

- Bulk power supply 1 and 2[1]
- Console device
- Power cords
- Modems/UPS
- DVD and 2.5 HDDs (SAS or SATA)[1]

The following are the iCRUs in the rx3600 server:

- I/O board assembly
- Core I/O board[1]
- Core LAN HBA
- SAS Disk HBA
- CPU board and CPUs[1]
- Disk BP board 1 and 2
- Memory extender and DIMMs[1]
- FP and Diagnostic LED board
- HBAs (optional)
- I/O VRM
- Cooling Fans 1-3[1]
- Midplane board
- Interconnect board

System Build-Up Troubleshooting Procedure

If the system powers on and remains powered on, but does not enter into or pass POST or does not boot to the EFI menu, follow these steps:

1. Remove the AC power cord from each bulk power supply.
2. Extend the server from the chassis, if the chassis is racked.
3. Remove all the HDDs from the front of the chassis.
4. Remove the memory extender and CPU board FRUs.
5. Remove the top cover.
6. Remove all components except the I/O backplane board and core I/O board FRUs.
7. Plug in the AC power cords. The iLO 2 MP and system console power on.
8. Execute the `iLO 2 MP:CM>DF` command. The CRU IDs are listed. You should see the Alert (IPMI) event for this action as read from the SEL
9. If you do not see the Alert Level 5 (IPMI) event, but get a different high level alert, try replacing the I/O backplane board.
10. Examine the pins on the midplane board, and if necessary, replace the midplane board.
11. Remove the AC power cords.
12. Add the memory carrier with at least one rank of DIMMs. You should see the Alert (IPMI) event for this action as read from the SEL.
13. If you do see Alert level 5 “Missing CRU device - CPU 0 PIROM”, insert the CPU board CRU with at least module 0 processor installed.

1. CRUs identified by the Diagnostic Panel LED when they are faulty or have failed.

14. Add the CPU board CRU and turn on system power. The cooling fans should turn on and stay on.

If the installed CRUs are all functional, the system should initiate POST on all processors. It is recommended that you view the system console output using live logs to ensure that POST is initiated and completes successfully.

If POST does not start after a few seconds, there may be a CPU board or processor problem. Typical problems show up in the SEL or FWP. If the IMPI event logs do not point to a root cause, escalate to bring in expert assistance.

CPU, Memory and SBA

All of the CPU, memory controller, and System Bus Adapter (SBA or I/O rope controller) functions reside on the processor board assembly FRU. Memory DIMMs reside on memory board FRUs. The Local Bus Adapter (LBAs or PCI-X bus controller chips) reside on the common I/O backplane CRU along with core and customer Host Bus Adapter (HBA device controller) I/O cards. This section discusses the roles of logical CPUs, physical memory ranks, and the rope interfaces in the SBA logic of the zx2 chip.

Troubleshooting the rx3600 CPU

Each rx3600 server supports one or two Intel Itanium processor modules. Each processor module contains two individual CPU cores. This results in four physical CPUs when two processor modules are installed in rx3600 servers.

Each physical CPU core contains logic to support two physical threads. This results in up to eight physical threads, or the equivalent of 8 logical CPUs, when two processor modules are installed and enabled in rx3600 servers. The operating system kernel attaches one or more software processes to each available thread. In multiple processor servers, having more threads means all software processes are launched and executed faster.)

Itanium Processor Load Order

For a minimally loaded server, one Itanium processor module must be installed in CPU socket 0 on the processor board CRU, and its threads must be enabled by user actions. You can install an additional identical processor in CPU socket 1.

Processor Module Behaviors

All enabled CPUs and their threads become functional when the system powers on. Each thread acquires instructions from the CPU instruction and data caches to complete early self tests and rendezvous.

The CPU communicates with the PDH until memory is configured. After the memory is configured, the CPUs communicate with memory.

Local machine check abort (MCA) events cause the physical CPU core and one or both of its logical CPUs within that processor module to fail while all other physical CPUs and their logical threads continue operating. Double-bit data cache errors in any physical CPU core cause a Global MCA event that causes all logical threads and physical CPUs in the server to fail and reboot the operating system.

Processor Problem Identification

- A diagnostic LED only lights for physical CPU core errors, when a specific processor module is isolated. If there is any uncertainty about a specific CPU the CRU LED on the diagnostic panel is not lighted. Check the SEL for any errors or warnings.
- For physical configuration errors, for example, when there is no processor module installed in CPU socket 0, all the CRU LEDs on the diagnostic LED panel light for all the missing processor modules.
- No diagnostic messages are reported for single-bit errors that are corrected in both instruction and data caches during corrected machine check (CMC) events to physical CPU core. Diagnostic messages are reported for CMC events when thresholds are exceeded for single-bit errors. Fatal processor errors cause global and local MCA events.

Table 53 and Table 54 list the processor events that light and that may light the diagnostic panel LEDs.

Table 53 Processor Events that Light Diagnostic Panel LEDs

Diagnostic LEDs	IPMI Event	Cause	Source	Notes
Processors	Type E0h, 39d:04d BOOT_DEConFIG_CPU	The processor failed and was deconfigured.	SFW	This event follows other failed processors.
Processors	Type E0h, 5823d:26d PFM_CACHE_ERR_PROC	Too many cache errors were detected by the processor.	WIN Agent	Threshold exceeded for cache parity errors on the processor.
Processors	Type E0h, 5824d:26d PFM_CORR_ERROR_MEM	Too many corrected errors detected by the platform.	WIN Agent	Threshold exceeded for cache errors from the processor, corrected by Zx2.
Processors	Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_Non_RECOVERABLE	Voltage on the FRU is inadequate.	BMC	Power Pod voltage is out of range (too low).
Processor Carrier	Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_Non_RECOVERABLE	Voltage on the FRU is inadequate.	BMC	Voltage on the FRU is inadequate.

Table 54 Processor Events That May Light Diagnostic Panel LEDs

Diagnostic LEDs	IPMI Event	Cause	Source	Notes
Processors	Type E0h, 734d:26d BOOT_CPU_LOADING_ERROR	Installed processors are not compatible.	SFW	
Processors	Type E0h, 2953d:26d BOOT_CPU_LOADING_ERROR	Processors and/or termination are out of order.	SFW	
Processors	Type E0h, 36d:26d BOOT_CPU_LATE_TEST_FAIL	A logical CPU thread failed a late self test.	SFW	
Processors	Type E0h, 677d:26d MC_RENDEZVOUS_SLAVES_FAIL	A logical CPU thread slave failed to rendezvous.	SFW	
Processors	Type E0h, 30d:26d BOOT_CPU_ConFIG_FAIL	A CPU core failed the configuration process.	SFW	
Processor	Type E0h, 790d:26d BOOT_CPU_BAD_CORE_FIXED_RATIO	A processor's fixed core frequency ratio is incompatible with the bus frequency.	SFW	

Table 54 Processor Events That May Light Diagnostic Panel LEDs *(continued)*

Diagnostic LEDs	IPMI Event	Cause	Source	Notes
Processor	`Type E0h, 745d:26d BOOT_FINAL_RENDEZ_WATCHDOG_FAIL`	A watchdog timer expired and determined that a monarch processor is not responding.	SFW	
Processors	`Type E0h, 83d:26d BOOT_RENDEZ_FAILURE`	A logical CPU thread rendezvous failed.	SFW	Bad or slow processor
Processors	`Type E0h, 67d:26d BOOT_MonARCH_TIMEOUT`	The logical monarch CPU thread has timed out.	SFW	
Processors	`Type E0h, 57d:26d BOOT_INCOMPATIBLE_SLAVE`	A logical slave CPU thread is incompatible with the logical monarch CPU.	SFW	
Processor	`Type E0h, 56d:26d BOOT_INCOMPATIBLE_ PAL`	CPU PAL is incompatible with the processor.	SFW	
Processors	`Type E0h, 34d:26d BOOT_CPU_FAILED`	A processor failed.	SFW	
Processors	`Type E0h, 33d:26d BOOT_CPU_EARLY_TEST_FAIL`	A logical CPU thread failed an early self test.	SFW	
Processors	`Type 02h, 25h:71h:80h MISSING_FRU_DEVICE`	No physical CPU cores are present.	BMC	Possible badly seated or failed processor

Troubleshooting rx3600 Memory

The memory controller logic in the zx2 chip supports three versions of memory expanders. An eight DIMM memory carrier provides two memory boards that hold two or four memory DIMMs in both memory cells 0 and 1. A 24 DIMM memory carrier provides two 12-DIMM memory boards that hold four, eight, or twelve DIMMs in both memory cells 0 and 1.

All three versions of memory expanders must have their memory DIMMs installed in groups of four, known as a quad. DIMM quads of different sizes can be installed in any physical rank on all versions of memory expanders, but they must be grouped by their size.

Both the 24 and 48 slot memory expanders support physical memory ranks with four DIMMs, while the common 8 slot memory expander's memory cells 0 and 1 each support physical ranks with two DIMMs. In the 8 slot memory expander, however, the logical quad of four DIMMs includes ranks from both sides 0 and 1 running in lock step with each other.

Memory DIMM Load Order

For a minimally loaded server, four equal-size memory DIMMs must be installed in slots 0A, 0B, 0C, and 0D on the same side of the 24/48 slot memory expander; and in the 0A and 0B slots on both 0 and 1 sides of the 8 slot memory expander.

The first quad of DIMMs are always loaded into rank 0's slots for side 0 then in the rank 0's slots for side 1. The next quad of DIMMs are loaded into rank 1's slots for side 0, then for side 1, and so on, until all ranks slots for both sides are full.

Best memory subsystem performance result when both memory sides 0 and 1 have the same number of DIMM quads in them.

Memory Subsystem Behaviors

The zx2 chip in rx3600 servers provides increased reliability of memory DIMMs and memory carriers.

The zx2 chip doubles memory carrier error correction from 4 bytes to 8 bytes of a 128 byte cache line during cache line misses initiated by processor cache controllers, and by Direct Memory Access (DMA) operations initiated by I/O devices. This feature is called double DRAM sparing. 2 out of 72 DRAMs in any DIMM quad can fail without any loss of server performance.

You must replace DIMMs or memory carriers when a threshold is reached for multiple double-byte errors from one or more DIMMs on the same board. When any uncorrectable memory error (more than 2 bytes) or when no quad of like memory DIMMs is loaded in rank 0 of side 0, you must replace the DIMMs. All other DIMM errors are corrected by zx2 and reported to the Page Deallocation Table (PDT) and the diagnostic LED panel.

Memory Error Messages

- Diagnostic LEDs light only when an error is isolated to a specific DIMM.
- Configuration errors, such as no DIMMs installed, cause diagnostic LEDs to light for all DIMMs not installed.
- No diagnostic LEDs light for single-byte errors that are corrected in both Zx2 caches and memory DIMMs during corrected platform error (CPE) events. Diagnostic messages are reported for CPE events when thresholds are exceeded for both single-byte and double byte errors; all fatal memory errors cause global MCA events.
- PDT logs for all double byte errors are permanent. Single byte errors are initially logged as transient errors. If the server logs two single byte errors within 24 hours, they are upgraded to permanent in the PDT.

Table 55 and Table 56 list the memory subsystem events that light and that may light the diagnostic panel LEDs.

Table 55 Memory Subsystem Events that Light Diagnostic Panel LEDs

Diagnostic LEDs	IPMI Events	Cause	Source	Notes
Memory Carrier	`Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_Non_RECOVERABLE`	Voltage on memory board is inadequate.	BMC	A voltage on the memory expander is out of range (likely too low)
DIMMs	`Type E0h, 208d:04d MEM_NO_DIMMS_INSTALLED`	No memory DIMMs installed in slot 0 of cell 0.	SFW	Light all DIMM LEDs in rank 0 of cell 0
DIMMs	`Type E0h, 172d:04d MEM_DIMM_SPD_CHECKSUM`	A DIMM has a serial presence detect (SPD) EEPROM with a bad checksum.	SFW	Either EEPROM is misprogrammed or this DIMM is incompatible
DIMMs	`Type E0h, 4652d:26d WIN_AGT_PREDICT_MEM_FAIL`	This memory board is correcting too many single-bit errors.	WIN Agent	Memory rank is about to fail or environmental conditions are causing more errors than usual

Table 56 Memory Subsystem Events that May Light Diagnostic Panel LEDs

Diagnostic LEDs	IPMI Events	Cause	Source	Notes
Processor Carrier	`Type E0h, 189d:26d MEM_ERR_LOG_FAILED_TO_CLEAR`	Unable to clear the platform error logs in the CEC.	SFW	
Processor Carrier	`Type E0h, 181d:26d MEM_ECC_MBE_SIGNAL_TST_FAILED`	Selftest of CEC multibit error signaling has failed.	SFW	

Table 56 Memory Subsystem Events that May Light Diagnostic Panel LEDs *(continued)*

Diagnostic LEDs	IPMI Events	Cause	Source	Notes
Processor Carrier	`Type E0h, 160d:26d MEM_BIB_REG_FAILURE`	The CEC failed the register test.	SFW	
Processor Carrier	`Type E0h, 187d:26d MEM_ECC_MBE_SIGNAL_TST_FAILED`	System firmware (SFW) was unable to clear the platform error logs on the CEC.	SFW	
Processor Carrier	`Type E0h, 190d:26d MEM_ERR_REG_CLEAR_FAILURE`	The error registers in the CEC failed to clear.	SFW	
Processor Carrier	`Type E0h, 208d:26d MEM_MC_REG_FAILURE`	The CEC memory controller failed the register test.	SFW	
Memory Carrier	`Type 02h, 02h:07h:06h VOLTAGE_Non_RECOVERABLE`	Memory card voltage error.	BMC	Voltage wholly contained on the memory carrier has failed.
DIMMs	`Type E0h, 4000d:26d MEM_CHIPSPARE_DEALLOC_RANK`	An SDRAM is failing on the DIMM.	SFW	The failing DIMM quad will be deallocated.
DIMMs	`Type E0h, 174d:26d MEM_DIMM_TYPE_INCOMPATIBLE`	DIMM type is not compatible with current DIMMs.	SFW	
DIMMs	`Type E0h, 173d:26d MEM_DIMM_SPD_FATAL`	Detected a fatal error in the DIMM serial presence detect (SPD).	SFW	
DIMMs	`Type E0h, 795d:26d MEM_DIMM_QUAD_MISMATCH`	DIMM mismatch was found within a quad of DIMMs.	SFW	24 or 48 slot memory carrier.
DIMMs	`Type E0h, 779d:26d MEM_DIMM_PAIR_MISMATCH`	DIMM mismatch was found within a pair of DIMMs.	SFW	8 slot memory carrier.

Figure 49 shows the DIMM slot IDs for the 8-DIMM memory carrier board.

Figure 49 8-DIMM Memory Carrier Board Slot IDs

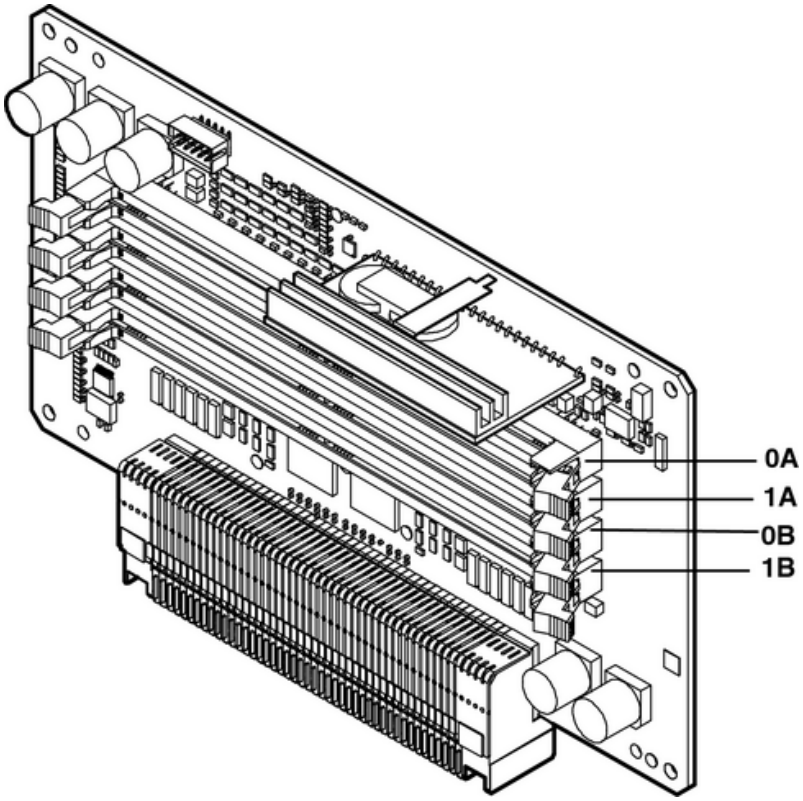
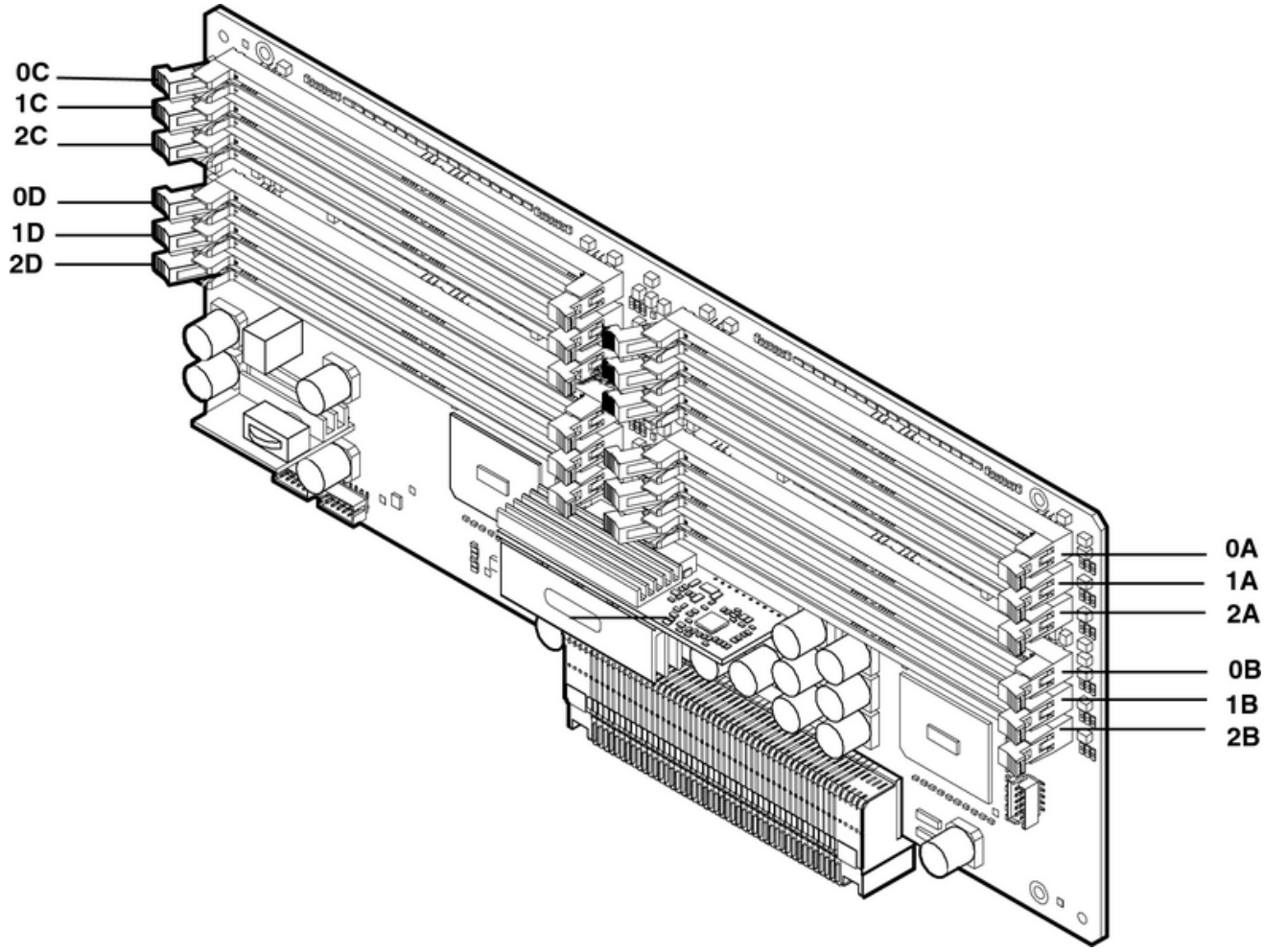


Figure 50 shows the DIMM slot IDs for the 24-DIMM memory carrier board.

Figure 50 24-DIMM Memory Carrier Board Slot IDs



Troubleshooting rx3600 SBA

The rx3600 server shares a common I/O backplane that supports a total of 10 PCI slots. Slots 1-2 on rx3600 systems with only one core I/O SAS card are for customer use. Slots 2-10 are used for core I/O functions on rx3600 systems with only 1 SAS core I/O card. The System Bus Adapter (SBA) logic within the zx2 chip of a rx3600 server uses 16 rope interfaces to support up to eight Lower Bus Adapter (LBA) chips. Each LBA chip interfaces with the SBA in the zx2 chip through one or multiple rope interfaces as follows:

- One LBA chip uses a single rope interface (used by core I/O) to support a single 32-bit/33-MHz PCI slot
- Three LBA chips use a single rope interface (one used by core I/O and two are for customer use) to support dual 64-bit/66-MHz PCI-X slots
- Two LBA chips use dual rope interfaces (both are for customer use) to support two single 64-bit/133-MHz PCI-X slots
- Two LBA chips use two quad rope interfaces (both are for customer use) to support two single 64-bit/266-MHz PCI-X slots

System Power (BPS and I/O VRM)

The two bulk power supply CRUs in the rx3600 chassis provide N+1 redundancy. Each power supply CRU is identified as 0 and 1 for logging purposes only. There are no LEDs on the diagnostic LED panel for the power supplies.

Power supply CRU failures are identified visually by a single green LED that is turned off when one or both of the power supplies fail. Power supply failures are also logged as IPMI events by voltage sensor logic and identified as power supply CRU failures on the front LED panel.

The I/O VRM CRU, located beside the core I/O board CRU, provides all I/O subsystem DC power.

Power Subsystem Behavior

For rx3600 servers, each bulk power supply CRU provides 1200 watts of DC power from a nominal 120 V AC 50-60 Hz. The Baseboard Management Controller (BMC) chip located on the core I/O board CRU controls the flow of +12 V DC power to the server CRUs. You can both control and display power supply status remotely with the iLO 2 MP `pc` and `ps` commands, respectively.)

The server powers on as follows:

- The Power LED on the front panel glows steady amber when one or two bulk power supplies are plugged into nominal AC voltage. The +3.3 VDC housekeeping voltage comes on and stays on whenever AC power is present.
- The BMC, iLO 2 MP, flash memory, and chassis intrusion circuits are reset after the +3.3 V DC housekeeping voltage stabilizes.
- The BMC monitors the Power button on the front panel.
- When the Power button is pressed or when a Wake on LAN (WOL) signal is asserted, the BMC signals the bulk power supplies to fully power on.
- +12 V DC comes up and all the cooling fans and the various VRMs power on sequentially.
- The BMC signals that the server is ready to come out of reset.
- The server comes out of reset.
- The zx2 chip resets all components connected and the server begins the boot process.

System Power LED/Switch

The front panel system power LED indicates system power status. It is incorporated with the Power button.

The Power button has a momentary switch that is recessed to prevent accidental powering on or off.

If the OS is running, press the Power button for less than four seconds to gracefully shut down the OS and power off the system. Press the Power button for greater than four seconds to power off the system immediately. When the server is booting (before the system has passed `EFI_EXIT_BOOT_SERVICES`), the BMC powers off the server immediately when you press the button.

If the OS is not running or is hung, or the BMC is not responding, press and hold the Power button for more than four seconds to power off the system.

To ensure that the system powers on correctly, the Power button must not be pressed again for four seconds after it powers off.

Table 57 lists the power LED states.

Table 57 Power LED States

LED Color	Flash Rate	Definition
None	Off	No AC power to the system
Green	Steady	System power is on
Amber	Steady	System is shut down, but AC and standby power are available

NOTE: For high availability and safety reasons, the power LED is run directly from the power rails, not under firmware control.

Power Supply Power LED

There are 1 Hz flashing green POWER LED (PWR) located on each power supply, which indicate that AC power is applied to the power supply, and that housekeeping voltages are available in the server. These LEDs light steady green when power is available from the power supplies to the server. If a power supply LED flashes amber at 1 Hz, the power supply has failed.

Table 58 lists the power supply LED states:

Table 58 Power Supply LED States

Power Supply Power LED	Power Supply Condition
Off	No AC power applied to any power supply
Off	No AC power applied to a specific power supply
Flashing green ~ 1 Hz	ac standby power is present
Steady green	Power supply DC outputs are functioning correctly
Flashing amber ~ 1 Hz	Power supply has failed. (includes overvoltage, overcurrent, overtemperature, and fan failure)

I/O VRM

Table 59 lists the I/O power events that light the diagnostic panel LEDs.

Table 59 I/O Power Events that Light Diagnostic Panel LEDs

Diagnostic LED	IPMI Event	Cause	Source	Notes
I/O power	`Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_Non_RECOVERABLE`	Voltage on CRU is inadequate	BMC	A voltage on the I/O power assembly is out of range (too low)

Cooling Subsystem

The three fan cooling zones located in the rx3600 chassis provide N+1 rotor redundancy for the chassis using three identical dual fan assembly CRUs. The fan assembly CRUs are identified in the chassis as fans 1, 2, and 3 both for logging and for fault identification on the diagnostic LED panel.

Cooling Subsystem Behavior

The BMC chip located on the core I/O board FRU controls fan speed based on ambient air temperatures, chip temperatures, server configuration, and fan operation or failure. Air is drawn through the front of the chassis and pushed out the rear by the cooling fans.

NOTE: You can display fan status remotely using the iLO 2 MP `ps` command.

Within HP Integrity rx3600 servers, temperature sensors report chassis temperatures to the BMC, which controls fan speed based on this information.

Table 60 lists the cooling subsystem events that light the diagnostic panel LEDs.

Table 60 Cooling Subsystem Events that Light Diagnostic Panel LEDs

Diagnostic LEDs	IPMI Events	Cause	Source	Notes
Fans (1-3)	`Type 02h, 0Ah:07h:01h COOLING_UNIT_WARNING`	The fan has failed or is degrading.	BMC	Replace the fan.
Fans (1-3)	`Type 02h, 0Ah:07h:02h COOLING_UNIT_FAILURE`	The fan has failed and no longer meets minimum cooling requirements.	BMC	Replace the fan.

Common I/O Backplane

This subsection provides information on troubleshooting issues with the eight public and two private PCI-X slots.

I/O Subsystem Behavior

The I/O subsystem transfers blocks of data and instruction words between physical shared memory and virtual memory (system disks/disk array). The system boot is the first time blocks of data and instructions words are transferred into physical shared memory from a local disk or DVD or from a remote disk on another server using multiple LAN transfers. This process is referred to as Direct Memory Access (DMA). It is initiated by I/O devices located in core I/O or on Host Bus Adapter (HBA) I/O cards and does not involve any logical CPUs.

The I/O subsystem also transfers data between the internal registers within each CPU core and the internal control registers within the Zx2/PDH/Local Bus Adapters (LBA) and HBA chips. This process is referred to as programmed I/O. It is initiated by logical CPUs executing external LOAD/STORE instructions. Both system firmware and the OS kernel use this method to initiate DMA transfers.)

I/O Messages

- Use the SEL to identify low level I/O subsystem faults if LEDs on the diagnostic panel are not lit. IPMI events in the SEL and FPL provide the logical ACPI path of the suspect I/O subsystem CRU. To determine the physical PCI slot number, see Table 63.
- For configuration errors, for example, no core I/O HBAs installed or working, see "Supported Configurations" (page 139).
- Diagnostic messages are reported for high level I/O subsystem errors. All fatal I/O subsystem errors cause global MCAs. HP-UX provides its own path with the physical rope number of the suspect I/O subsystem CRU. To determine the physical PCI slot number, see Table 63.)

Table 61 and Table 62 lists the I/O card events that light and may light the diagnostic panel LEDs.

Table 61 I/O Card Events that Light Diagnostic Panel LEDs

Diagnostic LEDs	IPMI Events	Cause	Source	Notes
I/O card	`Type 02h, 03h:05h:01h CURRENT_LIMIT_EXCEEDED`	Overcurrent on PCI slot.	BMC	Possible short circuit on the I/O card or I/O slot.
I/O assembly	`Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_Non_RECOVERABLE`	The voltage on the CRU is inadequate.	BMC	A voltage on the I/O backplane is out of range (probably too low).
Disk assembly	`Type 02h, 02h:07h:03h VOLTAGE_DEGRADES_TO_Non_RECOVERABLE`	The voltage on the CRU is inadequate.	BMC	A voltage on the I/O backplane is out of range (probably too low).

Table 62 I/O Card Events that May Light Diagnostic Panel LEDs

Diagnostic LEDs	IPMI Events	Cause	Source	Notes
I/O card	Type E0h, 4658d:26d IO_PCI_POWER_OVERLOAD_ERR	A non hot plug I/O slot's power consumption increases the total I/O power consumption beyond the supported limit	SFW	O/S does not boot. The system displays the following EFI error message: "I/O configuration exceeded"
I/O card	Type E0h, 137d:26d IO_NOT_ENOUGH_POWER_ERROR	Insufficient power to power on a hot-pluggable PCI-X slot.	SFW	The following EFI warning message displays: "Failed I/O slot(s) deconfigured"
I/O card	Type E0h, 147d:26d IO_SLOT_STANDBY_POWER_ERROR	PCI slot standby power failed.	SFW	Either a card or a slot problem. Reseat the card.
I/O card	Type E0h, 131d:26d IO_HOT_PLUG_CTRL_FAILED	PCI-X hot-pluggable controller failed.	SFW	Either a card or a slot problem. Reseat card first.
I/O card	Type E0h, 139d:26d IO_PCI_MAPPING_TOO_BIG	PCI bus walk (I/O discovery) resources have been exceeded.	SFW	Remove any unsupported I/O cards. Move an I/O card to an unused PCI slot.
I/O card	Type E0h, 148d:26d IO_UNKNOWN_PCIXCAP_VAL	Found an invalid PCIXCAP value.	SFW	
I/O card	Type E0h, 141d:26d IO_PCIXCAP_SAMPLE_ERROR	PCIXCAP sampling error.	SFW	
I/O card	Type E0h, 123d:26d IO_CHECK_LBA_MISSING_ERR	Expected I/O host bridge (LBA) is missing.	SFW	
I/O card	Type E0h, 619d:26d IO_CHECK_LBA_DEConFIG_ERR	Expected I/O host bridge (LBA) is deconfigured.	SFW	
I/O card	Type E0h, 133d:26d IO_LBA_CLEAR_ERR_FAILED	I/O LBA clear error failed.	SFW	
I/O card	Type E0h, 144d:26d IO_SBA_CLEAR_ERR_FAILED	I/O SBA clear error failed	SFW	
I/O card	Type E0h, 146d:26d IO_SLOT_POWER_on_ERROR	PCI-X slot power on error.	SFW	
I/O card	Type E0h, 145d:26d IO_SLOT_POWER_DEFAULT_ERROR	PCI-X slot has an incorrect default power state.	SFW	
I/O card	Type E0h, 136d:26d IO_LBA_RESET_ERROR	I/O host bridge (LBA) is inaccessible because rope reset failed to complete.	SFW	
I/O card	Type E0h, 130d:26d IO_DLL_ERROR	PCI clock DLL error.	SFW	
I/O card	Type E0h, 143d:26d IO_ROPE_RESET_ERROR	I/O rope reset failed to complete.	SFW	

Table 63 and list the PCI slot-rope-ACPI paths.

Table 63 PCI/PCI-X Slot-Rope-ACPI Paths

Physical Slot #	Physical Rope #	OLARD	Logical ACPI Path
XX Slow core iLO 2 MP at 33MHz.	0	No	Acpi(HWP0002,PNP0A03,0)/Pci(1 |0) Acpi(HWP0002,PNP0A03,0)/Pci(1 | 1) Acpi(HWP0002,PNP0A03,0)/Pci(1 | 2) Acpi(HWP0002,PNP0A03,0)/Pci(2 | 0) Acpi(HWP0002,PNP0A03,0)/Pci(2 | 1) Acpi(HWP0002,PNP0A03,0)/Pci(2 | 2)
1 Fast core storage at 66 MHz.	8	No	Acpi(HWP0002,PNP0A03,400)/Pci(1 | 0)
2 Fast core LAN at 66 MHz.	8	No	Acpi(HWP0002,PNP0A03,400)/Pci(2 | 0) Acpi(HWP0002,PNP0A03,400)/Pci(2 | 1)
3 Public, single at 266 MHz.	12, 13, 14 & 15	Yes	Acpi(HWP0002,PNP0A03,700)/Pci(1 | 0)
4 Public, single at 266 MHz.	4, 5, 6 & 7	Yes	Acpi(HWP0002,PNP0A03,300)/Pci(1 | 0)
5 Public, single at 133 MHz.	10 & 11	Yes	Acpi(HWP0002,PNP0A03,600)/Pci(1 | 0)
6 Public, single at 133 MHz.	2 & 3	Yes	Acpi(HWP0002,PNP0A03,200)/Pci(1 | 0)
7 Public, shared at 66 MHz.	9	Yes	Acpi(HWP0002,PNP0A03,500)/Pci(1 | 0)
8 Public, shared at 66 MHz.	9	Yes	Acpi(HWP0002,PNP0A03,500)/Pci(2 | 0)
9 Public, shared at 66 MHz.	1	Yes	Acpi(HWP0002,PNP0A03,100)/Pci(1 | 0)
10 Public, shared at 66 MHz.	1	Yes	Acpi(HWP0002,PNP0A03,100)/Pci(2 | 0)

Table 64 PCI/PCI-X/PCIe Slot-Rope-ACPI Paths

Physical Slot #	Physical Rope #	OLARD	Logical ACPI Path
XX Slow core iLO 2 MP at 33MHz.	0	No	Acpi(HWP0002,PNP0A03,0)/Pci(1|*)
XX Core I/O USB	0	No	Acpi(HWP0002,PNP0A03,0)/Pci(2|*)
XX Core I/O VGA (optional)	0	No	Acpi(HWP0002,PNP0A03,0)/Pci(4|*)
1 Fast core storage at 66 MHz.	8	No	Acpi(HWP0002,PNP0A03,400)/Pci(1|*)
2 Fast core LAN at 66 MHz.	8	No	Acpi(HWP0002,PNP0A03,400)/Pci(2|*)
3 Public, switched daul x8	10 & 11	No	Acpi(HPQ0002,PNP0A08,600)/Pci(0|0)/Pci(0|0)/Pci(1|0)/Pci(0|*)[1]
4 Public, switched dual x8	10 & 11	No	Acpi(HPQ0002,PNP0A08,600)/Pci(0|0)/Pci(0|0)/Pci(0|0)/Pci(0|*)[1]

Table 64 PCI/PCI-X/PCIe Slot-Rope-ACPI Paths *(continued)*

Physical Slot #	Physical Rope #	OLARD	Logical ACPI Path
5 Public, single at x8	12, 13, 14 & 15	Yes	Acpi(HPQ0002,PNP0A08,700)/Pci(0|0)/Pci(0|*)
6 Public, single at x8	4, 5, 6 & 7	Yes	Acpi(HPQ0002,PNP0A08,300)/Pci(0|0)/Pci(0|*)
7 Public, single at 133 MHz	2 & 3	Yes	Acpi(HWP0002,PNP0A03,200)/Pci(1|*)
8 Public, single at 133 MHz	9	Yes	Acpi(HWP0002,PNP0A03,500)/Pci(1|*)
9 Public, shared at 66 MHz.	1	Yes	Acpi(HWP0002,PNP0A03,100)/Pci(1|*)
10 Public, shared at 66 MHz	1	Yes	Acpi(HWP0002,PNP0A03,100)/Pci(2|*)

[1]

IMPORTANT: The new version of the PCI/PCI-X/PCIe backplane (version 1.1) is being shipped on July 1, 2008. For existing servers, repair and replace should continue to be performed with the version 1 I/O backplane. For servers shipped as of July 1, 2008, repair and replace should be performed with version 1.1 I/O backplane. The device paths for version 1.1 are as follows.

Slot	Function Associated with Path	Location as Viewed from Rear of Chassis	HP-UX Device Path	EFI Device Path
3	I/O PCIe x8 (switched with slot 4) Optional SAS core I/O card	3rd from left	0/6/0/0/0/0/1/0/0	`Acpi(HPQ0002,PNP0A08,600)/Pci(0|0)/Pci(0|0)/Pci(1|0)/Pci(0|*)`
4	I/O PCIe x8 (switched with slot 3) Optional SAS core I/O card	4rd from left	0/6/0/0/0/0/0/0/0	`Acpi(HPQ0002,PNP0A08,600)/Pci(0|0)/Pci(0|0)/Pci(0|0)/Pci(0|*)`

Management Subsystem

The management subsystem consists of the iLO 2 MP and the BMC.

Manageability LAN LED

The manageability LAN uses two LEDs, viewable from the rear of the system. The manageability LAN LED indicates link and activity status.

Table 65 Manageability LAN LED States and Speeds

LED	State	Link
Status	Blinking green	Activity
	Solid green	Link with no activity
	Off	No link
Speed	Solid amber	100 MB
	Off	10 MB

Table 65 lists the manageability LAN link statuses and speeds with their corresponding LED states.

Manageability Reset Button

The manageability Reset button, with pinhole access from the rear of the server, enables you to reset the iLO 2 MP. You can also use it to reset user-specified values to factory default values. Press and release the Reset button quickly to soft reset the iLO 2 MP. Press the Reset button and hold it for more than four seconds to hard reset the iLO 2 MP. A hard reset returns user-specified values to factory default values.

The following values are reset:

- Serial terminal baud settings
- User names and passwords

Manageability Status LED

The manageability status LED indicates the state and health of the iLO 2 MP. It is visible from the rear of the server.

Table 66 lists manageability status LED states and their definitions:

Table 66 Manageability Status LED

LED State	Definition
Off	iLO 2 MP is not responding
Steady amber	Self test
0.5 Hz flashing green	Heartbeat
1 Hz flashing amber	ROM error

I/O Subsystem

The I/O subsystem includes SAS, SATA, SCSI, DVD, HDD, and core I/O devices.

Verifying Hard Disk Drive Operation

Each hard disk drive has an activity LED indicator on the front of the drive.

NOTE: On HP Integrity rx3600 servers only the activity LED is used. The status LED is not monitored by the OS.

Lightpipes on the disk drive transmit light to these apertures from LEDs on the inside rear of the hot-swap mass storage cage. Verify that the activity LED shows the correct activity indication for all disk drives that you installed:

1. Power on the server and attached monitor.
2. During the boot sequence, watch the activity LED on each hard disk drive.
   - The LED quickly cycles from amber to green and stays steady green until the drive spins up.
   - When the drive is finished spinning up, the LED turns off.
3. If the activity LED stays illuminated steady green on a disk drive after the drive spins up, the drive cage may not be correctly installed. To check the installation, follow these steps:
   a. Power off the server and unplug the AC power cords and cables.
   b. Verify that the SAS interface is correctly installed.
   c. Reconnect the AC power cords and cables. Power on the server and repeat steps 1 and 2. If any activity LEDs remain lit, contact HP.

4. If the activity LED on a disk drive does not illuminate during the boot cycle, the disk drive may be installed incorrectly or its lightpipes may be damaged.

   Check the lightpipe on the disk drive as follows:

   a. Remove the disk drive.
   b. Inspect the lightpipes for damage. If a lightpipe is damaged, contact HP.

   CAUTION: The lightpipes are fragile. Be careful not to damage them when you inspect them or when you reinsert the disk drive.

   c. Replace the disk drive.
   d. Power on the server. Determine whether the LED illuminates during the boot cycle. If it does not, contact HP.

LAN LEDs

There are LAN LEDs on the rear bulkhead of the LAN HBA in PCI-X slot 2 of the HP Integrity rx3600 server.

HBA Bulkhead LAN LEDs

There are two 1 Gb LAN ports on the LAN HBA bulkhead. These are LAN A and LAN B.

Table 67 lists the 1 Gb LAN A interface provides three LEDs on the LAN bulkhead.

Table 67 LAN A Connector LEDs

LAN LED	Location	Color	State
Not used	Top	None	None
1000Mb	2nd from top	Blinking amber	The 1000 Mb/s ethernet protocol and twisted-pair wiring is enabled.
		Off	No link
100Mb	2nd from bottom	Blinking green	The 100 Mb/s with ethernet protocol and twisted-pair wiring is enabled.
		Off	No link
Activity	Bottom	Blinking green	The activity LED is enabled.
		Off	No activity

Table 68 lists the 1 Gb LAN B interface provides two LEDs on the LAN bulkhead.

Table 68 LAN B Connector LEDs

LED	Location	Color	Description
Speed (upper left)	Upper left	Yellow	The 1000 MHz with ethernet protocol and twisted-pair wiring is enabled.
		Green	The 100 MHz with ethernet protocol and twisted-pair wiring is enabled.
		Off	No link
Link (upper right)	Upper right	Green	link is enabled.
		Off	No link

Booting

Table 69 displays the normal boot process, as reflected in changes to front panel LED states.

Table 69 Normal Boot Process LED States

Step	System Health	Internal Health	External Health	Power	Diagnostic Panel	System Power State
1	Off	Off	Off	Off	Off	No AC power to the system.
2	Off	Off	Off	Steady amber	Off	System is shut down, but AC power and standby power are active.
3	Off	Off	Off	Steady green	Off	System power rails are on when power switch is toggled.
4	Off	Off	Steady green	Steady green	Off	System power rails are on; BMC drives External Health LED.
5	Off	Steady green	Steady green	Steady green	Off	System is booting firmware (has passed `BOOT_START` in firmware).
6	Steady green	Steady green	Steady green	Steady green	Off	System has finished booting firmware and an OS is either booting or running.

NOTE: In the normal boot process even though the BMC is running while the system is shut down (Power LED is steady amber), it does not drive the External Health LED to steady green until +12VDC power from the bulk power supplies is applied.

The following steps describe the system boot process. Step numbers provided correspond to the steps in Table 69:

3) System power switch turns on bulk power supplies and fans, and releases RESET on all CPUs simultaneously, when toggled on.

5) Initial CPU firmware code fetch is PAL code from EEPROM in PDH, retrieved 4 bytes at a time by DMDC in Zx2 (No shared memory or I/O devices are available at this time; they are not initially configured).

5) Firmware code stack is initially in BBRAM in PDH, retrieved 4 byes at a time, through PDH and DMD buses.

5) PAL code configures all CPUs.

5) SAL code configures all platform CEC chips, including shared memory and all responding I/O devices.

5) Firmware code and stack are relocated to shared memory after all x4DIMM ranks in shared memory are configured and tested.

5) EFI Shell launches from shared memory, and cache lines are retrieved 128 bytes at a time by MEMC in Zx2.

6) The OS loader launches using the EFI device driver.

6) The OS boots and starts its own device drivers.

6) The OS can use runtime PAL and SAL calls, and ACPI features. These abstraction layers enable platform independence.

Firmware

The system has three sets of firmware installed:

- System firmware
- BMC firmware
- iLO 2 MP firmware

All firmware must be from the same release. Independent updates are not supported. Details about a specific release are available in the Release Notes.

Firmware updates are available from http://www.hp.com under "Support and Drivers."

Identifying and Troubleshooting Firmware Problems

Erratic system operation and failure to boot to the EFI Boot Manager or to the EFI Shell are symptoms of possible firmware problems.

Problems due to firmware are relatively rare. Look for other problem causes first.

If you are dealing with a firmware problem, the probable failure areas are:

- Unsupported firmware installation
- Corrupt firmware installation

To troubleshoot firmware problems:

1. Verify that all system and BMC firmware components are from the same release using the iLO 2 MP`sr` command.
2. Reinstall all firmware.

Firmware Updates

The system has an EFI utility for updating system, BMC, and iLO 2 MP firmware, `fwupdate.efi` utility.

To update the firmware, follow these steps:

1. Power on the system and get to the EFI Shell prompt.
2. Execute the following EFI command at the EFI Shell prompt to determine the current firmware version: `Shell> info fw`
3. Look for the latest firmware updates at http://www.hp.com. If a new version of the firmware is available, download it. Save it to CD, or copy it over the network to the system you are going to update.
4. On the system you are updating, download and execute the appropriate `fweupdate` package, an EFI application you run without options or arguments to update your firmware.

Update the firmware in one of the following ways:

1. Use the same utilities that are used by system firmware and the BMC.
2. Initiate a firmware upgrade from the iLO 2 MP user interface; the iLO 2 MP pulls its image from the FTP server that you specify.
3. Initiate a firmware upgrade from the HP System Insight Manager (SIM) as a "Group Action"

Server Interface

All system console connections (VGA, USB, local RS-232, and iLO 2 MP LAN) are located on the bulkhead of the core I/O board FRU at the rear of the rx3600 chassis.

OSs can be configured to use a text/serial console, or the graphics/VGA as a console.

The iLO 2 MP provides a local serial port connection, and a LAN connection, both of which can be used to access an OS's text/serial console. The iLO 2 MP LAN can also be used to access the VGA console of an OS, if the iLO 2 Advanced Pack for Integrity is purchased. At this time, the integrated remote console feature for redirecting the VGA is only supported on the Windows OS.

For instance, by default HP-UX is configured to use text/serial as a console, using the iLO 2 MP as its console device. The iLO 2 MP provides this text/serial console through the iLO 2 MP LAN, and through the RS-232 console RS-232 port on the core I/O board. The primary console device used by any OS can be set in the EFI interfaces. For instance, Linux can be set to use a text/serial console, using the iLO 2 MP as its console device. Windows can be set to operate properly in

headless mode, with the iLO 2 MP as its headless console device, and the VGA as its graphics console.

Troubleshooting the Server Interface

RS-232 connection: A dumb terminal or PC running terminal emulation software is attached to the iLO 2 MP local port and does not respond to a **Control-B CR** key sequence and the terminal is running 9600 baud, 8 data bits, and is ONLINE. The solution is that the iLO 2 MP is not operational or functional. Examine the following LEDs:

- iLO 2 MP heartbeat LED
- BMC heartbeat LED

Replace the core I/O board FRU if both heartbeat LEDs are not flashing green. If both heartbeat LEDs are off, check the power supplies, midplane board FRU, and I/O backplane board FRU.

LAN Connection Problems: See "I/O Subsystem " (page 155). To locate these LEDs, see "Management Subsystem " (page 154).

Environment

Ambient intake air temperature is often different from ambient room temperature. Measure the operating temperature and humidity directly in front of the cabinet cooling air intakes in addition to ambient room conditions.

Within the server, temperature sensors report chassis temperature to the BMC. The BMC controls fan speed, based on this information.

Temperature sensors are found on the display panel, where a thermal sensor detects the ambient room temperature. This sensor's reading is the main parameter used to regulate fan speed under normal conditions.

Table 70 provides environmental specifications for rx3600 servers.

Table 70 rx3600 Environmental Specifications

Parameter	Operating Range	Recommended Operating Range	Maximum Rate of Change	Non-Operating Range
Temperature	5-35 degrees C (up to 5000 feet)	20-25 degrees C (up to 5000 feet)	10 degrees C/hr. with tape; 20 degrees C/hr. without tape	-40 degrees to +70 degrees C
Relative humidity	15-80% at 35 degrees C noncondensing	40-60% at 35 degrees C noncondensing	30% per hour noncondensing	

Reporting Your Problems to HP

HP customer care can help you solve server problems and, if necessary, initiate appropriate service procedures.

Support is available on the web and by phone.

For information on contacting the HP Support Center (HPSC) near you, go to:

http://www.hp.com/go/hpsc.

Online Support

To contact HP Customer Support online, see the Worldwide Limited Warranty and Technical SupportGuide or visit us at http://www.hp.com/go/bizsupport.

On the website, enter the server model number (rx3600) in the search field.

The following information is available on this website:

- Software and firmware updates
- The latest drivers and utilities
- Additional documentation

Phone Support

To contact HP customer support by phone, go to the HP Support Center (HPSC) at http://www.hp.com/go/hpsc.

Local phone numbers are listed in your native language for help.

Collecting Information Before Contacting Support

NOTE: HP recommends that you keep detailed records of any changes to your system, and of how system behavior has changed over time or as a result of changes made to your system.

Before you contact HP support, follow these steps:

1. Check the previous sections of this chapter to attempt to solve the problem.
   - Note failure symptoms and error indications (LEDs and messages).
   - Capture and permanently log the current SEL and FPL contents.
   - Try to determine precisely what did or did not happen.
2. Collect the following information:
   - Model number of the server (rx3600).
   - Product number of the server. Find this number on the identification label on the front of the chassis.
   - Serial number of the server. Find this number on the identification label.
3. Familiarize yourself with the system configuration.
   - Do you use the LAN, RS-232, or web interface to monitor the server?
   - How many processors, DIMMs, and PCI cards are installed?
   - What versions of processor, memory, and PCI cards are used and where are they installed?
   - What accessories are installed?
4. Determine the following:
   - Which firmware versions are in use?
   - When did the problem start?
   - Have recent changes been made to the system?
   - Which OS version is in use?

6 Removing and Replacing Server Components

This chapter describes safety information, required service tools, accessing the server, and the removal and replacement of hardware components for the HP Integrity rx3600 server.

This chapter addresses the following topics:

- "Installing the Latest Version of the Firmware" (page 106)
- "Safety Information" (page 162)
- "HP Integrity rx3600 Component Classification" (page 162)
- "Accessing a Rack-Installed Server" (page 164)
- "Accessing a Pedestal-Installed Server" (page 165)
- "Removing and Replacing the Top Cover" (page 165)
- "Removing and Replacing the Memory Carrier Assembly Cover" (page 166)
- "Removing and Replacing a Hot-Swappable Chassis Fan Unit" (page 168)
- "Installing a Hot-Swappable Power Supply" (page 46)
- "Removing and Replacing a Hot-Swappable Disk Drive Filler" (page 172)
- "Removing and Replacing a Hot-Pluggable Disk Drive" (page 172)
- "Removing and Replacing PCI/PCI-X/PCIe Card Dividers" (page 174)
- "Removing and Replacing a Hot-Pluggable PCI/PCI-X/PCIe Card" (page 175)
- "Removing and Replacing the DVD Drive" (page 185)
- "Removing and Replacing the Memory Carrier Assembly" (page 186)
- "Removing and Replacing System Memory" (page 188)
- "Removing and Replacing the Front Bezel" (page 196)
- "Removing and Replacing the Processor Board Assembly" (page 198)
- "Removing and Replacing a Dual-Core Processor" (page 199)
- "Removing and Replacing the I/O Board Assembly" (page 206)
- "Removing and Replacing the System Battery" (page 210)
- "Removing and Replacing the I/O Voltage Regulator Module" (page 212)
- "Removing and Replacing the Trusted Platform Module" (page 213)
- "Removing and Replacing the Core I/O Board" (page 216)
- "Removing and Replacing the Core I/O Board Battery" (page 217)
- "Removing and Replacing the SAS Core I/O Card" (page 219)
- "Removing and Replacing the LAN Core I/O Card" (page 220)
- "Removing and Replacing the Display Board" (page 221)
- "Removing and Replacing the SAS Backplane Board" (page 225)
- "Removing and Replacing the Interconnect Board" (page 229)
- "Removing and Replacing the Midplane Board" (page 232)

Required Service Tools

Service of this server requires one or more of the following tools:

- Electrically Conductive Field Service Grounding Kit (P/N 9300-1155)
- Processor install tool (attached to the processor board assembly)
- 1/4 inch flat blade screwdriver
- ACX-15 Torx screwdriver
- ACX-10 Torx screwdriver

Safety Information

Use care to prevent injury and equipment damage removing and replacing server components. Voltages can be present within the server. Many assemblies are sensitive to damage by electrostatic discharge (ESD).

Follow the safety conventions listed below to ensure safe handling of components, to prevent injury, and to prevent damage to the server:

- When removing or installing any server component, follow the instructions provided in this guide.
- If installing a hot-swappable or hot-pluggable component when power is applied (fans are running), reinstall the server cover immediately to prevent overheating.
- If installing a hot-pluggable component, complete the required software intervention prior to removing the component.
- If installing an assembly that is neither hot-swappable nor hot-pluggable, disconnect the power cable from the external server power receptacle.

⚠ **WARNING!** Ensure that the system is powered off and all power sources are disconnected from the server prior to removing or installing server hardware (unless you are removing or installing a hot-swappable or hot-pluggable component).

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is turned off.

Failure to observe this warning can result in personal injury or damage to equipment.

- Do not wear loose clothing that can snag or catch on the server or on other items.
- Do not wear clothing subject to static charge buildup, such as wool or synthetic materials.
- If installing an internal assembly, wear an antistatic wrist strap and use a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.

HP Integrity rx3600 Component Classification

The server components are classified into three major categories:

- "Hot-Swappable Components"
- "Hot-Pluggable Components"
- "Cold-Swappable Components"

A brief explanation of each category and the classifications for the server components follow.

Hot-Swappable Components

A component is defined as hot-swappable if you can remove it from the chassis while the server remains operational. Hot-swappable components require no software intervention prior to removing the component.

NOTE: Hot-swappable components are marked with red touch points.

The following are hot-swappable components:

- Fan units
- Power supplies
- Disk drive fillers

Hot-Pluggable Components

A component is defined as hot-pluggable if you can remove it from the chassis while the server remains operational. Software intervention is required prior to removing a hot-pluggable component.

NOTE: Hot-pluggable components are marked with red touch points.

The following are hot-pluggable components:

- Disk drives
- PCI/PCI-X/PCIe cards

Cold-Swappable Components

To remove and replace cold-swappable components, or components that are neither hot-swappable nor hot-pluggable, shut down the operating system and power off the server. For complete instructions on shutting down the operating system and powering off the server, see Chapter 4 (page 108).

NOTE: Cold-swappable components are marked with blue touch points.

The following are cold-swappable components:

- Front bezel
- DVD drive
- Memory carrier assembly
- Memory DIMMs
- Processor board assembly
- Dual-core processors
- I/O board assembly
- System battery
- I/O voltage regulator module
- Trusted Platform Module
- PCI/PCI-X card divider
- Core I/O board
- Core I/O board battery
- SAS core I/O card
- LAN core I/O card

- Doorbell board
- Display board
- SAS backplane board
- Interconnect board
- Midplane board

Accessing a Rack-Installed Server

The following procedure explains how to gain access to the HP Integrity rx3600 that is installed in an approved rack. For rack installation instructions, review the document titled *Installation Guide, Mid-Weight Slide Kit, 5065-7291*. You can access this document at:

http://h18004.www1.hp.com/products/servers/proliantstorage/bcs-rackandpower/information_library.html

⚠ **WARNING!** Ensure that all anti tip features are employed (front and rear anti tip feet installed; adequate ballast properly placed; and so on) are employed prior to extending the server from the rack.

Extending the Server from the Rack

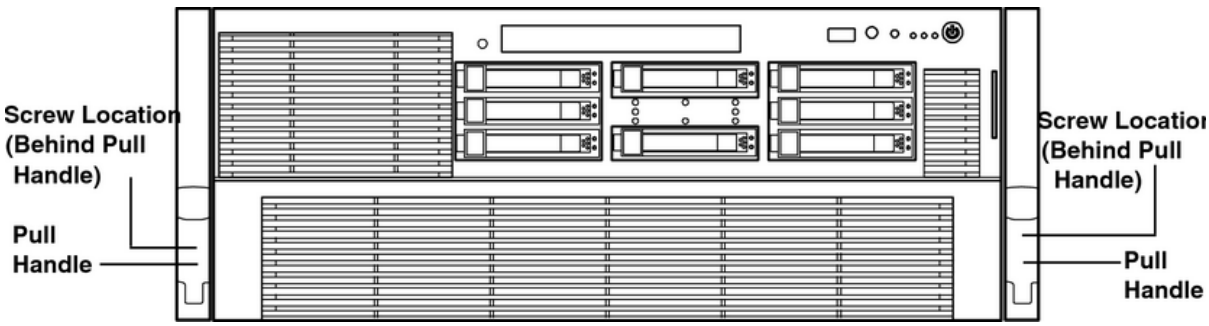
NOTE: Ensure that there is enough area (approximately 1.5 meters [4.5 ft.]) to fully extend the server from the front of the rack.

To extend the server from the rack, follow these steps:

1. Remove the T25 screws with the orange tags that fasten the front of the server to the rack (Figure 51).
2. Remove the large orange screws from the rear of the rack located on the left and right server slide rails. The server will not slide forward if these screws are not removed.
3. Flip out the two pull handles located on both ends of the front bezel (Figure 51).
4. Slowly pull the server forward by the handles until it is fully extended.

   NOTE: The server is fully extended when the rail clips are locked in place and the top cover is completely accessible.

Figure 51 Rack Screw Locations



Inserting the Server into the Rack

To insert the server into the rack, follow these steps:

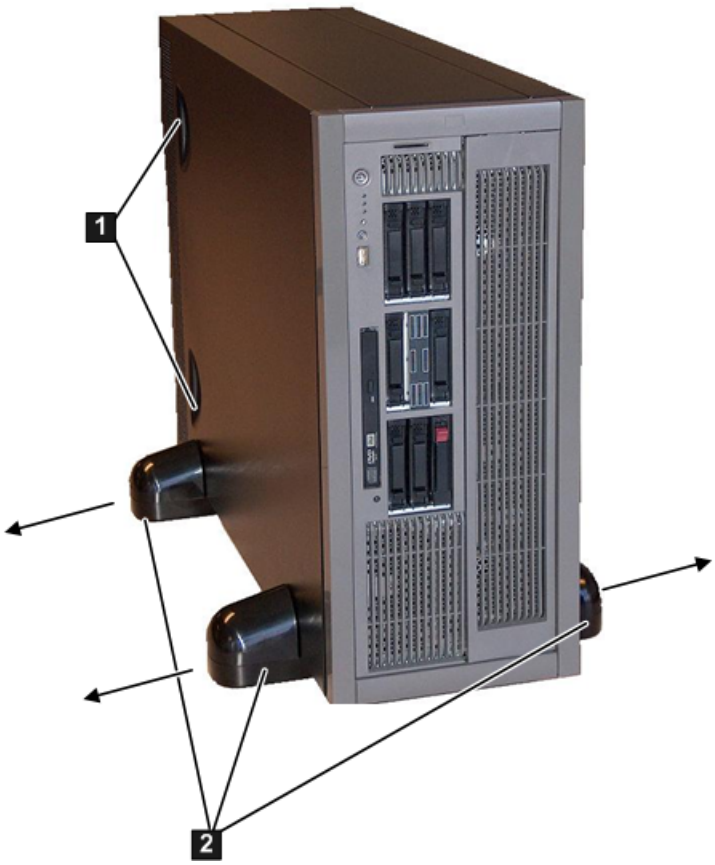
1. Press the rail clips on both sides of the server inward.
2. Push the server into the rack until it stops.

Accessing a Pedestal-Installed Server

Follow these steps to access the internal components in a pedestal installed server.

1. Remove the pedestal kit feet by pulling them outward
2. Lay the server horizontally onto its right side.
3. Unscrew the thumb screws in the rear of the server.
4. Pull back on the side component using the finger grips.
5. Once the pedestal side has moved about 1/4 inch the side can be removed.

Figure 52 Server in Pedestal Kit



1 Finger Grip 2 Pedestal Kit Feet

Removing and Replacing the Top Cover

Access to internal components require moving the locked top server cover in both standalone and pedestal-installed environments.

NOTE: When the top cover is open or removed, the chassis fan units increase to high speed to assist cooling. When the top cover is replaced at the end of the operation, the chassis fans return to normal speed. HP recommends replacing the top cover within 15 seconds.

Removing the Top Cover

To remove the top cover, follow these steps:

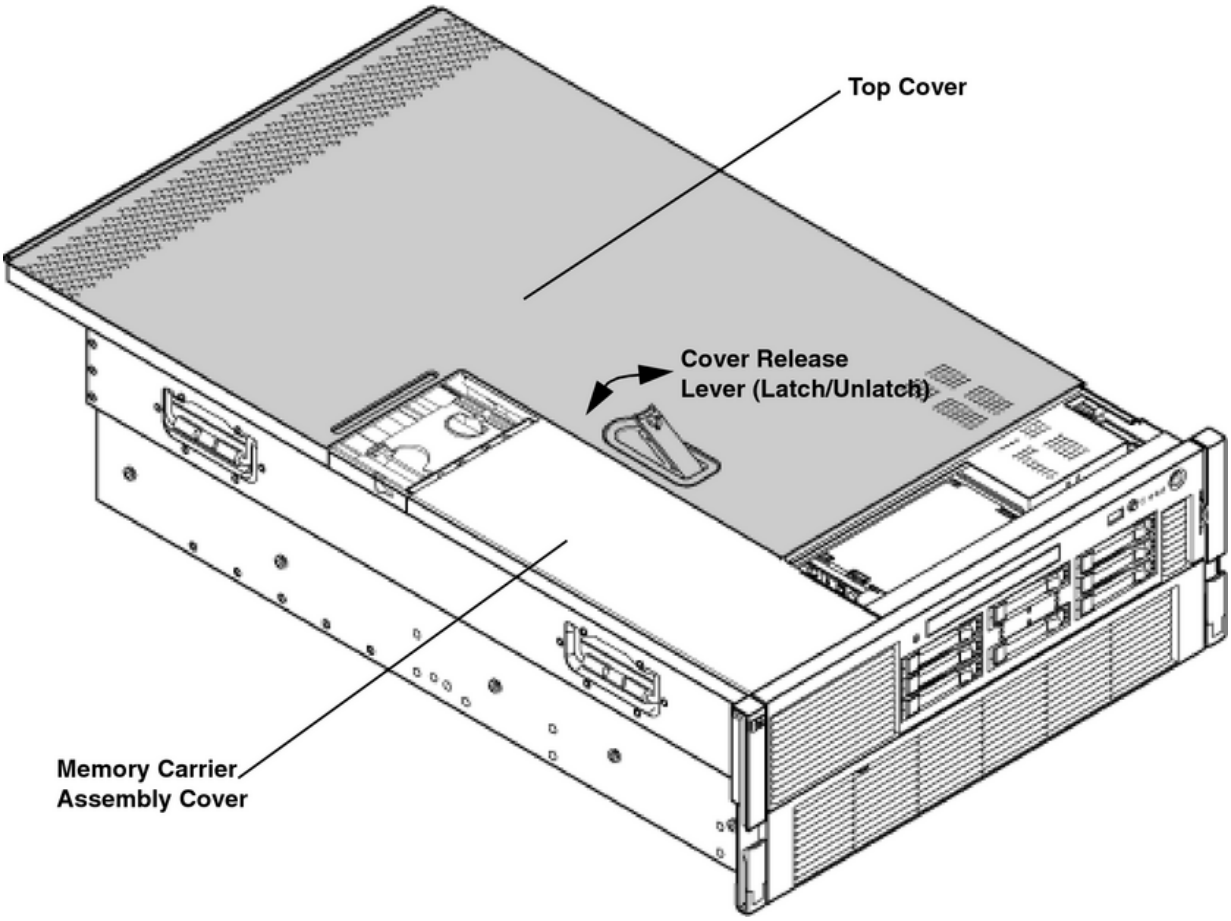
1. If rack installed, fully extend the server out from the rack. See "Extending the Server from the Rack" (page 164).
2. Unlock the cover release lever by turning the cam approximately 90 degrees counterclockwise.
3. Pull up on the cover release lever to disengage the top cover from the chassis (Figure 53).

NOTE: The cover release lever also disengages the memory carrier assembly cover for removal.

You can have the memory carrier assembly cover in place while servicing any components except for the memory carrier assembly and the processor board assembly.

4. Slide the cover toward the rear of the server until the tabs release from the slots in the chassis.
5. Lift the cover off the chassis.

Figure 53 Removing and Replacing the Top Cover



Replacing the Top Cover

NOTE: Replace the memory carrier assembly cover before replacing the top cover.

To replace the top cover, follow these steps:

1. Ensure the cover release lever is in the open position (Figure 53).
2. Align the tabs of the top cover with the corresponding slots in the chassis and insert the tabs into the slots.
3. Slide the cover forward until it is flush with the front of the chassis; push firmly.
4. Push the cover release lever down into the latched position (Figure 53).
5. Lock the cover release lever by turning the cam approximately 90 degrees clockwise.

Removing and Replacing the Memory Carrier Assembly Cover

Access to the memory carrier assembly is required for upgrades and repair of the server memory.

NOTE: When the memory carrier assembly cover is open or removed, the chassis fan units increase to high speed to assist cooling. When the top cover is replaced at the end of the operation, the chassis fans return to normal speed.

Removing the Memory Carrier Assembly Cover

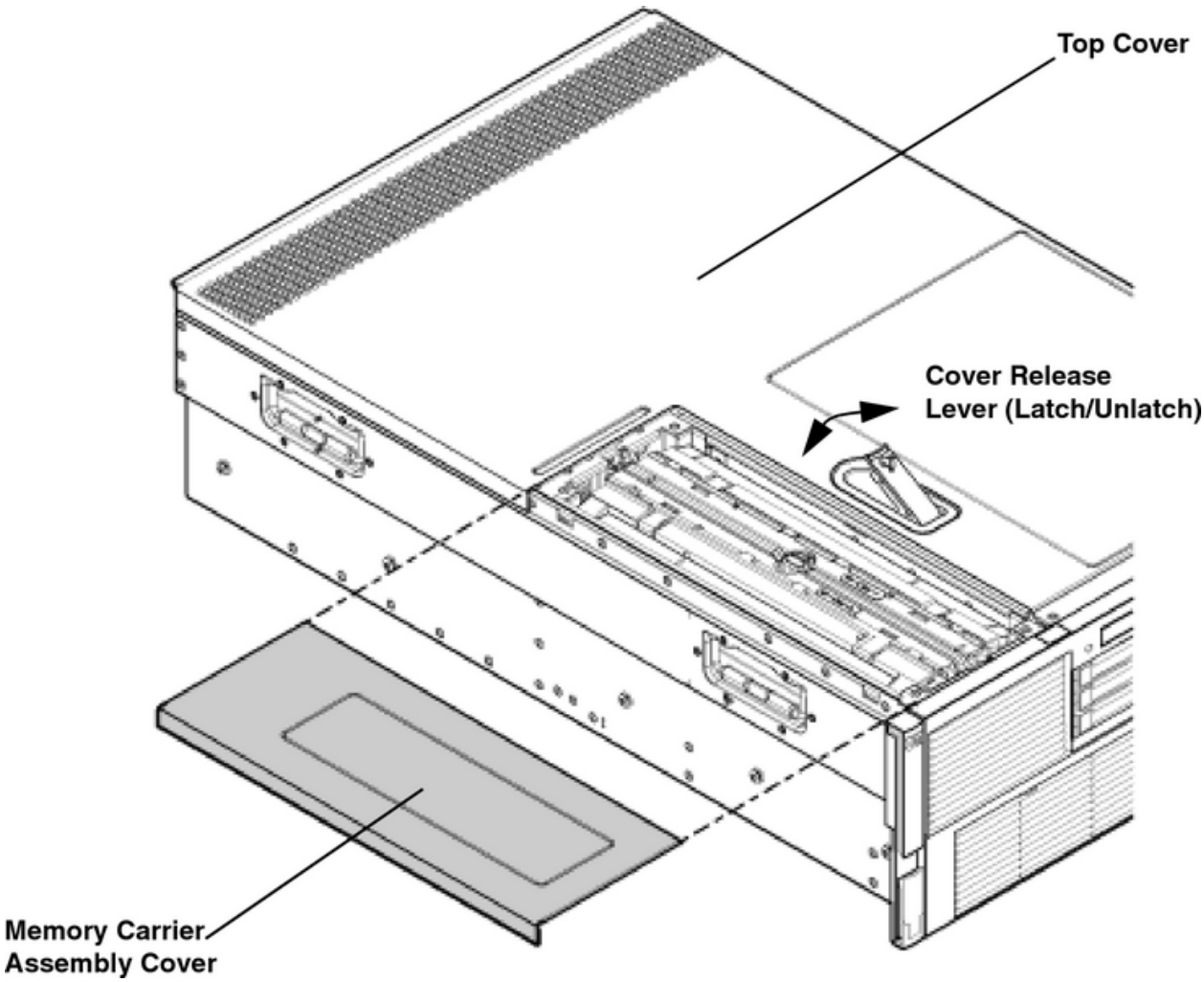
To remove the memory carrier assembly cover, follow these steps:

1. If rack installed, slide the server out from the rack until it stops. See "Extending the Server from the Rack" (page 164).

   NOTE: You do not need to extend the server completely out of the rack to remove the memory carrier.

2. Unlock the cover release lever by turning the cam approximately 90 degrees counterclockwise.
3. Pull up on the cover release lever to disengage the top cover and memory carrier assembly cover from the chassis (Figure 53).
4. Slide the memory carrier assembly cover toward the left side of the server to free it from the center of the chassis, and lift the cover off of the chassis (Figure 54).

Figure 54 Removing and Replacing the Memory Carrier Assembly Cover



Replacing the Memory Carrier Assembly Cover

To replace the memory carrier assembly cover, follow these steps:

1. Position the cover onto the opening above the memory carrier assembly.

2. Slide the cover toward the right side of the server until it is flush with the center chassis wall.
3. Slide the top cover forward until it is flush with the front of the chassis; push firmly.
4. Push the cover release lever down into the latched position (Figure 53).
5. Lock the cover release lever by turning the cam approximately 90 degrees clockwise.

Removing and Replacing a Hot-Swappable Chassis Fan Unit

There are three interchangeable, hot-swappable chassis fan units in the server. Fan unit one is located behind the memory carrier assembly. Fan units two and three are located in the center of the chassis between the disk drives and the I/O board assembly. You can replace the hot-swappable fans using the procedures in this section when system power is on or off.

CAUTION: Observe all ESD safety precautions before removing or replacing a fan unit. Failure to follow ESD safety precautions can result in damage to the server.

NOTE: A hot-swappable device does not require interaction with the operating system before the device is removed from or installed into the server.

The DC power to the server does not have to be off to remove or replace a hot-swappable chassis fan unit.

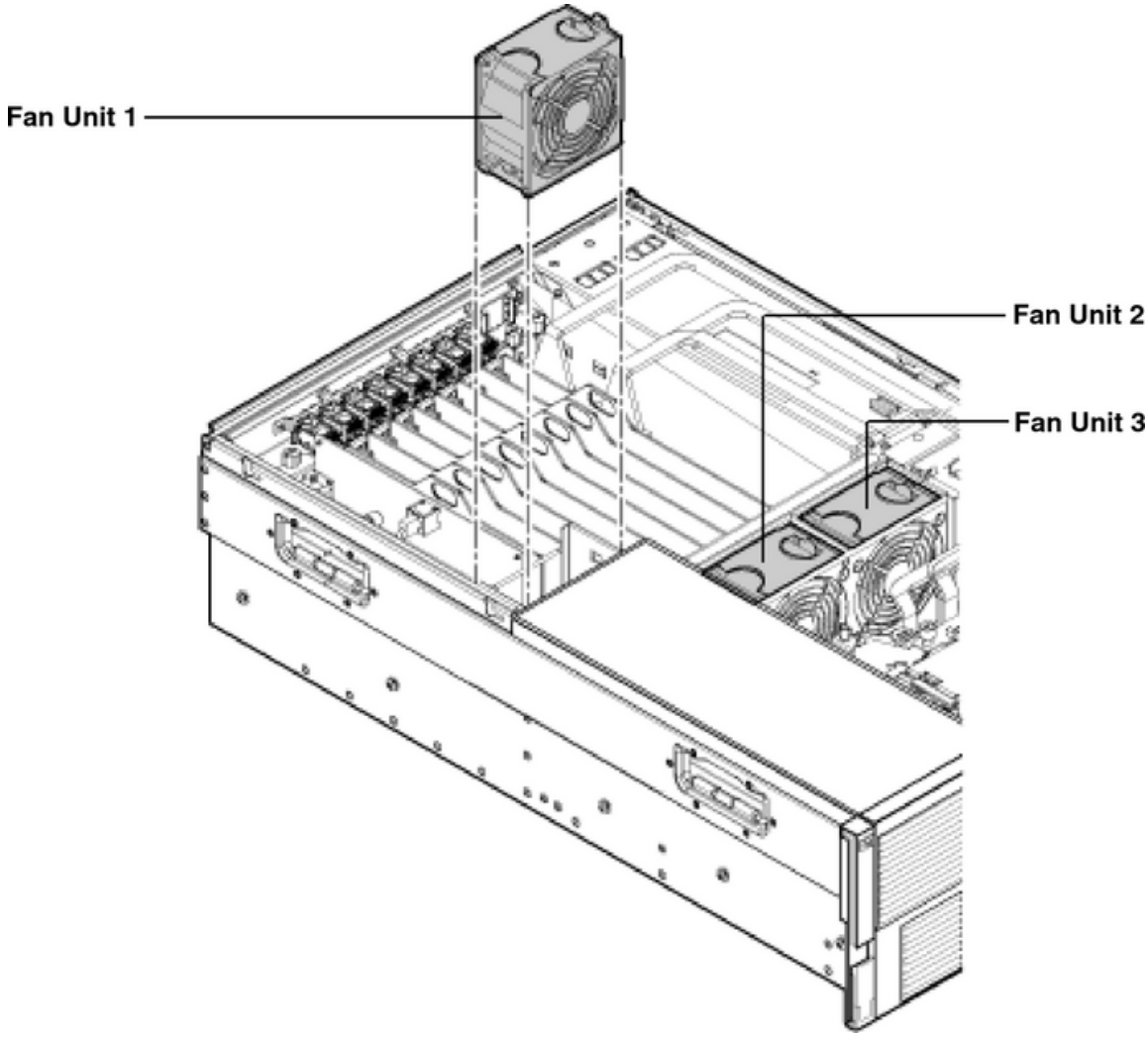
Removing a Hot-Swappable Chassis Fan Unit

To remove a hot-swappable chassis fan unit, follow these steps:

1. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
2. Remove the top cover. See "Removing the Top Cover" (page 165).
3. Insert thumb and forefinger into the openings on the top of the fan and squeeze until the fan releases from the socket.
4. Pull the fan straight up and out of the chassis.

CAUTION: To prevent server components from overheating, replace the fan within 20 seconds. Failure to observe this caution results in an automatic server shut down in two minutes to prevent an overtemperature condition.

Figure 55 Removing and Replacing a Hot-Swappable Chassis Fan Unit



Replacing a Hot-Swappable Chassis Fan Unit

CAUTION:
To prevent server components from overheating, replace the fan within 20 seconds. Failure to observe this caution results in the server automatically shutting down to prevent an overtemperature condition.

NOTE: The fan unit is keyed to fit into the fan housing in the correct orientation only.

To replace a hot-swappable chassis fan unit, follow these steps:

1. Push the fan unit firmly into the fan housing until it is flush with the top of the chassis.

   NOTE: It can take up to ten seconds after installation for the new fan LED to turn off.

2. Check the diagnostic LED that corresponds to the replaced fan unit.
   - When the fan is functioning normally, the LED is off.
   - If the fan fails, the LED is lit.
3. Replace the server top cover. See "Replacing the Top Cover" (page 166).

Removing and Replacing a Hot-Swappable Power Supply

The server can have one or two hot-swappable power supplies. These power supplies are located at the rear of the server. The supported configuration of the server requires a minimum of one power supply. You can install or replace a hot-swappable power supply using the procedures in this section when system power is on or off.

CAUTION: Observe all ESD safety precautions before removing or replacing a power supply. Failure to follow ESD safety precautions can result in damage to the server.

NOTE: A hot-swappable device does not require interaction with the operating system before the device is removed from or installed into the server.

The DC power to the server does not have to be off to install or replace a hot-swappable power supply.

Power Supply Loading Guidelines

The supported configuration of the server requires a minimum of one power supply installed in slot P0 or slot P1. You can install a second, optional hot-swappable power supply to provide 1+1 capability. The left side (viewed from the rear of the chassis) hot-swappable power supply is identified as P0, and the second hot-swappable power supply is identified as P1 (Figure 56).

CAUTION: When a second power supply is not used, the empty power supply slot must remain covered with the supplied metal filler panel. Failure to observe this caution can result in damage due to overheating if the cover does not remain in place.

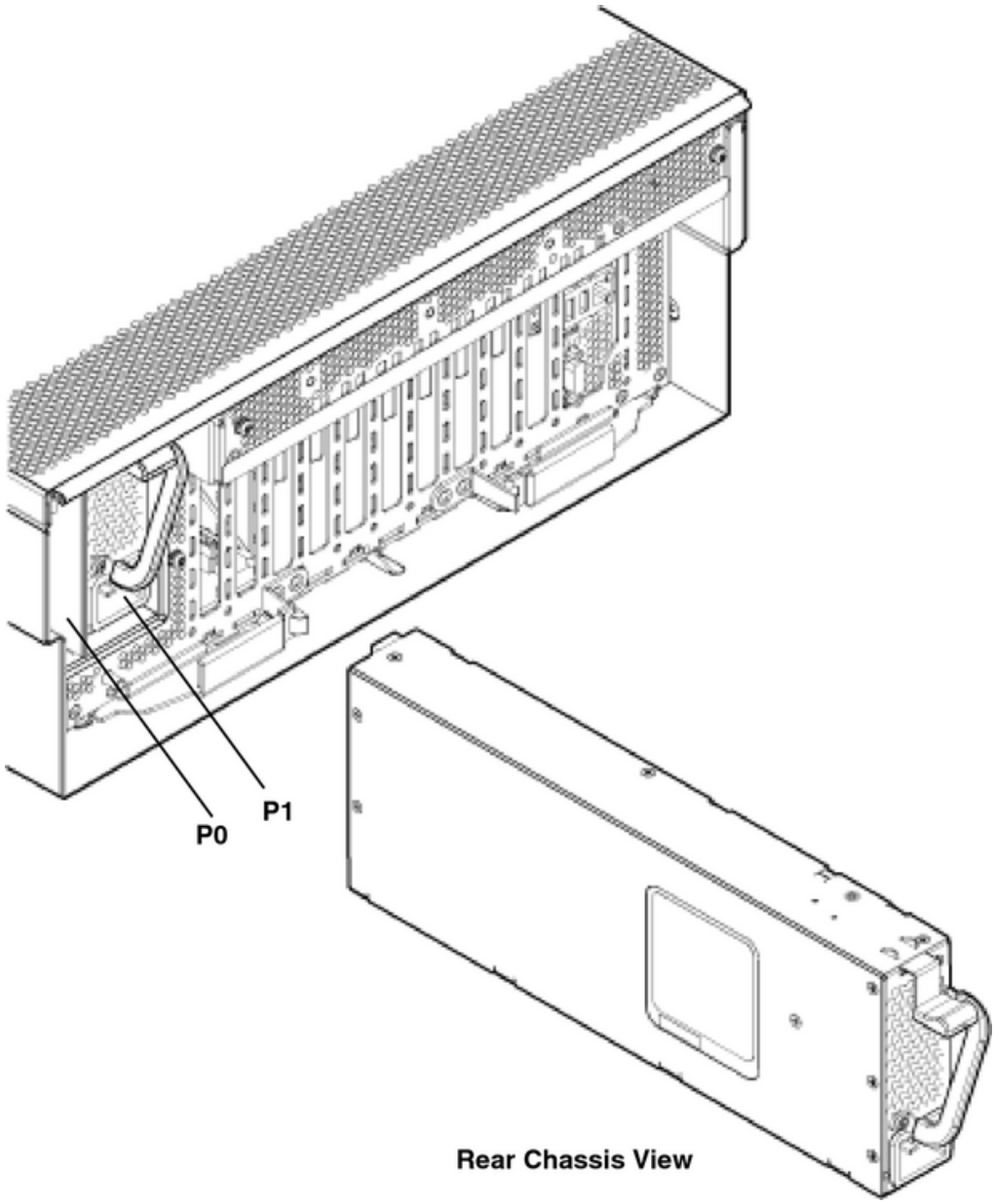
CAUTION: Install the hot-swappable power supply into the server before attaching the new power cord. Failure to observe this caution can result in damage to the server.

Removing a Hot-Swappable Power Supply

To remove a hot-swappable power supply, follow these steps:

1. Move the cable management arm from the rack slide nearest the power supplies just enough to allow access to the power supplies.
2. Remove the power cord plug from the power supply receptacle.
3. Grasp the handle and push the locking tab down with your thumb to release the power supply from the socket on the midplane board.
4. Support the power supply with both hands, and pull the power supply out of the server (Figure 56).

Figure 56 Removing and Replacing a Hot-Swappable Power Supply



Replacing a Hot-Swappable Power Supply

To replace a hot-swappable power supply, follow these steps:

1. Remove the metal filler panel.
2. Support the new power supply with both hands, and slide it into the empty slot until it clicks into place (Figure 56).

IMPORTANT: Ensure the power supply is flush with the adjacent power supply or metal filler panel.

3. Plug the power cord into the power supply receptacle.

NOTE: The LED immediately turns on when power is applied.

4. Replace the cable management arm.

Removing and Replacing a Hot-Swappable Disk Drive Filler

Disk drive fillers are installed for all slots that do not contain a disk drive.

IMPORTANT: For cooling purposes, always leave disk drive fillers in slots that do not contain a disk drive.

Removing a Hot-Swappable Disk Drive Filler

To remove a hot-swappable disk drive filler, follow these steps:

1. Squeeze the tabs on the front of the filler to release it from the slot in the drive bay.
2. Pull gently until the filler slides out of the chassis.

Replacing a Hot-Swappable Disk Drive Filler

To replace a hot-swappable disk drive filler, follow these steps:

1. Orient the disk drive filler so that the release tab is on the left side of the filler, and the airflow holes are on the right side of the filler.
2. Insert the filler into the slot guides, and slide the filler into the slot until it clicks into place and is fully seated.

Removing and Replacing a Hot-Pluggable Disk Drive

There are eight hot-pluggable disk drives located in the front of the server. You can replace the hot-pluggable disk drives using the procedures in this section when server power is on or off.

CAUTION: A hot-pluggable device may require interaction with the operating system before you can safely remove it from or install it into the server. Verify that the operating system supports removing and replacing disk drives while the operating system is running. If the operating system does not support this feature, shut down the operating system before removing or installing disk drive. Failure to observe this caution can result in system failure.

NOTE: The replacement disk drive must have the same product number as the disk drive that you replace.

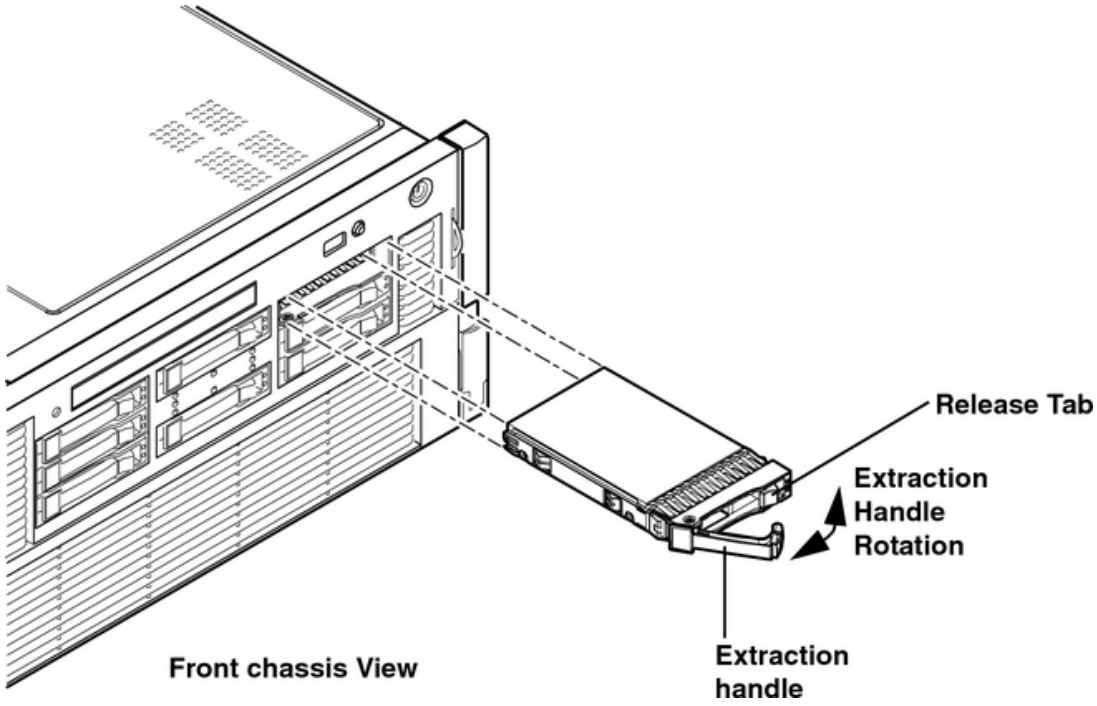
Removing a Hot-Pluggable Disk Drive

To remove a hot-pluggable disk drive, follow these steps:

1. Push the release tab away from the drive extraction handle and pull the extraction handle outward.

2. Pull gently until the hot-pluggable disk drive slides out of the chassis.

Figure 57 Removing and Replacing a Hot-Pluggable Disk Drive



NOTE: For cooling purposes, always leave disk drive fillers in slots that do not contain a disk drive.

Disk Drive Load Order

Disk drive are factory loaded in the following order:

1st drive load in Bay 8

2nd drive load in Bay 7

3rd drive load in bay 6

4th drive load in bay 5

5th drive load in Bay 4

6th drive load in Bay 3

7th drive load in bay 2

8th drive load in bay 1

CAUTION: Drives are loaded in the factory, starting with number 8, working from right to left and bottom to top. If you have never changed your SAS configuration before, you can safely move SAS devices downwards as a block. If you have bays 6, 7, and 8 occupied you can move them down to bays 1, 2, and 3 without having the hardware paths change during a cold-install or recovery while the system is shut down, but you **must** move the disks in order and you cannot rearrange them. For example, you can move bay 6 to 1, 7 to 2, and 8 to 3. After doing this you can safely populate the SAS enclosure from bay 4 onwards. The same procedure can be performed on bays 9 to 16.

TIP: When you receive an HP Integrity rx3600 or HP Integrity rx6600 server from HP, if you ever plan to add other SAS devices into the system, you should consider moving the SAS devices so they start in bay 1 going upwards instead of Bay 8 going downwards.

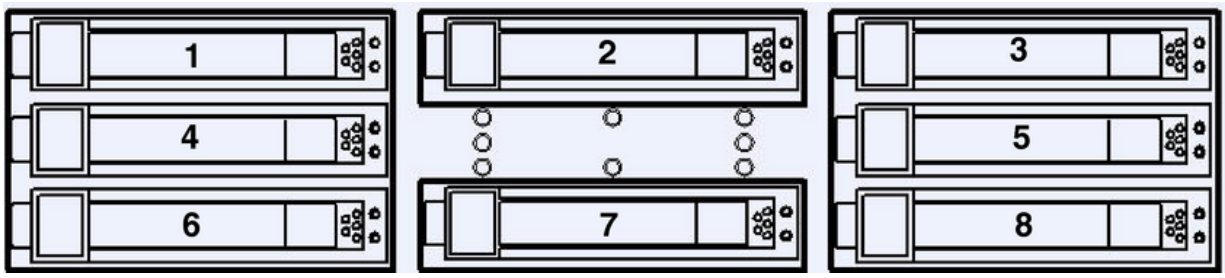
Replacing a Hot-Pluggable Disk Drive

NOTE: The replacement disk drive must have the same product number as the disk drive that you replace.

To install a hot-pluggable disk drive, follow these steps:

1. Use Figure 58 to determine the next available disk drive installation slot.

Figure 58 Disk Drive Slot IDs



2. Remove the disk drive filler. See "Removing a Hot-Swappable Disk Drive Filler" (page 48).

   NOTE: Save the disk drive filler for future use. For cooling purposes, always place disk drive fillers in slots that do not contain a disk drive.

3. Insert the hot-pluggable disk drive into the slot guides, and slide the drive into the slot until it seats into the socket on the disk backplane.
4. Close the extraction handle by pushing it inward until it clicks into place.
5. Observe the following disk drive LEDs to ensure the drive is functional. For more information see "Hot-Pluggable Disk Drive LEDs" (page 30).
   - Drive status LED
   - Drive activity LED

Removing and Replacing PCI/PCI-X/PCIe Card Dividers

PCI/PCI-X/PCIe card dividers are located on the I/O board assembly, between the PCI/PCI-X/PCIe cards. Eight dividers provide short circuit protection to the hot-pluggable PCI/PCI-X/PCIe cards by preventing inadvertent contact between cards during the replacement, addition, or removal of a card.

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing a PCI/PCI-X/PCIe Card Divider

To remove a PCI/PCI-X/PCIe card divider, follow these steps:

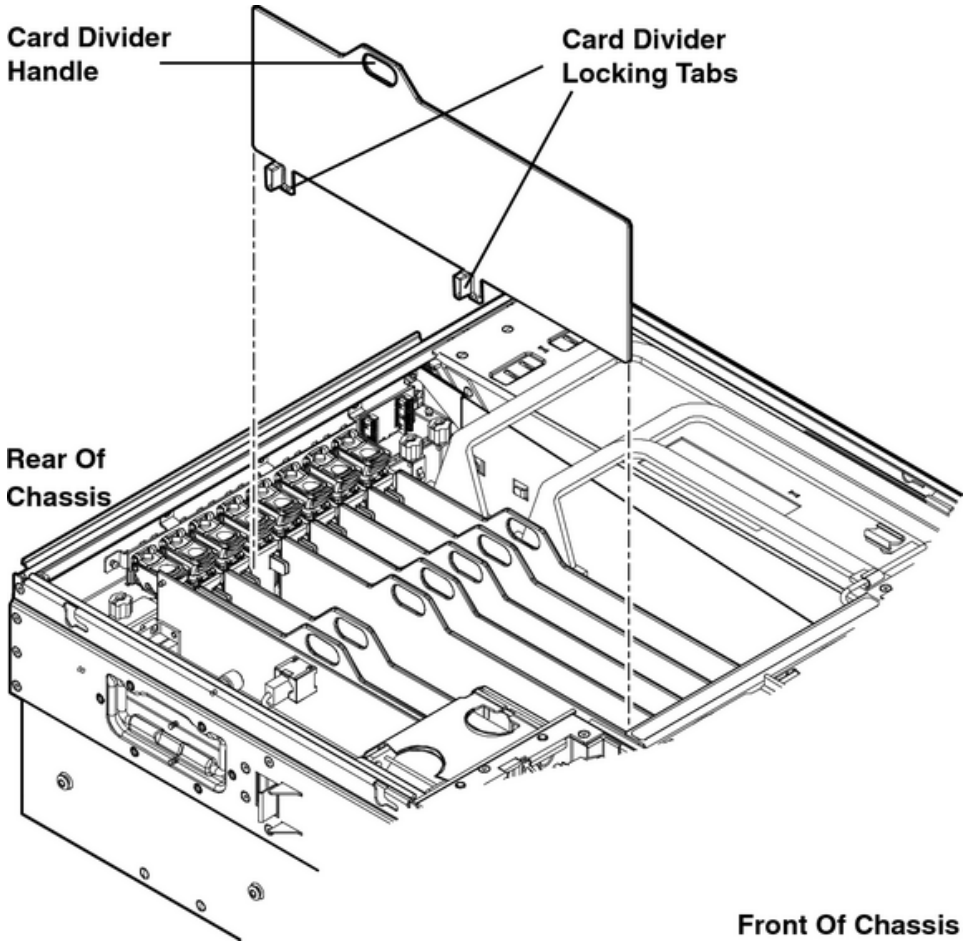
1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).

2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover. See "Removing the Top Cover" (page 165).

CAUTION: When extracting the card divider, ensure you release the locking tabs completely or you can damage them. If you damage the tabs, the divider does not seat properly when you reinsert it.

4. Use a tool to carefully push the two tabs that attach the card divider to the I/O board assembly.
5. Pull the card divider up sharply by the handle to disengage it from the I/O board assembly (Figure 59).

Figure 59 PCI/PCI-X/PCIe Card Divider Removal and Replacement



Replacing a PCI/PCI-X/PCIe Card Divider

To replace a PCI/PCI-X/PCIe card divider, follow these steps:

1. Insert the PCI/PCI-X/PCIe card divider locking tabs into the slots on the I/O board assembly.
2. Push down firmly to seat the card divider into the slots on the I/O board assembly.
3. Replace the top cover. See "Replacing the Top Cover" (page 166).
4. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
5. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing a Hot-Pluggable PCI/PCI-X/PCIe Card

PCI/PCI-X/PCIe cards are located on the I/O board assembly. Two of these cards are dedicated to core I/O functions and require that the server be powered off for card replacement. Core I/O

cards have designated slots on the I/O board assembly. The remaining eight PCI/PCI-X/PCIe cards are hot-pluggable. Software intervention is required prior to removing a PCI/PCI-X/PCIe card. This section describes the following hot-plug operations and PCI/PCI-X/PCIe card replacement procedures:

- "PCI/PCI-X/PCIe Configurations" (page 51)

  Describes PCI/PCI-X/PCIe capabilities and relates card functions and capabilities to specific slots.

- "Online Addition (OLA)" (page 181)

  Describes the installation of new PCI/PCI-X/PCIe expansion cards in previously empty slots without powering down the server.

- "Online Replacement (OLR)" (page 182)

  Describes the replacement of a PCI/PCI-X/PCIe card without powering down the server. This action requires suspending the associated driver. The existing driver for the old card must be compatible with the new card.

△ **CAUTION:** If you are performing OLR on HP-UX 11i version 1 (and later), the card you install must be exactly the same as the card you replace. This is also known as like-for-like replacement.

- "Removing a PCI/PCI-X/PCIe Card Offline" (page 183)

  Describes the removal of a PCI/PCI-X/PCIe card after powering down the server.

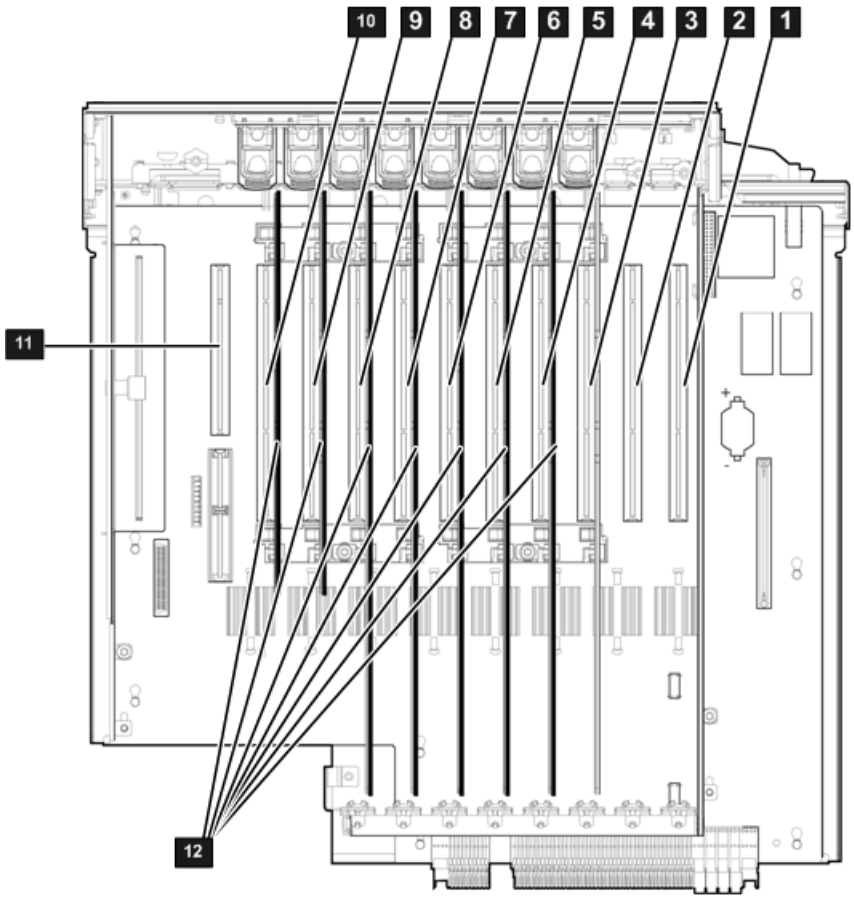
- "Installing a PCI/PCI-X/PCIe Card Offline" (page 184)

  Describes the installation of a PCI/PCI-X/PCIe card after powering down the server.

Figure 60 shows the PCI/PCI-X/PCIe slot identification and card divider locations.

NOTE: Slots one through eight are full-length; slots nine and ten are short-length.

Figure 60 PCI/PCI-X/PCIe Slot Identification and Card Divider Locations



1	Slot 1	5	Slot 5	9	Slot 9
2	Slot 2	6	Slot 6	10	Slot 10
3	Slot 3	7	Slot 7	11	Core I/O Board Slot
4	Slot 4	8	Slot 8	12	PCI/PCI-X/PXIe Card Dividers

PCI/PCI-X Configurations

PCI/PCI-X slots are numbered from one through ten in the server (Figure 60).

The following describes configuration requirements for slots 1 through 10 on the PCI/PCI-X/ I/O backplane and slots nine and ten on the PCI/PCI-X/PCIe I/O backplane:

- PCI-X slots 1 and 2 are reserved for use by the core I/O cards SAS core I/O cards and the Gigabit Ethernet LAN core I/O card. Slots 1 and 2 are not hot-pluggable. Install only supported PCI-X SAS and LAN core I/O cards in slots 1 and 2. PCIe SAS core I/O is installed in slots 3 and 4 on the PCI/PCI-X/PCIe IOBP. Depending upon the number and type of SAS core I/O cards installed on the system, the Gigabit Ethernet LAN core I/O card may be installed in slot 10.
- Slots 3 and 4 are nonshared slots. The maximum speed for cards in slots 3 and 4 is PCI-X 266 MHz.
- Slots 5 and 6 are nonshared slots. The maximum speed for cards in slots 5 and 6 is PCI-X 133 MHz.
- Slots 7, 8, 9, and 10 are shared slots. These four slots are limited by bus-mode or frequency-related incompatibilities. If you use different modes, such as PCI instead of PCI-X, or different card speeds in a shared bus environment, the slot automatically downgrades to the lesser mode or speed. The maximum capability of each slot is PCI-X 66 MHz.

NOTE: Shared slots have card compatibility restrictions. If one of the shared slots is occupied, the card added to the second slot is limited by the configuration of the occupied slot. If the new card has a slower capability than the current bus configuration, it fails. If the new card has a faster capability than the current bus configuration, it only runs at the slower bus mode and frequency of the current bus configuration.

The following are common configuration scenarios for cards that use shared slots. These examples also apply to slots nine and ten because they are shared (both use a common bus).

1. If there is a PCI-X 66 MHz card in slot 7, and you hot-plug a PCI 33 MHz card into slot 8, the operation fails. The new PCI 33 MHz card does not initialize and the slot powers down because you cannot change bus speed during hot-plug operations. The new card has a slower bus speed than the current card.

   NOTE: If the server is rebooted in this configuration, both cards initialize to run at PCI 33 MHz. The system firmware can only change the bus capability down to the lowest common value.

2. If there is a PCI 33 MHz card in slot 7, and you hot-plug insert a PCI-X 66 MHz card into slot 8, the new card works but it runs at PCI 33 MHz.
3. If the server is powered off, and you insert a PCI 33 MHz card into slot 7 (that shares a common bus with a PCI-X 66 MHz card in slot 8), then both cards run at PCI 33 MHz when the server powers up.

The following describes configuration requirements for slots one through ten on the PCI/PCI-X/PCIe I/O backplane:

- PCI-X slots 1 and 2 are reserved for use by the core I/O cards PCI-X SAS core I/O cards and the Gigabit Ethernet LAN core I/O card. Slots 1 and 2 are not hot-pluggable. Install only supported PCI-X SAS and LAN core I/O cards in slots 1 and 2. PCIe slots 3 and 4 are used for the PCIe SAS Core I/O cards, but are public slots. If the PCIe core I/O is not installed, these slots are available for other PCIe I/O cards.
- Slots 3 and 4 are swtiched PCIe x8
- Slots 5 and 6 are nonswitched PCIe x8.
- Slots 7 and 8 are nonshared slots. The maximum speed for cards in slots 7 and 8 is PCI-X 133 MHz.
- Slots 9 and 10 are shared slots. These two slots are limited by bus mode or frequency-related incompatibilities.

IMPORTANT: Slots 9 and 10 on the PCI/PCI-X/PCIe I/O backplane have the same configuration limitations as slots 9 and 10 on the PCI/PCI-X I/O backplane.

Table 71 lists the PCI/PCI-X card slot frequency and bus mode compatibility for shared slots.

Table 71 PCI/PCI-X Card Slot Frequency/Bus Mode Compatibility for Shared Slots[1]

Current PCI Bus Mode and Frequency for the Current Card in a Shared Slot	Cards to be installed				
	PCI 33	PCI 66	PCI-X 66	PCI-X 133	PCI-X 266
PCI 33 MHz	Compatible[2]	Compatible[2]New card running at PCI 33 MHz	Compatible[2]New card running at PCI 33 MHz	Compatible[2]New card running at PCI 33 MHz	Compatible[2]New card running at PCI 33 MHz
PCI 66 MHz	Incompatible-frequency[3]	Compatible[2]New card running at PCI 66 MHz	Compatible[2]New card running at PCI 66 MHz	Compatible[2]New card running at PCI 66 MHz	Compatible[2]New card running at PCI 66 MHz
PCI-X 66 MHz	Incompatible-frequency[3]	Incompatible-bus[4]	Compatible[2]New card running at PCI-X 66 MHz	Compatible[2]New card running at PCI-X 66 MHz	Compatible[2]New card running at PCI-X 66 MHz

[1] The conditions described in this table apply only to shared slots (slots 7, 8, 9, and 10). Slots 1, 2, 3, 4, 5, and 6 are not shared slots.

[2] Card is accepted and runs at frequency shown.

[3] The new card does not initialize and powers down due to frequency mismatch.

[4] The new card does not initialize and powers down due to bus mode mismatch.

PCI/PCI-X/PCIe Card Path Logging

Some PCI/PCI-X/PCIe failures result in I/O path logging. These paths help to indicate the source of the error and can be included in the error message or logged into console or event logs.

Table 72 describes the PCI/PCI-X I/O paths for the server. Table 73 (page 180) describes the PCI/PCI-X/PCIe I/O paths for the server.

Table 72 PCI/PCI-X I/O Paths

Slot	Function Associated With Path	Location (as viewed from rear of chassis)	HP-UX Device Path	EFI Device Path
1	SAS core I/O card	Left-most slot (private; nearest to power supply)	0/4/1/*	Acpi(HWP0002,400)/Pci(1□*)
2	Dual port Gigabit LAN (Core I/O LAN)[1]	2nd from left (private)	0/4/2/*	Acpi(HWP0002,400)/Pci(2□*)
3	I/O with 266 MHz/ 64 bit PCI-X card	3rd from left (public)	0/7/1/*	Acpi(HWP0002,700)/Pci(1□*)
4	I/O with 266 MHz/ 64 bit PCI-X card	4th from left (public)	0/3/1/*	Acpi(HWP0002,300)/Pci(1□*)
5	I/O with 133 MHz/ 64 bit PCI-X card	5th from left (public)	0/6/1/*	Acpi(HWP0002,600)/Pci(1□*)
6	I/O with 133 MHz/ 64 bit PCI-X card	6th from left (public)	0/2/1/*	Acpi(HWP0002,200)/Pci(1□*)
7	I/O with 66 MHz/ 64 bit PCI-X card (shared with slot 8)	7th from left (public)	0/5/1/*	Acpi(HWP0002,500)/Pci(1□*)
8	I/O with 66 MHz/ 64 bit PCI-X card (shared with slot 7)	8th from left (public)	0/5/2/*	Acpi(HWP0002,500)/Pci(2□*)
9	I/O with 66 MHz/ 64 bit PCI-X card (shared with slot 10)	9th from left (public)	0/1/1/*	Acpi(HWP0002,100)/Pci(1□*)
10	I/O with 66 MHz/ 64 bit PCI-X card (shared with slot 9)	10th from left (public; nearest to core I/O board)	0/1/2/*	Acpi(HWP0002,100)/Pci(2□*)

Table 72 PCI/PCI-X I/O Paths *(continued)*

Slot	Function Associated With Path	Location (as viewed from rear of chassis)	HP-UX Device Path	EFI Device Path
Core I/O board	Core I/O iLO 2 MP	Right-most special slot (private)	0/0/1/*	Acpi(HWP0002,0)/Pci(1□*)
	Core I/O USB	Right-most special slot (private)	0/0/2/*	Acpi(HWP0002,0)/Pci(2□*)
	Core I/O VGA (optional)	Right-most special slot (private)	0/0/4/*	Acpi(HWP0002,0)/Pci(4□*)

[1] The Core I/O LAN may be in slot 10 depending upon the configuration.

Table 73 PCI/PCI-X/PCIe I/O Paths

Slot	Function Associated with Path	Location as viewed from rear of chassis	HP-UX Device Path	EFI Device Path
1	SAS core I/O card	Left-most slot (nearest to power supply)	0/4/1/*	Acpi(HWP0002,PNP0A03,400)/Pci(1|*)
2	Dual port Gigabit LAN (core I/O LAN)[1]	2nd from left	0/4/2/*	Acpi(HWP0002,PNP0A03,400)/Pci(2|*)
3	I/O PCIe x8 (switched with slot 4) Optional SAS core I/O card	3rd from left	0/6/0/0/0/1/0/0/4[2]	Acpi(HPQ0002,PNP0A08,600)/Pci(0|0)/Pci(0|0)/Pci(1|0)/Pci(0|*)[2]
4	I/O PCIe x8 (switched with slot 3) Optional SAS core I/O card	4th from left	0/6/0/0/0/0/0/0/4[2]	Acpi(HPQ0002,PNP0A08,600)/Pci(0|0)/Pci(0|0)/Pci(0|0)/Pci(0|*)[2]
5	I/O PCIe x8	5th from left	0/7/0/0/0/*	Acpi(HPQ0002,PNP0A08,700)/Pci(0|0)/Pci(0|*)
6	I/O PCIe x8	6th from left	0/3/0/0/0/*	Acpi(HPQ0002,PNP0A08,300)/Pci(0|0)/Pci(0|*)
7	I/O 133 MHz 64-bit PCI-X card	7th from left	0/2/1/*	Acpi(HWP0002,PNP0A03,200)/Pci(1|*)
8	I/O 133 MHz 64-bit PCI-X card	8th from left	0/5/1/*	Acpi(HWP0002,PNP0A03,500)/Pci(1|*)
9	I/O with 66 MHz 64-bit PCI-X card (shared with slot 10)	9th from left	0/1/1/*	Acpi(HWP0002,PNP0A03,100)/Pci(1|*)
10	I/O with 66 MHz 64-bit PCI-X card (shared with slot 9)	10th from left (nearest to core I/O board)	0/1/2/*	Acpi(HWP0002,PNP0A03,100)/Pci(2|*)
Core I/O board	Core I/O iLO 2 MP	Right most special slot	0/0/1/*	Acpi(HWP0002,PNP0A03,0)/Pci(1|*)

Table 73 PCI/PCI-X/PCIe I/O Paths *(continued)*

Slot	Function Associated with Path	Location as viewed from rear of chassis	HP-UX Device Path	EFI Device Path
Core I/O board	Core I/O USB	Right most special slot	0/0/2/*	Acpi(HWP0002,PNP0A03,0)/Pci(2|*)
Core I/O board	Core I/O VGA (optional)	Right most special slot	0/0/4/*	Acpi(HWP0002,PNP0A03,0)/Pci(4|*)

[1] The Core I/O LAN may be in slot 10 depending upon the configuration.

[2] **IMPORTANT:** The new version of the PCI/PCI-X/PCIe backplane (version 1.1) is being shipped on July 1, 2008. For existing servers, repair and replace should continue to be performed with the version 1 I/O backplane. For servers shipped as of July 1, 2008, repair and replace should be performed with version 1.1 I/O backplane. The device paths for version 1.1 are as follows.

Slot	Function Associated with Path	Location as Viewed from Rear of Chassis	HP-UX Device Path	EFI Device Path
3	I/O PCIe x8 (switched with slot 4) Optional SAS core I/O card	3rd from left	0/6/0/0/0/0/1/0/0	Acpi(HPQ0002,PNP0A08,600)/Pci(0|0)/Pci(0|0)/Pci(1|0)/Pci(0|*)
4	I/O PCIe x8 (switched with slot 3) Optional SAS core I/O card	4rd from left	0/6/0/0/0/0/0/0/0	Acpi(HPQ0002,PNP0A08,600)/Pci(0|0)/Pci(0|0)/Pci(0|0)/Pci(0|*)

Online Addition (OLA)

IMPORTANT: Before installing a PCI/PCI-X/PCIe card, ensure you install the proper drivers.

To add a PCI/PCI-X/PCIe card into an empty slot, follow these steps:

1. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 45).
3. Select an empty slot that is appropriate for the card you are installing. See "PCI/PCI-X Configurations" (page 177) for more information.

CAUTION: Do not accidentally push the MRL of a powered-on, occupied slot; this automatically cuts off the power for that slot.

4. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X card bulkhead filler is fully exposed.

5. Remove the PCI/PCI-X/PCIe bulkhead filler.

CAUTION: When inserting the PCI/PCI-X/PCIe card, be careful that you do not accidentally touch an Attention button on the other PCI/PCI-X/PCIe MRLs; this shuts down another PCI/PCI-X/PCIe card/slot. If you do this, push the Attention button again within five seconds to cancel the shutdown.

Also, ensure that you fully seat the card into the slot or the card can fail after power is reapplied to the slot.

6. Insert the PCI/PCI-X/PCIe card into the empty slot, and use firm, even pressure to seat the card in the slot.
7. Connect all internal and external cables to the PCI/PCI-X/PCIe card.
8. Close the MRL.
   a. Rotate the MRL downward 90 degrees.
   b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.
9. Close the gate latch to secure the end of the card if it is full-length.
10. Activate the PCI/PCI-X/PCIe card and slot.
    a. Press the red Attention button located on the MRL of the appropriate slot. The power LED starts to blink.
    b. Wait until the power LED goes from blinking to steady on.

NOTE: After pushing the Attention button, you have five seconds to cancel the operation by pushing the Attention button again. After five seconds, pressing the Attention button initiates slot powerdown.

11. Replace the top cover. See "Replacing the Top Cover" (page 166).

Online Replacement (OLR)

CAUTION: For HP-UX 11i version 1 (and later), you can only replace an existing card with a like card.

To remove and replace a PCI/PCI-X/PCIe card into a populated slot, follow these steps:

1. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
2. Remove the top cover from the chassis. See "Removing the Top Cover" (page 165).
3. Deactivate the PCI/PCI-X/PCIe card and slot.
   a. Press the red Attention button located on the MRL of the appropriate slot, and the power LED starts to blink.
   b. Wait until the power LED goes from blinking to steady off.

NOTE: After pushing the Attention button, you have five seconds to cancel the operation by pushing the Attention button again.

4. Pull the gate latch toward the front of the chassis to completely unlock the PCI/PCI-X/PCIe card.
5. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead is fully exposed.
6. Disconnect all external and internal cables attached to the PCI/PCI-X/PCIe card.

7. Grasp the PCI/PCI-X/PCIe card divider by the handle, and pull upward to eject the PCI/PCI-X/PCIe card from the slot.
8. Grasp the PCI/PCI-X/PCIe card by the edges and lift it out of the chassis.

CAUTION: When inserting the PCI/PCI-X/PCIe card, be careful that you do not accidentally touch an Attention button on the other MRLs; this shuts down that PCI/PCI-X/PCIe card slot. If you do this, push the Attention button again within five seconds to cancel the shutdown.

Also, ensure that you fully seat the card into the slot or the card can fail after power is reapplied to the slot.

9. Insert the PCI/PCI-X/PCIe card into the empty slot, and use firm, even pressure to seat the card in the slot.
10. Reconnect all internal and external cables to the PCI/PCI-X/PCIe card.
11. Close the MRL.
    a. Rotate the MRL downward 90 degrees.
    b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.
12. Close the gate latch to secure the end of the card if it is full-length.
13. Activate the PCI/PCI-X/PCIe card and slot.
    a. Press the red Attention button located on the MRL of the appropriate slot, and the power LED starts to blink.
    b. Wait until the power LED goes from blinking to steady on.

NOTE: After pushing the Attention button, you have five seconds to cancel the operation by pushing the Attention button again. After five seconds, pressing the Attention button initiates slot powerdown for online replacement (OLR) of the card.

14. Replace the top cover. See "Replacing the Top Cover" (page 166).

Removing a PCI/PCI-X/PCIe Card Offline

Observe the following warning and cautions before performing an offline removal of a PCI/PCI-X/PCIe card.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before removing a PCI/PCI-X/PCIe card offline. Failure to follow ESD safety precautions can result in damage to the server.

CAUTION: Record the slot location of all PCI cards as they are removed. Depending on the operating system, replacing the PCI cards in a different location may require system reconfiguration and may cause boot failure.

To remove a PCI card from the server with the power off, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover from the chassis. See "Removing the Top Cover" (page 165).

4. Pull the gate latch toward the front of the chassis to completely unlock the PCI/PCI-X/PCIe card if it is full-length.
5. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead is fully exposed.
6. Disconnect all external and internal cables attached to the PCI/PCI-X/PCIe card.
7. Grasp the PCI/PCI-X/PCIe card divider by the handle, and pull upward to eject the PCI/PCI-X/PCIe card from the slot.
8. Grasp the PCI/PCI-X/PCIe card by the edges and lift it out of the chassis.

Installing a PCI/PCI-X/PCIe Card Offline

NOTE: Before installing a PCI/PCI-X/PCIe card, ensure that you install the proper drivers for the PCI/PCI-X/PCIe card.

To install a PCI/PCI-X/PCIe card with the server power off, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover from the chassis. See "Removing the Top Cover" (page 165).
4. Select an empty slot that is appropriate for the card you are installing. For more information see "PCI/PCI-X Configurations" (page 177) and Figure 60.
5. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead filler is fully exposed.
6. Remove the PCI/PCI-X/PCIe bulkhead filler.
7. Insert the PCI/PCI-X/PCIe card into the empty slot, and use firm, even pressure to seat the card in the slot.

△ **CAUTION:** Ensure that you fully seat the card into the slot, or the card can fail after power is reapplied to the slot.

8. Connect all internal and external cables to the PCI/PCI-X/PCIe card.
9. Close the MRL.
   a. Rotate the MRL downward 90 degrees.
   b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.
10. Close the gate latch to secure the end of the card if it is full-length.
11. Replace the top cover. See "Replacing the Top Cover" (page 166).
12. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
13. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the DVD Drive

The DVD drive is located in the front of the server above the disk drives.

WARNING! Ensure that the system powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

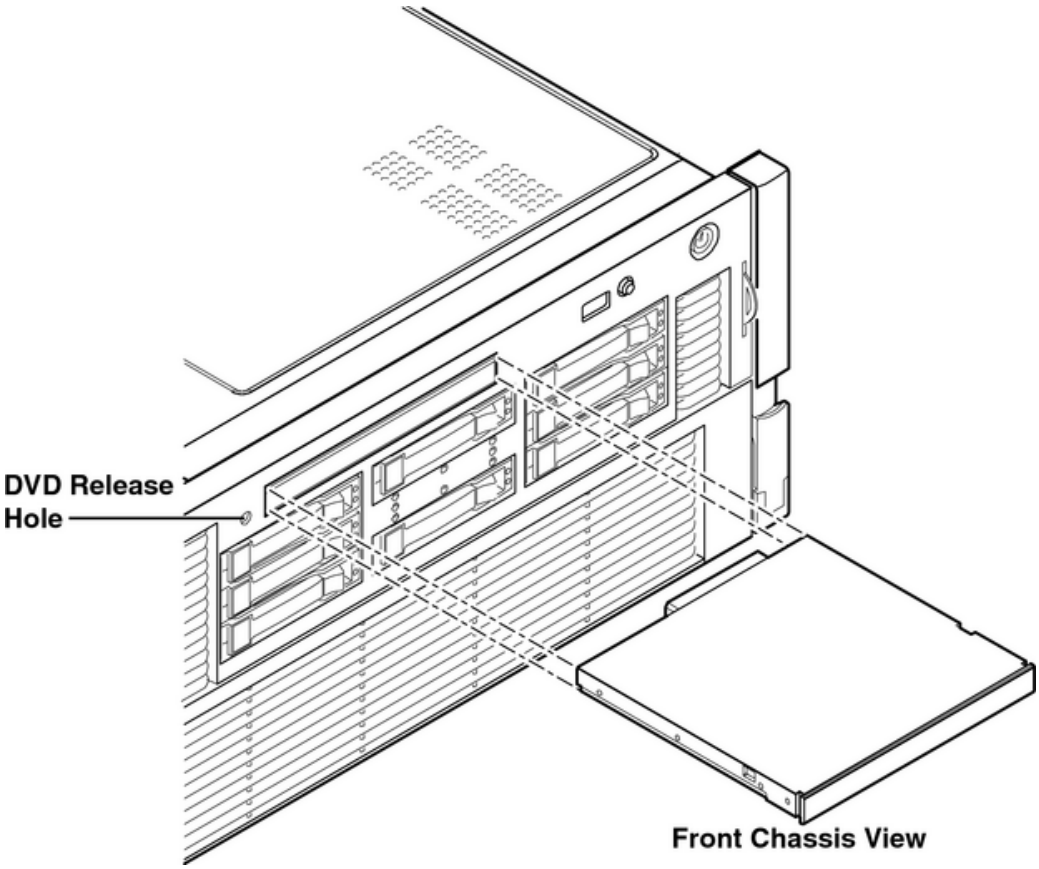
CAUTION: Observe all ESD safety precautions before removing or replacing the DVD drive. Failure to follow ESD safety precautions can result in damage to the server.

Removing the DVD Drive

To remove the DVD drive, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. Insert a paper clip or pin that fits into the hole to the left of the DVD drive, and push firmly to eject the drive out of the bay (Figure 61).
3. Pull the DVD drive straight out to remove it from the chassis (Figure 61).

Figure 61 DVD Drive Removal and Replacement



Replacing the DVD Drive

To replace a DVD drive, follow these steps:

1. Insert the DVD drive, and push it straight into the drive bay until it clicks into place (Figure 61).
2. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the Memory Carrier Assembly

The memory carrier assembly encloses the system DIMMs. There are two different memory carrier assemblies available for this server:

- 8-DIMM memory carrier assembly
- 24-DIMM memory carrier assembly

The 8- and 24-DIMM memory carrier assemblies have two sides, 0 and 1, each of which contain a memory board. System DIMMs seat onto the memory boards.

Table 74 lists the supported memory carrier assembly configurations.

Table 74 Supported Memory Carrier Assembly Configurations

Memory Carrier Configuration	Memory Boards Installed
8-DIMM memory carrier	Two 4-DIMM memory boards
24-DIMM memory carrier	Two 12-DIMM memory boards

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before removing and replacing the memory carrier. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Memory Carrier Assembly

To remove the memory carrier assembly, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server out from the rack until it stops. See "Extending the Server from the Rack" (page 164).
3. Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 167).

   NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open.

4. Press the button located in the center of the memory carrier assembly to release the extraction handles (Figure 62).

   CAUTION: Manipulate the extraction handles with care; failure to observe this caution can result in damage to the extraction handles.

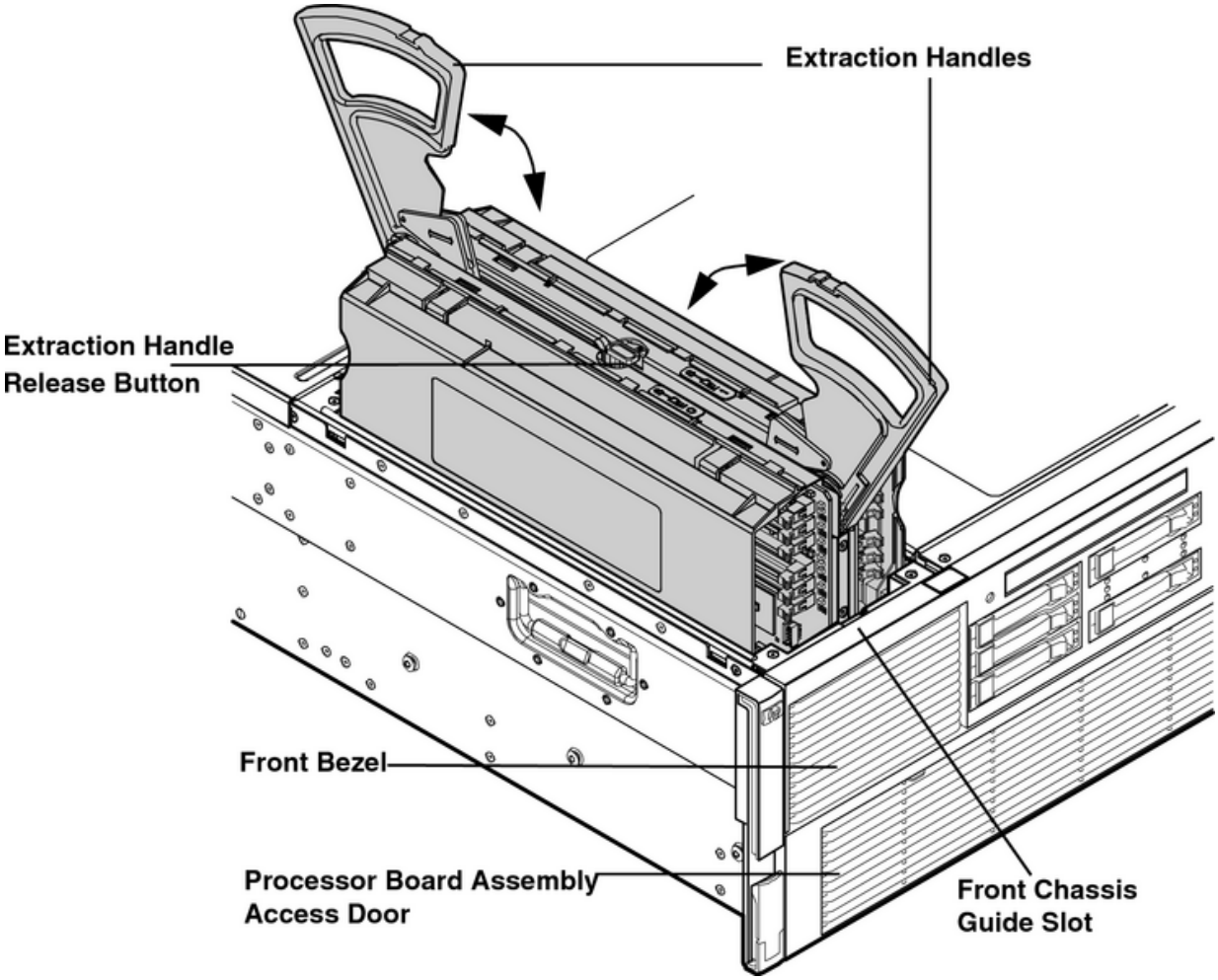
5. Pull up on the extraction handles, and rotate them outward approximately 90 degrees (Figure 62).

   NOTE: The extraction handles latch into the open position with an audible click.

6. Pull the extraction handles to lift the memory carrier assembly out of the chassis (Figure 62).

NOTE: To avoid damage to the extraction handles, HP recommends rotating the handles inward and snapping them into the locked position when servicing the system DIMMs or any time the carrier is out of the chassis. Before replacing the memory carrier, press the button to release the extraction handles. Use the handles to replace the memory carrier into the chassis.

Figure 62 Removing and Replacing the Memory Carrier Assembly



Replacing the Memory Carrier Assembly

CAUTION: Ensure the processor board assembly is fully seated before you replace the memory carrier assembly. The processor board assembly access door must be flush with the front bezel.

To replace the memory carrier assembly, follow these steps:

1. Ensure that the extraction handles are positioned in the outward, unlocked position.
2. Align the memory carrier assembly with the front and rear chassis guide slots.

NOTE: Assembly side 0 is on the left, and assembly side 1 is on the right as viewed from the front of the chassis.

3. Slide the memory carrier assembly into the chassis until it begins to seat into the socket located on the processor board.

CAUTION: Do not apply excessive force when closing the extraction handles and seating the memory carrier assembly into the socket on the processor board. Manipulate the extraction handles with care; failure to observe these cautions can result in damage to the extraction handles and other server components.

4. Rotate the extraction handles inward and press the handles straight down until they snap into the locked position.
5. Replace the memory carrier assembly cover and latch the top cover release lever closed. See "Replacing the Memory Carrier Assembly Cover" (page 167).
6. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
7. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing System Memory

System memory, or DIMMs, are located on a pair of memory boards inside the memory carrier assembly.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before removing or replacing system memory. Failure to follow ESD safety precautions can result in damage to the server.

Removing System Memory

To remove system memory, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server out from the rack until it stops. See "Extending the Server from the Rack" (page 164).
3. Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 167).

NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open. You must remove the memory carrier because it attaches directly to the processor board.

4. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 186).

NOTE: To avoid damage to the memory carrier extraction handles, HP recommends rotating the handles inward and snapping them into the locked position when servicing the system DIMMs or any time the carrier is out of the chassis. Before replacing the memory carrier, press the button to release the extraction handles. Use the handles to replace the memory carrier into the chassis.

5. To locate the DIMM you need to remove, use Figure 65: "8-DIMM Memory Carrier Board Slot IDs" (page 192), or Figure 66: "24-DIMM Memory Carrier Board Slot IDs" (page 193).

6. Lay the memory carrier assembly on side 0 or side 1 so that the memory board containing the DIMMs that require servicing faces upward (Figure 63 (page 189)).
7. Remove the memory carrier assembly side cover.
   a. Press the release tabs (Figure 63 (page 189)) on both sides of the extraction handle release button until the side cover releases from the top center of the assembly.
   b. Rotate the side cover slightly to free the tabs from the retaining slots at the base of the assembly (Figure 22).
   c. Lift the side cover off the assembly.
8. Release the DIMM from the slot.
   a. Identify the DIMM you want to remove on the memory board.
   b. Push the appropriate extraction levers found on either side of the DIMM slot outward to the open position (Figure 67 (page 195)).
9. Remove the DIMM from the slot.

Figure 63 shows the memory carrier assembly removed from the chassis.

Figure 63 Memory Carrier Assembly

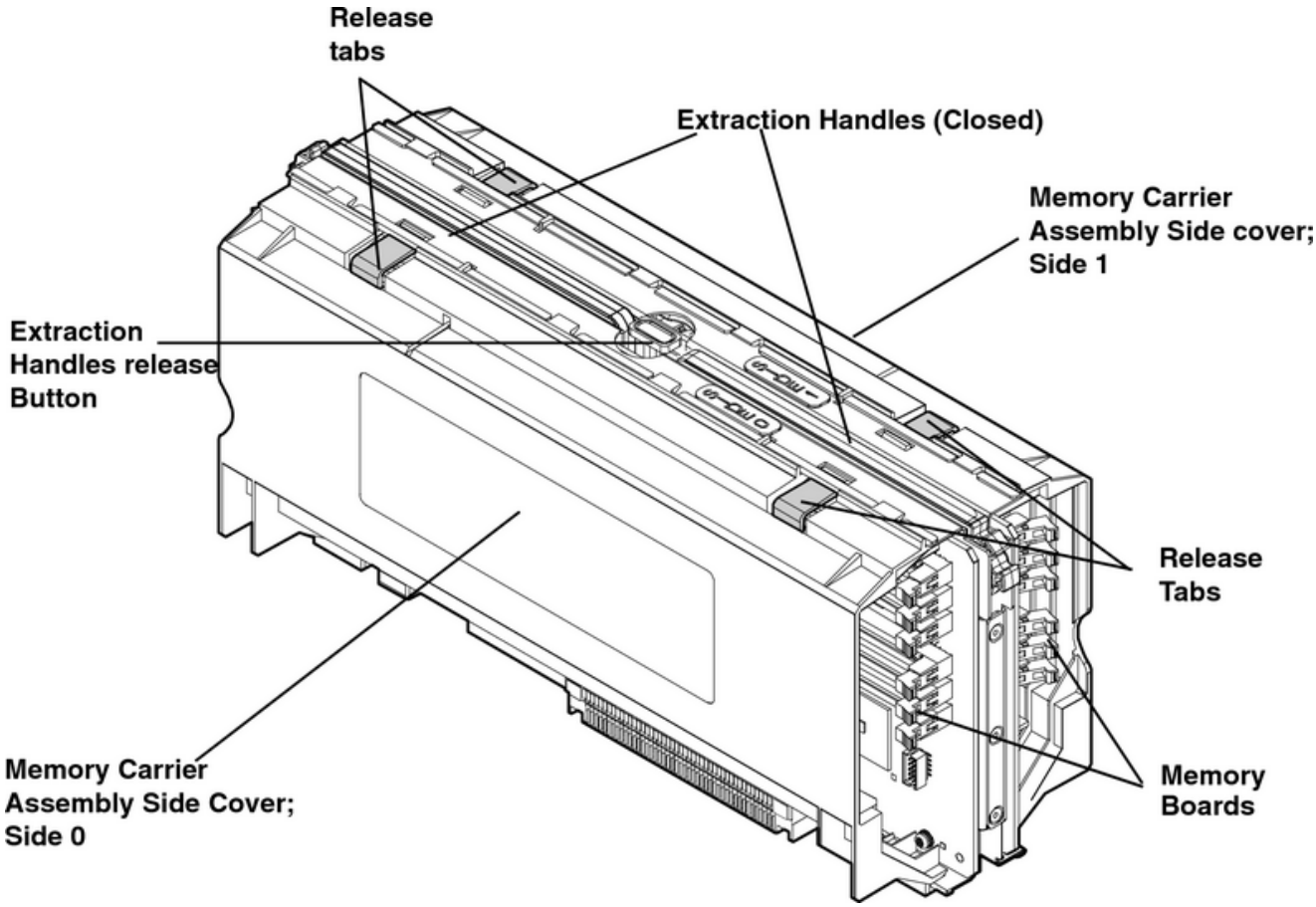
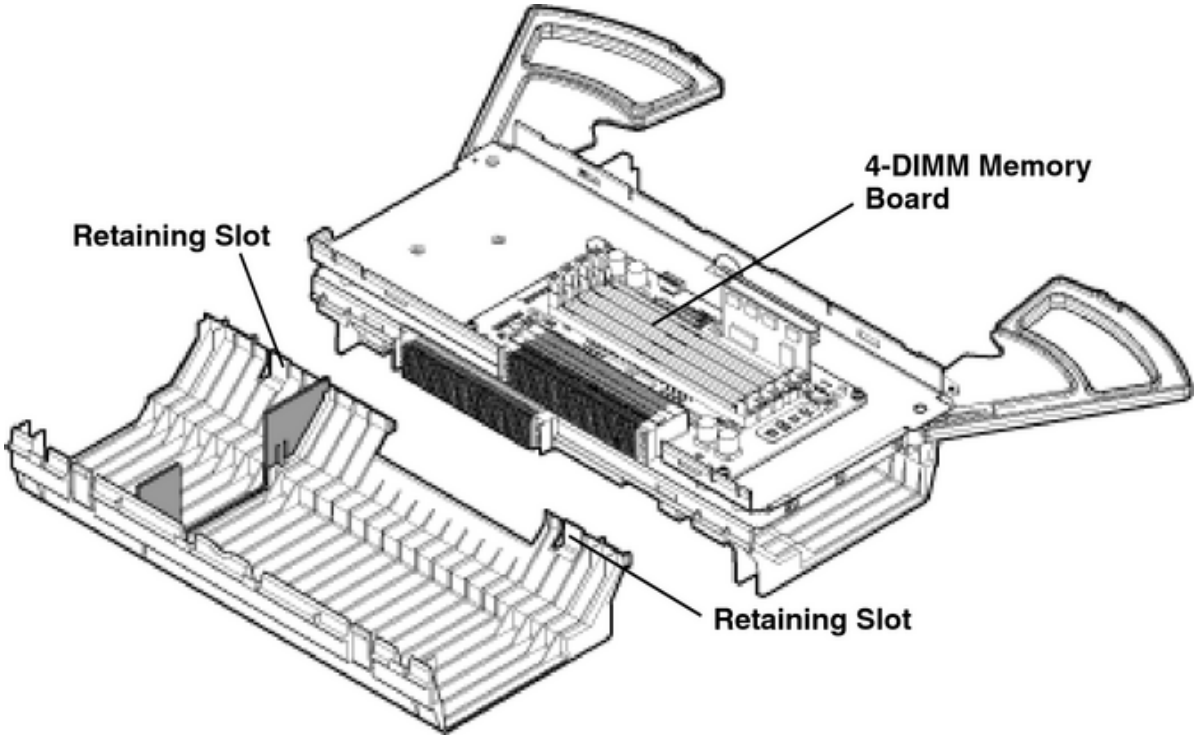


Figure 64 shows the memory carrier with the side cover removed.

Figure 64 Memory Carrier Assembly with Side Cover Removed



Memory Installation Conventions

Before installing memory, read and understand the following memory installation conventions:

- "Supported DIMM Sizes and Memory Configurations"
- "Memory Load Order"
- DIMM slot IDs

Supported DIMM Sizes and Memory Configurations

The standard server configuration includes an 8-DIMM memory carrier which contains two 4-DIMM memory boards. An optional, high-capacity memory configuration with a 24-DIMM memory carrier containing a pair of 12-DIMM memory boards is available with this server.

System DIMMs seat onto the memory boards. The minimum server configuration requires at least one memory pair in the 8-DIMM memory carrier, and at least one memory quad (group of four DIMMs) in the 24-DIMM memory carrier.

The following are the supported DIMM sizes for the server:

- 512 MB
- 1 GB
- 2 GB
- 4 GB
- 8 GB

Table 75 lists the supported memory configurations for the server.

Table 75 Supported Memory Configurations

Memory Carrier Type	Memory Boards Installed	Minimum Memory Configuration	Maximum Memory Configuration
8-DIMM memory carrier (standard)	Two 4-DIMM memory boards	2 GB (one pair: two 1-GB DIMMs)	64 GB (four pairs: eight 8-GB DIMMs)
24-DIMM memory carrier (optional, high-capacity)	Two 12-DIMM memory boards	2 GB (one quad: four 512-MB DIMMs)	192 GB (six quads: 24 8-GB DIMMs)

Memory Load Order

When installing memory, use a minimum of one pair in the 8-DIMM carrier, and one quad in the 24-DIMM carrier, of like-sized DIMMs. Insert additional DIMMs into 8- or 24-DIMM memory carriers in the next available pair or quad, in order of capacity from largest to smallest.

Install DIMMs into the appropriate slots on the 8- and 24-DIMM memory carrier boards; each slot has a unique ID. Use Figure 65: "8-DIMM Memory Carrier Board Slot IDs" (page 192), or Figure 66: "24-DIMM Memory Carrier Board Slot IDs" (page 193) to determine where to install DIMMs on the memory board.

△ **CAUTION:** Failure to observe the following cautions results in system degradation or failure:

- Do not mix DIMM sizes or types within a pair or quad.
- Load DIMM quads in order of capacity from largest to smallest. For example, if you have a quad of 2 GB DIMMs and a quad of 1 GB DIMMs, install the quad of 2 GB DIMMs first.

8-DIMM Memory Carrier Load Order

The 8-DIMM memory carrier has two sides labeled side 0 and side 1, each of which contains a memory board. The 8-DIMM memory carrier can contain one to four pairs of memory. Pairs of memory are divided equally between the two sides of the memory carrier. For example, if you have two pairs of memory to install, load two DIMMs in slots 0A and 0B of side 0, and load two DIMMs in slots 0A and 0B of side 1.

Table 76 lists the 8-DIMM memory carrier load order.

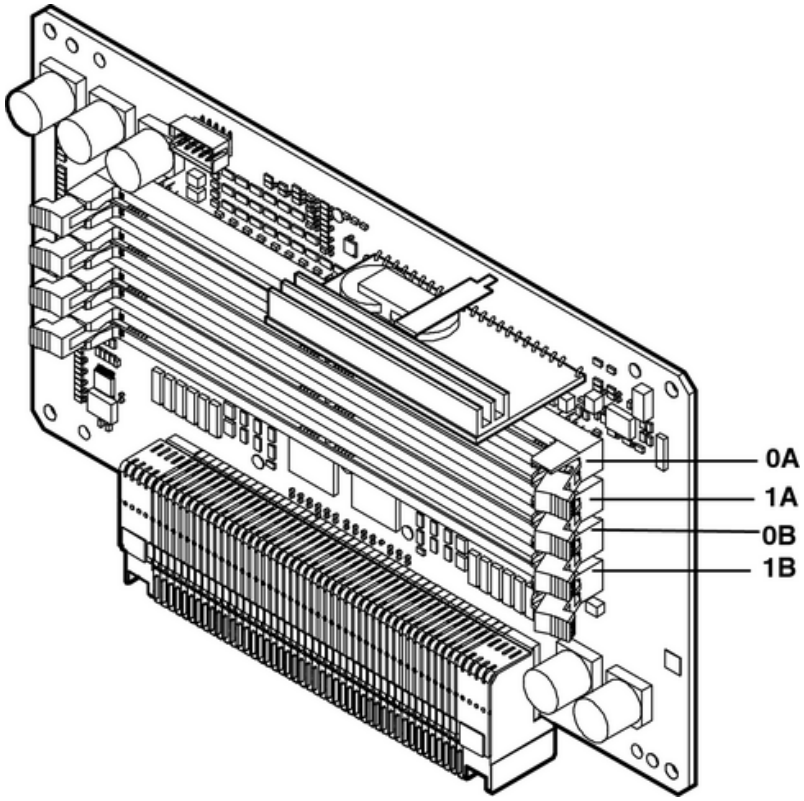
Table 76 8-DIMM Memory Carrier Load Order

Pair Number	Memory Carrier Side	Slot ID
1	Side 0	0A 0B
2	Side 1	0A 0B
3	Side 0	1A 1B
4	Side 1	1A 1B

The DIMM slot IDS are the same for both 8-DIMM memory carrier boards. Unique slots are identified within the carrier by the side in which they reside. For example, slot 0A is identified as slot 0A, side 0; or slot 0A, side 1.

Figure 65 shows the DIMM slot IDs for the 8-DIMM memory carrier board.

Figure 65 8-DIMM Memory Carrier Board Slot IDs



24-DIMM Memory Carrier Load Order

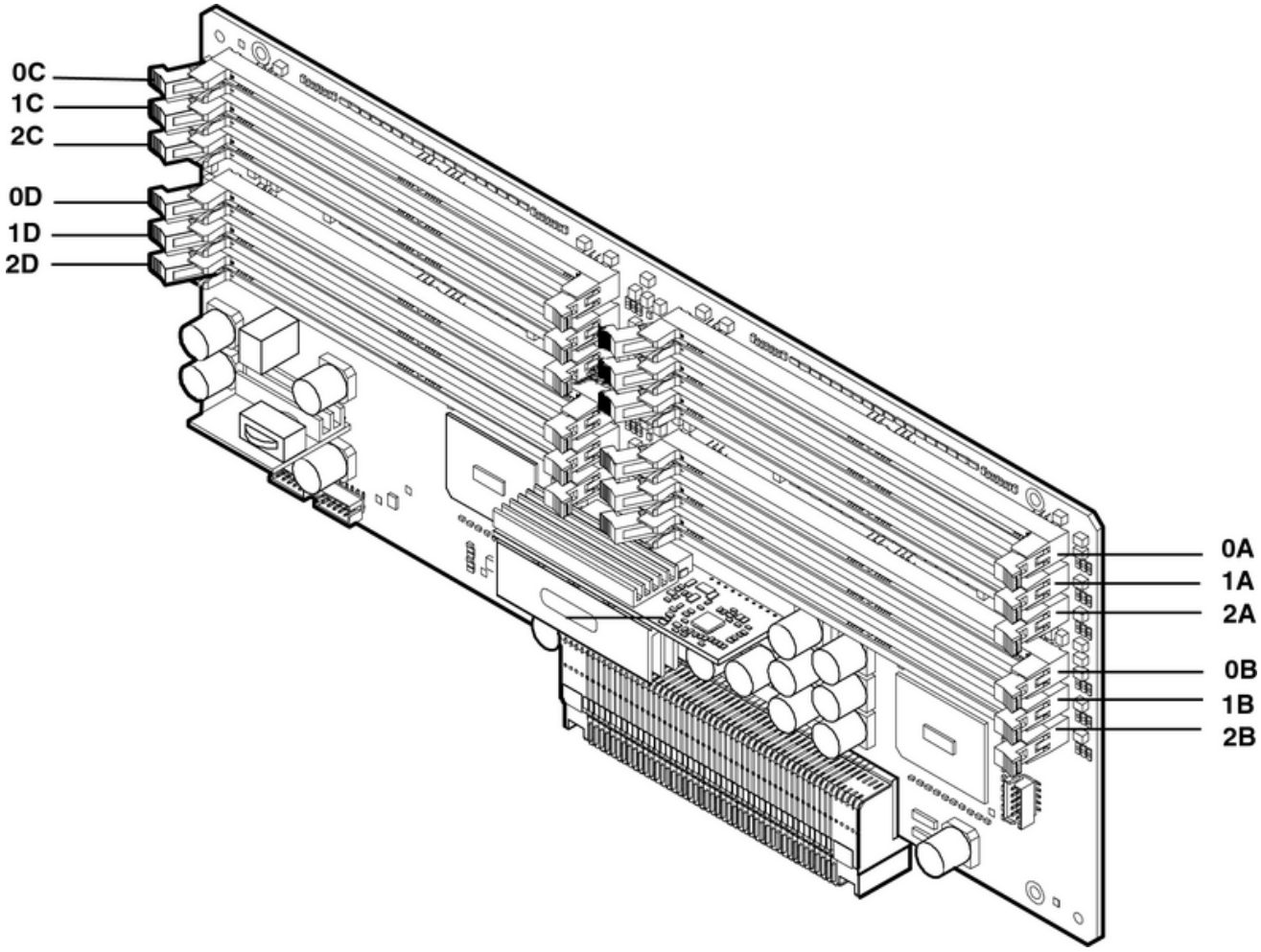
The 24-DIMM memory carrier has two sides labeled side 0 and side 1, each of which contain a memory board. The 24-DIMM memory carrier can contain up to six quads of memory. DIMM quads are loaded in order of size from largest to smallest capacity.

DIMM quads are loaded in a certain way to balance the memory capacity between the two sides of the memory carrier, starting with side 0. If you have more than two quads of memory to install, load the first quad into slots 0A-0D of side 0, and load the second quad into slots 0A-0D of side 1. For the third and remaining quads of memory see "Memory Loading Rules and Guidelines" (page 193).

The DIMM slot IDS are the same for both 24-DIMM memory carrier boards. Unique slots are identified within the carrier by the side in which they reside. For example, slot 0A is identified as slot 0A, side 0; or slot 0A, side 1.

Figure 66 shows the DIMM slot IDs for the 24-DIMM memory carrier board.

Figure 66 24-DIMM Memory Carrier Board Slot IDs



Memory Loading Rules and Guidelines

Use the following rules and guidelines when installing memory:

- Install DIMMs in pairs in the 8-DIMM memory carrier and in quads in the 24-DIMM memory carrier.
- Ensure all DIMMs within a pair or quad are identical.
- Install quads in order of capacity from largest to smallest. For example, install all 2 GB quads before 1 GB or smaller quads, and install all 1 GB quads before 512 MB quads.
- Side 0 must have equal or greater memory capacity than side 1.
- Install DIMM pairs or quads based on the following rules:
  1. Load pairs or quads into the memory carrier in order, starting with slot 0 and ending with slot 2.
  2. Install the first pair or quad in side 0.
  3. Install the second pair or quad in side 1.
  4. For the remaining pairs or quads:
     a. If both sides of the memory carrier contain the same capacity of memory, install the next pair or quad in side 0.
     b. If side 0 contains more memory capacity than side 1, install the next quad in side 1.
     c. If side 1 is full, install the remaining quads in side 0.

Table 77 shows several examples of proper memory carrier loading order.

IMPORTANT: The number in parenthesis indicates the order in which the quads are loaded.

Table 77 24-DIMM Memory Carrier Loading Examples

	Quad Number	Quad Slot IDs	Memory Carrier Side 0	Memory Carrier Side 1
Example 1				
	0	0A 0B 0C 0D	2 GB (1)	2 GB (2)
	1	1A 1B 1C 1D	1 GB (3)	1 GB (4)
	2	2A 2B 2C 2D	512 MB (5)	512 MB (6)
Example 2				
	0	0A 0B 0C 0D	2 GB (1)	1 GB (2)
	1	1A 1B 1C 1D	512 MB (4)	1 GB (3)
	2	2A 2B 2C 2D		512 MB (5)
Example 3				
	0	0A 0B 0C 0D	2 GB (1)	1 GB (2)
	1	1A 1B 1C 1D		512 MB (3)
	2	2A 2B 2C 2D		512 MB (4)
Example 4				
	0	0A 0B 0C 0D	2 GB (1)	512 MB (2)
	1	1A 1B 1C 1D	512 MB (5)	512 MB (3)
	2	2A; 2B 2C 2D	512 MB (6)	512 MB (4)

Installing Memory

IMPORTANT: You must pull the AC power plugs on the server every time you modify the DIMMs. If you do not pull the AC power plugs, the system does not display the correct DIMM information.

To install memory, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server out from the rack until it stops. See "Extending the Server from the Rack" (page 164).
3. Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 167).

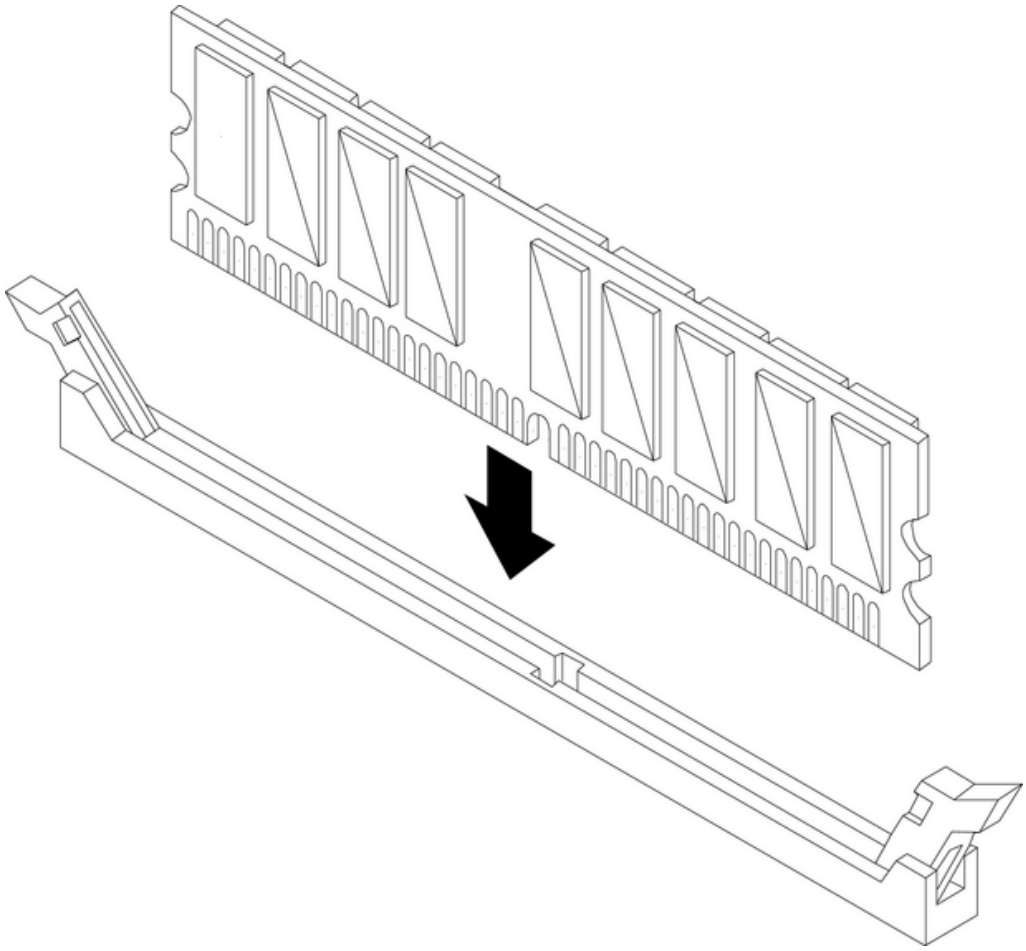
   NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open.

4. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 186).

   NOTE: To avoid damage to the memory carrier extraction handles, HP recommends rotating the handles inward and snapping them into the locked position when servicing the system DIMMs or any time the carrier is out of the chassis. Before replacing the memory carrier, press the button to release the extraction handles. Use the handles to replace the memory carrier into the chassis.

5. Complete the following memory installation prerequisite tasks before installing the memory:
   a. Determine the DIMM load order as appropriate for the 8-DIMM or 24-DIMM memory carrier. For more information, see "Memory Load Order" (page 191).
   b. Determine the DIMM slots to populate using Figure 65 (page 192) or Figure 66 (page 193)..
   c. Read, understand, and follow the general guidelines to install memory in the server. See "Memory Loading Rules and Guidelines" (page 193).
6. Lay the memory carrier assembly on side 0 or side 1 so that the memory carrier side that contains the DIMM slots that require servicing faces upward (Figure 63).
7. Remove the memory carrier assembly side cover.
   a. Press the release tabs (Figure 63) on both sides of the extraction handle release button until the side cover releases from the top center of the assembly.
   b. Rotate the side cover slightly to free the tabs from the retaining slots at the base of the assembly (Figure 64).
   c. Lift the side cover off the assembly.
8. Install the DIMM (Figure 67).
   a. Align the DIMM with the correct slot located on the memory board, and align the key in the connector with the notch in the DIMM.
   b. Firmly and evenly push on each end of the DIMM until it seats into the slot.
   c. Ensure the extraction levers are in the locked position.

Figure 67 Inserting DIMM into Memory Board Connector



9. Replace the memory carrier assembly side cover.
   a. Insert the side cover tabs into the retaining slots at the base of the assembly (Figure 22).
   b. Insert the tabs (Figure 63) into the slots on both sides of the extraction handle release button until the side cover snaps into place.

NOTE: To install DIMMs into slots on the other side of the memory carrier, turn the carrier over to the opposite side (side 0 or side 1) and repeat the installation procedure.

10. Replace the memory carrier assembly and latch the top cover release lever closed. See "Replacing the Memory Carrier Assembly" (page 187).
11. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
12. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the Front Bezel

The front bezel provides server control and port access, and LED interfaces. You must power off the server to remove the front bezel.

NOTE: The procedures in this section see the upper portion of the front bezel; the lower portion of the front bezel is the processor access door.

Removing the Front Bezel

To remove the front bezel, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server out from the rack until it stops. See "Extending the Server from the Rack" (page 164).
3. Remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 167).

NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open. You must remove the memory carrier because it attaches directly to the processor board.

4. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 186).
5. Press the button located on top of the bezel and directly in front of the memory carrier assembly to release the processor board access door (Figure 68).

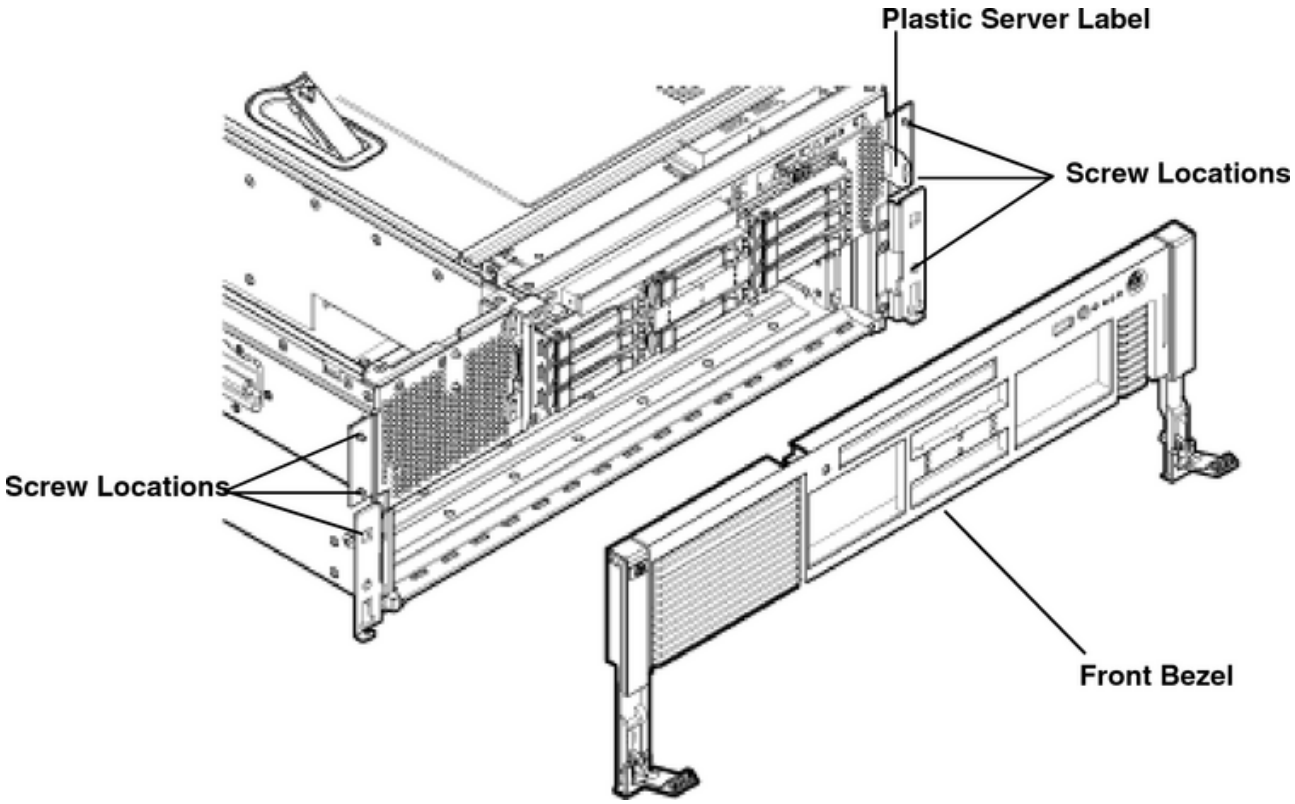
△ **CAUTION:** The processor board access door opens to approximately a 30 degree angle. Do not force the door to open to a greater angle. Failure to observe this caution results in damage to server components.

6. Use the processor board assembly access door as a handle and gently slide the assembly out of the chassis approximately six inches.
7. Remove the six screws that attach the bezel to the chassis (Figure 68).
8. Tilt the bezel away from the chassis (Figure 68).
9. Remove the plastic server label located to the right of the front panel LEDs.
   a. Grasp the label, and pull it out until it stops.
   b. Lift up on the notched retaining tab at the rear of the label until it clears the slot.
   c. Pull the label completely out of the chassis.

ⓘ **IMPORTANT:** You must reinstall the plastic server label into the replacement bezel.

10. Flip out the two pull handles located on both ends of the front bezel (Figure 68).
11. With pull handles open, slide the bezel to the right to release it from the chassis, and lift it off the chassis.

Figure 68 Removing and Replacing the Front Bezel



Replacing the Front Bezel

To replace the front bezel, follow these steps:

1. Align the bezel slots with the tabs on the chassis.
2. Slide the bezel from right to left to lock it into place.
3. Tilt the bezel toward the chassis until it is flush with the chassis.
4. Flip in the two pull handles located on both ends of the front bezel.
5. Replace the three screws that attach the bezel to the right side of the chassis.
6. Replace the three screws that attach the bezel to the left side of the chassis.
7. Reinsert the plastic label with the notched end on the bottom, and push it into the slot in the bezel.
8. Slide the processor board assembly into the chassis until it begins to seat into the socket located on the midplane board.
9. Push the processor board access door upward until it locks into position.
10. Replace the memory carrier assembly. See "Replacing the Memory Carrier Assembly" (page 187).
11. Replace the memory carrier assembly cover. See "Replacing the Memory Carrier Assembly Cover" (page 167).
12. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
13. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the Processor Board Assembly

The processor board assembly holds one or two dual-core Itanium processors, it is located beneath the disk drives and memory carrier assembly in the bottom service bay. The processor board is installed onto a removable carrier tray that is retained in the service bay by a hinged access door.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Processor Board Assembly

To remove the processor board assembly, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server out from the rack until it stops. See "Extending the Server from the Rack" (page 164).
3. Unlatch the cover release lever on the top cover and remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 167).

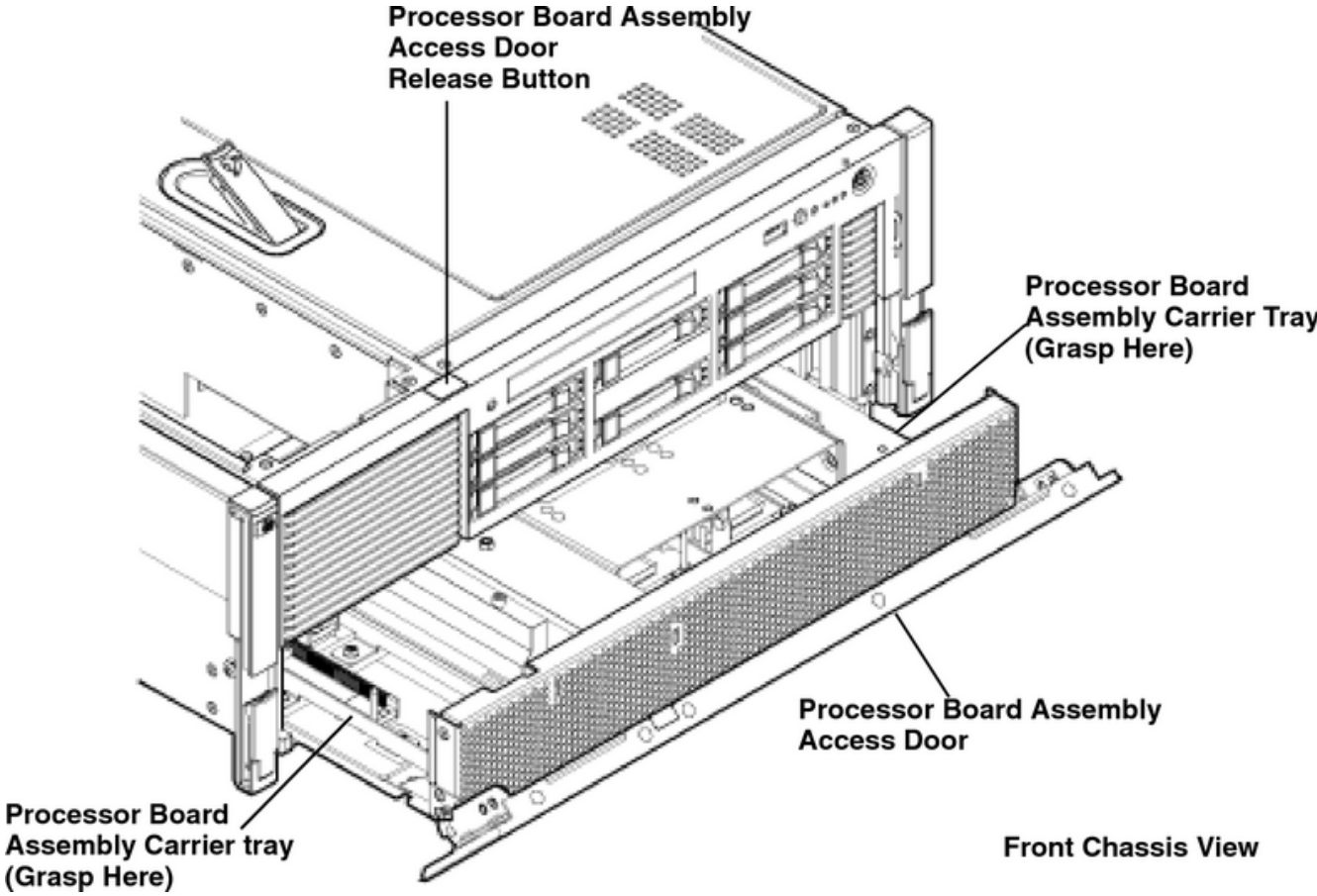
   NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open. You must remove the memory carrier because it attaches directly to the processor board.

4. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 186).
5. Press the button located on top of the bezel and directly in front of the memory carrier assembly to release the processor board access door (Figure 69).

   CAUTION: The processor board access door opens to approximately a 30 degree angle. Do not force the door to open to a greater angle. Failure to observe this warning results in damage to server components.

6. Use the processor board assembly access door as a handle and gently slide the assembly out of the chassis approximately six inches.
7. Grasp the handholds on the assembly carrier tray with both hands and carefully slide the assembly out of the chassis (Figure 69).

Figure 69 Removing the Processor Board Assembly



Replacing the Processor Board Assembly

To replace the processor board assembly, follow these steps:

1. Align the edges of the processor board assembly with the assembly guides in the chassis.
2. Slide the processor board assembly into the chassis until it begins to seat into the socket located on the midplane board.
3. Push the processor board access door upward until it locks into position.
4. Replace the memory carrier assembly. See "Replacing the Memory Carrier Assembly" (page 187).
5. Replace the memory carrier assembly cover and latch the top cover release lever closed. See "Replacing the Memory Carrier Assembly Cover" (page 167).
6. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
7. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing a Dual-Core Processor

The HP Integrity rx3600 uses dual-core processors. That is, each processor contains two cores that function as separate processors. Dual-core processors double the processing power of the server while maintaining the physical dimensions of a single processor.

The server can contain one or two dual-core processors that provide the following configuration options:

- 1P/2C (One processor/two cores)
- 2P/4C (Two processors/four cores)

If the server has fewer than the maximum number of dual-core processors installed, install the additional processor in the appropriate slot.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Ensure that processor speed and cache size are identical for all processors. Failure to observe this caution results in performance degradation or system failure.

The easiest way to ensure compatibility is to use dual-core processors with identical part numbers.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Processor Load Order

The server can have up to two dual-core processors on the processor board. The slots on the processor board are labeled Module 0 and Module 1.

Table 78 lists the processor load sequence.

Table 78 Processor Load Order

Dual-Core Processor	Slot
1	Module 0
2	Module 1

Required Tools

To install and remove processors, use the processor install tool fastened to the processor board.

Removing a Dual-Core Processor

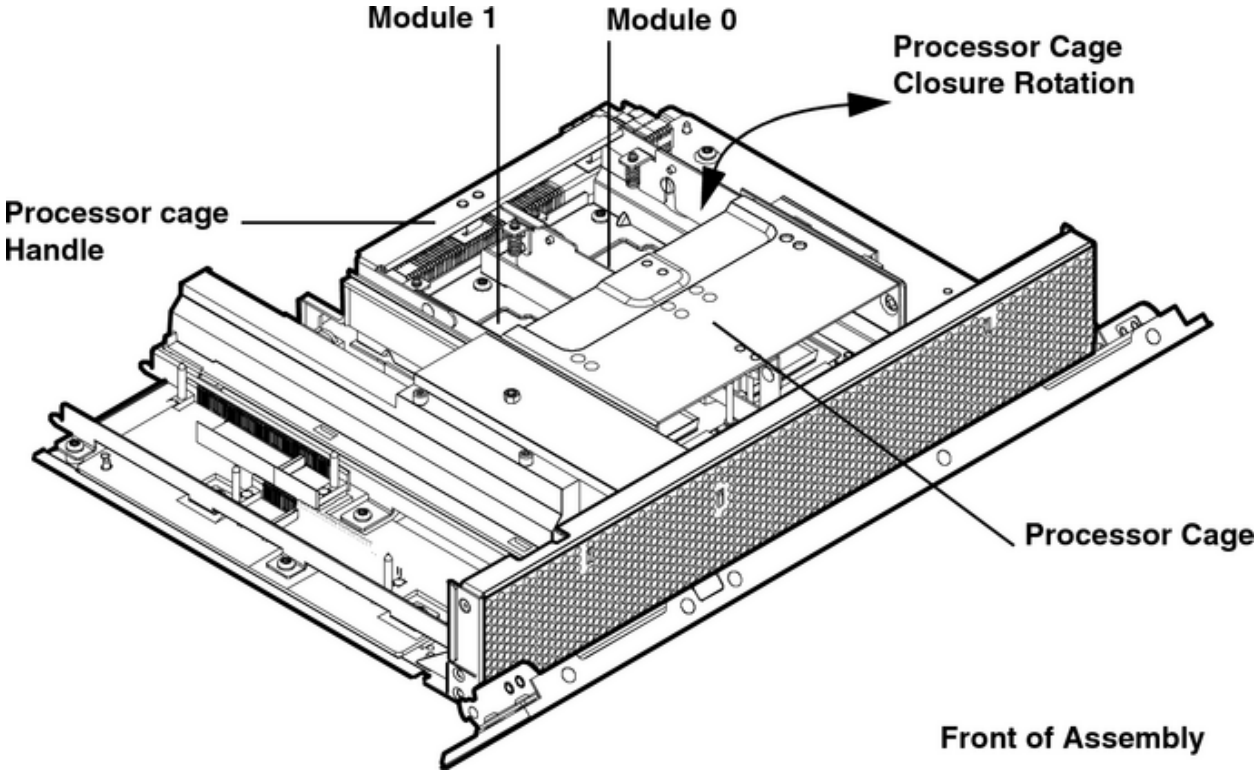
To remove a dual-core processor, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server out from the rack until it stops. See "Extending the Server from the Rack" (page 164).
3. Remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 167).

   NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open. You must remove the memory carrier because it attaches directly to the processor board.

4. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 186).
5. Remove the processor board assembly. See "Removing the Processor Board Assembly" (page 198).

Figure 70 Processor Board Assembly



6. Open the processor cage (Figure 70).
   a. Grasp the processor cage handle, and apply adequate force to rotate the handle upward.
   b. Use the handle to rotate the cage closure approximately 90 degrees toward the front of the assembly until it stops.

IMPORTANT: Ensure the processors are entirely exposed and can clear the cage closure for removal.

7. Disconnect the processor power cable from the connector cable that attaches directly to the processor board (Figure 71).
8. Unlock the processor from the socket on the processor board (Figure 72).
   a. Unfasten the processor install tool (2.5-mm driver) from the tool holder on the processor board.
   b. Insert the processor tool into the hole that runs down the side of the heatsink.
   c. Rotate the processor tool counterclockwise 180 degrees.

CAUTION: The zero insertion force (ZIF) socket for the processor is locked and unlocked by half of a full turn of the processor install tool. The counterclockwise 180 degree rotation (half turn) unlocks the socket. A clockwise 180 degree rotation locks the socket. Attempting to turn the locking mechanism more than 180 degrees can severely damage the socket.

   d. Refasten the processor install tool to the tool holder on the processor board.
9. Remove the dual-core processor from the processor slot.
   a. Carefully grasp the sheet metal that encases the processor.
   b. Pull the processor straight up and out of the chassis.
10. Protect the processor from damage.
    a. Install the protective pin cover on the processor connectors to shield the connector pins.
    b. Place the dual-core processor in an anti static container.

Figure 71 shows the power connector and cable for the processor.

Figure 71 Processor Power Cable

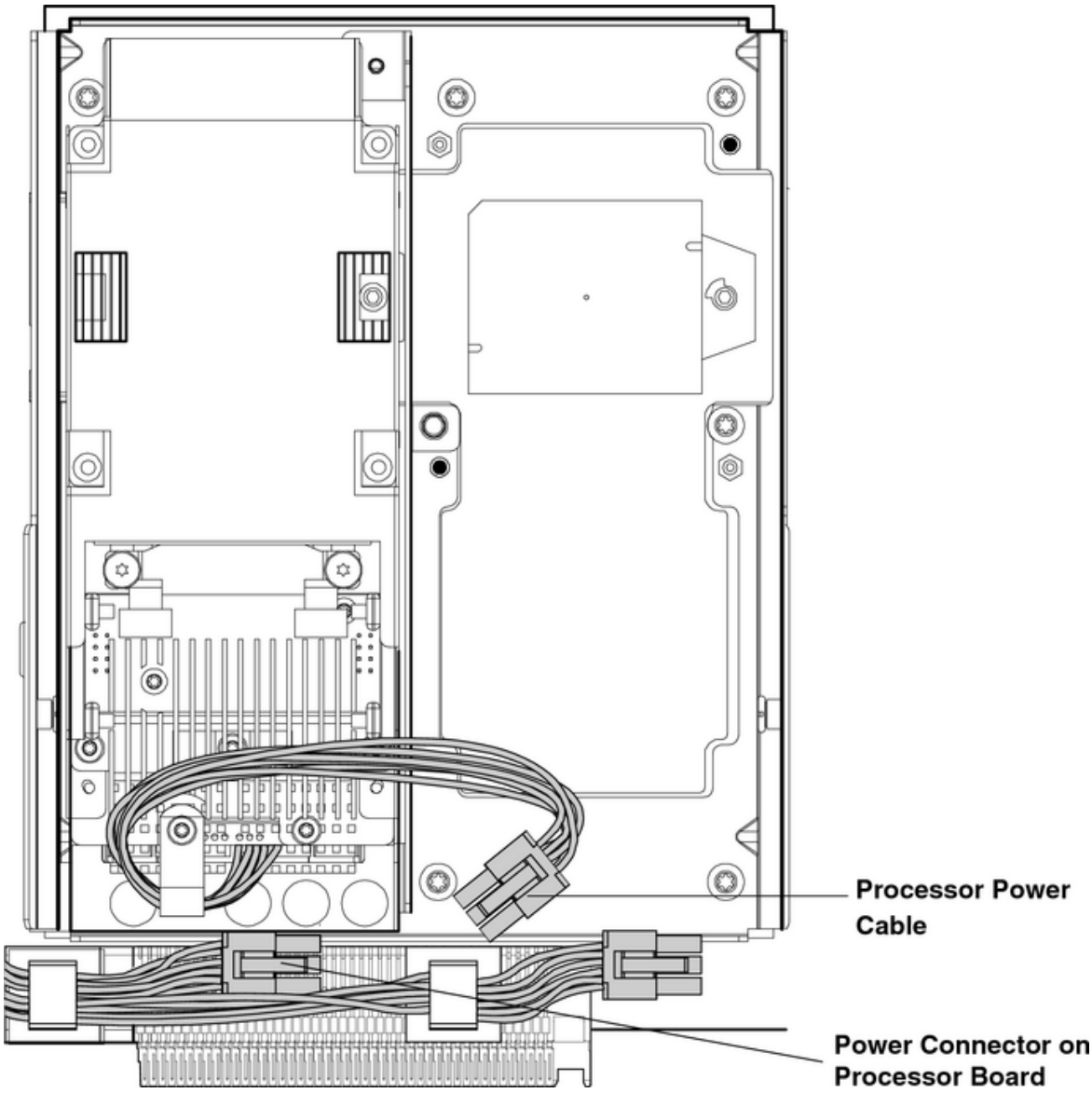


Figure 72 shows the processor lock and unlock mechanism location and the alignment holes of an installed processor.

Figure 72 Processor Alignment Posts and Lock/Unlock Mechanism

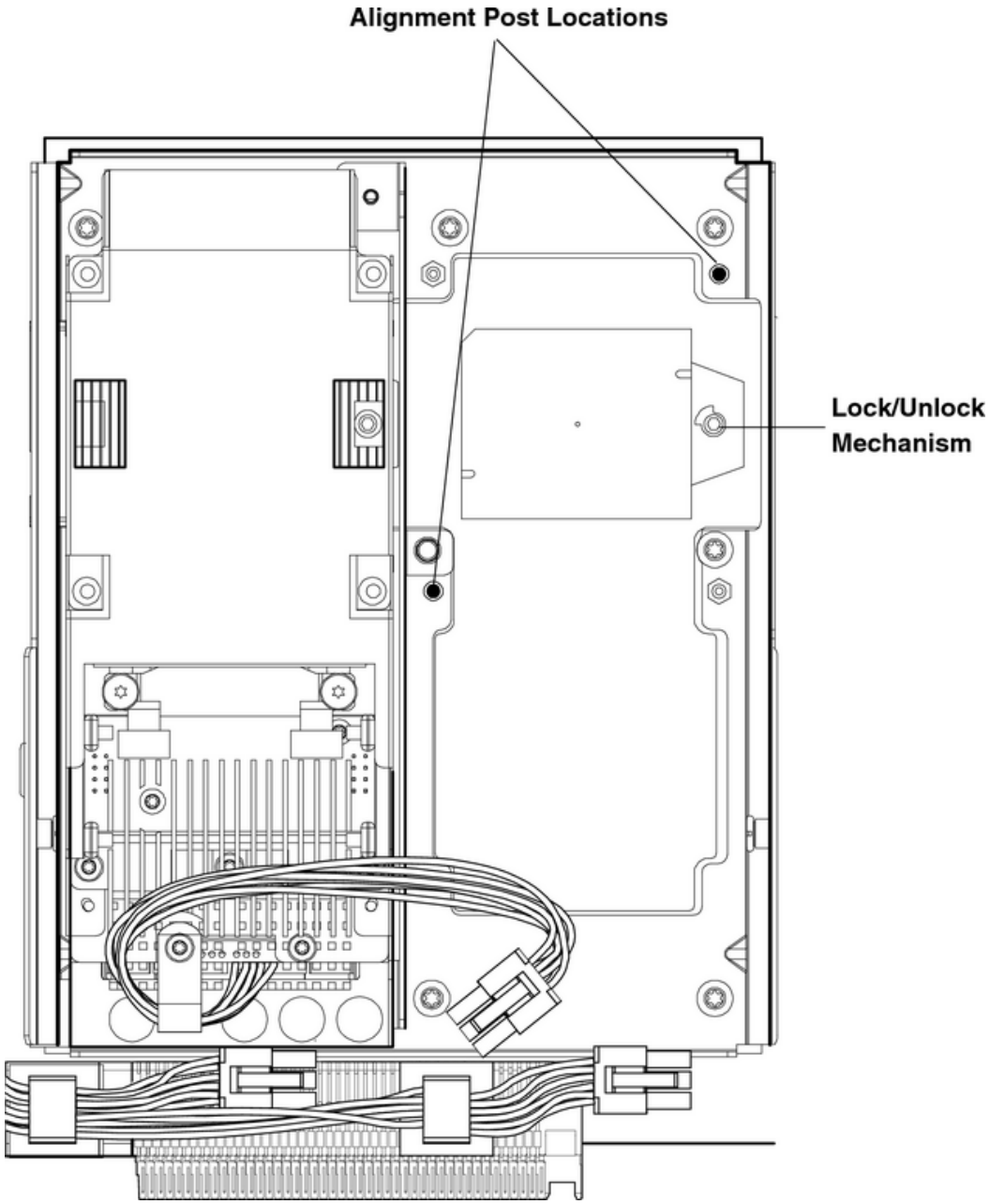
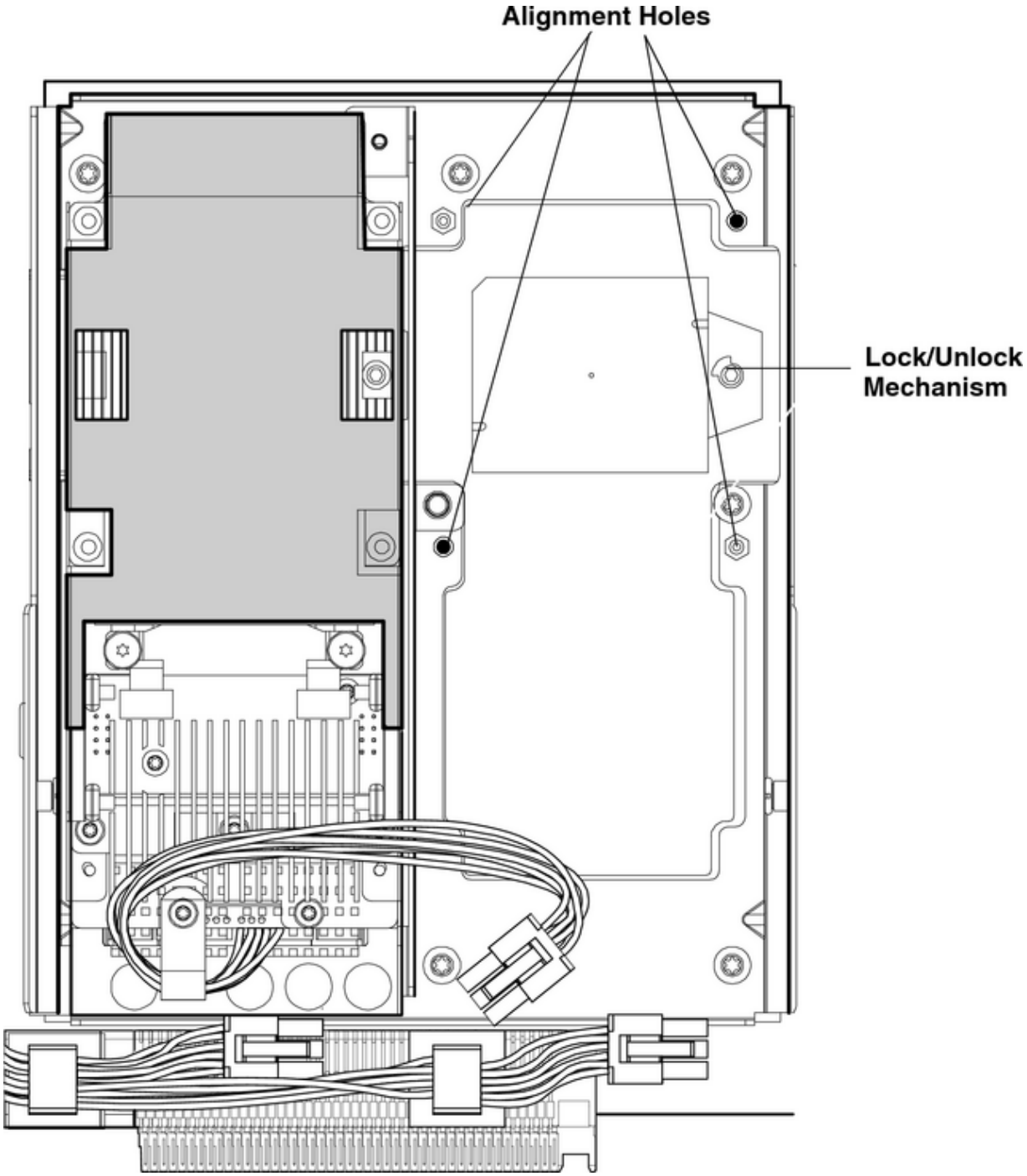


Figure 73 shows the processor socket lock and unlock mechanism and alignment post locations.

Figure 73 Processor Alignment Holes and Lock/Unlock Mechanism



Installing a Dual-Core Processor

To install a dual-core processor, follow these steps:

NOTE: Prior to installing a dual-core processor into the server, read the following instructions carefully and see the figures in this chapter for a complete understanding of this process.

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server out from the rack until it stops. See "Extending the Server from the Rack" (page 164).
3. Remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 167).

NOTE: You do not need to fully remove the top cover to service this component; however, the top cover release lever must be open. You must remove the memory carrier because it attaches directly to the processor board.

4. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 186).
5. Remove the processor board assembly. See "Removing the Processor Board Assembly" (page 198).
6. Open the processor cage (Figure 70 (page 201)).
   a. Grasp the processor cage handle, and apply adequate force to rotate the handle upward.
   b. Use the handle to rotate the cage closure approximately 90 degrees toward the front of the assembly until it stops.

IMPORTANT: Ensure that the processor slot is entirely exposed. The processor must clear the cage closure for proper installation.

7. Locate the appropriate processor slot (Module 0 or Module 1) for the processor installation (Figure 70 (page 201)).
8. Remove the plastic airflow blocker covering the processor slot, if required.
9. Remove the protective dust cover from the processor socket, if required.
10. Ensure the cam on the processor socket lock is in the unlocked position (Figure 73).

CAUTION: The zero insertion force (ZIF) socket for the processor is locked and unlocked by half of a full turn of the processor install tool. The counterclockwise 180 degree rotation (half turn) unlocks the socket. A clockwise 180 degree rotation locks the socket. Attempting to turn the locking mechanism more than 180 degrees can severely damage the socket.

11. Remove any protective packaging from the new processor.

NOTE: Protective covers are installed to protect connector pins. Save these covers for future use.

12. Inspect the processor pins and verify that the pins are not bent.
13. Align the alignment holes on the processor with the alignment posts on the processor cage, and carefully lower the processor onto the processor socket (Figure 72 and Figure 73).

CAUTION: Do not press the processor into the socket. When properly aligned, the processor pins seat into the socket. No additional pressure is required. Damage to the pins can occur if too much pressure is applied.

14. Lock the processor into the socket on the processor board (Figure 72).
    a. Unfasten the processor install tool from the tool holder on the processor board.
    b. Insert the processor tool into the hole that runs down the side of the heatsink.
    c. Rotate the processor tool clockwise 180 degrees.
    d. Refasten the processor install tool to the tool holder on the processor board.
15. Reconnect the processor power cable to the connector cable that attaches directly to the processor board (Figure 71).
16. Close the processor cage (Figure 70 (page 201)).
    a. Grasp the processor cage handle and rotate the cage closure inward toward the rear of the assembly until it is completely closed.
    b. Apply adequate force to push the handle down until it is flush with the cage.
17. Replace the processor board assembly. See "Replacing the Processor Board Assembly" (page 199).

18. Replace the memory carrier assembly. See "Replacing the Memory Carrier Assembly" (page 187).
19. Replace the memory carrier assembly cover and latch the top cover release lever closed. See "Replacing the Memory Carrier Assembly Cover" (page 167).
20. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
21. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).
22. Verify processor replacement and operation by using either the iLO 2 MP commands or the EFI commands.

Removing and Replacing the I/O Board Assembly

IMPORTANT: The new version of the PCI/PCI-X/PCIe backplane (version 1.1) was shipped on July 1, 2008. For existing servers, repair and replace should continue to be performed with the version 1 I/O backplane. For servers shipped as of July 1, 2008, repair and replace should be performed with version 1.1 I/O backplane.

The I/O board assembly contains the following server components:

- System battery
- I/O voltage regulator module
- Core I/O board
- LAN core I/O card
- SAS core I/O card
- PCI/PCI-X cards
- Trusted Platform Module (TPM)

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the I/O Board Assembly

To remove the I/O board assembly, follow these steps:

1. Record the boot configuration settings. To find the settings, use the INFO ALL EFI Shell command.
2. Use Figure 78: "TPM Location on I/O Board", to determine if there is a TPM on the I/O board assembly. If so, record the TPM settings to transfer to the replacement I/O board assembly. See the HP-UX operating system documentation for instructions.
3. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).

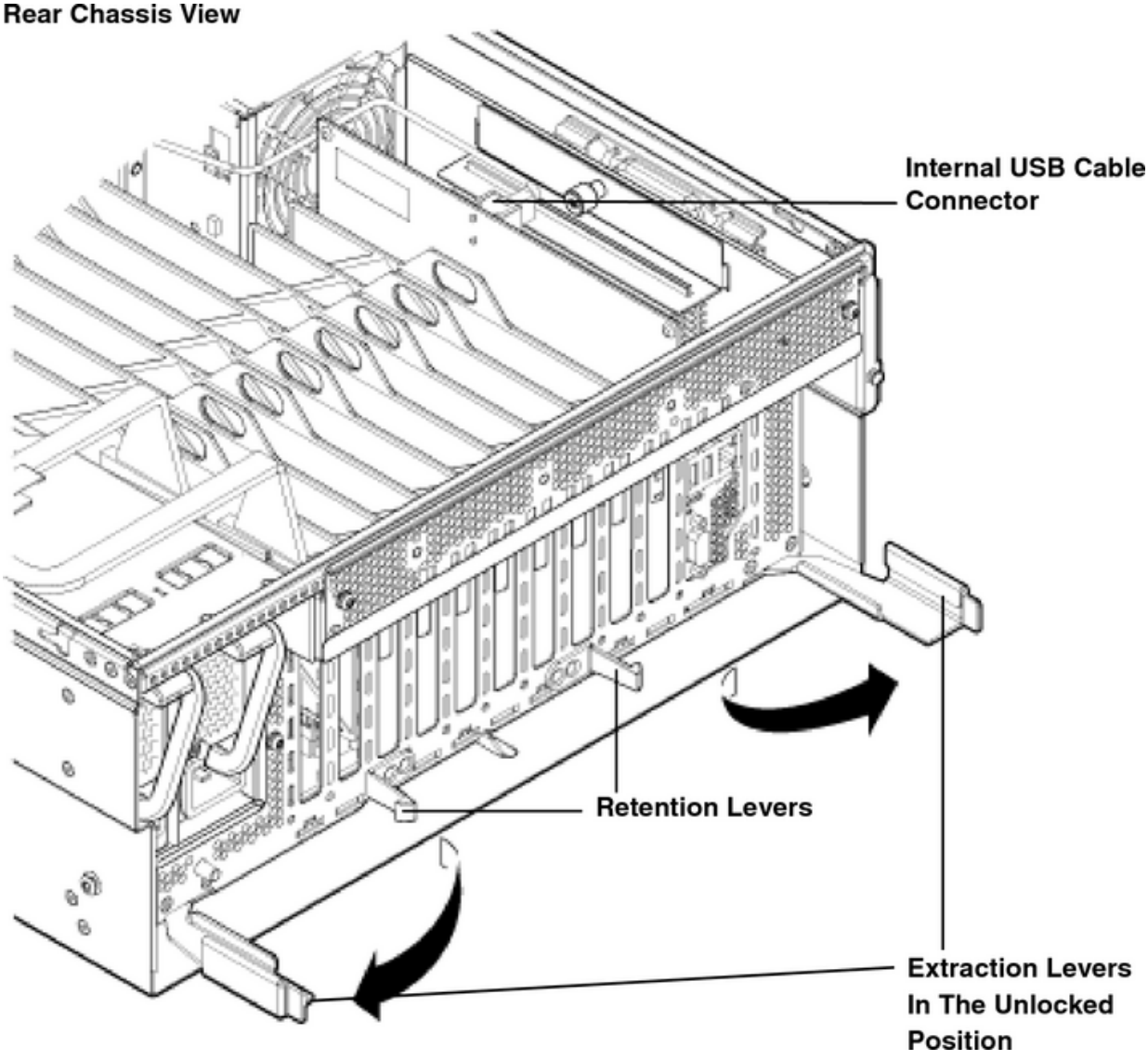
CAUTION: The removal and replacement of the I/O board assembly occurs through the rear of the rack for rack-installed servers. Carefully follow the board removal and replacement procedures. You must first perform several tasks with the server extended out from the front of the rack.

4. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
5. Remove the top cover. See "Removing the Top Cover" (page 165).
6. Disconnect the internal USB cable from the connector on the core I/O board (Figure 74).
7. Disconnect the SAS cables attached to the SAS core I/O card in PCI slot 1.

CAUTION: When disconnecting the SAS cables, note the labeling on the cables. Both cables and sockets are clearly marked with the correct channel. When reconnecting these cables, match each cable with the appropriate socket on the SAS core I/O card. If the cables are mismatched, the server operating system may not reboot.

8. Slide the server completely back into the rack.
9. Open the cable management arm wide enough to slide the I/O board out the rear of the rack.
10. Disconnect all external cabling attached to ports at the rear of the chassis.
11. Press in on the retention levers to unlock the I/O board assembly extraction handles (Figure 74).

Figure 74 I/O Board Assembly

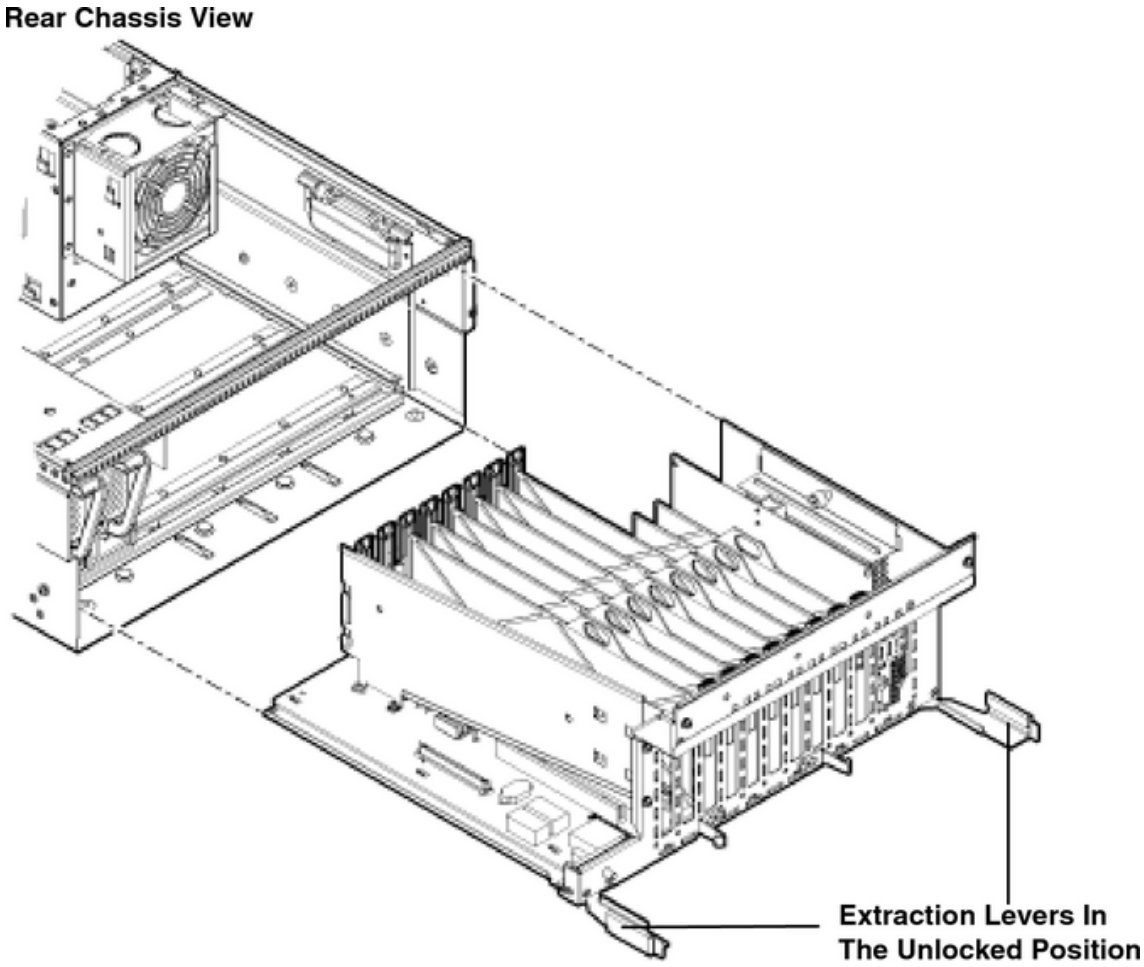


12. Pull the I/O board assembly extraction handles outward to unplug the I/O board assembly from the socket on the midplane board.

13. Slide the I/O board assembly all the way out the rear of the chassis (Figure 75).

NOTE: The I/O board assembly is large. Use care when lifting it out of the server chassis.

Figure 75 I/O Board Assembly Removal and Replacement



Replacing the I/O Board Assembly

IMPORTANT: Ensure that the I/O board extraction handles are in the outward, unlocked position to engage the assembly correctly with the midplane board socket.

NOTE: The I/O board assembly is large. Use care when sliding it into the server chassis.

To replace the I/O board assembly, follow these steps:

1. Transfer the following components from the removed I/O board assembly to the replacement I/O board assembly:
   a. SAS core I/O card. See "Removing and Replacing the SAS Core I/O Card" (page 219).
   b. LAN core I/O card. See "Removing and Replacing the LAN Core I/O Card" (page 220).
   c. Trusted Platform Module (TPM). Use Figure 78: "TPM Location on I/O Board", to determine if there is a TPM on the removed I/O board assembly. If so, transfer the TPM from the removed I/O board assembly to the replacement I/O board assembly. See "Removing and Replacing the Trusted Platform Module" (page 213).
   d. Core I/O board. See "Removing and Replacing the Core I/O Board" (page 216).
2. Align the I/O board assembly rails with the chassis slots, and slide the assembly into the chassis until it stops against the midplane board socket (Figure 75).

3. **IMPORTANT:** Do not pinch the cable of the fan located behind the memory carrier assembly between the fan housing unit and the I/O board when sliding the board into the chassis.
4. Ensure the I/O board assembly is flush against the midplane board socket, and firmly push the extraction handles inward until the assembly plugs completely into the midplane board socket.
5. Press in on the retention levers to lock the I/O board assembly extraction handles into place.
6. Reconnect all external cabling into the ports at the rear of the chassis.
7. Close and secure the cable management arm.
8. Slide the server completely out from the front of the rack.
9. Reconnect the internal SAS cables to the connectors on the SAS core I/O card in PCI slot 1.

CAUTION: When reconnecting the SAS cables, note the labeling on the channel cables. Both cables and sockets are clearly marked with the correct channel. Match each cable with the appropriate socket on the SAS core I/O card. If the cables are mismatched, the server operating system may not reboot.

10. Reconnect the USB cable to the connector on the core I/O board.
11. Replace the top cover. See "Replacing the Top Cover" (page 166).
12. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

IMPORTANT: Serial number and model string data information is stored on both the interconnect board and the I/O board. When installing a new I/O board, copy this information from the interconnect board to the new I/O board.

13. Respond **YES** to prompts regarding copying information onto the new board.
14. Verify the serial number and model string data information copied onto the new I/O board.
    a. Boot to EFI.
    b. Enter **service** mode using the following command:

```
Shell> sysmode service
Current System Mode: ADMIN
You are now in SERVICE mode.
```

    c. Use the `sysset` command to verify that all values are set:

```
Shell> sysset

System Information:
Manufacturer: hp
Product Name: server rx3600
Product Number: AB463A
Secondary Product Number is Identical
Serial number: SGH43442VB
Secondary Serial Number is Identical
UUID: 3C33C58E-2E5A-11D8-A33B-4188C0AEFAE2 (Valid)
Secondary UUID is Identical
Product ID: 0x301
```

15. Enable the TPM. See "Replacing the TPM" (page 215).
16. Restore the TPM settings. See the HP-UX operating system documentation for instructions.
17. Verify the system board replacement and operation using either the iLO 2 MP or EFI commands:

Removing and Replacing the System Battery

The system battery is located on the I/O board assembly. Replace the battery with only an identical or equivalent battery only. Dispose of used batteries according to the manufacturer's instructions.

WARNING! Lithium batteries may explode if mistreated. Do not recharge, disassemble, or dispose of batteries in a fire. Failure to observe this warning can result in personal injury or damage to equipment.

Removing the System Battery

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

IMPORTANT: Before removing the system battery, record all boot and LAN configuration settings. (Find the settings using the INFO ALL EFI command.) You must reset these values after replacing the battery.

To remove and replace the system battery, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).

CAUTION: You must remove the I/O board assembly to service the system battery. The removal and replacement of the I/O board assembly occurs through the rear of the rack for rack-installed servers. Carefully follow the removal and replacement procedures; you must first perform several tasks with the server extended out from the front of the rack. See "Removing and Replacing the I/O Board Assembly" (page 206) for complete instructions.

2. Remove the I/O board assembly. See "Removing the I/O Board Assembly" (page 206).
3. Locate the system battery on the I/O board assembly (Figure 76).

WARNING! Do not attempt to remove the battery by hand. Doing so can cause the battery holder to separate from the system board.

WARNING! Do not attempt to remove the battery from the side marked "+" first. If your battery holder does not have the "+" marking, the side of the holder with springs will be the "+" end.

4. Using a nonconductive tool small enough to fit into the battery slot as leverage, gently remove the battery from the holder from the end marked "–".

NOTE: HP recommends using ESD safe, non-conductive tweezers or a similar tool.

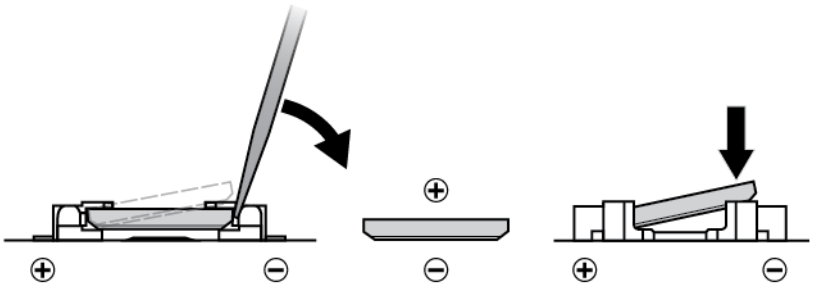
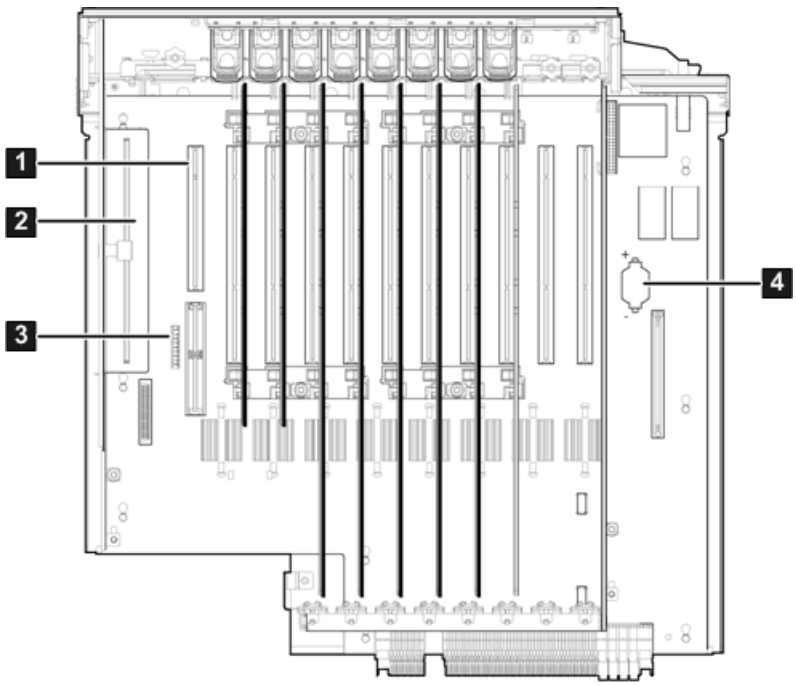


Figure 76 Battery Location on I/O Board



1 Core I/O Board Slot
2 I/O VRM
3 TPM
4 System Battery

Replacing the System Battery

1. Insert the replacement battery into the socket on the I/O board assembly.

CAUTION: You must remove the I/O board assembly to service the system battery. The removal and replacement of the I/O board assembly occurs through the rear of the rack for rack-installed servers. Carefully follow the removal and replacement procedures; you must perform several tasks with the server extended out the front of the rack. See "Removing and Replacing the I/O Board Assembly" (page 206) for complete instructions.

IMPORTANT: Ensure that the new battery is fully seated and that all locking tabs are correctly engaged.

NOTE: The positive terminal of the battery is designated by the + sign. Install the battery with the + sign facing up.

2. Replace the I/O board assembly. See "Replacing the I/O Board Assembly" (page 208).
3. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).
4. Reset the server date and time using the EFI `date` and `time` commands.

Removing and Replacing the I/O Voltage Regulator Module

The I/O voltage regulator module (I/O VRM) is a stand alone component located on the I/O board assembly that regulates voltage for I/O operations.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

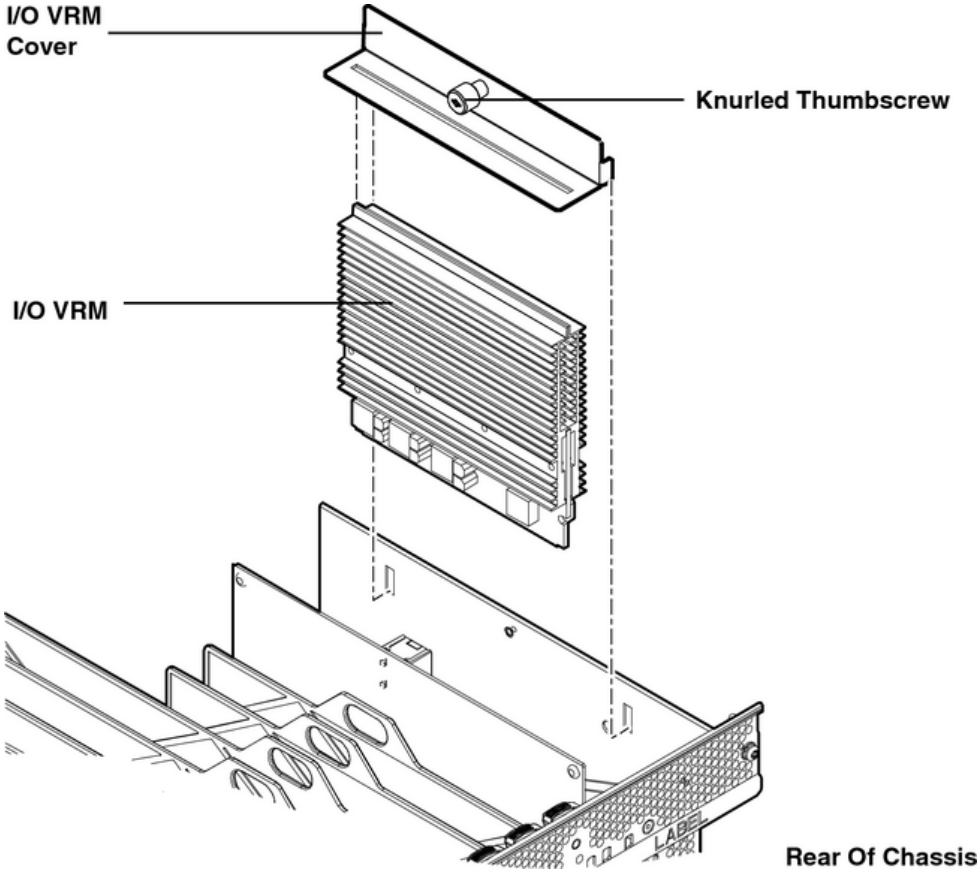
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the I/O VRM

To remove the I/O VRM, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover. See "Removing the Top Cover" (page 165).
4. Remove the I/O VRM cover (Figure 77).
   a. Locate the knurled thumb screw on top of the I/O VRM cover and turn it counterclockwise until the cover disengages from the chassis wall.
   b. Lift the cover off the I/O VRM.
5. Push the extraction levers found on either side of the I/O VRM slot outward to the open position to release the I/O VRM from the socket.
6. Grasp the I/O VRM by the edges and lift it out of the chassis (Figure 77).

Figure 77 Removing and Replacing the I/O VRM



Replacing the I/O VRM

To replace the I/O VRM, follow these steps:

1. Insert the I/O VRM into the socket on the I/O board.

   NOTE: The I/O VRM is keyed to fit into the socket in only one direction.

   a. Firmly and evenly push on each end of the I/O VRM until it seats into the slot.
   b. Ensure that the extraction levers on the socket are in the closed position.

   NOTE: You may need to manually close the extraction levers on the socket.

2. Place the I/O VRM cover on top of the I/O VRM and turn the knurled thumb screw clockwise until the cover tightens into place on the chassis wall (Figure 77).
3. Replace the top cover. See "Replacing the Top Cover" (page 166).
4. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
5. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the Trusted Platform Module

The Trusted Platform Module (TPM) is an optional security component which enhances security capabilities for the server if it is running the HP-UX operating system. The TPM is a security chip that is unique to the server. It performs key security processes independent of other hardware components. The TPM creates and stores additional encryption keys at the system root. The encryption keys created by the TPM encapsulate system application encryption keys to provide an additional layer of security for sensitive system data.

The fundamental capabilities of the TPM include:

- Platform authentication
- Sensitive information protection
- Data integrity
- System privacy

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

IMPORTANT: You must run the supported version of the HP-UX operating system to utilize the TPM security component.

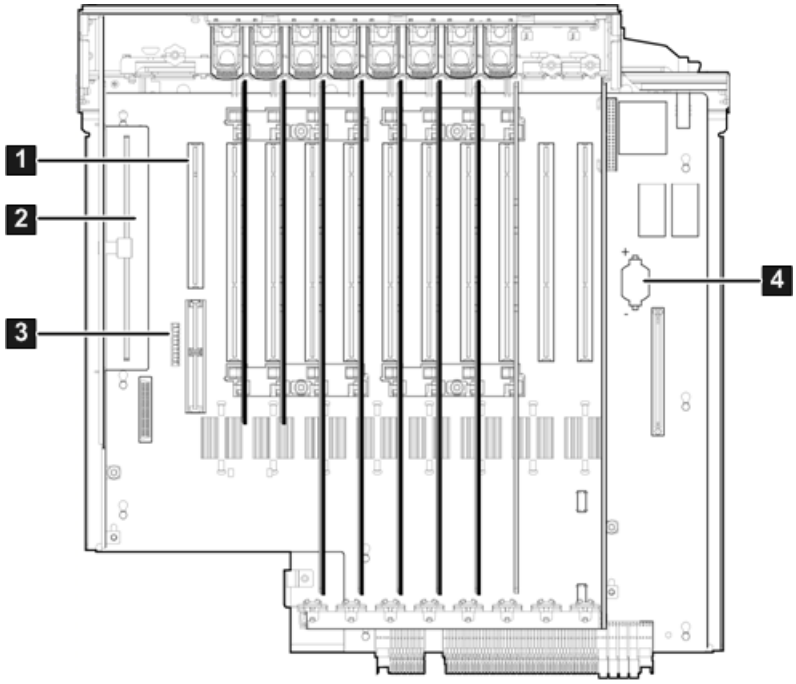
Removing the TPM

To remove the TPM, follow these steps:

1. Back up the current TPM settings. See the HP-UX operating system documentation for more information.
2. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
3. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
4. Remove the top cover. See "Removing the Top Cover" (page 165).
5. Remove the core I/O board. See "Removing the Core I/O Board" (page 216).
6. Grasp the TPM by the edges and lift it out of the socket on the I/O board (Figure 78).

CAUTION: Destroy the TPM after removing it from the server. Follow local regulations to securely destroy the TPM. Do not attempt to use the TPM in another server.

Figure 78 TPM Location on I/O Board



1 Core I/O Board Slot
2 I/O VRM
3 TPM
4 System Battery

Replacing the TPM

To replace the TPM, follow these steps:

1. Insert the TPM.
   a. Align the TPM connector pinouts with the pins on the I/O board socket.

      NOTE: The female connector on the TPM has one pinout plugged, which aligns with a missing pin on the male connector on the I/O board assembly.

   b. Push the TPM straight down into the socket until it is fully seated (Figure 78).
2. Replace the core I/O board. See "Replacing the Core I/O Board" (page 217).
3. Replace the top cover. See "Replacing the Top Cover" (page 166).
4. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
5. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).
6. Set the TPM to the prior state, if available, or to a customer preference. Example 1 is an example of using the `secconfig` command to enable the TPM as a customer preference.

Example 1 Enabling the TPM

1. Access the EFI Shell.
2. Enter **`info sec`** to display the server security settings on the screen. The TPM is disabled by default.
3. Enter **`secconfig`** to display a list of configurable security settings.
4. Enter **`secconfig tpm on`** to enable the TPM.

7. Reset the server.
8. Boot the operating system. See "Booting and Shutting Down HP-UX" (page 110).

9. Restore the former TPM settings to the new TPM. See the HP-UX operating system documentation for more information.
10. Back up the TPM security information. See the HP-UX operating system documentation for more information.

Removing and Replacing the Core I/O Board

The core I/O board provides local and remote manageability access, and manages many critical server functions and components such as:

- Power supplies
- Fans
- Main memory
- Front panel
- Processors
- Remote interfaces
- USB
- VGA (optional)
- Server boards

The core I/O board has a unique, dedicated slot located to the left of the public PCI/PCI-X card slots (as viewed from the front of the chassis) on the I/O board assembly. The core I/O board includes VGA (optional), iLO 2 MP LAN, iLO 2 MP USB, and iLO 2 MP serial ports, and locator and iLO 2 MP status LEDs. For more detail on the port locations and LEDs, see "Controls, Ports, and LEDs" (page 28).

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

voltages are present at various locations within the server whenever an AC power source is connected. this voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: The dedicated core I/O board slot is not hot-pluggable.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Core I/O Board

IMPORTANT: The replacement core I/O board may not be the same as the current core I/O board. If the server is running an operating system other than Windows or Linux, the current core I/O board may not have a VGA connector. The replacement core I/O board always ships with a VGA connector. The VGA connector may not be functional depending on the server operating system. However, when you run system discovery utilities, such as MAPPER, the output includes VGA.

To remove the core I/O board, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. Disconnect all external cables attached to the board.
3. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).

4. Remove the top cover. See "Removing the Top Cover" (page 165).
5. Disconnect the internal USB cable attached to the core I/O board.
6. Remove the slotted T15 screw that attaches the card bulkhead to the chassis; use a T15 driver to turn the screw counterclockwise until it is free from the chassis.

CAUTION: Do not rock the board side to side during removal, or you can damage the slot pins. Pull the board straight up and out of the chassis for removal.

7. Grasp both edges of the board and apply even force to lift the board straight up and out of the chassis.

Replacing the Core I/O Board

To replace the core I/O board, follow these steps:

1. Insert the replacement card into the dedicated core I/O board slot.

CAUTION: Do not rock the board side to side during installation, or you can damage the slot pins. Push the board straight down into the slot for installation.

   a. Insert the tab at the base of the card bulkhead into the slot in the chassis.
   b. Align the card connectors with the slots on the I/O board.
   c. Apply firm, even pressure to both sides of the card until it fully seats into the slot.
2. Replace the slotted T15 screw that attaches the card bulkhead to the chassis; use a T15 driver to turn the screw clockwise until it tightens to the chassis.
3. Reconnect the USB cable to the card.
4. Replace the top cover. See "Replacing the Top Cover" (page 166).
5. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
6. Reconnect all external cables to the card.
7. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the Core I/O Board Battery

Replace the battery with an identical or equivalent battery only. Dispose of used batteries according to the manufacturer's instructions.

WARNING! Lithium batteries can explode if mistreated. Do not recharge, disassemble, or dispose of batteries in a fire. Failure to observe this warning can result in personal injury or damage to equipment.

Removing the Core I/O Board Battery

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

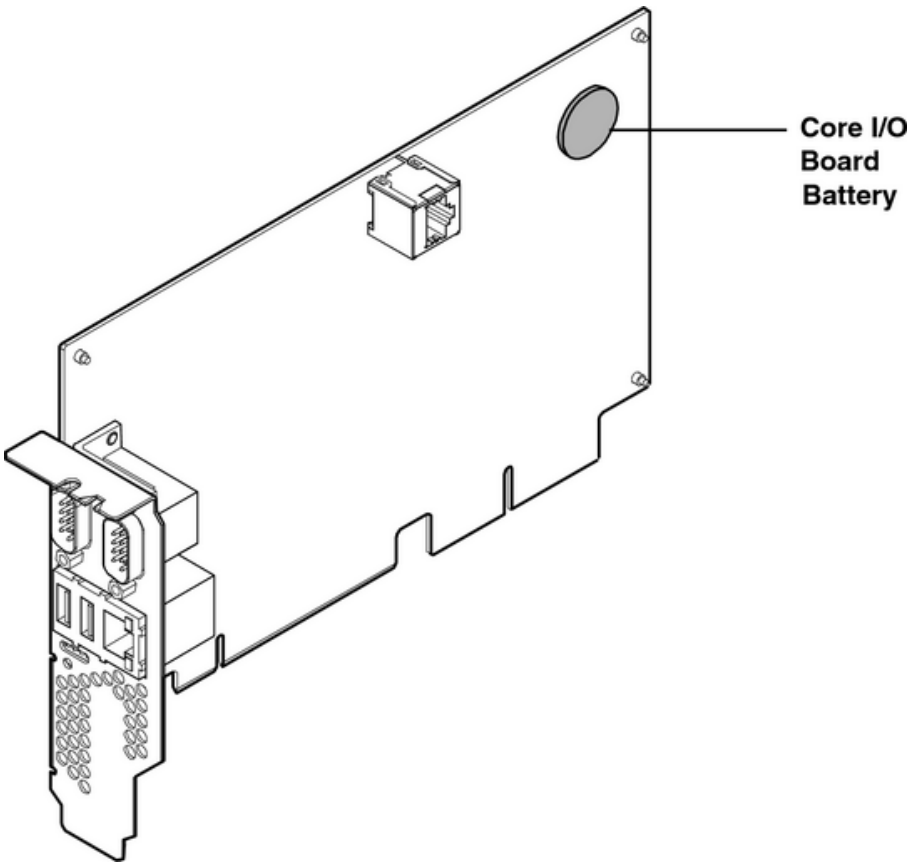
CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

IMPORTANT: Before removing the system battery, record all boot and LAN configuration settings. (Find the settings using the INFO ALL EFI command.) You must reset these values after replacing the battery.

To remove the core I/O board battery, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover from the chassis. See "Removing the Top Cover" (page 165).
4. Remove the core I/O board. See "Removing the Core I/O Board" (page 216).
5. Locate the battery on the core I/O board (Figure 79).
6. Insert a flat tool under the battery and carefully lift upward to pry the battery from the socket.

Figure 79 Battery Location on the Core I/O Board



Replacing the Core I/O Board Battery

To replace the core I/O board battery, follow these steps:

1. Insert the replacement battery into the socket.

   NOTE: The positive terminal of the battery is designated by a + sign. Install the battery with the + sign facing up.

2. Replace the core I/O board. See "Replacing the Core I/O Board" (page 217).
3. Replace the top cover. See "Replacing the Top Cover" (page 166).
4. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
5. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

6. Restore the iLO 2 MP configuration settings using the server console. For additional information about using the iLO 2 MP see the *HP Integrity Integrated Lights-Out 2 Operations Guide*.

Removing and Replacing the SAS Core I/O Card

The SAS core I/O card connects to the SAS disk backplane and controls internal data storage operations for the server. There are four types of SAS core I/O cards supported on the server:

- Half length generic SAS card (PCI-X)
- Full length SAS card with RAID capability (PCI-X or PCIe)
- Full length SAS card with RAID capability able to connect to external storage (PCIe)

Slots 1 and 2 are dedicated for the PCI-X core I/O cards. The LAN core I/O card is installed either in slot 2 or slot 10 depending on the configuration. PCIe SAS core I/O cards are installed in slots 3 or 4 on the PCIe I/O backplane.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: PCI/PCI-X slots 1 and 2 are dedicated for use by core I/O cards. Do not place any other PCI/PCI-X expansion cards in slots 1 and 2. Slots 1 and 2 are not hot-plug capable.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the SAS Core I/O Card

NOTE: You may need to remove the LAN core I/O card to access the SAS core I/O card.

To remove the SAS core I/O card, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover. See "Removing the Top Cover" (page 165).

CAUTION: When disconnecting the SAS cables, note the labeling on the cables. Both cables and sockets are clearly marked with the correct channel. When reconnecting these cables, match each cable with the appropriate socket on the SAS core I/O card. If the cables are mismatched, the server operating system may not reboot.

4. Disconnect the internal SAS cables attached to the card.
5. Remove the slotted T15 screw that attaches the card bulkhead to the chassis; use a T15 driver to turn the screw counterclockwise until it is free from the chassis.
6. SAS RAID card only, pull the gate latch toward the front of the chassis to unlock the SAS core I/O card.
7. Grasp the card by the edges and lift it out of the chassis.

Replacing the SAS Core I/O Card

To replace the SAS core I/O card, follow these steps:

1. Insert the replacement card into the dedicated SAS core I/O card slot.
   a. Insert the tab at the base of the card bulkhead into the slot in the chassis.
   b. Align the card connectors with the slots on the I/O board.
   c. Apply firm, even pressure to both sides of the card until it fully seats into the slot.
2. SAS RAID card only, close the gate latch to secure the end of the SAS RAID card.
3. Replace the slotted T15 screw that attaches the card bulkhead to the chassis; use a T15 driver to turn the screw clockwise until it tightens to the chassis.
4. Reconnect the internal SAS cables to the card.

CAUTION: When reconnecting the SAS cables, note the labeling on the channel cables. Both cables and sockets are clearly marked with the correct channel. Match each cable with the appropriate socket on the SAS core I/O card. If the cables are mismatched, the server operating system may not reboot.

5. Replace the top cover. See "Replacing the Top Cover" (page 166).
6. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
7. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the LAN Core I/O Card

The LAN core I/O card enables network connectivity for the server. The dedicated slot for the LAN core I/O card is slot 2 unless there are two PCI-X SAS core I/O cards installed. In this case, the dedicated slot for the LAN core I/O card is slot 10.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: PCI/PCI-X slots 1 and 2 are dedicated for use by core I/O cards. Do not place any other PCI/PCI-X expansion cards in slots 1 and 2. Slots 1 and 2 are not hot-plug capable.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the LAN Core I/O Card

To remove the LAN core I/O card, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. Disconnect all external cables attached to the card.
3. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
4. Remove the top cover. See "Removing the Top Cover" (page 165).
5. Remove the slotted T15 screw that attaches the card bulkhead to the chassis; use a T15 driver to turn the screw counterclockwise until it is free from the chassis.
6. Grasp the card by the edges and lift it out of the chassis.

Replacing the LAN Core I/O Card

To replace the LAN core I/O card, follow these steps:

1. Insert the replacement card into the dedicated LAN core I/O slot.
   a. Insert the tab at the base of the card bulkhead into the slot in the chassis.
   b. Align the card connectors with the slots on the I/O board.
   c. Apply firm, even pressure to both sides of the card until it fully seats into the slot.
2. Replace the slotted T15 screw that attaches the card bulkhead to the chassis; use a T15 driver to turn the screw clockwise until it tightens to the chassis.
3. Replace the top cover. See "Replacing the Top Cover" (page 166).
4. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
5. Reconnect all external cables to the card.
6. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the Display Board

The display board is a combination board that supports the following server components:

- Power switch and status LEDs
- DVD drive
- Front panel USB port
- Diagnostic panel

The display board attaches to an interconnect board that functions as a link between the midplane board and the display board.

The display board contains the power switch and the following status LEDs:

- Power LED
- System health LED
- Internal health LED
- External health LED
- Locator LED

For more detailed information about front panel LED behavior, see "Controls, Ports, and LEDs" (page 28).

The display board includes a USB connector that supports USB 2.0 (480 Mbps).

The diagnostic panel provides failure identification for each component that has a detectable error associated with it. For more information on the diagnostic panel LEDs, see "Controls, Ports, and LEDs" (page 28).

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

IMPORTANT: System information is stored on the display board assembly. You must write the serial number and model string information to the new display board after installation.

Removing the Display Board

To remove the display board, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover. See "Removing the Top Cover" (page 165) .

NOTE: The USB cable connector is an RJ45 connector; it is not a typical USB connector.

4. Remove the air baffle (Figure 83).
5. Remove the clear plastic cover.
6. Disconnect the USB cable from the connector on the display board (Figure 80).
7. Remove the DVD drive. See "Removing the DVD Drive" (page 185).
8. Locate the knurled thumbscrew behind the DVD drive that holds the display board in place (Figure 80).
9. Turn the thumbscrew counterclockwise until the board releases from the chassis.
10. Remove the top two screws from the right side of the bezel. Pull the bezel out from the chassis approximately one half inch so that the display board can clear the locator and Power buttons (Figure 80).

CAUTION: Do not pull the bezel out from the chassis more than one half inch. Do not use the USB connector as a handle to remove the display board. Failure to observe these cautions can result in damage to server components.

11. Hold the bezel out from the chassis, and use the diagnostic panel light guide as a handle to simultaneously push the board to the left to unplug it from the socket on the interconnect board.

NOTE: Use the guide pins on the chassis and the L-shaped keyways on the display board to help you with the display board removal procedures.

12. Slide the board toward the rear of the chassis until it stops against the guide pins.
13. Tilt the board toward the front of the chassis, and lift it out at an angle.
14. Remove the diagnostic panel light guide by squeezing the plastic tabs until they disengage from the slots on the board (Figure 82).

IMPORTANT: Do not discard the diagnostic panel light guide. You must install it onto the replacement display board.

Figure 80 Display Board Location

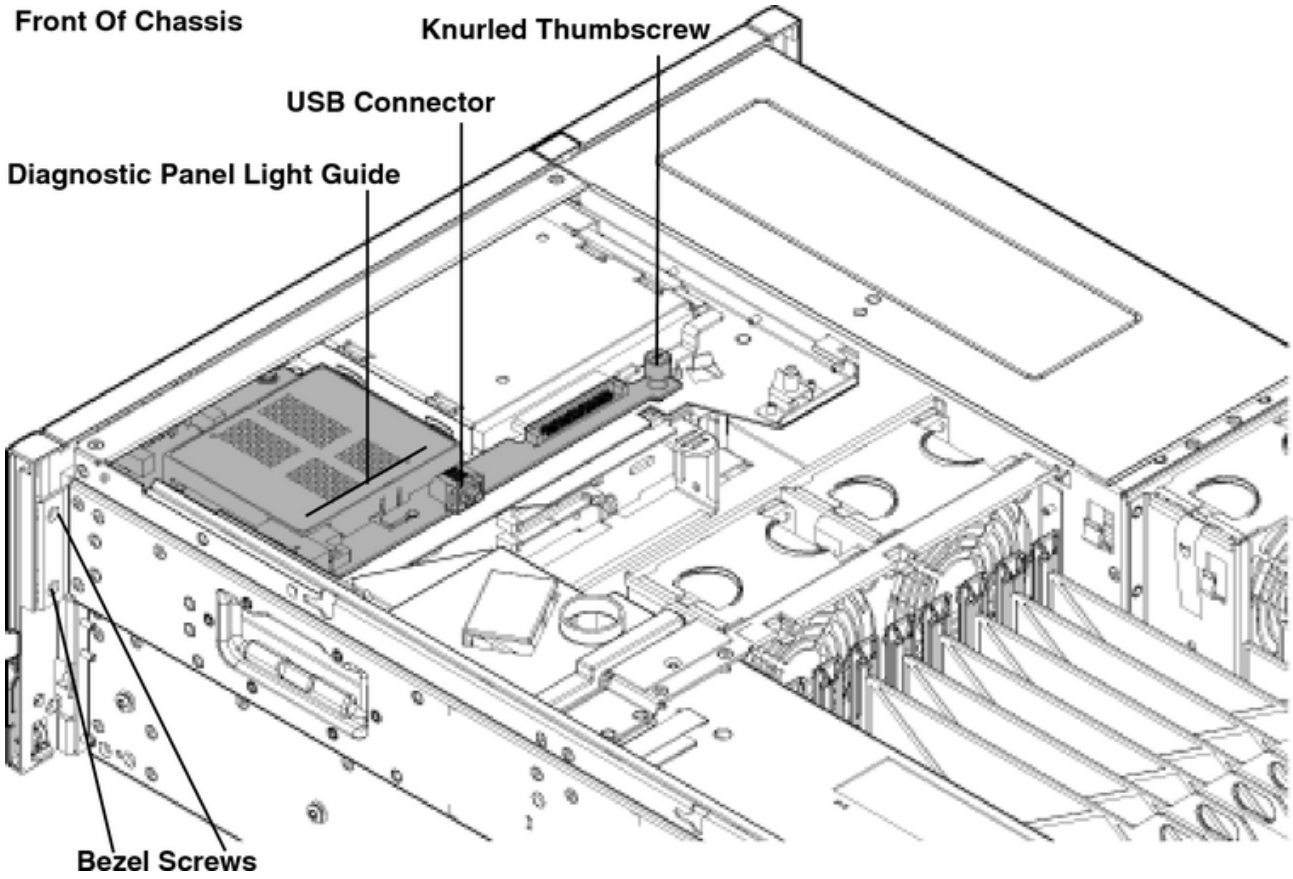


Figure 81 Display Board

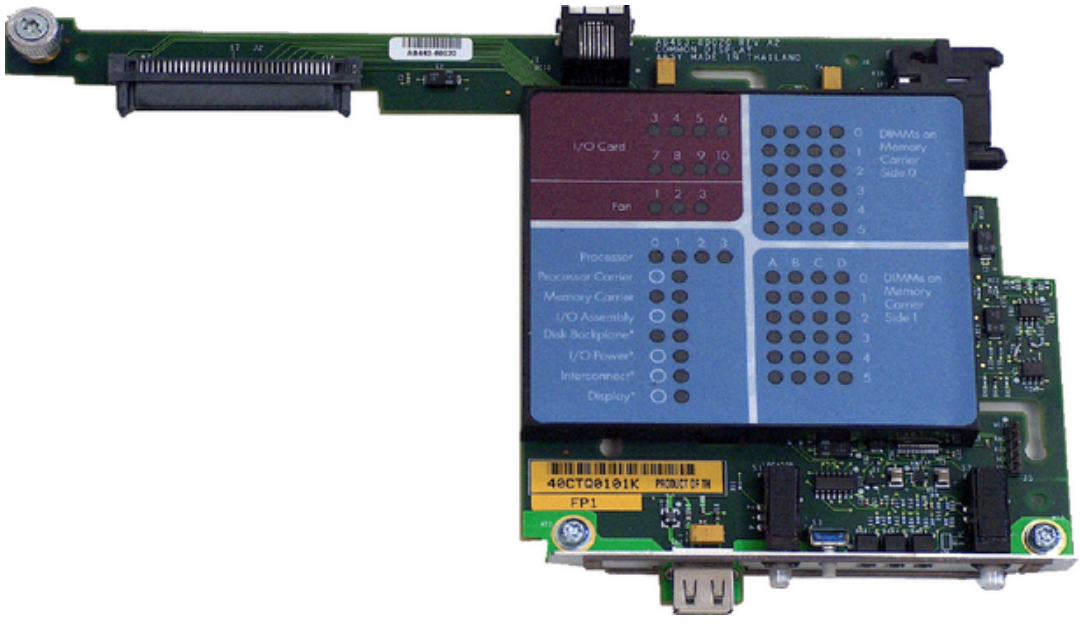
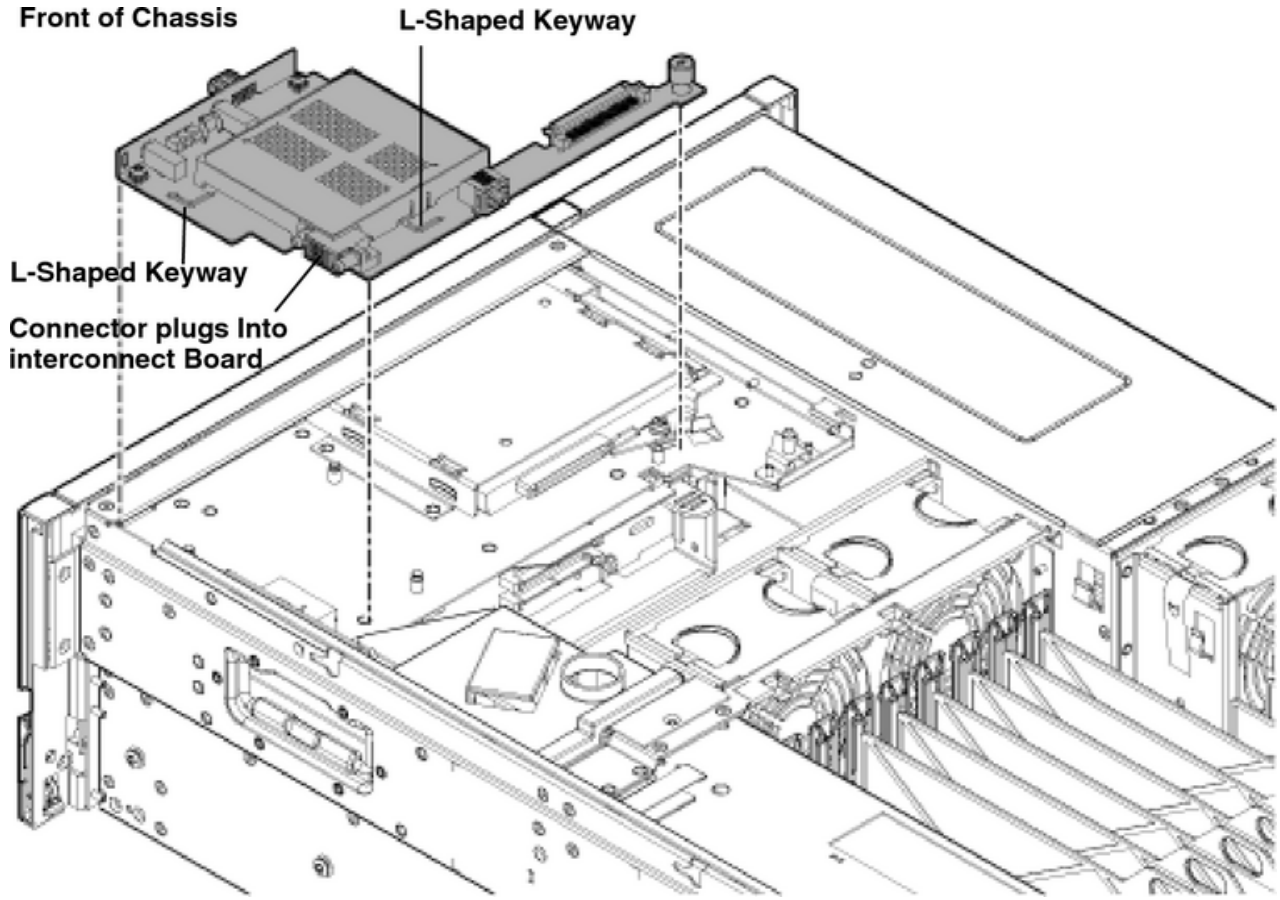


Figure 82 Display Board Removal and Replacement



Replacing the Display Board

To replace the display board, follow these steps:

NOTE: Use the guide pins on the chassis and the L-shaped keyways on the display board to help you with the display board replacement procedures.

1. Remove the diagnostic panel light guide protective cover from the replacement display board (Figure 80).

CAUTION: Do not use the USB connector as a handle to replace the display board. Failure to observe this warning can result in damage to server components.

2. Place the display board onto the guide pins.
3. Use the diagnostic panel light guide as a handle to push the board toward the front of the chassis until it fully seats against the front of the chassis (Figure 80).
4. Remove the top two screws from the right side of the bezel. Pull the bezel out from the chassis approximately one half inch so that the display board can clear the locator and Power buttons (Figure 80).

CAUTION: Do not pull the bezel out from the chassis more than one half inch. Failure to observe this warning can result in damage to server components.

5. Hold the bezel out from the chassis, and simultaneously push the board to the right to plug it into the socket on the interconnect board.
6. Locate the knurled thumbscrew behind the DVD drive that holds the display board in place. Turn the screw clockwise until the board is secured into place (Figure 80).

7. Install the diagnostic panel light guide (Figure 80).
   a. Align the diagnostic panel light guide tabs with the slots on the display board.
   b. Push down firmly on the light guide until it seats onto the board.
8. Replace the top two right-side bezel screws (Figure 80).
9. Replace the DVD drive. See "Replacing the DVD Drive" (page 185).
10. Reconnect the USB cable into the connector on the display board (Figure 80).
11. Replace the air baffle (Figure 83).
12. Replace the clear plastic cover.
13. Replace the top cover. See "Replacing the Top Cover" (page 166).
14. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
15. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the SAS Backplane Board

Serial-attached SCSI (SAS) is a new, faster version of the industry standard SCSI technology. Although SCSI is a proven technology, its parallel data communication model restricts it from providing the speed and scalability required for modern data transfer and storage. In a parallel data communication environment, multiple devices share one bus; all data travels over the same cable and through the same port.

SAS provides serial, or point-to-point, data transfer. A point-to-point architecture means that each device has its own private bus, cable, and port. This architecture improves the reliability and availability of data, and greatly enhances data transfer rates. Current data transfer rates are 3 Gb/s. Additional features of the SAS technology include:

- Full-duplex capability (all data reads and writes occur simultaneously)
- Automatic device discovery and configuration (each device is assigned a unique SAS address)
- Thin cables and small connectors (assists with cooling and ease cable management issues)
- Increased scalability (expanders enable support for thousands of SAS devices)

The SAS backplane board attaches to an interconnect board that functions as a link between the midplane board and the SAS backplane board.

⚠ **WARNING!** Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

⚠ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the SAS Backplane Board

To remove the SAS backplane board, follow these steps:

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover. See "Removing the Top Cover" (page 165).
4. Remove the air baffle (Figure 83).
5. Remove the clear plastic cover.

6. Slide the SAS drives and fillers approximately two inches out of the drive bays. See "Removing a Hot-Pluggable Disk Drive" (page 172).

CAUTION: When disconnecting the SAS cables, note the labeling on the cables. Both cables and sockets are clearly marked with the correct channel. When reconnecting these cables, match each cable with the appropriate socket on the SAS backplane board. If the cables are mismatched, the server operating system may not reboot.

7. Disconnect the SAS cables from the connectors on the SAS backplane board (Figure 84).
8. Remove the interconnect board air baffle (Figure 85). See "Removing the Interconnect Board" (page 229).
9. Push down on the release lever to disengage the SAS backplane board from the chassis (Figure 84).

CAUTION: Do not use the release lever as a handle to remove the SAS backplane board. Failure to observe this caution can result in damage to the release lever and the SAS backplane board.

10. Use the sheet metal bracket that surrounds the SAS backplane board as a handle and slide the board to the left to unplug it from the socket on the interconnect board (Figure 84).
11. Pull the board straight back toward the rear of the chassis, and lift the board out of the chassis (Figure 84).

Figure 83 Air Baffle Removal and Replacement

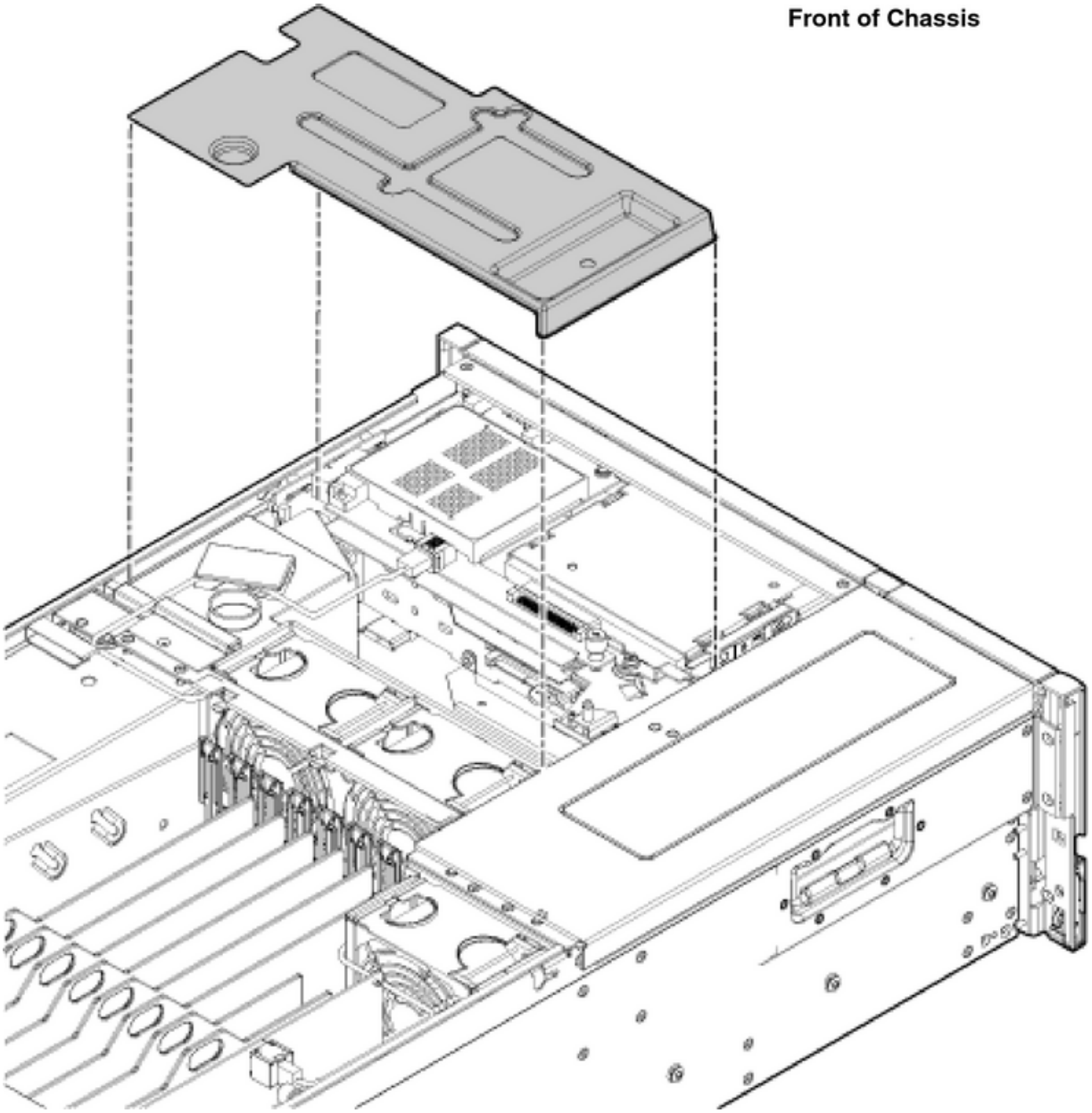
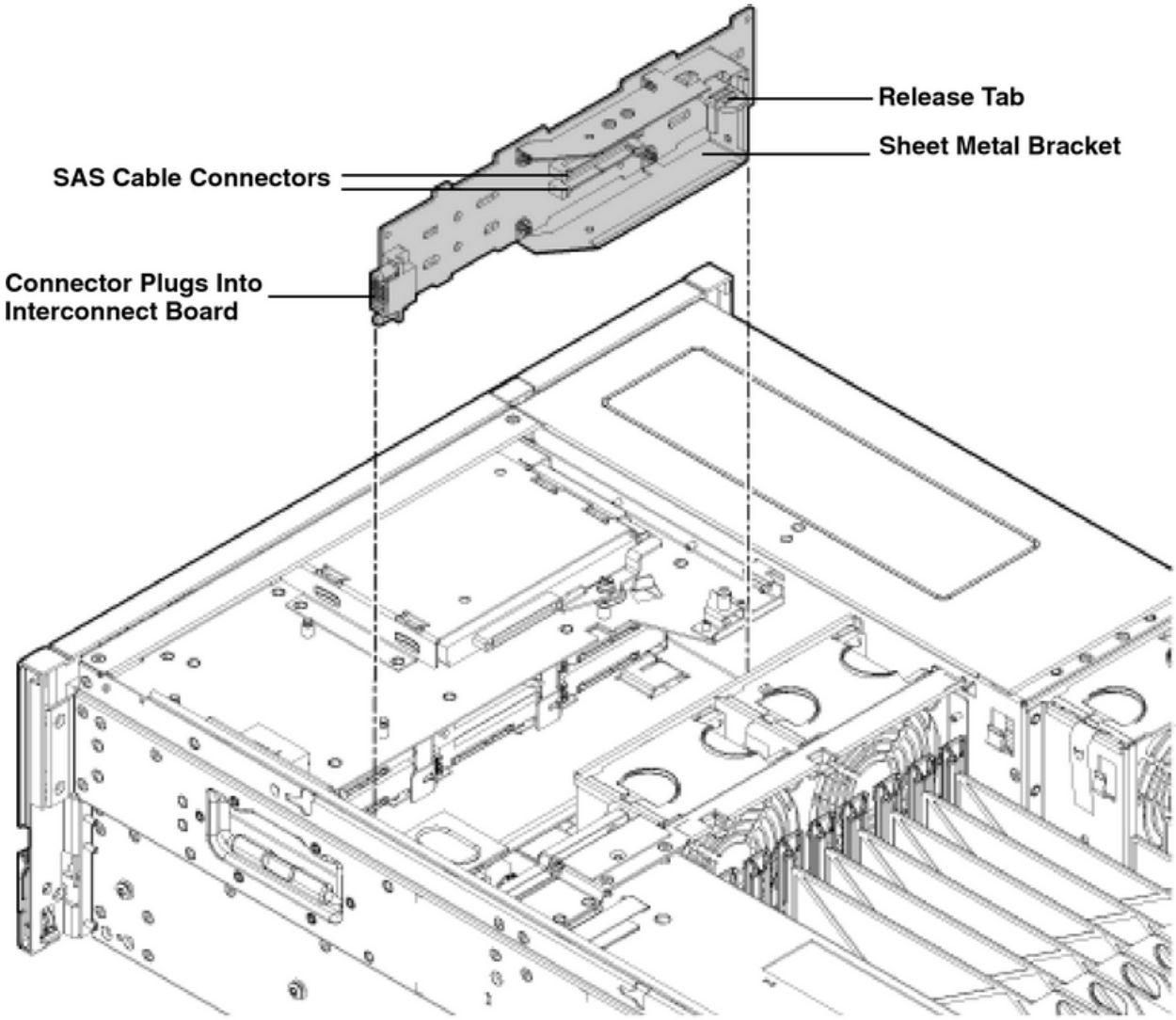


Figure 84 SAS Backplane Board Removal and Replacement



Replacing the SAS Backplane Board

To replace the SAS backplane board, follow these steps:

1. Hold the SAS backplane board by the sheet metal bracket and guide it toward the front of the chassis until the four keyway slots on the board seat onto the locking studs (Figure 84).
2. Push the board to the right to plug it into the socket on the interconnect board. The release lever locks into place when the board is fully seated (Figure 84).
3. Replace the interconnect board air baffle (Figure 85). See "Replacing the Interconnect Board" (page 231).

△ **CAUTION:** When reconnecting the SAS cables, note the labeling on the channel cables. Both cables and sockets are clearly marked with the correct channel. Match each cable with the appropriate socket on the SAS backplane board. If the cables are mismatched, the server operating system may not reboot.

4. Reconnect the SAS cables into the connectors on the SAS backplane board (Figure 84).
5. Replace the SAS disk drives. See "Replacing a Hot-Pluggable Disk Drive" (page 174).
6. Replace the air baffle (Figure 83).
7. Replace the clear plastic cover.

8. Replace the top cover. See "Replacing the Top Cover" (page 166).
9. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
10. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

Removing and Replacing the Interconnect Board

The interconnect board attaches the midplane board to the display board and the SAS backplane board.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

IMPORTANT: System information is stored on the interconnect board. You must write serial number and model string information to the new interconnect board after installation.

Removing the Interconnect Board

To remove the interconnect board, follow these steps:

NOTE: Use the guide posts located on the chassis and the keyways located on the interconnect board to help you with the interconnect board removal and replacement procedures.

1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).
2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover. See "Removing the Top Cover" (page 165).
4. Remove the air baffle (Figure 83).
5. Remove the clear plastic cover.
6. Disconnect the USB cable from the connector on the display board (Figure 80).
7. Remove the DVD drive. See "Removing the DVD Drive" (page 185).
8. Remove the display board. See "Removing the Display Board" (page 222).
9. Slide the SAS drives and fillers approximately two inches out of the drive bays. See "Removing a Hot-Pluggable Disk Drive" (page 172).

CAUTION: When disconnecting the SAS cables, note the labeling on the cables. Both cables and sockets are clearly marked with the correct channel.When reconnecting these cables, you must match each cable with the appropriate socket on the SAS core I/O card. If the cables are mismatched, the server operating system may not reboot.

10. Disconnect the SAS data and power cables from the connectors on the SAS backplane (Figure 84).
11. Remove the interconnect board air baffle (Figure 85).
    a. Insert your finger into the opening on the interconnect board air baffle and pull upward to release the air baffle from the chassis.
    b. Lift the air baffle out of the chassis at an angle.

12. Remove the SAS backplane. See "Removing the SAS Backplane Board" (page 225).
13. Insert your fingers into the handle on the interconnect board and push the board toward the front of the chassis to unplug it from the socket on the midplane board (Figure 86).
14. Lift the interconnect board out of the chassis (Figure 86).

Figure 85 Interconnect Board Air Baffle

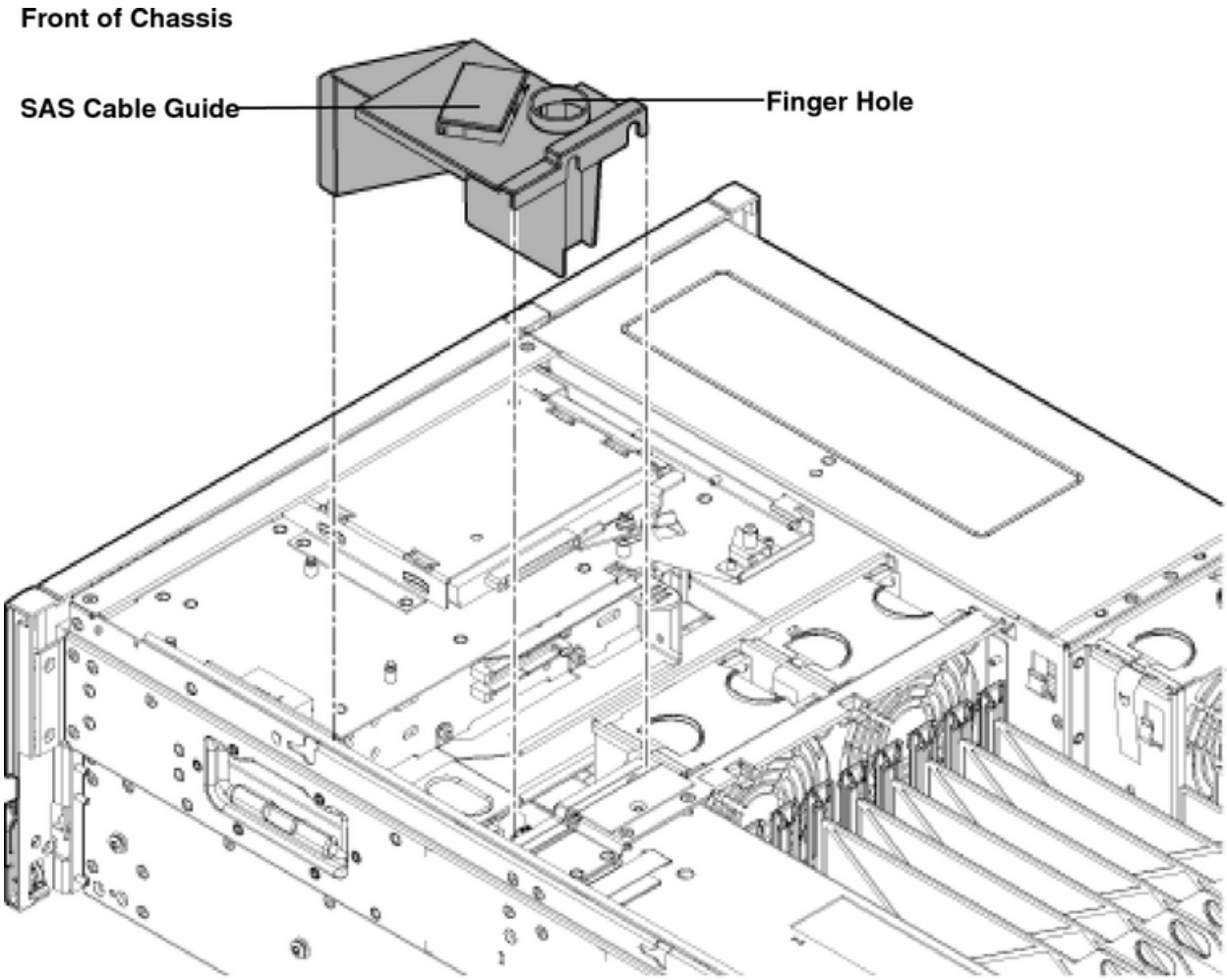
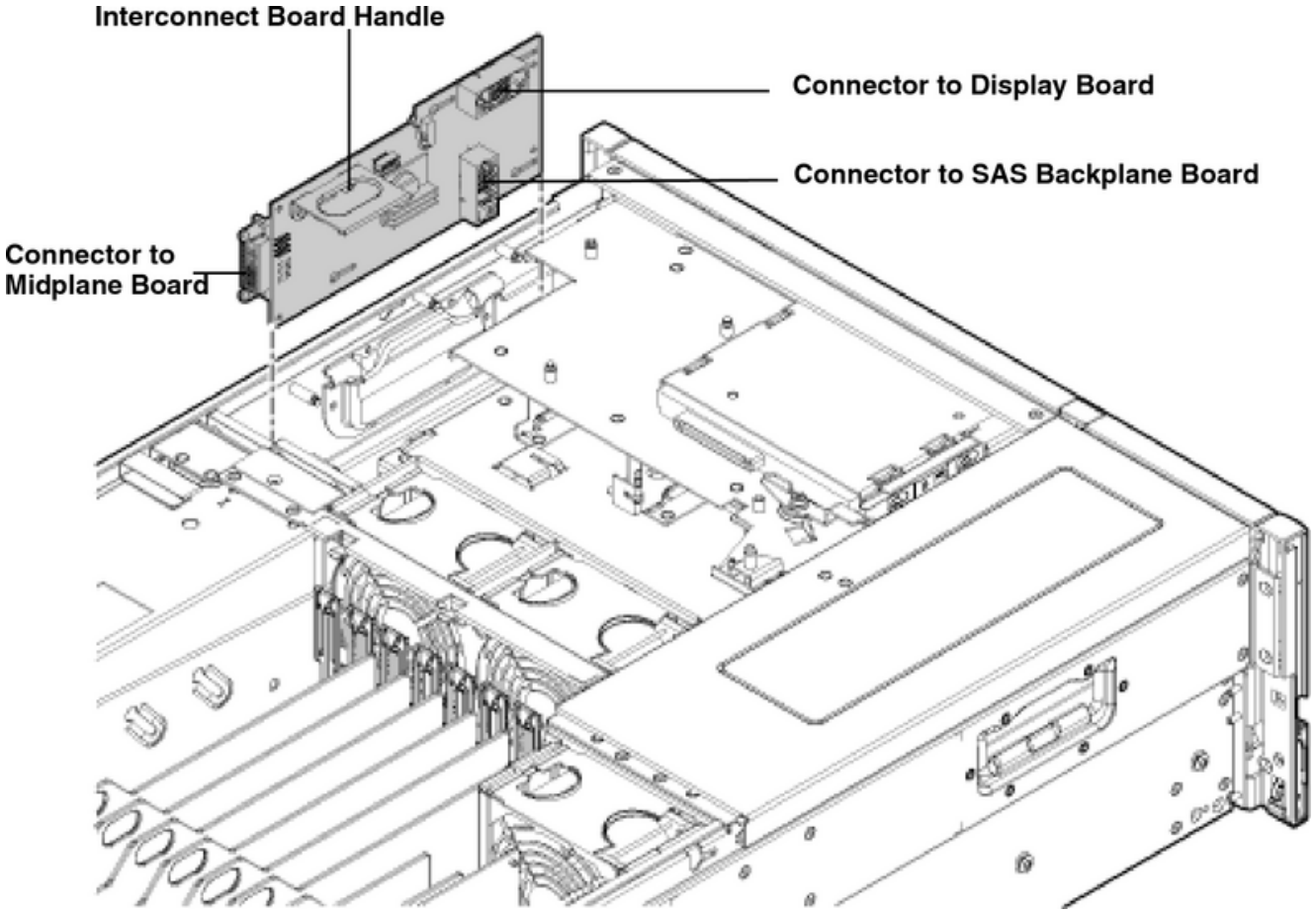


Figure 86 Interconnect Board Removal and Replacement



Replacing the Interconnect Board

To replace the interconnect board, follow these steps:

CAUTION: Handle the interconnect board carefully, or you can damage the plastic insulator material on the back of the board.

NOTE: Use the guide posts located on the chassis and keyways located on the interconnect board to help you with the interconnect board removal and replacement procedures.

1. Place the interconnect board onto the guide posts.
2. Insert your fingers into the board handle and push the board toward the rear of the chassis until it plugs into the socket on the midplane board (Figure 86).
3. Replace the SAS backplane. See "Replacing the SAS Backplane Board" (page 228).
4. Guide the interconnect board air baffle into the chassis and snap it into place (Figure 85).

CAUTION: When reconnecting the SAS cables, note the labeling on the channel cables. Both cables and sockets are clearly marked with the correct channel.Match each cable with the appropriate socket on the SAS core I/O card. If the cables are mismatched, the server operating system may not reboot.

5. Reconnect the SAS data and power cables into the connectors on the SAS backplane (Figure 84).
6. Replace the display board. See "Replacing the Display Board" (page 224).
7. Replace the SAS disk drives. See "Replacing a Hot-Pluggable Disk Drive" (page 174).
8. Replace the DVD drive. See "Replacing the DVD Drive" (page 185).

9. Reconnect the USB cable into the connector on the display board (Figure 80).
10. Replace the air baffle (Figure 83).
11. Replace the clear plastic cover.
12. Replace the top cover. See "Replacing the Top Cover" (page 166).
13. If rack installed, slide the server completely into the rack. See "Inserting the Server into the Rack" (page 164).
14. Reconnect the power cables and power on the server. See "Powering On the Server" (page 81).

IMPORTANT: Serial number and model string data information is stored on both the interconnect board and the I/O board. When you install a new interconnect board, you must copy this information from the I/O board to the new interconnect board.

15. Respond **YES** to prompts regarding copying information onto the new board.
16. Verify the serial number and model string data information copied onto the new interconnect board.
    a. Boot to EFI.
    b. Enter **service** mode:

```
Shell> sysmode service
Current System Mode: ADMIN
You are now in SERVICE mode.
```

    c. Use the `sysset` command to verify that all values are set:

```
Shell> sysset

System Information:
Manufacturer: hp
Product Name: server rx3600
Product Number: AB463A
Secondary Product Number is Identical
Serial number: SGH43442VB
Secondary Serial Number is Identical
UUID: 3C33C58E-2E5A-11D8-A33B-4188C0AEFAE2 (Valid)
Secondary UUID is Identical
Product ID: 0x301
```

Removing and Replacing the Midplane Board

The midplane board is attached to the main bulkhead in the center of the chassis. It provides a connection between the power supplies, the I/O board assembly, and the processor board assembly.

WARNING! Ensure that the system is powered off and all power sources have been disconnected from the server prior to performing this procedure.

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position.

Failure to observe this warning can result in personal injury or damage to equipment.

CAUTION: Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

Removing the Midplane Board

To remove the midplane board, follow these steps:

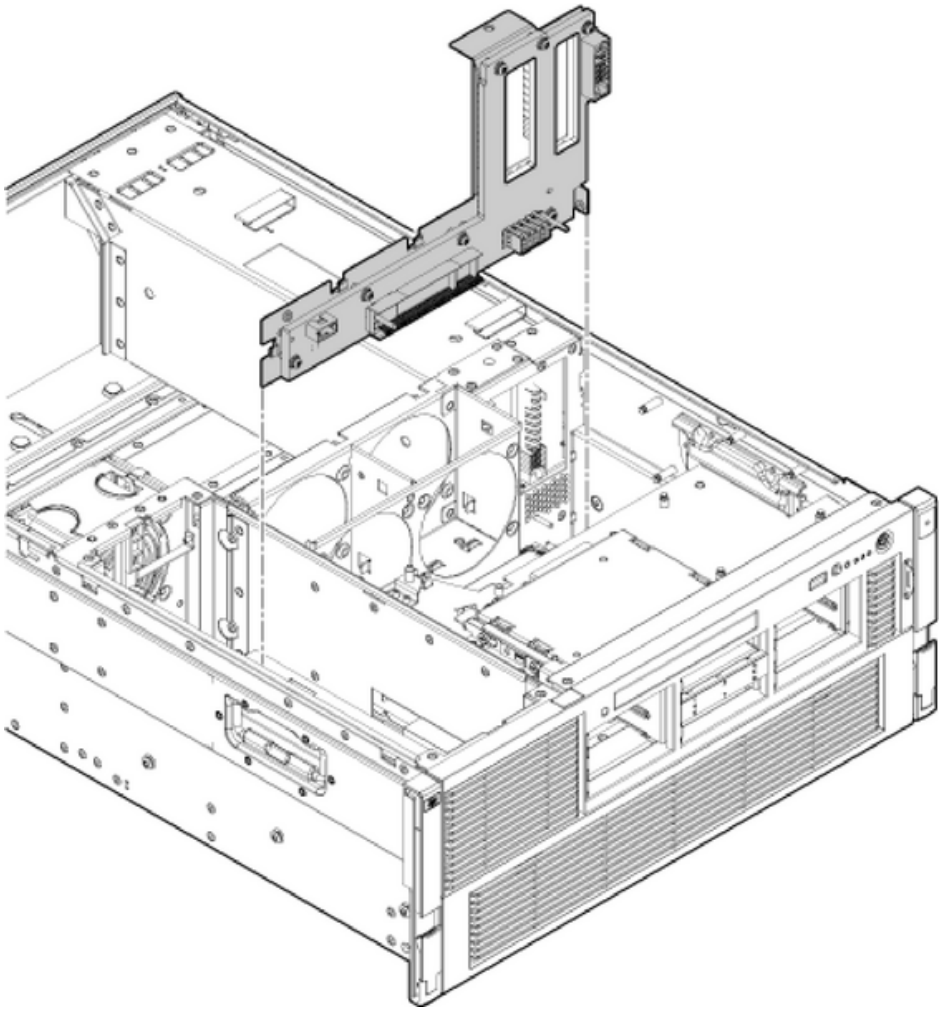
1. Power off the server and disconnect the power cables. See "Powering Off the Server" (page 82).

2. If rack installed, slide the server completely out from the rack. See "Extending the Server from the Rack" (page 164).
3. Remove the top cover. See "Removing the Top Cover" (page 165).
4. Remove the memory carrier assembly cover. See "Removing the Memory Carrier Assembly Cover" (page 167).
5. Remove the clear plastic cover.
6. Remove the memory carrier assembly. See "Removing the Memory Carrier Assembly" (page 186).
7. Remove the processor board. See "Removing the Processor Board Assembly" (page 198).
8. Remove hot-swappable chassis fan units 2 and 3. See "Removing a Hot-Swappable Chassis Fan Unit" (page 168).
9. Remove the air baffle.
10. Disconnect the USB cable from the connector on the display board.
11. Remove the DVD drive. See "Removing the DVD Drive" (page 185).
12. Remove the display board. See "Removing the Display Board" (page 222).
13. Slide the SAS drives and fillers approximately two inches out of the drive bays. See "Removing a Hot-Pluggable Disk Drive" (page 172).

△ **CAUTION:** When disconnecting the SAS cables, note the labeling on the cables. Both cables and sockets are clearly marked with the correct channel. When reconnecting these cables, match each cable with the appropriate socket on the SAS core I/O card. If the cables are mismatched, the server operating system may not reboot.

14. Disconnect the SAS data and power cables from the connectors on the SAS backplane board.
15. Remove the SAS backplane board. See "Removing the SAS Backplane Board" (page 225).
16. Remove the interconnect board. See "Removing the Interconnect Board" (page 229).
17. Remove the I/O board assembly. See "Removing the I/O Board Assembly" (page 206).
18. Remove the power supplies. See "Removing a Hot-Swappable Power Supply" (page 170).
19. Remove the fan cables from the fan 1 and fan 2 housing units.
    a. Push the release tab down and push the cable connector toward the front of the chassis until the connector tabs clear the opening in the fan housing.
    b. Guide the cable connector down through the opening in the fan housing.
    c. Remove the cable.
20. From the front of the server use a Torx 15 driver to remove the five Torx screws attaching the midplane bracket assembly to the chassis.
21. Grasp the top edge of the midplane board sheet metal attachment and lift straight back to release it from the guide pins on the chassis
22. Pull straight out and up to remove the midplane board from the chassis.

Figure 87 Midplane Board



Replacing the Midplane Board

To replace the midplane board, follow these steps:

1. Place the midplane board onto the guide pins on the chassis wall.
2. Push straight down until the board seats onto the locking studs.
3. Use a Torx 15 driver to replace and tighten the five Torx screws attaching the midplane bracket assembly to the chassis.
4. Replace the fan cables into the fan 1 and fan 2 housing units.
   a. Guide the cable connector up through the opening in the fan housing.
   b. Push the cable connector toward the front of the chassis until the connector tabs seat into place.
5. Replace the power supplies. See "Replacing a Hot-Swappable Power Supply" (page 171).
6. Replace the I/O board assembly. See "Replacing the I/O Board Assembly" (page 208).
7. Replace the interconnect board. See "Replacing the Interconnect Board" (page 231).
8. Replace the SAS backplane board. See "Replacing the SAS Backplane Board" (page 228).

△ **CAUTION:** When reconnecting the SAS cables, note the labeling on the channel cables. Both cables and sockets are clearly marked with the correct channel. Match each cable with the appropriate socket on the SAS core I/O card. If the cables are mismatched, the server operating system may not reboot.

9. Reconnect the SAS data and power cables into the connectors on the SAS backplane board.

10. Replace the SAS disk drives. See “Replacing a Hot-Pluggable Disk Drive” (page 174).
11. Replace the display board. See “Replacing the Display Board” (page 224).
12. Replace the DVD drive. See “Replacing the DVD Drive” (page 185).
13. Reconnect the USB cable into the connector on the display board.
14. Replace the air baffle.
15. Replace hot-swap chassis fan units 1 and 2. See “Replacing a Hot-Swappable Chassis Fan Unit” (page 169).
16. Replace the clear plastic cover.
17. Replace the processor board. See “Replacing the Processor Board Assembly” (page 199).
18. Replace the memory carrier assembly. See “Replacing the Memory Carrier Assembly” (page 187).
19. Replace the memory carrier assembly cover. See “Replacing the Memory Carrier Assembly Cover” (page 167).
20. Replace the top cover. See “Replacing the Top Cover” (page 166).
21. If rack installed, slide the server completely into the rack. See “Inserting the Server into the Rack” (page 164).
22. Reconnect the power cables and power on the server. See “Powering On the Server” (page 81).

A Customer Replaceable Units Information

This appendix provides the following information for each field replaceable unit:

- Manufacturing part number
- Description
- Replacement part number
- Exchange part number

This appendix addresses the following topic:

- "Parts Only Warranty Service"
- "Customer Self Repair"
- "Customer Replaceable Units List"

Parts Only Warranty Service

Your HP Limited Warranty may include a parts only warranty service. Under the terms of parts only warranty service, HP will provide replacement parts free of charge. For parts only warranty service, CSR part replacement is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.

Customer Self Repair

HP products are designed with many Customer Replaceable Units (CRU) parts, to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period HP (or HP service providers or service partners) identifies that the repair can be accomplished by the use of a CRU part, HP will ship that part directly to you for replacement. There are three categories of CRU parts:

Yes	Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.
Optional	Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.
No	Some HP parts are not designed for customer self repair. To satisfy the customer warranty, HP requires that an authorized service provider replace the part.

Based on availability and where geography permits, CRU parts are shipped for next business day delivery. Same-day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone.

HP specifies in the materials shipped with a replacement CRU part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP within a defined period of time, normally five business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. With a CRU, HP pays for all the shipping and part return costs and determines the courier to be used.

For more information about HP's Customer Self Repair program, contact your local service provider. For the North American program, refer to the HP website at:

http://www.hp.com/go/selfrepair

Table 79 provides customer self repair information.

Table 79 Customer Self Repair Information

Code	Level	Description	Comments
AY	Yes	Level A with instructions available in the service guide	Requires you to replace these parts under warranty. No technical skills required.
BY	Optional	Level B with instructions available in the service guide	Low to moderate technical skills required.
CY	Optional	Level C with instructions available in the service guide	High technical skills required.
N	No	Not a customer replaceable part.	Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part.

Customer Replaceable Units List

Table 80 lists the customer replaceable units (CRUs) of the HP Integrity rx3600 server.

IMPORTANT: The list of part numbers is current and correct as of the publication of the document. Part numbers change often. Check the HP Partsurfer website, http://www.partsurfer.hp.com/search.aspx, to ensure you have the latest part numbers associated with this server.

Table 80 CRU List

Manufacturing Part Number	Description	Replacement Part Number	Exchange Part Number	Customer Self Repair
Processors				
AB576-2100B/AB576AX	CPU module, 1.4 GHz/12 MB Cache	AB576-2100B	AB576-69017	BY
AB577-2100B/AB577AX	CPU module, 1.6 GHz/18 MB Cache	AB577-2100B	AB577-69018	BY
AD391-2100C AD391AX	CPU, 1.67 GHz/18MB, dual core	AD391-2100B	AH241-6900A	BY
AD390-2100C AD390AX	CPU, 1.42 GHz/12MB, dual core	AD390-2100B	AH240-6900A	BY
Memory (DIMMs)				
AB563AX	512 MB DIMM	AD326A	AB563-69001	BY
AB564AX	1 GB DIMM	AD327A	AB564-69001	BY
AB565AX	2 GB DIMM	AD328A	AB565-69001	BY
AB566AX	4 GB DIMM	AD329A	AB566-69001	BY
AB567AX	8 GB 2Rx4 PC2-4200 DDR 1.2” DIMM	AB567–67001	AB567–67001	BY
PCI-X and Core I/O Cards				
AB352-60003	PCI-X 2-Port GbE core card	AB352-67003	n/a	BY
435234-001	PCI-X serial attach SCSI adapter	435709-001	n/a	BY
336685-001	PCI-X SAS RAID controller (P600)	370855-001	n/a	BY
309522-001N	SAS controller, cache (P600)	309522-001	n/a	BY
307132-001	SAS controller, battery (P600)	307132-001	n/a	BY
012760-002	PCIe SAS RAID controller (P400)	405832-001	n/a	BY
012764-004	256 Cache module (P400)	405836-001	n/a	BY
408658-001	Battery cable assembly, 11.5"	409124-001	n/a	BY

Table 80 CRU List *(continued)*

Manufacturing Part Number	Description	Replacement Part Number	Exchange Part Number	Customer Self Repair
381573-001	Battery, BBWC, NiMH, 3.6-V (P400 & P800)	398648-001	n/a	BY
381572-001	PCIe SAS RAID controller able to connect to external storage (P800)	398657-001	n/a	BY
405965-001	Battery retainer (P800)		n/a	BY
PCA Boards				
AB463-60003	Core I/O board with VGA	AB463-67003	n/a	AY
AB463-60004	Core I/O board without VGA	AB463-67003	AB463-69003	AY
AB463-60006	SAS disk backplane board	AB463-67006	n/a	BY
AB463-60010	Midplane board	AB463-67010	n/a	CY
AB463-60020	Display board	AB463-67020	n/a	BY
AB463-60025	Interconnect board	AB463-67025	n/a	CY
AB463-60113	2-socket processor extender	AB463-60113	AB463-69113	BY
Internal Disks/Removable Media				
375863-001	36 GB SAS HDD	376596-001	n/a	AY
375863-002	72 GB SAS HDD	376597-001	n/a	AY
AD142-2100B	DVD drive, 8X slim, IS, S5, CBT, TE	AD143-2100B	n/a	AY
AD143-2100A	DVD+RW drive, 8X, S5, CBT, TE	AD143-2100B	n/a	AY
Server Subassemblies				
AB463-2134B	I/O backplane assembly (PCI/PCI-X)	AB463-67034	AB463-69034	BY
AB295A #200 AB296A #200	PCI/PCI-X/PCIe I/O backplane version 1[1]	AB463-60027	AB463-69061	BY
AB295A #300 AB296A #300	PCI/PCI-X/PCIe I/O backplane version 1.1[1]	AB463-60028	AB463-69161	BY
AD124-2100B	8-DIMM memory carrier assembly	AD124-67001	AD124-69001	AY
AD125-2100B	24-DIMM memory carrier assembly	AD125-67001	AD125-69001	AY
Fan Assemblies				
AB463-2158A	Fan	AB463-2158A	n/a	AY
Other				
314581-003	Trusted Platform Module	406059-001	n/a	CY
0950-4677	I/O VRM	0950-4617	n/a	BY
0957-2198	Power supply	0957-2198	AD052-69001	AY
234556-001	System battery (located on the I/O board) (CR2032)	234556-001	n/a	BY
234556-001	iLO/MP Battery (located on the Core I/O board) (CR2032)	234556-001	n/a	BY
AB463-3402E	rx3600 memory carrier plastic cover (8/24 DIMM)	AB463-3402E	n/a	BY

Table 80 CRU List *(continued)*

Manufacturing Part Number	Description	Replacement Part Number	Exchange Part Number	Customer Self Repair
8710-2446	2.5mm Hex	8710-2446	n/a	BY
376383-001	HDD filler panel	376383-002	n/a	AY
AB463-2145A	rx3600 bezel	AB463-2145A	n/a	BY
AB463-3421B	rx3600 air baffle		n/a	AY
Cables				
AB463-2003A	Display board USB signal cable (connects to UCIO board)	AB463-2003A	n/a	AY
AB463-2005A	Power cable: internal memory fan	AB463-2005A	n/a	BY
AB463-2006A	Power cable: internal CPU fan	AB463-2006A	n/a	CY
AB463-2011A	Doorbell board cable	AB463-2011A	n/a	AY
AB463-2012C	CPU power pod cable	AB463-2012C	n/a	AY
AB463-2017A	SAS data A cable	AB463-2017A	n/a	AY
AB463-2017A	SAS data B cable		n/a	AY
5184-1894	Serial console cable	5184-1894	n/a	AY
Power Cords				
8120-6903	Power Cord - U.S	8120-6903	n/a	AY
8121-0871	Power Cord - Australia	8121-0871	n/a	AY
8121-0070	Power Cord	8121-0070	n/a	AY
8120-6898	Power Cord - UK & HK & Singapore	8120-6898	n/a	AY
8121-0161	Power Cord	8121-0161	n/a	AY
8120-6895	Power Cord	8120-6895	n/a	AY
8121-0675	Power Cord	8121-0675	n/a	AY
8120-6897	Power Cord - Sweden & Denmark	8120-6897	n/a	AY
8120-6899	Power Cord - Europe	8120-6899	n/a	AY
8121-0802	Power Cord	8121-0802	n/a	AY
8121-0974	Power Cord	8121-0974	n/a	AY

1

IMPORTANT: The new version of the PCI/PCI-X/PCIe backplane (version 1.1) is being shipped on July 1, 2008. For existing servers, repair and replace should continue to be performed with the version 1 I/O backplane. For servers shipped as of July 1, 2008, repair and replace should be performed with version 1.1 I/O backplane.

B Upgrades

This appendix address the following topics:

- "I/O Backplane Upgrade" (page 240)
- "Installing Core I/O Cards" (page 247)
- "Processor Upgrades" (page 259)

I/O Backplane Upgrade

I/O Backplane Upgrade Overview

The HP Integrity rx3600 Server and rx6600 Server may be upgraded from the 10 slot PCI/PCI-X I/O backplane (HPPN AB463-60001) to the 10 slot PCI/PCI-X/PCIe I/O backplane (HPPN AB463-60027). Table 81 provides a comparison of the two backplanes for planning movement of I/O cards.

Core I/O cards must be placed in appropriate slots. The HP 8 Internal Port SAS HBAs or HP Smart Array P600 PCI-X cards must be installed in slots 1 and 2. The HP Smart Array P400 and HP Smart Array P800 PCIe cards must be installed in slots 3 and 4. The Core LAN card is placed in slot 2, unless that slot is occupied by a SAS or Smart Array card. In such instances the Core LAN is placed in slot 10.

Table 81 Slot Speed Comparison and Planning Table

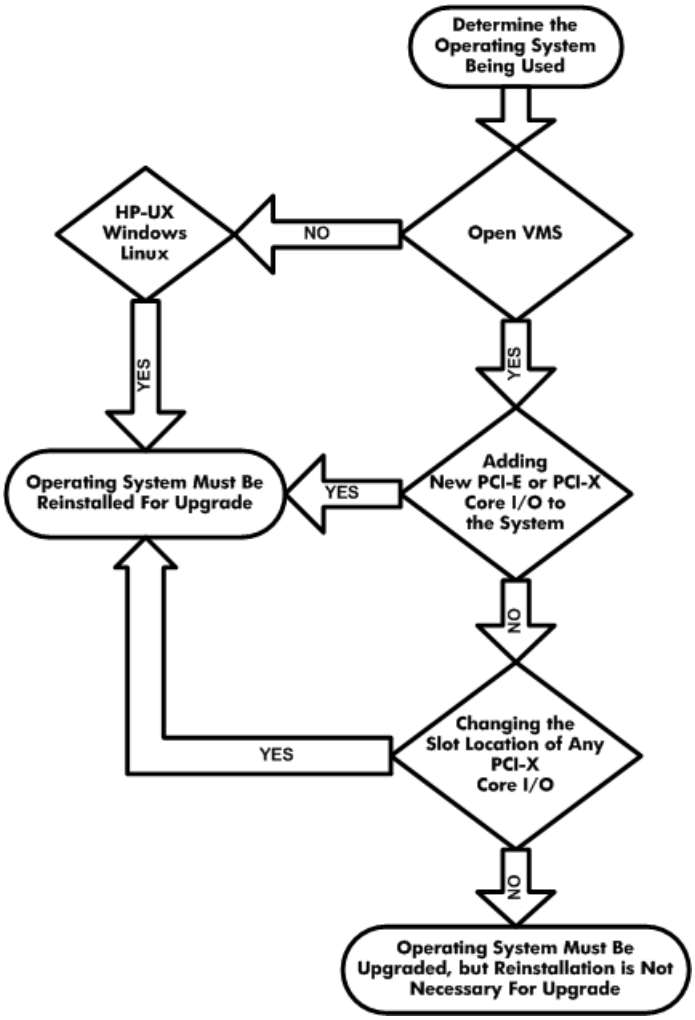
Slot Number	PCI/PCI-X I/O Backplane	Installed I/O Card	PCI/PCI-X/PCIe I/O Backplane	Upgraded I/O Configuration
1	Core I/O Only- PCI-X 66 MHz[1]		Core I/O Only- PCI-X 66 MHz[1]	
2	Core I/O Only -PCI-X 66 MHz[1]		Core I/O Only- PCI-X 66 MHz[1]	
3	PCI-X 266 MHz		PCIe x8[2]	
4	PCI-X 266 MHz		PCIe x8[2]	
5	PCI-X 133 MHz		PCIe x8	
6	PCI-X 133 MHz		PCIe x8	
7	PCI-X 66 MHz[3]		PCI-X 133 MHz	
8	PCI-X 66 MHz[3]		PCI-X 133 MHz	
9	PCI-X 66 MHz[4]		PCI-X 66 MHz[4]	
10	PCI-X 66 MHz[4, 5]		PCI-X 66 MHz[4, 5]	

[1] Slots 1 and 2 are shared slots on both backplanes.
[2] Slots 3 and 4 are switched slots on the PCI/PCI-X/PCIe backplane.
[3] Slots 7 and 8 are shared slots on the PCI/PCI-X backplane.
[4] Slots 9 and 10 are shared slots on both blackplanes and are half length.
[5] Core I/O LAN may occupy slot 10.

For more information on shared slots see Table 71 (page 179)

Upgrading the I/O backplane may require reinstalling the Operating System. See Figure 88 to determine if OS reinstallation is required.

Figure 88 OS Reinstallation Flowchart



Required Service Tools

Service of this server requires one or more of the following tools:

- Electrically Conductive Field Service Grounding Kit (P/N 9300-1155)
- 1/4 inch flat blade screwdriver
- ACX-15 Torx screwdriver
- ACX-10 Torx screwdriver

Safety Information

Use care to prevent injury and equipment damage removing and replacing server components. Voltages can be present within the server. Many assemblies are sensitive to damage by electrostatic discharge (ESD).

Follow the safety conventions listed below to ensure safe handling of components, to prevent injury, and to prevent damage to the server:

△ **CAUTION:** Observe all ESD safety precautions before attempting this procedure. Failure to follow ESD safety precautions can result in damage to the server.

- When removing or installing any server component, follow the instructions provided in this guide.
- If installing a hot-pluggable component, complete the required software intervention prior to removing the component.

- If installing an assembly that is neither hot-swappable nor hot-pluggable, disconnect the power cable from the external server power receptacle.

WARNING! Ensure that the system is powered off and all power sources are disconnected from the server prior to removing or installing server hardware (unless you are removing or installing a hot-swappable or hot-pluggable component).

Voltages are present at various locations within the server whenever an AC power source is connected. This voltage is present even when the main power switch is turned off.

Failure to observe this warning can result in personal injury or damage to equipment.

- Do not wear loose clothing that can snag or catch on the server or on other items.
- Do not wear clothing subject to static charge buildup, such as wool or synthetic materials.
- If installing an internal assembly, wear an antistatic wrist strap and use a grounding mat, such as those included in the Electrically Conductive Field Service Grounding Kit (HP 9300-1155).
- Handle accessory boards and components by the edges only. Do not touch any metal-edge connectors or any electrical components on accessory boards.

WARNING! To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

I/O Backplane Upgrade Procedure

The following is a checklist for upgrading the server.

Table 82 I/O Backplane Upgrade Checklist

Step	Action	X
1	Update the Operating System as necessary[1]	
2	Update Firmware to the latest revision: • SFW • BMC • iLO 2 MP • FPGA • vBios	
3	Perform a complete backup	
4	Shutdown the Operating System	
5	Power down the Server	
6	Remove the I/O backplane	
7	Move all components to the new I/O backplane: • Trusted Platform Module • I/O Voltage Regulator Module • Core I/O Board • SAS Core I/O • LAN Core I/O • Any other compatible I/O cards	
8	Install new core I/O (if necessary)	
9	Install the new I/O backplane	

Table 82 I/O Backplane Upgrade Checklist *(continued)*

Step	Action	X
10	Power to the EFI • Verify the serial number and model string data information copied onto the new I/O board. • Enable the TPM. • Verify the system board replacement and operation.	
11	View any warnings	
12	Verify all I/O cards are recognized	
13	Install the Operating System (if necessary)[1]	
14	Boot to the Operating System	

[1] HP-UX, Windows, and Linux require reinstallation of the OS with the upgrade of the IOBP. See Figure 88 (page 241) for more information.

1. Updating the Operating System

   Refer to your operating system documentation for procedures on updating the operating system.

2. Updating the Firmware

IMPORTANT: When performing a firmware upgrade that contains system programmable hardware (FPGA, EFI, PSOC, BMC), you must properly shut down any OS that is running before starting the firmware upgrade process.

SFW, iLO and BMC

Follow these steps to update the SFW, BMC and iLO2 MP firmware:

a. **SFW, iLO and BMC**

Update the SFW, BMC and iLO2 MP firmware:

1. Power on the system and get to the EFI Shell prompt.
2. Execute the following EFI command at the EFI Shell prompt to determine the current firmware version: `Shell> info fw`
3. Look for the latest firmware updates for Itanium-based servers at http://www.hp.com/go/bizsupport.
4. If a new version of the firmware is available, download it. Save it to CD, or copy it over the network to the system you are going to update.
5. Choose one of the following two options to update the firmware:
   - On the system you are updating, follow the instructions provided in the firmware release notes to download and execute the appropriate files to update your firmware.
   - Initiate a firmware upgrade from the HP System Insight Manager (SIM) as a "Group Action"

b. **FPGA**

The FPGA firmware upgrade is performed using FTP over the iLO 2 MP LAN, which must be operational. Follow these steps to update the FPGA firmware:

1. Execute the following EFI command at the EFI Shell prompt to determine the current firmware version: `Shell> info fw`
2. Look for the latest firmware updates for Itanium-based servers at http://www.hp.com/go/bizsupport.
3. If a new version of the firmware is available, copy the firmware image file onto your own FTP server.
4. Follow the instructions provided in FPGA release notes to Initiate a firmware upgrade from the iLO 2 MP user interface; the iLO 2 MP pulls its image from the FTP server that you specify.

c. **vBios**

If the server has UCIO with VGA the vBios must be updated. Follow these steps to update the vBios firmware:

1. Power on the system and get to the EFI Shell prompt.
2. Execute the following EFI command at the EFI Shell prompt to determine the current firmware version: `Shell> info fw`
3. Look for the latest firmware updates for Itanium-based servers at http://www.hp.com/go/bizsupport.
4. If a new version of the Video Graphics Adapter (VGA) firmware is available, download it. Save it to CD, or copy it over the network to the system you are going to update.
5. From the EFI Shell, move to the directory in which the downloaded firmware file is located.
6. Follow the installation instructions provided in the firmware release notes to update the VGA firmware using the provided flasher, `efiflash_1p15.efi`.

3. Performing a System Backup

Record the boot configuration settings. To find the settings, use the `INFO ALL` EFI Shell command.

Use Figure 78: "TPM Location on I/O Board", to determine if there is a TPM on the I/O board assembly. If so, record the TPM settings to transfer to the replacement I/O board assembly. See the HP-UX operating system documentation for instructions.

Back up the current TPM settings. See the HP-UX operating system documentation for more information.

TIP: Running the `info io` command from the EFI shell will allow you to record the device codes, given in HEX, for your I/O devices. This may be helpful in verifying I/O cards after the upgrade.

4. Shutting Down the Operating System

   See Chapter 4 (page 108) for this procedure.

5. Powering Off the Server

   See "Powering On and Powering Off the Server" (page 81) for this procedure.

6. Removing the I/O Backplane

   See "Removing the I/O Board Assembly" (page 206) for this procedure.

7. Moving Backplane Components
   a. Move the Trusted Platform Module. See "Removing and Replacing the Trusted Platform Module" (page 213) for this procedure.
   b. Move the I/O Voltage Regulator Module. See "Removing and Replacing the I/O Voltage Regulator Module" (page 212) for this procedure.
   c. Move the Core I/O Board. See "Removing and Replacing the Core I/O Board" (page 216) for this procedure.
   d. Move the LAN Core I/O Card. See "Removing and Replacing the LAN Core I/O Card" (page 220) for this procedure.
   e. Move the SAS Core I/O Card.

      TIP: If you are not migrating PCI-X SAS core I/O, skip this procedure.

      See "Removing and Replacing the SAS Core I/O Card" (page 219) for this procedure.
   f. Move PCI/PCI-X Cards. See "Replacing the I/O Board Assembly" (page 208) for this procedure.

8. Installing New SAS Core I/O

TIP: If you are not installing *new* SAS core I/O, skip this procedure.

Section (page 247) contains installation procedures for new SAS core I/O cards. There are four types of SAS core I/O cards supported on the server:

- Half length generic PCI-X SAS card supported on HP-UX and Open VMS, see "Installing the HP Eight-Internal Port SAS Host Bus Adapter" (page 248) for installation instructions.
- Full length PCI-X SAS card with RAID capability, supported on Windows and Linux, see"Installing the HP Smart Array P600" (page 249) for installation instructions.
- Full length PCIe SAS card with RAID capability, supported on HP-UX, OpenVMS, Windows and Linux, see"Installing the HP Smart Array P400" (page 250) for installation instructions.
- Full length PCIe SAS card with RAID capability, able to connect to external storage, supported on Windows and Linux, see "Installing the HP Smart Array P800" (page 254) for installation instructions.

9. Installing the New I/O Backplane

IMPORTANT: System information is stored on the I/O board assembly. You must write the serial number and model string information to the new I/O board after installation.

See "Removing the I/O Board Assembly" (page 206) for this procedure.

10. Power up to EFI. See "Powering On and Powering Off the Server" (page 81) for this procedure.
    a. Verification from EFI
       1. Respond **YES** to prompts regarding copying information onto the new board.
       2. Verify the serial number and model string data information copied onto the new I/O board.
          a. Boot to EFI.
          b. Enter **service** mode using the following command:

```
Shell> sysmode service
Current System Mode: ADMIN
You are now in SERVICE mode.
```

          c. Use the `sysset` command to verify that all values are set:

```
Shell> sysset

System Information:
Manufacturer: hp
Product Name: server rx3600
Product Number: AB463A
Secondary Product Number is Identical
Serial number: SGH43442VB
Secondary Serial Number is Identical
UUID: 3C33C58E-2E5A-11D8-A33B-4188C0AEFAE2 (Valid)
Secondary UUID is Identical
Product ID: 0x301
```

    b. Enable the TPM.
       1. Access the EFI Shell.
       2. Enter **`info sec`** to display the server security settings on the screen. The TPM is disabled by default.
       3. Enter **`secconfig`** to display a list of configurable security settings.
       4. Enter **`secconfig tpm on`** to enable the TPM.
    c. Verify the system board replacement and operation using either the iLO 2 MP or EFI commands.

11. Viewing Warnings

    To view warning access the EFI shell and run the `info warning` command.

12. Verifying I/O cards

    To verify the I/O cards access the EFI shell and run the `info io` command.

```
Shell> info io

I/O INFORMATION


BOOTABLE DEVICES

   Order  Media Type  Path
   -----  ----------  ----------------------------------------
     1    CDROM       Acpi(HWP0002,PNP0A03,0)/Pci(2|1)/Usb(0, 0)/CDROM(Entry0)/HD(Part1,Sig00000000)
     2    HARDDRIVE
Acpi(HWP0002,PNP0A03,400)/Pci(2|0)/Sas(Addr5000C5000034749D,Lun0)/HD(Part1,Sig4EE76936-BE45-47FA-9AC7-B0ECF2D912F2)

     3    HARDDRIVE
Acpi(HWP0002,PNP0A03,400)/Pci(2|0)/Sas(Addr5000C50000347735,Lun0)/HD(Part1,Sig92C8CB4C-E0F2-11DA-8002-D6217B60E588)

     4    HARDDRIVE
Acpi(HWP0002,PNP0A03,400)/Pci(2|0)/Sas(Addr5000C50000347735,Lun0)/HD(Part3,Sig92C8CB7E-E0F2-11DA-8004-D6217B60E588)



   Seg  Bus  Dev  Fnc  Vendor  Device Slot
    #    #    #    #     ID      ID     #   Path
   ---  ---  ---  ---  ------  ------  ---  -----------
    00   00   01   00  0x103C  0x1303   XX  Acpi(HWP0002,PNP0A03,0)/Pci(1|0)
    00   00   01   01  0x103C  0x1302   XX  Acpi(HWP0002,PNP0A03,0)/Pci(1|1)
    00   00   01   02  0x103C  0x1048   XX  Acpi(HWP0002,PNP0A03,0)/Pci(1|2)
```

```
00   00   02   00  0x1033  0x0035   XX  Acpi(HWP0002,PNP0A03,0)/Pci(2|0)
00   00   02   01  0x1033  0x0035   XX  Acpi(HWP0002,PNP0A03,0)/Pci(2|1)
00   00   02   02  0x1033  0x00E0   XX  Acpi(HWP0002,PNP0A03,0)/Pci(2|2)
00   14   01   00  0x1000  0x0054   01  Acpi(HWP0002,PNP0A03,400)/Pci(1|0)
00   14   02   00  0x1000  0x0054   02  Acpi(HWP0002,PNP0A03,400)/Pci(2|0)
00   15   01   00  0x1000  0x000F   07  Acpi(HWP0002,PNP0A03,500)/Pci(1|0)
00   15   01   01  0x1000  0x000F   07  Acpi(HWP0002,PNP0A03,500)/Pci(1|1)
00   15   02   00  0x8086  0x1079   08  Acpi(HWP0002,PNP0A03,500)/Pci(2|0)
00   15   02   01  0x8086  0x1079   08  Acpi(HWP0002,PNP0A03,500)/Pci(2|1)


   Fast initialization: Enabled
   System Wake-On-LAN:  Enabled

Shell>
```

Devices, such as USB ports, that do not occupy a slot are referenced as being in slot XX. Slots that do not contain an I/O card will not be listed in the output. Using the output, confirm that a device detected in each slot that is populated.

13. Installing the OS

    HP-UX, Windows, and Linux require reinstallation of the OS with the upgrade of the IOBP. See Figure 88 (page 241) for more information.

14. Booting to the Operating System

    See Chapter 4 (page 108) for this procedure.

Installing Core I/O Cards

WARNING! To reduce the risk of personal injury from hot surfaces, allow the internal system components to cool before touching them.

CAUTION: To reduce the risk of personal injury or damage to the equipment, consult the safety information and user documentation provided with the server before attempting the installation. Many servers are capable of producing energy levels that are considered hazardous and are intended to be serviced only by qualified personnel who have been trained to deal with these hazards. Do not remove enclosures or attempt to bypass any interlocks that may be provided for the purpose of removing these hazardous conditions.

CAUTION: Electrostatic discharge (ESD) can damage electronic components. Be sure that you are properly grounded before beginning this procedure.

CAUTION: When working with equipment installed in a rack, be sure that the equipment and rack are stable before beginning the installation procedure.

Slots 1 and 2 are dedicated for the PCI-X core I/O cards. The LAN core I/O card is installed either in slot 2 or slot 10 depending on the configuration. PCIe SAS core I/O cards are installed in slots 3 or 4 on the PCIe I/O backplane.

Cabling

The cables that are required to connect the adapters and controllers to other devices are provided with most HP server products that need them. Table 83 lists some cables that can be used with these adapters and controllers. All HP cables are keyed so that they cannot be installed incorrectly.

Table 83 Cable kit part numbers

Type of Cable	Description	Part Number
Internal SAS/SATA	Multi-lane A cable	389647-B21
Internal SAS/SATA	Host fan cable	389650-B21
Internal SAS/SATA	Target fan cable	389653-B21
Internal SAS/SATA	Multi-lane B cable	389659-B21

Table 83 Cable kit part numbers *(continued)*

Type of Cable	Description	Part Number
Internal SAS/SATA	Multi-lane 76-cm (30-in) cable	389662-B21
Internal SAS/SATA	Multi-lane 48-cm (19-in) cable	391330-B21

Additional cables can be ordered from an authorized HP reseller or authorized HP service provider. If the cable that you need is not listed here, or if you need additional ordering information, see the HP website at http://www.hp.com.

This chapter contains the following topics:

- "Installing the HP Eight-Internal Port SAS Host Bus Adapter" (page 248)
- "Installing the HP Smart Array P600" (page 249)
- "Installing the HP Smart Array P400" (page 250)
- "Installing the HP Smart Array P800" (page 254)

Installing the HP Eight-Internal Port SAS Host Bus Adapter

On HP Integrity rx3600 and rx6600 servers, the HP Eight-Internal Port SAS Host Bus Adapter is supported by HP-UX and OpenVMS operating systems. It should be installed in slot 1 if one card is to be installed, and slot 2 if slot 1 is already occupied.

The installation procedure involves the following steps:

- Preparing the server
- Installing the adapter hardware.
- Connecting the Adapter to Other Devices
- Completing the adapter installation procedure, including updating the firmware and installing drivers.

For more information, including configuring and troubleshooting, refer to the *HP 8 Internal Port SAS Host Bus Adapter (SAS Controller) Users Guide* which can be found in the *I/O Cards and Networking Software* collection under *SAS Host Bus Adapters* at:

http://www.hp.com/go/integrity-iocards-docs

Procedure 1 Preparing the Server

To prepare the server for add or replacement, use the following steps:

1. Perform a normal system shutdown.
2. Power down the server.
3. Power down all peripheral devices attached to the server.
4. Unplug the AC power cord from the outlet, and then unplug it from the server
5. Disconnect all peripheral devices attached to the server.

Procedure 2 Installing the Adapter Hardware

1. Remove or open the server access panel and locate the PCI/PCI-X bus expansion slots. (For detailed instructions, see the documentation that was provided with the server.)
2. Select the appropriate core I/O slot.
3. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead filler is fully exposed.
4. Remove the PCI/PCI-X/PCIe bulkhead filler. Save it to use for if you later decide to remove the adapter and leave the slot empty.
5. Insert the adapter into the slot, and press it firmly into place. The contacts on the adapter edge should be fully seated in the system board connector.

6. Close the MRL.
   a. Rotate the MRL downward 90 degrees.
   b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.

Procedure 3 Connecting the Adapter to Other Devices

- Connect the Adapter to SAS backplane. See Table 83 (page 247) for a listing of Cable kit part numbers.

Procedure 4 Completing the Adapter Installation

1. Verify that all cables are routed correctly and are not restricting or being pinched by other components. For the correct routing of the cables, see the server documentation.
2. Reconnect any peripheral devices to the server.
3. Plug the AC power cord into the server, and then into a grounded AC outlet.
4. Power on any peripheral devices attached to the server
5. Power up the server.
6. If necessary, update the server ROM. The required firmware files are on either a CD in the adapter kit or the HP website, http://www.hp.com. Instructions are provided with the files (in the case of the CD, in a booklet provided with the CD).
7. Install the adapter drivers. The drivers are also on either the CD in the adapter kit or the HP website, and instructions are again provided with the files.

Installing the HP Smart Array P600

On HP Integrity rx3600 and rx6600 servers, the HP Smart Array P600 is supported by Windows and Linux operating systems. It should be installed in slot 1 if one card is to be installed, and slot 2 if slot 1 is already occupied.

For more information, including configuring and diagnosing array problems, refer to the *HP Smart Array P600 Controller for Integrity Servers User Guide* which can be found in the *I/O Cards and Networking Software* collection under *Smart Array* at:

http://www.hp.com/go/integrity-iocards-docs

The installation procedure involves the following steps:

- Preparing the server
- Installing the controller board.
- Connecting the Controller to Other Devices
- Completing the adapter installation procedure, including updating the firmware and installing drivers.

Procedure 5 Preparing the Server

1. Close all applications.
2. Power down the server.
3. Power down all peripheral devices that are attached to the server.
4. Unplug the AC power cord from the outlet and then from the server.
5. Disconnect all peripheral devices from the server.

Procedure 6 Installing the Controller Board

1. Remove or open the access panel.
2. Select the appropriate core I/O slot.
3. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead filler is fully exposed.
4. Remove the PCI/PCI-X/PCIe bulkhead filler. Save it to use for if you later decide to remove the adapter and leave the slot empty.

5. Insert the adapter into the slot, and press it firmly into place. The contacts on the adapter edge should be fully seated in the system board connector.
6. Close the MRL.
   a. Rotate the MRL downward 90 degrees.
   b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.
7. Close the gate latch to secure the end of the card.

Procedure 7 Connecting the Controller to Other Devices

- Connect the Adapter to the SAS backplane. See Table 83 (page 247) for a listing of Cable kit part numbers.

Procedure 8 Completing the Adapter Installation

To update the firmware on the server, controller, or hard drives, use Smart Components. The most recent version of a particular component is available on the support page of the HP website http://www.hp.com/support. Some components are also available on the Smart Setup media.

1. Find the most recent version of the component that you require.
2. Follow the instructions for installing the component on the server. These instructions are provided on the same web page as the component.
3. Follow the additional instructions that describe how to use the component to flash the ROM. These instructions are provided with each component.

Installing the HP Smart Array P400

On HP Integrity rx3600 and rx6600 servers, the HP Smart Array P400 is supported by HP-UX, OpenVMS, Windows and Linux operating systems. It should be installed in PCIe slot 3 or 4.

For more information, including configuring and diagnosing array problems, refer to the *HP Smart Array P400 Controller Support Guide* which can be found in the *I/O Cards and Networking Software* collection under *Smart Array* at:

http://www.hp.com/go/integrity-iocards-docs

The installation procedure involves the following steps:

- Preparing the server
- Installing the controller board.
- Connecting the Controller to Other Devices
- Completing the adapter installation procedure, including updating the firmware and installing drivers.

Procedure 9 Preparing the Server

1. Close all applications.
2. Power down the server.
3. Power down all peripheral devices that are attached to the server.
4. Unplug the AC power cord from the outlet and then from the server.
5. Disconnect all peripheral devices from the server.

Procedure 10 Installing the Controller Board

1. Remove or open the access panel
2. Select the appropriate PCI Express slot (3 or 4).
3. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead filler is fully exposed.
4. Remove the PCI/PCI-X/PCIe bulkhead filler. Save it to use for if you later decide to remove the adapter and leave the slot empty.

5. Insert the adapter into the slot, and press it firmly into place. The contacts on the adapter edge should be fully seated in the system board connector.
6. Close the MRL.
   a. Rotate the MRL downward 90 degrees.
   b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.
7. Close the gate latch to secure the end of the card.

Procedure 11 Connecting the Controller to Other Devices

- Connect the Adapter to the SAS backplane. See Table 83 (page 247) for a listing of Cable kit part numbers.

Completing the Adapter Installation on HP-UX

Procedure 12 Downloading Software for the Smart Array Series Controllers

The drivers, utilities and manpages for the Smart Array series controllers are located at the HP Software Depot.

1. Go to http://www.software.hp.com
2. Search for "Smart Array"
3. Click **Receive for Free**.
4. Select the HP-UX version that your system runs, then complete the required registration information and click Next.
5. Click the depot that corresponds with the OS you are running to download the drivers, utilities, and manpages for the Smart Array Controllers.
6. In the **Documents** column next to the **Download Software** column, click **Installation Instructions** to download instructions for using the Software Distributor tool to install the drivers, utilities, and manpages.

Installing Software for Smart Array Series Controllers

The drivers, utilities, and manpages for the Smart Array Series Controllers contained in the RAID-01 bundle downloaded depot can be installed using Software Distributor (SD). SD is a tool for installing software on HP-UX host systems. SD can also be used to remove software from HP-UX systems. The RAID-01 bundle is composed of several files that will be copied to the appropriate directories on the host system. View these files in the /opt/raidsa/bin directory. The instructions for using SD to install or remove the drivers, utilities, and manpages for the Smart Array series controllers can be viewed at the HP Software Depot.

Procedure 13 Verifying the Installation

After the system reboots, verify that the installation was successful by following these steps:

1. Enter the `swlist` command:

   `swlist`

   When running HP-UX 11i v2 the generated output will look like this:

   ```
   RAID-01 B.11.23.0612 RAID SA; Supptd HW=A7143A/A9890A/A9891A
   ```

2. Enter the `ioscan -kfnd ciss` command:

   `ioscan -kfnd ciss`

   If the Smart Array Controller software is installed correctly, the generated output looks similar to this:

   ```
   # ioscan -kfnd ciss
   Class I H/W Path Driver S/W State H/W Type Description
   ============================================================================
   ext_bus 5 0/6/0/0/0/0/1/0/0/0 ciss CLAIMED INTERFACE PCIe SAS SmartArray P400 RAID
   Controller
   /dev/ciss5
   ```

   If the software is not installed correctly, reinstall it using `swinstall`.

Procedure 14 Updating the Firmware

Use the `sautil` command to confirm and update the firmware version currently installed on the Smart Array Controller. HP recommends that you install the latest firmware. You must log in as a superuser user to run the `sautil` command. Before running the `sautil` command to confirm or update the controller firmware, you must know the device file name for the Smart Array Controller.

1. Determine the device file for the Smart Array Controller by running the `ioscan -kfnd ciss` command. The following is an example of the ioscan output listing the Smart Array Controller device files:

```
# ioscan -kfnd ciss
Class I H/W Path Driver S/W State H/W Type Description
=============================================================================
ext_bus 5 0/6/0/0/0/0/1/0/0/0 ciss CLAIMED INTERFACE PCIe SAS SmartArray P400 RAID
Controller
/dev/ciss5
```

   In the example, `/dev/ciss5` is the device file for Smart Array P400 Controller.

2. Determine the Smart Array series controller firmware version that is in the ROM on the Smart Array Controller by using either the `sautil <device_file>` command (extensive output), or the `sautil <device_file> -s` command (shortened output). Entering the `sautil <device_file -s>` command provides an abbreviated listing of information for the Smart Array Controller and all connected devices, including the firmware version currently in ROM.

```
# sautil /dev/ciss5 -s
*****************************************************************************
**** ****
**** S A U T I L S u p p o r t U t i l i t y ****
**** ****
**** for the HP SmartArray RAID Controller Family ****
**** ****
**** version A.02.11 ****
**** ****
**** (C) Copyright 2003-2006 Hewlett-Packard Development Company, L.P. ****
*****************************************************************************
---- DRIVER INFORMATION ------------------------------------------------------
Driver State..................... READY
---- CONTROLLER INFORMATION --------------------------------------------------
Controller Product Number.......... P400
Controller Product Name............ HP PCIe SmartArray P400
Hardware Path...................... 0/6/0/0/0/0/1/0/0/0
Serial Number...................... PA5360BBFSW2ON
Device File........................ /dev/ciss5
Hardware Revision.................. 'B'
Firmware Revision (in ROM)......... 1.96
# of Logical Drives................ 2
# of Physical Disks Configured..... 4
# of Physical Disks Detected........ 4
o
o (content has been omitted)
o
*****************************************************************************
**** End of SAUTIL Output ****
*****************************************************************************
```

   In this example, the Smart Array Controller `/dev/ciss5` has ROM firmware revision 1.96.

3. Update the Smart Array controller firmware by using the `sautil` command. The `sautil` command syntax for updating Smart Array Controller firmware is:

   `sautil <device_file> download_ctlr_fw <fw_image>`

   where:

   <device_file> The controller device file.

   <fw_image> The file path for the firmware version you want to install on the Smart Array Controller.

   When you enter the `sautil <device_file> download_ctlr_fw <fw_image>` command, the currently installed firmware version is listed along with the firmware version you selected to replace it with. You can either proceed with the download or cancel.

```
# sautil /dev/ciss5 download_ctlr_fw INCPTR_2.02.2.42.PAK
*****************************************************************************
**** ****
**** S A U T I L S u p p o r t U t i l i t y ****
**** ****
**** for the HP SmartArray RAID Controller Family ****
**** ****
**** version A.02.11 ****
**** ****
**** (C) Copyright 2003-2006 Hewlett-Packard Development Company, L.P. ****
*****************************************************************************
---- DRIVER INFORMATION ------------------------------------------------------
Driver State..................... READY
---- CONTROLLER INFORMATION --------------------------------------------------
Controller Product Number........... P400
Controller Product Name............. HP PCIe SmartArray P400
Hardware Path....................... 0/6/0/0/0/0/1/0/0/0
Device File......................... /dev/ciss5
---- FIRMWARE DOWNLOAD -------------------------------------------------------
** You are downloading the firmware image "INCPTR_2.02.2.42.PAK"
** to the controller "/dev/ciss5".
Retrieving firmware image file from disk.................. [Done]
Validating the file's signature and size.................. [Done]
Retrieving the firmware revision string from ROM.......... [Done]
Retrieving the firmware revision string from the file..... [Done]
Current Revision (in ROM)....... 1.96
New Revision (in file).......... 2.02
WARNING: The firmware download process may take several minutes to
complete. All I/O to this controller will be temporarily
halted during this time.
Are you sure you want to continue (y/n)? y
Preparing for download.................................... [Done]
Sending the new firmware to the controller................ [Done]
Activating the new firmware............................... [Done]
Resetting the controller.................................. [Done]
Retrieving the firmware revision string from ROM.......... [Done]
Current Revision (in ROM)....... 2.02
FIRMWARE DOWNLOAD WAS SUCCESSFUL!
*****************************************************************************
**** End of SAUTIL Output ****
*****************************************************************************
```

Completing the Adapter Installation on Windows and Linux

To update the firmware on the server, controller, or hard drives, use Smart Components. These components are available on the *Firmware Maintenance CD*. A more recent version of a particular server or controller component might be available on the support page of the HP website (http://www.hp.com/support).

1. Find the most recent version of the component that you require. Components for controller firmware updates are available in offline and online formats
2. Follow the instructions for installing the component on the server. These instructions are given with the CD and are provided on the same web page as the component.
3. Follow the additional instructions that describe how to use the component to flash the ROM. These instructions are provided with each component.

Installing the HP Smart Array P800

On HP Integrity rx3600 and rx6600 servers, the HP Smart Array P800 is supported by HP-UX 11i v2 and v3, Open VMS 8.3-1H1, Windows and Linux operating systems. It should be installed in PCIe slot 3 or 4.

For more information, including configuring and diagnosing array problems, refer to the *HP Smart Array P800 Controller for Integrity Servers User Guide* which can be found in the *I/O Cards and Networking Software* collection under *Smart Array* at:

http://www.hp.com/go/integrity-iocards-docs

The installation procedure involves the following steps:

- Preparing the server
- Installing the controller board.
- Connecting the Controller to Other Devices
- Completing the adapter installation procedure, including updating the firmware and installing drivers.

Windows Installation

Procedure 15 Windows Quick Installation Procedure

1. Power down the server.
2. Unplug the AC power cord from the power outlet.
3. Unplug the power cord from the server.
4. Install the controller hardware
5. If necessary, install additional physical drives. The number of drives in the server determines the RAID level that is autoconfigured when the server is powered up (next step)
6. Power up the server.
7. Update the controller firmware.

   When the firmware update process is complete, the server reboots and runs through a POST procedure. This POST procedure halts briefly during controller initialization and prompts you to open ORCA.
8. Open ORCA
   - If using a headless console, press the **Esc+8** key combination.
   - Otherwise, press the **F8** key.
9. Configure the logical boot drive, and then exit from ORCA.
10. Load the controller driver from EBSU on the Smart Setup media. (To load the driver, select Load OEM Boot Drivers in EBSU. For more information about Smart Setup, refer to the HP Smart Setup Guide on the Smart Setup media.)
11. Run Express Setup.
12. When you have finished installing the operating system as directed during the Express Setup procedure, remove the operating system CD, and then insert the Smart Setup media.
13. Install the Integrity Support Pack.

Procedure 16 Preparing the server

1. Back up all data.
2. Close all applications.
3. Power down the server.

△ **CAUTION:** In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

4. Power down all peripheral devices that are attached to the server.
5. Unplug the AC power cord from the outlet and then from the server.

6. Disconnect all peripheral devices from the server.

Procedure 17 Installing the controller board

1. Remove or open the access panel.
2. Select the appropriate PCI Express slot (3 or 4).
3. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead filler is fully exposed.
4. Remove the PCI/PCI-X/PCIe bulkhead filler. Save it to use for if you later decide to remove the adapter and leave the slot empty.
5. Insert the adapter into the slot, and press it firmly into place. The contacts on the adapter edge should be fully seated in the system board connector.
6. Close the MRL.
   a. Rotate the MRL downward 90 degrees.
   b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.
7. Close the gate latch to secure the end of the card.

Connecting the Controller to Other Devices

Procedure 18 Connecting to Internal Storage

- Connect the Adapter to the SAS backplane. See Table 83 (page 247) for a listing of Cable kit part numbers.

Procedure 19 Connecting to External Storage

1. Connect an external SAS cable to the external port of the controller.
   a. Pull back the tab on the mini SAS 4x connector on the cable
   b. Insert the cable connector into the external port of the controller.
   c. Release the tab.
2. Connect the other end of the cable to the SAS input connector of the external storage enclosure.
   - If the enclosure uses a standard SAS 4x connector, insert the cable connector into the enclosure connector, and then tighten the lock screws on the cable connector.
   - If the enclosure uses a mini SAS 4x connector, pull back the tab on the cable connector, insert the cable connector into the enclosure connector, and then release the tab.

Table 84 SAS cable part numbers

Approximate cable length	Type of cable	Option kit part number
1 m (3 ft.)	Mini SAS 4x to standard SAS 4x	419570-B21
2 m (6 ft.)	Mini SAS 4x to mini SAS 4x	407339-B21
	Mini SAS 4x to standard SAS 4x	419571-B21
4 m (13 ft.)	Mini SAS 4x to mini SAS 4x	432238-B21
	Mini SAS 4x to standard SAS 4x	419572-B21
6 m (20 ft.)	Mini SAS 4x to mini SAS 4x	432239-B21
	Mini SAS 4x to standard SAS 4x	419537-B21

Completing the Adapter Installation

Procedure 20 Updating the Firmware

To update the firmware on the server, controller, or hard drives, use Smart Components. These components are available on the *Firmware Maintenance CD*. A more recent version of a particular

server or controller component might be available on the support page of the HP website (http://www.hp.com/support).

1. Find the most recent version of the component that you require. Components for controller firmware updates are available in offline and online formats
2. Follow the instructions for installing the component on the server. These instructions are given with the CD and are provided on the same web page as the component.
3. Follow the additional instructions that describe how to use the component to flash the ROM. These instructions are provided with each component.

Installing device drivers and Management Agents

You can use the Integrity Support Pack to automatically install the device drivers, Event Notification Service, and Management Agents, or you can install these items manually.

The Integrity Support Pack is located on the Smart Setup media. To install the Integrity Support Pack, launch Express Setup from EBSU and follow the on-screen instructions.

Installing device drivers

The drivers for the controller are located on the Smart Setup media. Updates are posted to the support page of the HP website (http://www.hp.com/support/itaniumservers). Installation instructions are provided with the drivers.

Installing the Event Notification Service

The HP Smart Array SAS/SATA Event Notification Service provides event notification to the Microsoft® Windows® Server 2003 64-bit system event log and the HP Integrated Management log. The most recent version of the software component is available on the support page of the HP website (http://www.hp.com/support/itaniumservers). Installation instructions are provided with the component.

Installing Management Agents

The Management Agents are available on the Smart Setup media. The most recent versions of the agents are available on the support page of the HP website (http://www.hp.com/support/itaniumservers). Installation instructions are provided with the agents. If the new agents do not function correctly, you might also need to update Systems Insight Manager. The latest version of Systems Insight Manager is available for download at the HP website (http://www.hp.com/servers/manage).

Linux Installation

Procedure 21 Linux Quick Installation Procedure

To install the controller:

1. Power down the server.
2. Unplug the AC power cord from the power outlet.
3. Unplug the power cord from the server.
4. Install the controller hardware ("Installing the controller hardware" on page 9)
5. If necessary, install additional physical drives. The number of drives in the server determines the RAID level that is autoconfigured when the server is powered up (next step)
6. Power up the server.
7. Update the controller firmware.

   When the firmware update process is complete, the server reboots and runs through a POST procedure. This POST procedure halts briefly during controller initialization and prompts you to open ORCA.
8. Open ORCA.
   - If using a headless console, press the **Esc+8** key combination.
   - Otherwise, press the **F8** key.
9. Configure the logical boot drive, and then exit from ORCA.

Procedure 22 Preparing the server

1. Back up all data.
2. Close all applications.
3. Power down the server.

△ **CAUTION:** In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

4. Power down all peripheral devices that are attached to the server.
5. Unplug the AC power cord from the outlet and then from the server.
6. Disconnect all peripheral devices from the server.

Procedure 23 Installing the controller board

1. Remove or open the access panel.
2. Select the appropriate PCI Express slot (3 or 4).
3. Open the MRL.
   a. Press the indentation on the MRL to release it from the chassis wall.
   b. Lift the edge of the MRL, and rotate it upward 90 degrees until it rests against the chassis wall and the PCI/PCI-X/PCIe card bulkhead filler is fully exposed.
4. Remove the PCI/PCI-X/PCIe bulkhead filler. Save it to use for if you later decide to remove the adapter and leave the slot empty.
5. Insert the adapter into the slot, and press it firmly into place. The contacts on the adapter edge should be fully seated in the system board connector.
6. Close the MRL.
   a. Rotate the MRL downward 90 degrees.
   b. Push the edge of the MRL down until it clicks into place on the PCI/PCI-X/PCIe card bulkhead.
7. Close the gate latch to secure the end of the card.

Connecting the Controller to Other Devices

Procedure 24 Connecting to Internal Storage

- Connect the Adapter to the SAS backplane. See Table 83 (page 247) for a listing of Cable kit part numbers.

Procedure 25 Connecting to External Storage

1. Connect an external SAS cable to the external port of the controller.
   a. Pull back the tab on the mini SAS 4x connector on the cable
   b. Insert the cable connector into the external port of the controller.
   c. Release the tab.
2. Connect the other end of the cable to the SAS input connector of the external storage enclosure.
   - If the enclosure uses a standard SAS 4x connector, insert the cable connector into the enclosure connector, and then tighten the lock screws on the cable connector.
   - If the enclosure uses a mini SAS 4x connector, pull back the tab on the cable connector, insert the cable connector into the enclosure connector, and then release the tab.

Table 85 SAS cable part numbers

Approximate cable length	Type of cable	Option kit part number
1 m (3 ft.)	Mini SAS 4x to standard SAS 4x	419570-B21
2 m (6 ft.)	Mini SAS 4x to mini SAS 4x	407339-B21
	Mini SAS 4x to standard SAS 4x	419571-B21

Table 85 SAS cable part numbers *(continued)*

Approximate cable length	Type of cable	Option kit part number
4 m (13 ft.)	Mini SAS 4x to mini SAS 4x	432238-B21
	Mini SAS 4x to standard SAS 4x	419572-B21
6 m (20 ft.)	Mini SAS 4x to mini SAS 4x	432239-B21
	Mini SAS 4x to standard SAS 4x	419537-B21

Completing the Adapter Installation

Procedure 26 Updating the Firmware

To update the firmware on the server, controller, or hard drives, use Smart Components. These components are available on the *Firmware Maintenance CD*. A more recent version of a particular server or controller component might be available on the support page of the HP website (http://www.hp.com/support).

1. Find the most recent version of the component that you require. Components for controller firmware updates are available in offline and online formats
2. Follow the instructions for installing the component on the server. These instructions are given with the CD and are provided on the same web page as the component.
3. Follow the additional instructions that describe how to use the component to flash the ROM. These instructions are provided with each component.

Installing device drivers and Management Agents

The drivers for the controller are bundled into the supported Red Hat and Novell Linux distributions.

In a system that does not yet have Linux installed:

1. Follow the standard controller installation procedure.
2. Reboot the server.
3. Follow the standard procedure for installing Linux. As Linux is installed, it recognizes the controller and automatically loads the correct driver.
4.

In a system that already has Linux installed:

1. Power down the system.
2. Follow the standard controller installation procedure.
3. Power up the system. As Linux boots, it recognizes the controller.
4. Enter one of the following commands as appropriate to ensure that the driver is loaded correctly:

   Red Hat
   ```
   #mkinitrd -f /boot/efi/efi/redhat/initrd-$(uname -r).img $(uname -r)
   ```

   Novell (SLES)
   ```
   #mkinitrd -k /boot/vmlinux -i/boot/initrd
   ```

5. For Novell, enter the following command to confirm that the driver is active:

   ```
   #lsmod | grep cciss
   ```

   If the driver is active, the system responds by displaying `cciss`.

Installing Management Agents

The most recent versions of the agents are available on the support page of the HP website (http://www.hp.com/support/itaniumservers). For installation instructions, refer to the downloadable file HP Insight Management Agents for Linux on Integrity Servers provided with the agents. If the new agents do not function correctly, you might also need to update Systems Insight Manager. The latest version of Systems Insight Manager is available for download at the HP website (http://www.hp.com/servers/manage).

Processor Upgrades

The HP Integrity rx2660, rx3600, rx6600 servers, and BL860c server blade support upgrades from Dual-Core Intel® Itanium® 2 processors 9000 series to Intel Itanium Dual-Core Intel® Itanium® 2 processors 9150M.

△ **CAUTION:** Dual-Core Intel® Itanium® 2 processors 9150M cannot be intermixed with similar Dual-Core Intel® Itanium® 2 processors 9000 series. Processor speed and cache size must be identical for all processors in a system. To ensure compatibility whether upgrading, replacing, or adding an additional processor, use processors with identical part numbers.

Failure to observe this caution results in performance degradation or system failure.

To ensure compatibility, use processors with identical part numbers.

Table 86 lists the processor upgrades that are supported, and required system firmware levels for each server.

Table 86 Processor Upgrades

Manufacturing Part Number	Processor	System Firmware Level
HP Integrity rx2660 server		
AD392-2100B AD392AX	1.6 GHz / 12 MB / Single Core	greater than 01.05
AD390-2100B AD390AX	1.42 GHz / 12 MB / Dual Core	
AD391-2100B AD391AX	1.67 GHz / 18 MB / Dual Core	
HP Integrity rx3600 server		
AD390-2100C AD390AX	1.42 GHz / 12 MB	greater than 02.03
AD391-2100C AD391AX	1.67 GHz / 18 MB	
HP Integrity rx6600 server		
AD388-2100C	1.6 GHz / 24 MB	greater than 02.03
AD389-2100C	1.6 GHz / 18 MB	
AD390-2100C AD390AX	1.42 GHz / 12 MB	
HP Integrity BL860c server blade		
AD394-2101C	1.42 GHz / 12 MB	greater than 01.01
AD395-2102C	1.6 GHz / 6 MB	
AD396-2101C	1.67 GHz / 18 MB	

Upgrading Versus Adding On

If your HP Integrity server already contains one, or more, of the processors listed in Table 86, then follow the processor removal and replacement procedures (see "Removing and Replacing a Dual-Core Processor" (page 199)) to add another processor. Updating the system firmware and OS is unnecessary when adding another processor.

If your HP Integrity server does not currently contain one, or more, of the processors listed in Table 86, then a server upgrade is being performed, and system firmware and OS updates may be necessary. After any necessary system firmware and OS updates are performed, follow the processor removal and replacement procedures (see "Removing and Replacing a Dual-Core Processor" (page 199)).

Firmware

Before upgrading the processor, ensure the server is at the required system firmware level. Check the system firmware version by executing the `info fw` command at the EFI Shell prompt.

NOTE: HP recommends using the latest version of firmware.

Go to http://www.hp.com/support/itaniumservers to download firmware updates.

Operating systems

IMPORTANT: Check the HP Support Center (HPSC) website at http://www.hp.com/go/hpsc for any required OS patches.

HP-UX

HP-UX supports the processor upgrade at the following minimum release levels:

- HP-UX 11.23 0706
- HP-UX 11.31 0709

OpenVMS

OpenVMS must be upgraded to OpenVMS V8.3-1H1 to support the processor upgrade.

Windows

Windows® supports the processor upgrade.

Linux

Linux supports the processor upgrade. If you choose to move any I/O cards or storage during this upgrade, Linux must be reinstalled.

C Core I/O Card Utilities

This appendix provides information on core I/O cards that need additional configuration.

This appendix addresses the following topics:

- "Integrated RAID" (page 83)
- "HP 8 Internal Port SAS HBA (SAS Controller)" (page 83)
- "MPTUTIL Utility" (page 83)
- "DRVCFG Utility" (page 85)
- "CFGGEN Utility" (page 93)
- "Smart Array P400, P600 and P800 Controllers" (page 95)
- "SAUPDATE Utility" (page 97)
- "EBSU Utility" (page 99)
- "ORCA Utility" (page 102)
- "ACU Utility" (page 103)

Integrated RAID

Use Integrated RAID (IR) where either storage capacity, redundancy, or both of a RAID configuration are required. Two components of IR are:

- Integrated Mirror (IM)
- Global Hot Spare

Integrated Mirror

The advantage of an IM is there is always a mirrored copy of the data. An IM provides data protection for the system boot volume to safeguard critical information such as the operating system on servers and high performance workstations. An IM supports two simultaneous mirrored volumes, making an array, providing fault-tolerant protection for critical data. Typically, one of these volumes is the boot volume. If a disk in an IM fails, the hot swap capability enables the volume to be easily restored by replacing the failed disk. The firmware then automatically re-mirrors to the replaced disk.

Global Hot Spare

Each SAS controller can have one global hot spare disk available to automatically replace a failed disk in the one or two IM volumes configured on the controller. The hot spare makes the IM array more fault tolerant. Up to two IM volumes are supported per SAS controller plus the hot spare.

HP 8 Internal Port SAS HBA (SAS Controller)

The following information is provided to assist you in configuring the 8 Internal Port SAS HBA controller during installation. For additional information refer to the *HP 8 Internal Port SAS Host Bus Adapter (SAS Controller) Users Guide* in the *I/O Cards and Networking Software* collection under *SAS Host Bus Adapters* at http://www.hp.com/go/integrity-iocards-docs.

MPTUTIL Utility

The `MPTUTIL` utility enables you to update the adapter flash memory with the EFI driver and HBA firmware. New versions of these images are released periodically.

IMPORTANT: Do not store the files in this package on a SAS device. If you store these files on a SAS device and the update fails, these files will not be accessible.

To update firmware, follow these steps:

1. Insert the *HP IPF Offline Diagnostics and Utilities CD* in the drive and boot to the EFI Shell.

   NOTE: You can also download the firmware image file and update utility from the HP website at: http://www.hp.com in the *Driver Downloads* section.

   IMPORTANT: When you boot the EFI enabled systems, the CD containing the utility must be in the drive to allow device mapping. The EFI utility and firmware image files are located in the root directory or in a subdirectory on the CD.

2. The CD drive displays in the list of mapped devices as **fs0**. To change to this device, enter **`fs0:`**

   ```
   shell> fs0:
   fs0:\>
   ```

3. To determine the current version of the firmware, follow these steps.
   a. At the EFI Shell, enter **`mptutil`** from the directory that contains `mptutil.efi`. The following example indicates that the EFI Serial Attached SCSI card utility version is 1.01.12.00:

   ```
   fs0:\EFI\HP\TOOLS\NETWORK> mptutil
   MPTUTIL-1.01.12.00
            Vendor  Device Choice
       ID      ID    Bus Device
    ------  ------  ------  --- ------
       0     1000h   0054h  14h  01h  LSI Logic SAS1068 Host Adapter
       1   -  Refresh
   ```

   b. Press **Enter**.
4. To update the firmware, use the `mptutil` command.
5. Reset the controller.

   ```
   fs0:\> reset
   ```

The `mptutil` commands and functions are listed in Table 87 and described in the following sections.

Table 87 mptutil Commands and Functions

Command	Function
mptutil -f <firmware_file>	Updating HBA RISC firmware on the controller
mptutil -o -g <x86_file> <fcode_file>	Updating EFI driver on first controller
mptutil -o -vpd -c 0	Viewing VPD information
Parameters in < > are optional. A space is required between command line options and their parameters.	

The following sections describe the `mptutil` commands and functions.

Flashing Firmware on First Controller

To update the HBA RISC firmware on the first controller, follow these steps:

1. At the `fsO:\>` prompt, enter **`mptutil -f <firmware_file> -c 0`**.
2. At the `fsO:\>` prompt, enter **`reset`**.

The filename is optional and you are prompted for a filename if omitted.

Another way for the firmware to be flashed is done without your knowledge. When `mptutil` is executed, and a SAS HBA is in any state other than ready or operational, `mptutil` immediately performs a firmware download boot. The firmware provided by you to do the firmware download boot is immediately flashed after the firmware download boot has completed. `mptutil` does this because the firmware only moves to the operational state if it is running from flash and not memory. Operational state is needed to do everything else provided in the utility.

Flashing BIOS and EFI Driver on the First Controller

To update the EFI driver on the first controller, follow these steps:

1. At the `fs0:\>` prompt, enter **`mptutil -o -g <Bios_File> <EFI_driver_file> -c 0`**.
2. At the `fs0:\>` prompt, enter **`reset`**.

The filename is optional and you are prompted for a filename if omitted.

Common Questions About Flashing Firmware

Question	After I update firmware on my SAS HBA, why doesn't the version string change in the menu?
Answer	The firmware you just flashed on the HBA does not run until a diagnostic reset occurs. If you exit the utility and reenter it, the version string is updated.
Question	This image does not contain a valid `nvdata` when I try to flash the firmware, why?
Answer	You are expected to concatenate a proper `nvdata` image on to the firmware. `mptutil` keeps you from flashing an image without one. To concatenate `nvdata` and firmware you need to run the `mptutil -o -d 64it__l.fw,sas106x.dat,output.fw` command. . • 64it__l.fw is the firmware image without a `nvdata` image • `sas106x.dat` is the `nvdata` image. This file depends on the type/rev of HBA on which the firmware is used • `output.fw` is the name of the file created with the firmware and `nvdata` concatenated. This concatenated image can be used for all boards of this type or revision.
Question	How do I program multiple cards in a system from the command line?
Answer	`mptutil` (EFI) does not support this.
Question	Can I program a new flash and option ROM in the same command line argument?
Answer	Yes. Run the `mptutil -f <firmware_name> -b <option_rom_name>` command.

Viewing the VPD Information for EFI Driver and RISC Firmware

To view the VPD information for the EFI driver and RISC firmware, follow these steps:

- At the `fs0:\>` prompt, enter **`mptutil -o -vpd -c 0`**.

EFI Commands

To configure an Integrated Mirror (IM) Array on the SAS Controller, use one of the following EFI commands:

- `DRVCFG` (GUI interface)
- `CFGGEN` (command line interface)

NOTE: If you are not using the IM functionality, do not follow these procedures.

DRVCFG Utility

To configure an IM on the SAS controller, follow these steps:

Starting the DRVCFG Utility

To start the`DRVCFG`configuration utility, follow these steps:

1. Select the EFI Shell from the console menu.
2. Type **`drvcfg -s`** and press **Enter**.

Using the DRVCFG Utility

The configuration utility uses several input keys (**F1**, **F2**, **HOME**, **END**, and so on) that may not be supported by all terminal emulation programs. Each of these keys has an alternate key that performs the same function. Review the terminal emulation program documentation to verify which input keys are supported. If problems occur using any of the function keys or **HOME**/**END**/**PGUP**/**PGDN,** it is recommended that the alternate keys be used.

There are general key inputs throughout the configuration utility that apply on all screens:

F1 Help	Context sensitive help for the cursor-resident field.
Arrow Keys	Select Item - Up, down, left, right movement to position the cursor.
Home/End	Select Item - Up, down, left, right movement to position the cursor.
+/-	Change Item - Items with values in [ ] brackets are modifiable. Numeric keypad + and numeric keypad - (minus) update a modifiable field to its next relative value.
Esc	Abort/Exit - Escape aborts the current context operation and/or exits the current screen. User confirmation is solicited as required if changes have been made by user. If you are using a serial console, pressing **Esc** causes a delay of several seconds before it takes effect. This is normal system behavior and is not an error.
Enter	Execute <item> - Executable items are indicated by highlighted text and a different background color. Press **Enter** to execute the field's associated function.

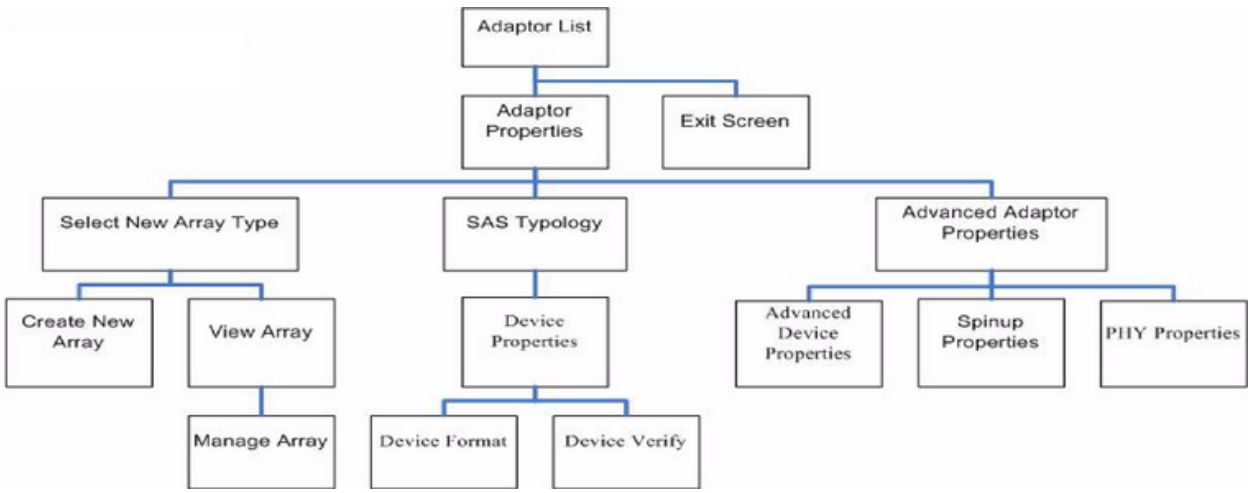
Configuration Utility Screens

All SAS BIOS configuration utility screens contain the following areas, starting at the top of the screen:

Header area	Identifies the utility and version number.
Menu area	Gives the title of the current screen, and on screens other than the **Adapter List** screen also identifies the adapter.
Main area	The main area for presenting data. This area has a cursor for item selection, and horizontal and vertical scroll bars if necessary.
Footer area	Provides general help information text.

Figure 89 provides a map of how screens are accessed in the `DRVCFG` utility.

Figure 89 Accessed Screens in the DRVCFG Utility



DRVCFG Screens

Adapter List Screen

The **Adapter List** screen displays when the configuration utility is first started. This screen displays a scrolling list of up to 256 SAS controllers in the system, and information about each of them.

Use the arrow keys to select a SAS controller, and press **Enter** to view and modify the selected SAS controller's properties.

You can view and modify the SAS controller whether it is enabled or disabled. You can use the **Boot Support** setting in the **Adapter Properties** menu to change the status of this setting. You must reconnect the EFI Driver in order for a new **Boot Support** setting to take effect.

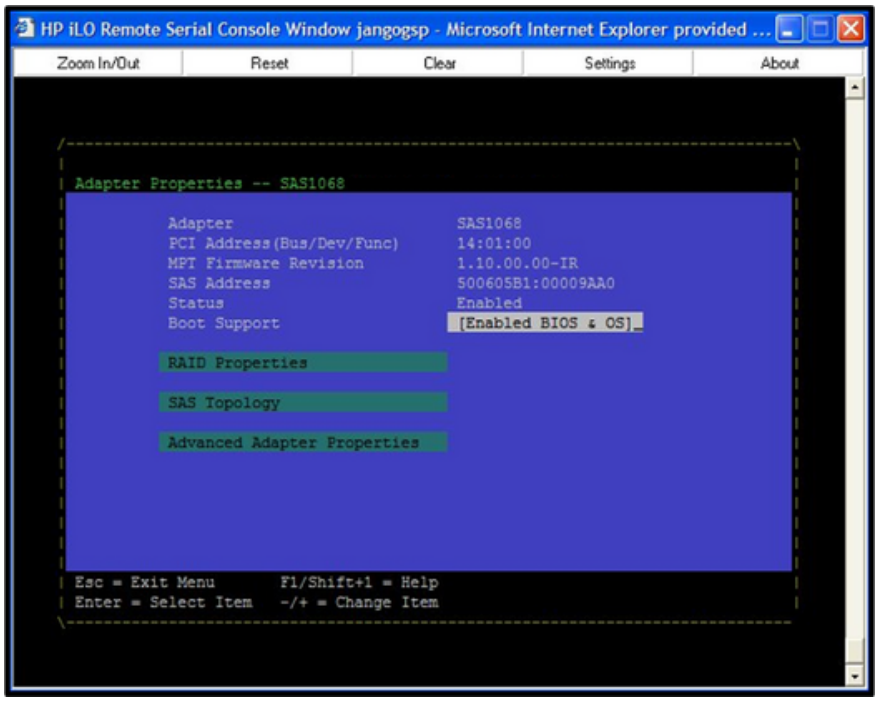
The following are the descriptions for the **Adapter List** screen.

Adapter	Indicates the specific SAS Controller type.
PCI Bus	Indicates the PCI Bus number assigned by the system BIOS to an adapter (0x00 - 0xFF, 0 - 255 decimal)
PCI Dev	Indicates the PCI Device assigned by the system BIOS to an adapter (range 0x00 - 0x1F, 0 - 31 decimal)
PCI Fnc	Indicates the PCI Function assigned by the system BIOS to an adapter (range 0x00 - 0x7, 0 - 7 decimal)
FW Revision	Displays the Fusion MPT firmware version and type (IR or IT)
Status	Indicates whether the adapter is or is not eligible for software control (enabled, disabled or error)
Enabled	Indicates the EFI Driver is either currently controlling the adapter, or will attempt to control the adapter upon reload.
Disabled	Indicates the EFI Driver is either not controlling the adapter, or will discontinue control of the adapter upon reload.
Error	Indicates that the EFI Driver encountered a problem with the adapter. Viewing and modifying settings for the adapter is allowed but the information and functionality available may be limited.

Adapter Properties Screen

The **Adapter Properties** screen enables you to view and modify adapter settings. To scan the SAS controller's devices, select a SAS controller and press **Enter**. The **Adapter Properties** screen displays.

Figure 90 Adapter Properties Screen



Use the arrow keys to select **RAID Properties**, and press **Enter** to view the **Select New Array Type** screen.

To access the following screens, use the arrow keys to select the screen, and press **Enter** on the appropriate field:

- RAID Properties
- SAS Topology
- Advanced Adapter Properties

The following are the descriptions for the **Adapter Properties** screen.

Adapter — Indicates the specific SAS Controller type.

PCI Address — Displays the PCI Address assigned by the system BIOS to the adapter.

- Bus value range 0x00 - 0xFF, 0 - 255 decimal
- Device value range 0x00 - 0x1F, 0 - 31 decimal
- Function range 0x00 - 0x7, 0 - 7 decimal

FW Revision — Displays the MPT firmware version and type in the format (x.xx.xx.xx- yy), where **x.xx.xx.xx** refers to the FW version and **yy** refers to the type. The currently supported type is IR.I).

SAS Address — Displays the SAS Address assigned to this adapter.

FW Revision — Displays the Fusion MPT firmware version and type (IR or IT)

Status — Indicates whether an adapter is eligible for configuration utility software control or is reserved for control by other software (Enabled, Disabled or Error).

- Enabled — Indicates the EFI Driver is either currently controlling the adapter, or will attempt to control the adapter upon reload.
- Disabled — Indicates the EFI Driver is either not controlling the adapter, or will discontinue control of the adapter upon reload.
- Error — Indicates that the EFI Driver encountered a problem with the adapter. Viewing and modifying settings for the adapter is allowed but the information and functionality available may be limited.

Boot Support — Specifies whether an adapter is eligible for configuration utility software control or is reserved for control by other software (Enabled BIOS & OS, Enabled BIOS Only, Enabled OS Only or Disabled).

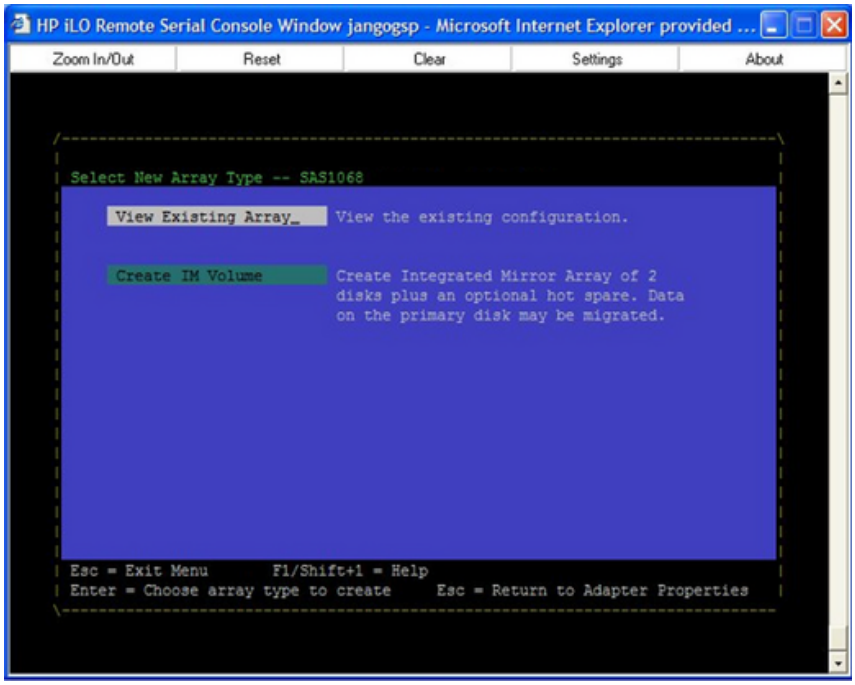
- Enabled BIOS & OS - SAS controller is controlled by both the BIOS and OS driver.
- Enabled BIOS Only - SAS controller is controlled only by the BIOS. This setting may not be supported by all OS drivers. For example, it is not possible to disable an adapter in a Windows driver.
- Enabled OS Only - SAS controller is controlled only by the OS driver.
- Disabled - SAS controller is not controlled by the BIOS when the SAS controller is loaded. However, the adapter is still visible through the configuration protocol.

Changes to the **Boot Support** setting are reflected in the **Status** field of the **Adapter List** menu. The new setting will do not take effect until the BIOS is reloaded (system reboot).

RAID Properties Screens

There are four screens within RAID properties. To access the screens, select RAID Properties from the **Adapter Properties** screen. The **Select New Array Type** screen displays.

Figure 91 Select New Array Type Screen



Select New Array Type Screen

The **Select New Array Type** screen enables you to view an existing array or create an Integrated Mirror array of two disks, plus an optional hot spare.

- To go to the **Create New Array** screen, select Create IM Volume.
- To go to the **View Array** screen, select View an Existing Array.

Create New Array Screen

The **Create New Array** screen enables you to create a new array. To access the **Create New Array** screen, press **Enter** on the **Create IM Volume** field from the **Select New Array Type** screen.

To create a new array, follow these steps:

1. Select one of the following options:
   - To migrate to an IM array, press**M**. This keeps the existing data, and the disk is synchronized.
   - To delete all data on all the disks in the array, press**D**. This overwrites existing data when creating a new IM array, and the disk is not synchronized
2. To create the array after the volume is configured, press**C**. The system prompts you to save changes, which creates the array. During the creation process, the utility pauses. You are then taken back to the **Adapter Properties** screen.

The following are the descriptions for the **Create New Array** screen.

Array Type	Indicates the type of array being created.
Array Size	Indicates the size of the array in MegaBytes.
Bay	Displays the bay in which devices are located.
Device Identifier	Displays the device identifier.

RAID Disk

Specifies the devices (disks) that make up an IM array. If RAID Disk is **Yes**, the device is part of an IM array; if **No**, the device is not part of an IM array. This field is grayed out under the following conditions:

- The device does not meet the minimum requirements for use in an IM array.
- The device is not large enough to mirror existing data on the primary drive.
- This disk has been selected as the hot spare for the IM array.

Hot Spr

Specifies whether a device is the hot spare for an IM array. If hot spare is Yes the device is used as a hot spare for the IM array; if No, the device is not used as a hot spare for the IM array. Only one hot spare per IM array is permitted. A hot spare is not required in an IM. You can specify a hot spare at array creation, or any time after creation, provided the array is made up of five disks or fewer. This field is grayed out under the following conditions:

- The device does not meet the minimum requirements for use in an IM array.
- The array already has a hot spare.
- The array is made up of the maximum number of devices (six).
- The device isn't large enough to mirror existing data on the primary. The hot spare drive must be greater than or equal to the size of any drive in any IM volume.

Drive Status

xxxx

OK	Disk is online and fully functional.
Missing	Disk is not responding.
Failed	Disk has failed.
Initalizing	Disk is initializing.
CfgOffln	Disk is offline at host's request.
User Fail	Disk is marked failed at host's request.
Offline	Disk is offline for some other reason.
Inactive	Disk has been set inactive.
Not Syncd	Data on disk is not synchronized with the rest of the array.
Primary	Disk is the primary disk for a 2 disk mirror and is OK.
Secondary	Disk is the secondary disk for a 2 disk mirror and is OK.
Wrg Type	Device is not compatible for use as part of an IM array.
Too Small	Disk is too small to mirror existing data.
Max Dsks	Maximum # of disks allowed for this type of Array reached and/or Maximum # of total IM disks on a controller reached.
No SMART	Disk doesn't support SMART, cannot be used in an RAID array.
Wrg Intfc	Device interface (SAS) differs from existing IM disks.

Pred Fail

Indicates whether device SMART is predicting device failure (Yes, No).

Size (MB)

Indicates the size of the device in megabytes (megabyte = 1024 x 1024 = 1,048,576). If the device is part of a two-disk array, this field

reflects the size of the array, not the size of the individual disk. If the device is part of a three or more disk array, this field is the size that the disk makes up within the array. When creating a striped array, the usable size of the array is determined by the number of drives times the size of the smallest drive in the array. In arrays consisting of different sized drives, excess space on larger drives are unusable.

View Array Screen

The **View Array** screen enables you to view the current array configuration. To access the **View Array** screen, press **Enter** on the **View Existing Array** field from the **Select New Array Type** screen.

You can perform the following actions on the **View Array** screen:

- To view the next array, press **N**.
- To create a new array, press **C**.

Array	Displays the number of this array.
Identifier	Displays the identifier of this array.
Type	Displays the RAID type.
Scan Order	Displays the scan order of the array.
Size (MB)	Displays the size of the array.
Status	Displays the status of the array.
Bay	Displays the bay in which devices are located.
Device Identifier	Displays the device identifier.
RAID Disk	Specifies the devices (disks) that make up an IM array. If RAID Disk is **Yes**, the device is part of an IM array, if **No**, the device is not part of an IM array. This field is grayed out under the following conditions: • The device does not meet the minimum requirements for use in an IM array. • The device is not large enough to mirror existing data on the primary drive. • This disk has been selected as the hot spare for the IM array.
Hot Spr	Specifies whether a device is the hot spare for an IM array. If hot spare is Yes, the device is used as a hot spare for the IM array, if No, the device is not used as a hot spare for the IM array. Only one hot spare per IM array is permitted. A hot spare is not required in an IM. A hot spare can be specified at array creation, or any time after creation, provided the array is made up of five disks or fewer. This field is grayed out under the following conditions: • The device does not meet the minimum requirements for use in an IM array. • The array already has a hot spare. • The array is made up of the maximum number of devices (6). • The device isn't large enough to mirror existing data on the primary. The hot spare drive must be greater than or equal to the size of any drive in any IM volume.
Drive Status	xxxx

OK	Disk is online and fully functional.
Missing	Disk is not responding.
Failed	Disk has failed.
Initalizing	Disk is initializing.
CfgOffln	Disk is offline at host's request.

	User Fail	Disk is marked failed at host's request.
	Offline	Disk is offline for some other reason.
	Inactive	Disk has been set inactive.
	Not Syncd	Data on disk is not synchronized with the rest of the array.
	Primary	Disk is the primary disk for a 2 disk mirror and is OK.
	Secondary	Disk is the secondary disk for a 2 disk mirror and is OK.
	Wrg Type	Device is not compatible for use as part of an IM array.
	Too Small	Disk is too small to mirror existing data.
	Max Dsks	Maximum # of disks allowed for this type of Array reached and/or Maximum # of total IM disks on a controller reached.
	No SMART	Disk doesn't support SMART, cannot be used in an RAID array.
	Wrg Intfc	Device interface (SAS) differs from existing IM disks.
Pred Fail		Indicates whether device SMART is predicting device failure (Yes, No).
Size (MB)		Indicates the size of the device in megabytes (megabyte = 1024 x 1024 = 1,048,576). If the device is part of a two-disk array, this field reflects the size of the array, not the size of the individual disk. If the device is part of a three or more disk array, this field is the size that the disk makes up within the array. When creating a striped array, the usable size of the array is determined by the number of drives times the size of the smallest drive in the array. In arrays consisting of different sized drives, excess space on larger drives are unusable.

Manage Array Screen

The **Manage Array** screen enables you to manage the current array. To access the **Manage Array** screen, select the appropriate field and press **Enter** on the **Manage Array** field from the **View Array** screen.

The **Manage Array** screen enables you to perform the following actions:

Manage Hot Spare

To display a **Hot Spare Management** screen that has the same layout as the **Create New Array** screen, press **Enter** on Manage Hot Spare. This field is grayed out under the following conditions:

- The array is inactive.
- The array is at its maximum number of devices.
- Non-IR firmware is used.
- IR is disabled. The array is inactive.

Synchronize Array

To perform a synchronization of the IM array, press **Enter** on Synchronize Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes or **N** for no. This field is grayed out under the following conditions:

- The array is inactive.
- The array does not need to be resynchronized.
- The adapter's MPT firmware does not support the feature

- Non-IR firmware is used.
- IR is disabled. The array is inactive.

Activate Array

To perform an activation of an IM array, press **Enter** on Activate Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes or **N** for no.

Delete Array

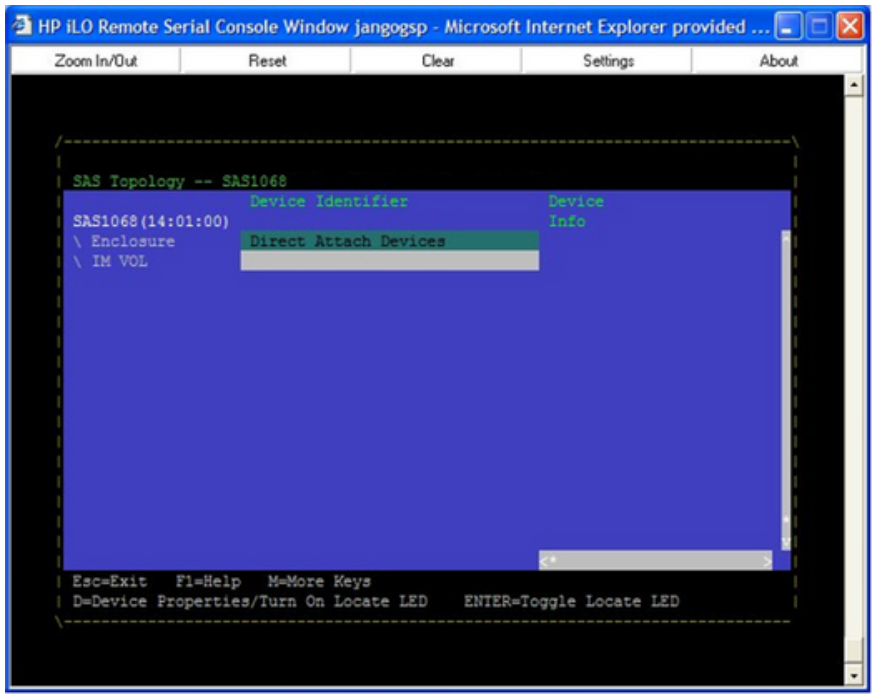
To perform the deletion of the currently displayed IM array, press **Enter** on Delete Array. The screen prompts you to ask if you want to perform this action. Press **Y** for yes and **N** for no.

Identifier	Displays the identifier of this array.
Type	Displays the RAID type.
Scan Order	Displays the scan order of the array.
Size (MB)	Displays the size of this array.
Status	Displays the status of this array.

SAS Topology Screen

The **SAS Topology** screen presents a view of the adapter's SAS hierarchy, and provides other user functionality. To access SAS Topology, press **Enter** on SAS Topology from the **Adaptor Properties** screen.

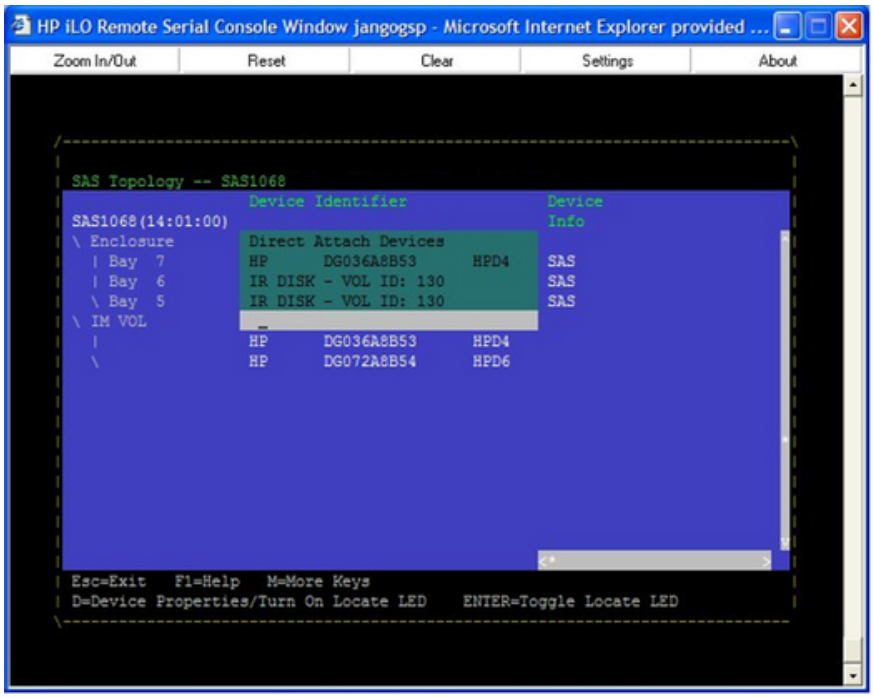
Figure 92 SAS Topology Screen - Expander Closed



The following objects along with their significant properties are shown:

- Adapter
- PHYs
- Expanders/Enclosures
- Attached Devices

Figure 93 SAS Topology Screen - Expander Open



You can access the **Device Properties** screen from SAS Topology:

- To access the **Device Properties** screen for the specific device and turn on the locate LED, press **D** from an expanded enclosure.

You can perform the following actions from SAS Topology:

- To expand the SAS Topology for display, select an expander/enclosure and press **Enter**. This displays all Phys/Devices/Bays. Press **Enter** again to collapse the expander/enclosure.
- To activate the locate LED, press **Enter** while on a device.
- To clear device mapping for non-present devices, press **C**.

Device Identifier	Indicates the ASCII device identifier string extracted from the device's Inquiry Data.
Device Info	Indicates if a device is SAS, SATA, Expander, or Enclosure.
Neg. Link Speed	Indicates the negotiated link speed for this Phy or whether it has been disabled.
Phy. Link Speed	Indicates the maximum hardware link rate possible for this Phy.

Device Properties Screen

The **Device Properties** screen displays information about a specific device. To access the **Device Properties** screen, press **D** from the **SAS Topology** screen when the cursor is on an expanded enclosure of the **Device Identifier** field of a device.

To access the following screens from Device Properties, select the appropriate field and press **Enter**:

- Device Format
- Device Verify

You can perform the following actions from Device Properties:

- To cycle to the next device, press **N**.
- To cycle to the previous device, press **P**.

Device Identifier	Indicates the ASCII device identifier string extracted from the device's Inquiry Data.
SAS Address	Indicates the SAS Address of this device.

Serial Number	Indicates the serial number for this device.
Elapsed Time	Displays the total time elapsed since Format or Verify Operation started.
Percent Complete	Graphical status bar display that indicates the current relative percentage complete of the operation.

Device Format and Device Verify Screens

The **Format** and **Verify** screens have a similar layout. To access the screens, press **Enter** on the appropriate field from the **Device Properties** screen. These screens include an elapsed time and status bar that begin incrementing once the operation is started, enabling you to determine progress of the operation.

Device Identifier	Indicates the ASCII device identifier string extracted from the device's Inquiry Data.
SAS Address	Indicates the SAS Address of this device.
Serial Number	Indicates the serial number for this device.
Elapsed Time	Displays the total time elapsed since Format or Verify Operation started.
Percent Complete	Graphical status bar display that indicates the current relative percentage complete of the operation.

Formatting

If enabled, a low-level formatting on a disk drive is allowed on the Device Format screen. Low-level formatting completely and irreversibly erases all data on the drive. To begin the format, press **F**.

IMPORTANT: Formatting defaults the drive to a 512-byte sector size even if the drive had previously been formatted to another sector size.

CAUTION: Once format has begun, you cannot stop or cancel the action.

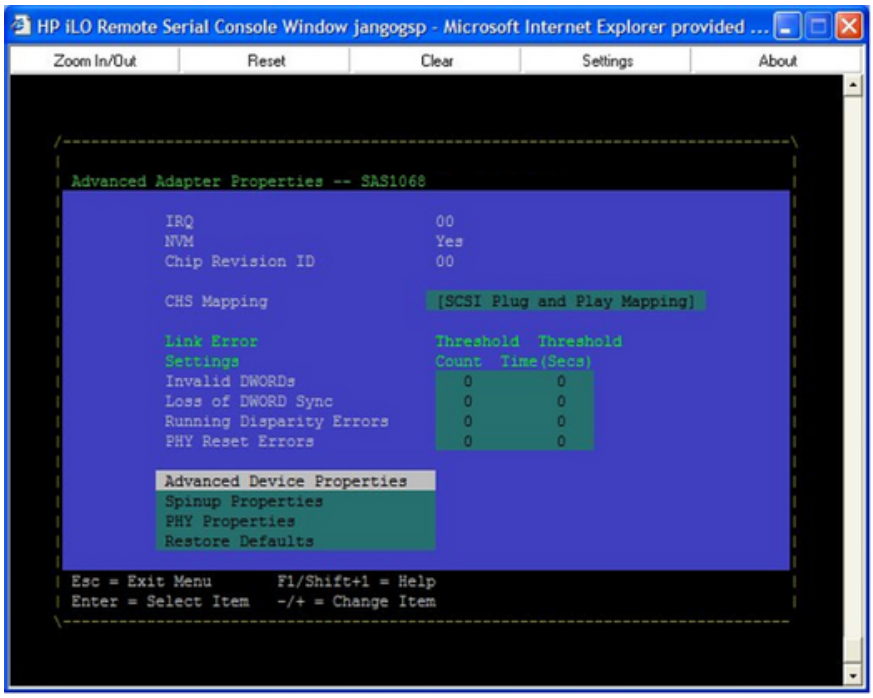
Verifying

The **Verify** screen enables you to verify all of the sectors on the device. If needed, you can reassign defective Logical Block Addresses (LBAs). To start the verification, press **Enter**.

Advanced Device Properties Screen

The Advanced Device Properties screen enables you to view and modify infrequently accessed device settings. To access Advanced Device Properties, press **Enter** on the Advance Device Properties field from the **Advanced Adaptor Properties** screen.

Figure 94 Advanced Adaptor Properties Screen



You can perform the following actions from Advanced Device Properties:

- To set default values for all items on this screen, press **Enter** on Restore Defaults.
- To toggle between LUN 0 and All in any LUN field, press + or -. LUN 0 scans only LUN 0, All scans all LUNs.

Max Devices
: Specifies the maximum number of devices attached to the adapter for which to install a pre-OS IO interface.

Max Spin-ups
: Specifies the maximum number of targets that can be simultaneously spinning up. The IOC must delay by the time indicated in spin-up delay field before starting spin-up of the next set of targets. A value of zero in the **Maximum Target Spinups** field is treated the same as a value of one.

IO Timeouts
: Specifies the time which the host uses to timeout I/Os for the following devices with Non-Removable Media:
  - SCSI Device Type 00h - Direct Access
  - SCSI Device Type 04h - Write Once
  - SCSI Device Type 07h - Optical
  - SCSI Device Type 0Eh - Simplified Direct Access

IO Timeouts (Removable)
: Specifies the time which the host uses to timeout I/Os for the following devices with Removable Media:
  - SCSI Device Type 00h - Direct Access
  - SCSI Device Type 04h - Write Once
  - SCSI Device Type 05h - CD-ROM
  - SCSI Device Type 07h - Optical
  - SCSI Device Type 0Eh - Simplified Direct Access

IO Timeouts for Sequential Devices	Specifies the time (Time in seconds (0-999, 0 means no-timeout)) which the host uses to timeout I/Os for the following devices: • SCSI Device Type 01h - Sequential Access
IO Timeouts for Other Devices	Specifies the time (Time in seconds (0-999, 0 means no-timeout)) which the host uses to timeout I/Os for devices other than: • SCSI Device Type 00h - Direct Access • SCSI Device Type 01h - Sequential Access • SCSI Device Type 04h - Write Once • SCSI Device Type 05h - CD-ROM • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access
LUNs to Scan for Block Devices	Controls LUN scans for the following devices with Non-Removable Media: • SCSI Device Type 00h - Direct Access • SCSI Device Type 04h - Write Once • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access
LUNs to Scan for Block Devices (Removable)	Controls LUN scans for the following devices with Removable Media: • SCSI Device Type 00h - Direct Access • SCSI Device Type 04h - Write Once • SCSI Device Type 05h - CD-ROM • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access
LUNs to Scan for Sequential Devices	Controls LUN scans for the following devices: • SCSI Device Type 01h - Sequential Access
LUNs to Scan for Other Devices	Controls LUN scans for all devices other than the following: • SCSI Device Type 00h - Direct Access • SCSI Device Type 01h - Sequential Access • SCSI Device Type 04h - Write Once • SCSI Device Type 05h - CD-ROM • SCSI Device Type 07h - Optical • SCSI Device Type 0Eh - Simplified Direct Access

Spinup Properties Screen

To access Spinup Properties, press **Enter** on the **Spinup Properties** field from the **Advanced Adaptor Properties** screen. This screen enables you to view and modify spin up specific settings.

Spin up refers to the disk drives getting up to rotation speed during system boot. To reduce the power requirement stress on the backplane a delay is introduced between drive spin ups.

Direct Attached Spinup Delay	Time, in seconds, between each disk drive spin up (default 3 seconds).
Direct Attached Max Targets	Number of disk drives that spin up at the same time (default 1 drive).

Expander Spinup Delay	Expanders are not supported.
Expander Max Target Devices	Expanders are not supported.

PHY Properties Screen

The PHY Properties screen enables you to view and modify PHY specific settings. To access PHY Properties, press **Enter** on the **PHY Properties** field from the **Advanced Adaptor Properties** screen.

You can perform the following actions from PHY Properties:.

- To display the next PHY, press **N**.
- To display the previous PHY, press **P**.
- To reset the Link Error Counts for this PHY or all PHYs, press **Enter** on Reset Link Error Counts. Resetting Link Error Counts issues a PHY Link Error Reset. The following prompt displays when you press **Enter**:

```
Are you sure you want to reset Phy error counts?
Reset error counts for this Phy only
Reset error counts for all Phys
Cancel
```

NOTE: The Link Error Settings values on this screen display the current values for this PHY only, and are not modifiable. To modify the Threshold values, you must return to **Advanced Adapter Properties** screen.

PHY	Displays the PHY number current information.
SAS Port	Indicates the associated SAS Port (0 to N) as configured on this adapter.
Link Status	Indicates the PHY link status. Possible values are: • Enabled, Unknown Link Rate • PHY Disabled • Enabled, negotiation failed • Enabled, SATA OOB Complete • Enabled, 1.5 Gbs • Enabled, 3.0 Gbs
Discovery Status	32 bit hexidecimal value indicating the discovery status for the PHY or Expander. Currently defined values are: • Discovery completed successfully - 0x00000000 • Loop Detected - 0x00000001 • Unaddressable device exists - 0x00000002 • Multiple Ports - 0x00000004 • Expander Error - 0x00000008 • SMP Timeout - 0x00000010 • Out of route entries - 0x00000020 • SMP Response Index Does Not Exist - 0x00000040 • SMP Response Function Failed - 0x00000080 • SMP CRC error - 0x00000100
Device Identifier	Indicates the ASCII device identifier string extracted from the device's Inquiry Data.
Scan Order	Indicates the scan order for this device (equivalent of a SCSI ID for parallel SCSI).
Device Information	Indicates if a device is SAS.

SAS Address	Indicates the SAS Address of this device.
Link Error Setting	• Invalid DWORDs - Number of invalid dwords that have been received outside of PHY reset sequences, since the last PHY Link Error Reset. [a] • Loss of DWORD Sync - Number of times, since the last PHY Link Error Reset, that dword synchronization was lost and the link reset sequence occurred.[a] • Running Disparity Errors - Number of dwords with running disparity errors that have been received outside of PHY reset sequences, since the last PHY Link Error Reset.[a] • PHY Reset Errors - Number of times the PHY reset sequence has failed, since the last PHY Link Error Reset.[a]
Link Error Count	Actual link error count values since the last PHY Link Error Reset.[a]
Threshold Count	Link error count threshold values.[b]
Threshold Time	Time, in seconds, over which to apply Threshold Count.[b]

[a]. The count stops when it reaches the maximum value.

[b]. When a Link Error Count exceeds a Threshold Count within the Threshold Time the link rate may be reduced by the MPT firmware.

Exit the SAS Configuration Utility Screen

As some changes only take effect when you exit the utility, it is important to always exit the utility properly. To exit the utility, follow these steps:

1. To return to the Adapter List from Adapter Properties, press **ESC**.
2. To exit the utility from the Adapter List, press **ESC**.

NOTE: A similar exit screen is used when exiting most other screens, and can be used to save settings.

The exit screen shows some options that are grey, indicating that they are not available. You can only select the available options. The exit choices are as follows:

- `Are you sure you want to exit?`
- `Cancel Exit`
- `Save changes and reboot`
- `Discard changes and reboot`
- `Exit the Configuration Utility and Reboot`

CFGGEN Utility

The `CFGGEN` utility is a command line utility that runs in the Linux, EFI, and Windows Pre-Installation (WinPE) environments. It is a minimally interactive program that you execute from a command line prompt, or a shell script. The results from invoking this utility are communicated through the program status value that is returned when the program exits. Use the `CFGGEN` utility to create IM storage configurations on SAS controllers. Some `CFGGEN` commands work only with SAS adaptors in the EFI environment.

Starting CFGGEN

The`CFGGEN`utility is located on the *HP IPF Offline Diagnostic and Utilities CD*. To use `CFGGEN`, follow these steps:

1. Insert the CD into the drive.
2. Boot the system to the EFI Shell prompt.

3. From the EFI Shell prompt, change to the CD drive.

```
shell> fs0: Enter
fs0:\>
```

4. Change to the directory that contains `cfggen.efi`.

```
fs0:\> cd EFI\HP\TOOLS\NETWORK Enter
fs0: EFI\HP\TOOLS\NETWORK>
```

From this directory use `CFGGEN`.

CFGGEN Operation

`CFGGEN` is not case sensitive. You can enter `CFGGEN` commands and parameters in uppercase, lowercase, or a mixture of the two. Use the following conventions in the command descriptions:

- Text in italics must be entered exactly as shown on the command line
- Text surrounded by <> must be replaced with a required parameter
- Text surrounded by [ ] may be replaced by an optional parameter
- Parameters surrounded by {} must be entered one or more times, as appropriate for the executed command
- Do not enter the command line definition characters (<>, [ ], and {}) on the command line.

`CFGGEN` uses a command line interface.

Syntax: `cfggen <controller #> <command> <parameters>`

NOTE: The program name, controller number, command, and parameters fields must be separated by the ASCII space character. The format of the parameters is command specific.

The program return value is returned to the user when the program exits. A value of `0` is returned if the command is successful. Otherwise, a value of `1` is returned.

Rules for creating IM volumes and hot spare disks

The following rules apply when creating IM volumes and hot spare disks:

- All disks that are part of an IM volume or a hot spare for an IM volume must be on the same SAS controller.
- IM volumes are supported.
- Only two IM volumes (plus a global hot spare) per controller can be created.
- An IM array must have exactly two disks.
- A hot spare disk cannot be created without at least one IM volume already created.
- The utility does not allow adding a hot spare disk of type different from disk types in any of the volume.
- With the `AUTO` command all drives used are the same type as the first available disk found, and the size is limited to the size of the smallest disk.

CFGGEN Commands

Using the CREATE Command

The `CREATE` command creates IM volumes on the SAS controller. Firmware and hardware limitations for this family of cards limit the number of configurations that are possible.

Syntax

```
cfggen <controller #> create <volume type> <size> [qsync] [noprompt]
```

Parameters

<volume type> Volume type for the volume to be created. Valid value is IM.

<size>	Size of the IM volume in Mbytes or “MAX” for the maximum size available.
[*qsync*]	Quick synchronization of the volume created.
[*noprompt*]	Eliminates warnings and prompts.

Operation

Once a disk has been added to an IM volume, all of its storage capacity may or may not be used depending on drive capacity and volume capacity. For example, if you add a 36 GB disk drive to a volume that only uses 9 GB of capacity on each disk drive, the remaining 27 GB of capacity on the disk drive is unusable.

The disk identified by the first SCSI ID on the command line is assigned as the primary disk drive when creating an IM volume. If the SAS controller is allowed to resync the disk drives, the data on the primary disk drive is available by accessing the newly created volume.

Using the AUTO Command

The `AUTO` command automatically creates an IM volume on the SAS controllers. The volume is created with the maximum number of disks available for use in the specified volume type. The main difference from the `CREATE` command is that with `AUTO` command user does not specify SCSI ID values for disks to use in the volume. The `CFGGEN` utility automatically uses the first disks it finds that are usable in the IM volume. Firmware and hardware limitations for the family of controllers limit the number of configurations that are possible.

Syntax

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

Parameters

<volume type>	Volume type for the volume to be created. Valid value is IM.
<size>	Size of the RAID volume in Mbytes or “MAX” for the maximum size available.
[qsync]	Quick synchronization of the volume created.
[noprompt]	Eliminates warnings and prompts.

Operation

When `AUTO` creates an IM volume, the first disk found is assigned as the primary disk drive. If the controller is allowed to resync the disk drives, the data on the primary disk drive is available by accessing the newly created volume. Reply**`Yes`**if you want to complete the creation.

HOTSPARE

The `HOTSPARE` command creates a hot spare disk drive. The hot spare drive is added to hot spare pool 0.

Syntax

```
cfggen <controller #> HOTSPARE [DELETE] <Encl:Bay>
```

Parameters

<controller #>	A SAS controller number between 0 and 255.
[DELETE]	Specifies that the hot-spare is to be deleted (Omit the DELETE keyword to specify hot-spare creation).
<Encl>:<Bay>	Enclosure number and Bay number that identifying the disk drive that will become the hot spare.

Operation

The number of disk drives in an IM array plus the hot spare disk cannot exceed three. You can create only one hot spare disk. You must make sure the capacity of the hot spare disk is greater

than or equal to the capacity of the smallest disk in the logical drive. An easy way to verify this is to use the DISPLAY command.

CAUTION: See rules for creating IM volumes and hot spare disks.

DELETE

The DELETE command sets the controller configuration to factory defaults. This command also deletes any existing IR volumes.

Syntax

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

Parameters

<controller #>	A SAS controller number between 0 and 255.
[noprompt]	Eliminates warnings and prompts.

Operation

After entering the DELETE command, the system prompts you and asks if you want to proceed with the command. Enter **Yes** if you want to proceed.

DISPLAY

This DISPLAY command displays information about controller configurations: controller type, firmware version, BIOS version, volume information, and physical drive information.

Syntax

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

Parameters

<controller #>	A SAS controller number between 0 and 255.
[filename]	Valid filename to store output of command to a file.

Sample Output

```
Read configuration has been initiated for controller 0
------------------------------------------------------------------------
Controller information
------------------------------------------------------------------------
  Controller type                         : SAS1068
  EFI BSD version                         : 2.00.09.00
  Firmware version                        : 1.10.01.00
  Channel description                     : 1 Serial Attached SCSI
  Initiator ID                            : 63
  Maximum physical devices                : 62
  Concurrent commands supported           : 511
------------------------------------------------------------------------
IR Volume information
------------------------------------------------------------------------
IR volume 1
  Volume ID                               : 2
  Status of volume                        : Okay (OKY)
  RAID level                              : 1
  Size (in MB)                            : 34304
  Physical hard disks (Target ID)         : 9 1
------------------------------------------------------------------------
Physical device information
------------------------------------------------------------------------
Initiator at ID #63
Target on ID #1
  Device is a Hard disk
```

```
  Enclosure #                             : 1
  Slot #                                  : 8
  Target ID                               : 1
  State                                   : Online (ONL)
  Size (in MB)/(in sectors)               : 34732/71132960
  Manufacturer                            : HP
  Model Number                            : DG036A8B53
  Firmware Revision                       : HPD6
  Serial No                               : 3LC04757000085425VFK
  Drive Type                              : SAS
Target on ID #4
  Device is a Hard disk
  Enclosure #                             : 1
  Slot #                                  : 5
  Target ID                               : 4
  State                                   : Ready (RDY)
  Size (in MB)/(in sectors)               : 70007/143374738
  Manufacturer                            : HP
  Model Number                            : DG072A8B54
  Firmware Revision                       : HPD6
  Serial No                               : 3LB02CXH00008523E83Z
  Drive Type                              : SAS
Target on ID #5
  Device is a Hard disk
  Enclosure #                             : 1
  Slot #                                  : 4
  Target ID                               : 5
  State                                   : Ready (RDY)
  Size (in MB)/(in sectors)               : 70007/143374738
  Manufacturer                            : HP
  Model Number                            : DG072A8B5C
  Firmware Revision                       : HPD4
  Serial No                               : B062P5B011M00547
  Drive Type                              : SAS
Target on ID #6
  Device is a Hard disk
  Enclosure #                             : 1
  Slot #                                  : 3
  Target ID                               : 6
  State                                   : Ready (RDY)
  Size (in MB)/(in sectors)               : 70007/143374738
  Manufacturer                            : HP
  Model Number                            : DG072A8B5C
  Firmware Revision                       : HPD4
  Serial No                               : B062P5B011RK0548
  Drive Type                              : SAS
Target on ID #7
  Device is a Hard disk
  Enclosure #                             : 1
  Slot #                                  : 2
  Target ID                               : 7
  State                                   : Ready (RDY)
  Size (in MB)/(in sectors)               : 70007/143374738
  Manufacturer                            : HP
  Model Number                            : DG072A8B5C
  Firmware Revision                       : HPD4
  Serial No                               : B062P5B011NB0548
  Drive Type                              : SAS
Target on ID #9
  Device is a Hard disk
  Enclosure #                             : 1
  Slot #                                  : 7
  Target ID                               : 9
  State                                   : Online (ONL)
  Size (in MB)/(in sectors)               : 70007/143374738
```

```
  Manufacturer                              : HP
  Model Number                              : DG072A8B5C
  Firmware Revision                         : HPD4
  Serial No                                 : B062P5B010R10547
  Drive Type                                : SAS
------------------------------------------------------------------------
Enclosure information
------------------------------------------------------------------------
Enclosure#                                  : 1
Logical ID                                  : 500605B0:0001A950
Numslots                                    : 8
StartSlot                                   : 1
Start TargetID                              : 0
Start Bus                                   : 0
```

Logical drive status values:

Okay (OKY)	Volume is Active and drives are functioning properly and user data is protected if the current RAID level provides data protection.
Degraded (DGD)	Volume is Active and the user's data is not fully protected due to a configuration change or drive failure; a data resync or rebuild may be in progress.
Inactive (OKY)	Volume is inactive and drives are functioning properly and user data is protected if the current RAID level provides data protection.
Inactive (DGD)	Volume is inactive and the user's data is not fully protected due to a configuration change or drive failure; a data resync or rebuild may be in progress.

Physical device status values are as follows:

Online (ONL)	The drive is operational and is part of a logical drive.
Hot Spare (HSP)	The drive is a hot spare that is available for replacing a failed drive in an array.
Ready (RDY)	The drive is ready for use as a normal disk drive or it can be, but has not been, assigned to a disk array or hot spare pool.
Available (AVL)	The hard disk drive may or may not be ready, and it is not suitable for inclusion in an array or hot spare pool (for example, it is not spun up, its block size is incorrect, or its media is removable).
Failed (FLD)	Drive was part of a logical drive or was a hot spare drive, and it failed. It has been taken offline.
Standby (SBY)	This status is used to tag all non-hard disk devices.

FORMAT

The `FORMAT` command performs a low-level format of a disk drive. This operation can only be performed on a hard disk drive. The drive cannot be an IR volume or a hot spare drive.

Syntax

```
cfggen <controller #> format <Encl:Bay> [noprompt]
```

Parameters

<controller #>	A SAS controller number between 0 and 255.
<Encl:Bay>	Enclosure number and Bay number that identifying the disk drive that will be formatted.
[noprompt]	Eliminates warnings and prompts.

△ **CAUTION:** Performing a low-level format on a hard disk drive results in the destruction of all data stored on that disk drive. The operation cannot and should not be interrupted; doing so may result in irreparable damage to the hard disk drive.

Operation

Unless you include <no prompt> on the command line, warning messages display. You are required to properly answer a series of prompts or the command aborts. The answers are case sensitive and must be entered in upper case.

This command will not complete and return to a shell prompt until the format operation is complete. Depending on the capacity and model of disk drive, this can take a considerable amount of time.

STATUS

The `STATUS` command displays the status of any volume synchronization operation that is currently in progress on the controller.

Syntax

```
cfggen <controller #> status
```

Parameters

<controller #> A SAS controller number between 0 and 255.

Operation

If no volume synchronization is in progress, `CFGIR` prints a message so indicating before exiting. The `STATUS` command adds the **Inactive** flag to the **Volume State** field, if the volume is marked as inactive by the controller firmware.

Sample Output

The following is an example of the status information returned when a volume resynchronization is in progress.

```
Background command progress status for controller 0...
IR Volume 1
  Current operation                     : None
  Volume ID                             : 2
  Volume status                         : Enabled
  Volume state                          : Optimal
  Physical disk I/Os                    : Not quiesced
```

The status fields in the data displayed can take on the following values:

Current operation	Synchronize or None
Volume status	Enabled or Disabled
Volume state	Inactive] Optimal, Degraded or Failed
Physical disk I/Os	Quiesced or Not quiesced

ENABLEIR

The `ENABLEIR` command turns on IR functionality on a SAS controller. To accomplish the enabling, clear the `MPI_IOUNITPAGE1_DISABLE_IR` bit in the **IO Unit 1 MPT Configuration** page.

Syntax

```
cfggen <controller #> enableir
```

Parameters

<controller #> A SAS controller number between 0 and 255.

Operation

If there are any existing IR volumes when this command is run you are notified with an output message, no action is taken and `CFGGEN` returns SUCCESS. If IR is currently enabled when this command is run, `CFGGEN` returns SUCCESS.

Faulty controller or peripheral hardware (such as., cables, disk drives, and so on.) will not cause this utility to hang. It exits with the appropriate return value. If an operation fails, a reasonable

attempt is made to recover the operation. This may include clearing the fault condition by whatever means necessary and retrying the operation.

DISABLEIR

The DISABLEIR command turns off IR functionality on a SAS controller. To accomplish the disabling, set the MPI_IOUNITPAGE1_DISABLE_IR bit in the **IO Unit 1 MPT Configuration** page.

Syntax

```
cfggen <controller #> disableir
```

Parameters

This command does not require <controller #>.

Sample Output

```
 Vendor  Device
Index  ID  ID  Bus Device
-----  ------  ------  ---------
0  1000h  0054h  14h 08h LSI 1068 SAS Host Adapter
```

LOCATE

The LOCATE command turns locate LED's on and off.

Syntax

```
cfggen <controller #> locate
```

Parameters

<controller #> A SAS controller number between 0 and 255.

Smart Array P400, P600 and P800 Controllers

The following information is provided to assist you in configuring the Smart Array P400, P600 and P800 controllers during installation. For additional information refer to the following documents:

- *HP Smart Array P400 Controller Support Guide*
- *HP Smart Array P600 Controller for Integrity Servers User Guide*
- *HP Smart Array P800 Controller for Integrity Servers User Guide*

Quick Installation Procedure

To install the controller, follow these steps:

1. Power off the server.
2. Install additional physical drives if necessary (see "Connecting External Storage" (page 96)). The number of drives in the server determines the RAID level that is auto configured when the server is powered on.
3. Power on the server.
4. Update the controller firmware (see "SAUPDATE Utility" (page 97)). When the firmware update process is complete, the server reboots and runs through a POST procedure. This POST procedure halts briefly during controller initialization and prompts you to open ORCA (Option ROM Configuration for Arrays).
5. Open ORCA. See "Configuring the Array" (page 101).
   - If using a headless console, press **Esc+8**.
   - Otherwise, press **F8**.
6. Configure the logical boot drive, and exit from ORCA.

Depending on the OS, additional device drivers and management agents must be installed. See the User Guide for the specific HP Smart Array Controller at:

http://www.hp.com/go/integrity-iocards-docs under the specific HP Smart Array Controller product for installation procedures.

The latest firmware, drivers, utilities, software, and documentation for HP Integrity servers are available on the support page of the HP website at:

http://www.hp.com/support/itaniumservers

Connecting External Storage

IMPORTANT: Not all OSs, or Smart Array cards support external drives.

To connect external storage, follow these steps:

1. Power off the server.
2. Connect an external SAS cable to the external port of the controller.

   NOTE: You do not have to disconnect any internal drives on shared internal port 1I because the controller preferentially discovers devices attached to port 1E. However, drives on the shared internal port are unavailable until you disconnect the external storage device.

3. Tighten the lock screws on the cable connector.
4. Attach the other end of the cable to the SAS input connector of the external storage enclosure.

IMPORTANT: Drives that are to be used in the same array must be of the same type, either all SAS or all SATA. (Parallel SCSI drives cannot be used with this controller.)

5. Tighten the lock screws on the cable connector.
6. Power on the enclosure.
7. Power on the server.

SAS Cable Part Numbers

If you require additional cables, order them by the option kit number listed in Table 88.

Table 88 SAS Cable Part Numbers

Cable Length	Option Kit Number	Cable Assembly Number
1.0 m (3.3 ft.)	389664-B21	361317-001
2.0 m (6.6 ft.)	389668-B21	361317-002
4.0 m (13 ft.)	389671-B21	361317-004
6.0 m (20 ft.)	389674-B21	361317-006

SAUPDATE Utility

Use `saupdate` from the EFI Shell to update the firmware image on the HP Smart Array P600. Command line options are described below. Follow one of these two procedures to run saupdate:.

- If you are using `saupdate` from the Offline Diagnostic CD:

1. Download the firmware and copy it to the EFI partition.
2. The CD containing `saupdate.efi` must be in the drive before booting the system to allow device mapping.
3. Boot the system to the EFI Shell prompt. The CD drive should appear in the list of mapped devices as **fs0**.
4. Change to this device by typing fs0: under EFI Shell prompt.
5. If the EFI utility and firmware image files are not located in the root directory, move to the directory in which these files are located, for example:

```
fs0:\>cd \EFI\HP\TOOLS\IO_CARDS\SmartArray
```

IMPORTANT: Both `saupdate.efi` and the firmware image file must be located in the same directory. If they are not, copy them both to the EFI partition. Run the `saupdate.efi` using the `fs0:\> saupdate` command.

- If you are not using the Offline Diagnostic CD:

1. Download the SA EFI update utility `saupdate.efi` and copy it to the EFI partition.
2. Download the firmware and copy it to the EFI partition.
3. Boot the system to the EFI Shell and change directories to the EFI partition.
4. Run the `saupdate.efi` using the using the `fs0:\> saupdate.efi` command. The following screen displays. The version of the utility displays on the second line:

```
************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00
(C) Copyright 2004 Hewlett Packard Development Company L.P.
************************************************************
```

Syntax

saupdate <operation> <parameters>

Commands

You can use the following operations with saupdate:

- `LIST`
- `UPDATE`
- `UPDATE all`
- `HELP or?`

List

Use `LIST` to display all detected Smart Array controllers along with the active firmware versions.

```
fs0:\> saupdate LIST
************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00
(C) Copyright 2004 Hewlett Packard Development Company L.P.
************************************************************

Seg  Bus  Dev  Func        Description          Version
1    51    4    0       HP Smart Array 6400      1.92
1    20    1    0       HP Smart Array 5300      3.54
```

The identification information from this list is used to designate which controller is to be updated.

UPDATE

NOTE: The saupdate utility program file (`saupdate.efi`) must be located in the same file system as the firmware files.

```
saupdate UPDATE [ <seg:bus:dev:func>] [smartarray_firmware_file]
```

For example, to update the controller at segment 1, bus 51, device 4, function 0 from the example output above, enter a command at the EFI Shell prompt as in this following example:

```
fs0:\> saupdate UPDATE 1:51:4:0 CYBORG234.BIN
```

Replace `CYBORG234.BIN` with the name of your firmware file.

The following screen displays:

```
************************************************************
Smart Array Offline Firmware Update Utility
```

```
Version: 1.04.12.00
(C) Copyright 2004 Hewlett Packard Development Company L.P.
************************************************************

Updating controller in Seg: 1, Bus: 51, Dev: 4, Func: 0
Current firmware version 1.92Percentage completed: 100%

Activating firmware now, this may take several minutes.
Resetting and reinitializing controller.
Retrieving firmware version, this may take several minutes.
Current controller firmware version is 2.34.
```

NOTE: The UPDATE command will not prevent downgrade to a lower firmware version.

After updating the firmware, cycle the power on the system and on any external JBODS connected to the Smart Array HBAs.

Exit status codes`0: Success`

UPDATE all

When "all" is specified, the utility downloads the firmware image to all the controllers to which the firmware image applies and updates the remaining controllers. If an update operation fails for a controller, the utility still updates the remaining controllers.

The example below shows the command to update all controllers for which the firmware image file applies. The controllers for which the firmware image is not applicable are skipped. In this example, the Smart Array 6400 controller is updated, and the Smart Array 5300 is skipped:

```
fs0:\> saupdate UPDATE all CYBORG234.BIN
```

Replace `CYBORG234.BIN` with the name of your firmware file.

The following screen displays, showing the controllers that are updated and skipped:

```
************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00
(C) Copyright 2004 Hewlett Packard Development Company L.P.
************************************************************

Updating controller in Seg: 1, Bus: 51, Dev: 4, Func: 0
Current firmware version 1.92

Percentage completed: 100%
Activating firmware now, this may take several minutes.
Resetting and reinitializing controller.
Retrieving firmware version, this may take several minutes.
Current controller firmware version is 2.34.

************************************************************
Smart Array Offline Firmware Update Utility
Version: 1.04.12.00
(C) Copyright 2004 Hewlett Packard Development Company L.P.
************************************************************

Firmware Image is not suitable for HP Smart Array
5300 Controller at Seg: 1, Bus 20, Dev: 1, Func:0
```

After updating the firmware, cycle the power on the system and on any external JBODS connected to the Smart Array HBAs.

HELP or ?

Use HELP or ? to display usage text, program version number, and build date:

Enter: `saupdate HELP`

or

```
saupdate ?
```

Error Messages

The following is a list of error messages under various situations:

- When keyword LIST or `UPDATE` is misspelled or extra parameters are specified:

  Error: Syntax Error

  Usage: `saupdate LIST` or `saupdate UPDATE [ all ]`

- When the controller ID in the `saupdate UPDATE` command is not correct:

  No matching controller found

- When a firmware file does not exist in the `saupdate UPDATE` command, the example shows: CYBORG101.BIN does not exist.

  ```
  File CYBORG101.BIN: Not Found
  ```

- When an invalid firmware or corrupted file is specified in the `saupdate UPDATE` command, the example shows: CYBORG101.BIN does not exist.

  ```
  File CYBORG101.BIN: invalid or corrupted
  ```

EBSU Utility

The EFI-based Setup Utility (EBSU) provides an easy-to-use interface for flashing firmware, partitioning the hard disk, installing diagnostic tools, configuring storage controllers, and running other EFI utilities.

NOTE: You can use EBSU to update firmware for many different devices in the system. Smart Array P600 is shown as an example.

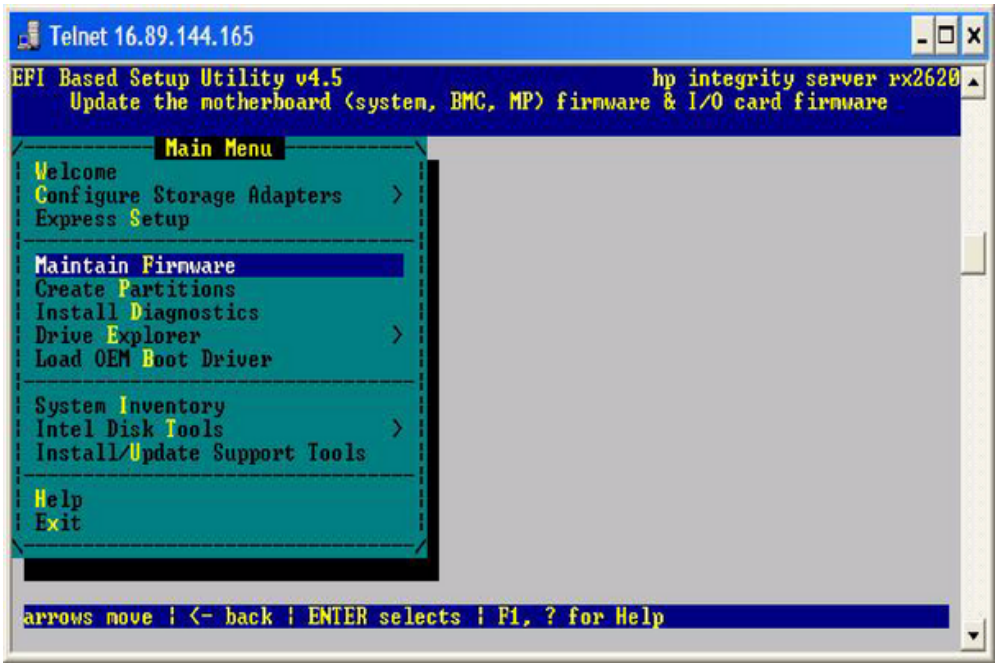
To update the Smart Array firmware:

1. Power on the server. The server boots to EFI. The EFI Boot Manager may be used from the enhanced interface (grey background) or the legacy interface (black background).
2. Load the HP Smart Setup media into the server DVD drive.
3. From the EFI Boot Menu, select **Internal Bootable DVD** and press **Enter**. EBSU starts and displays the **Welcome** screen.

Figure 95 EBSU Welcome Screen

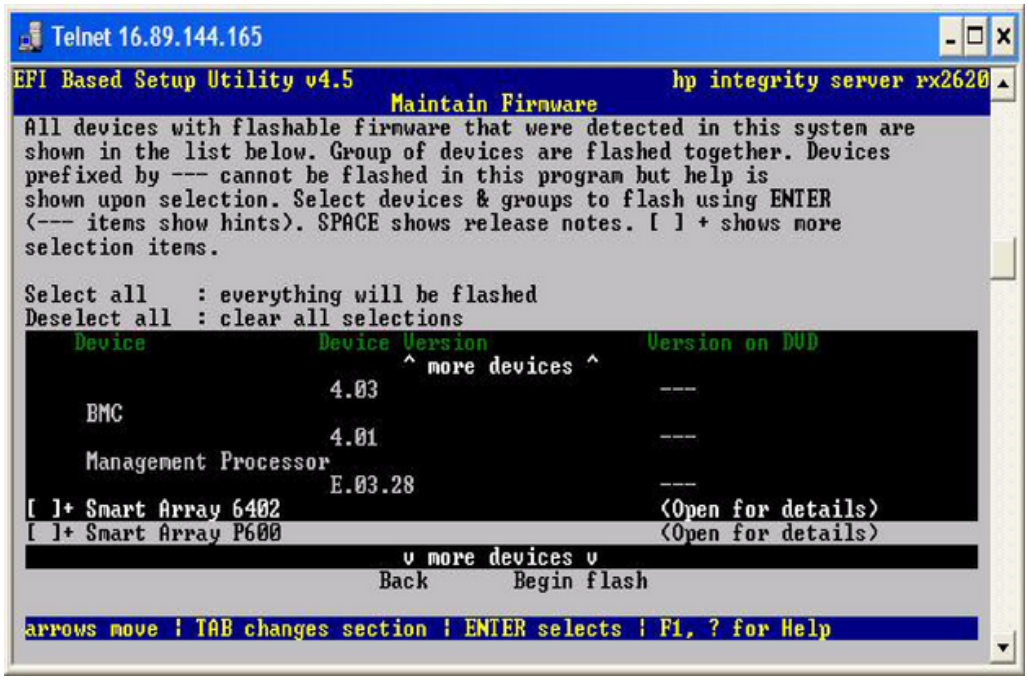
4. Select **OK** and press **Enter** to continue.
5. From the main menu, select **Maintain Firmware** and press **Enter**.

Figure 96 EBSU Main Menu



6. In the **Maintain Firmware** screen, use the tab key to scroll down to the **Device** section.
7. Use the down arrow key to scroll down to the **Smart Array P600** item in the list.
8. Press **Enter** to display detailed information about the device.

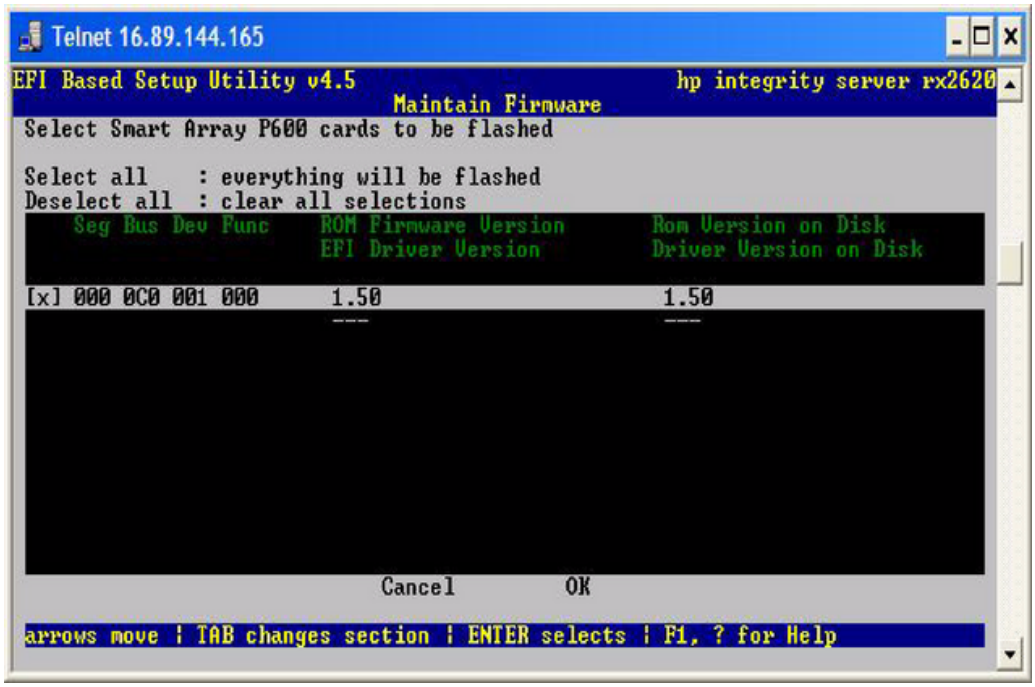
Figure 97 EBSU Maintain Firmware Screen



EBSU displays the firmware update screen for the selected device.

- The version number in the first column (ROM Firmware Version) is the one currently installed on your system.
- The version number in the second column (ROM Version on Disk) is the one available on your Smart Setup media.

Figure 98 EBSU Maintain Firmware Update Screen



9. Compare the two version numbers and perform one of the following options:
   - If the number in the first column is the same or higher than the number in the second column, your installed firmware is current. You do not need to update the firmware for this device! You can exit EBSU and quit this procedure.
   - If the number in the first column is less than the number in the second column, your installed firmware is older than the version on your Smart Setup media. You must update the firmware for this device! Proceed to Step 9 and continue from there.

NOTE: The utility does not allow you to flash the firmware if the installed version is the same or higher than the version on the Smart Setup media.

10. Use the tab key to scroll down into the **Device** section and highlight the device name.
11. Press **Enter** to select the device (this puts an "X" inside the box on the left side of the device name).
12. Use the tab key to move to the **OK** selection and press **Enter**.

    ]The firmware update begins and proceeds automatically to completion.

Configuring the Array

provides two utilities for manually configuring an array on a Smart Array controller:

- ORCA, a simple ROM-based configuration utility.
- Array Configuration Utility (ACU), a versatile, browser-based utility that provides maximum control over configuration parameters

NOTE: To copy a particular array configuration to several other servers on the same network, use the Array Configuration Replicator (ACR) or the scripting capability of ACU. ACR is provided in the SmartStart Scripting Toolkit, available on the HP website at: http://www.hp.com/servers/sstoolkit.

Whichever utility you use, the following limitations apply:

- For the most efficient use of drive space, do not mix drives of different capacities within the same array. The configuration utility treats all physical drives in an array as if they have the same capacity as the smallest drive in the array. The excess capacity of any larger drives is wasted because it is unavailable for data storage.
- The probability that an array will experience a drive failure increases with the number of physical drives in the array. If you configure a logical drive with RAID 5, keep the probability of failure low by using no more than 14 physical drives in the array.

For conceptual information about arrays, logical drives, and fault-tolerance methods, and for information about default array configuration settings, see the *HP Array Configuration Utility User Guide* at I/O Cards and Networking Software at:

http://www.hp.com/go/integrity-iocards-docs

Comparing the Utilities

Table 89 lists the supported features and procedures for the ACU and ORCA utilities.

NOTE: A + in the appropriate column indicates that the feature or procedure is supported, while -- indicates that the feature or procedure is not supported.

Table 89 ACU and ORCA Supported Features and Procedures

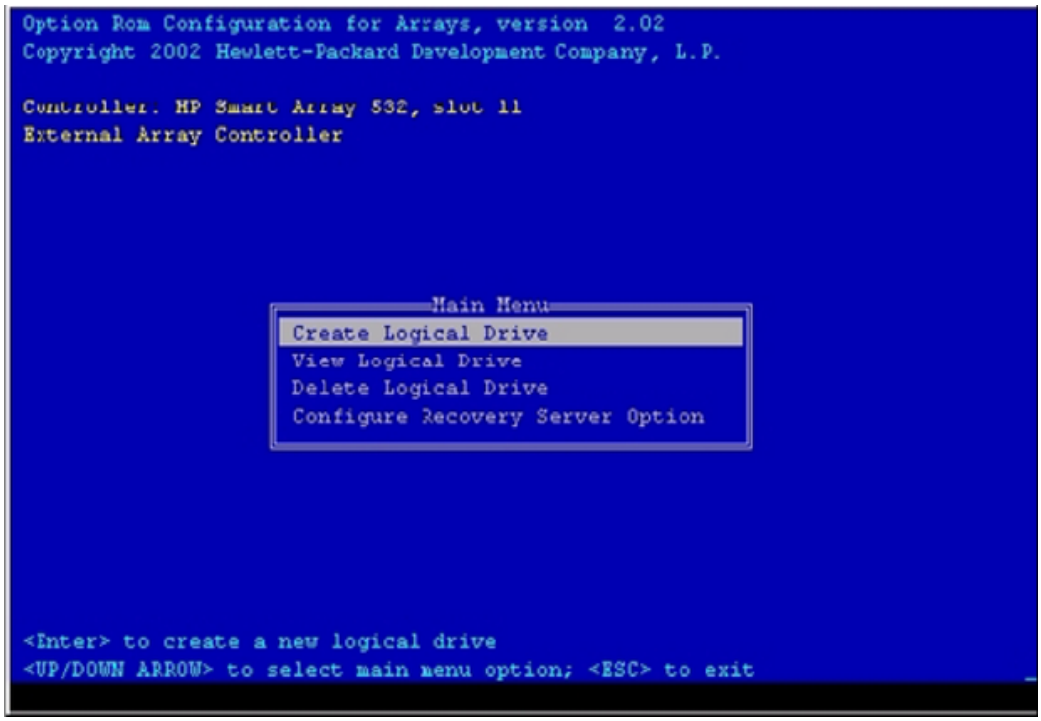
	ACU	ORCA
Supported Features		
Uses a graphical interface	Yes	No
Available in languages other than English	Yes	No
Available on CE	Yes	No
Uses a wizard to suggest the optimum configuration for an unconfigured controller	Yes	No
Describes configuration errors	Yes	No
Suitable for configuration while online	Yes	No
Suitable for configuration while offline	No	Yes
Supported Procedures		
Creation and deletion of arrays and logical drives	Yes	Yes
Assignment of RAID level	Yes	Yes
Sharing of spare drives among several arrays	Yes	No
Assignment of multiple spare drives per array	Yes	No
Setting of stripe size	Yes	No
Migration of RAID level or stripe size	Yes	No
Configuration of controller settings	Yes	No
Expansion of an array	Yes	No
Creation of multiple logical drives per array	Yes	No

ORCA Utility

To use ORCA, follow these steps:

1. Power on the server. POST runs, and any array controllers that are in the server are initialized one at a time. During each controller initialization process, POST halts for several seconds while an ORCA prompt message displays.
2. At the ORCA prompt:
   - If you are connected using a headless console, press the **Esc+8** combination.
   - Otherwise, press **F8**. The **ORCA Main Menu** displays, enabling you to create, view, or delete a logical drive.

Figure 99 ORCA Main Menu



Creating a Logical Drive Using ORCA

To create a logical drive using ORCA, follow these steps:

1. Select **Create Logical Drive**. The screen displays a list of all available (unconfigured) physical drives and the valid RAID options for the system.
2. Use the **Arrow** keys, **Spacebar**, and **Tab** to navigate around the screen and set up the logical drive, including an online spare drive if one is required.

NOTE: You cannot use ORCA to configure one spare drive to be shared among several arrays. Only ACU enables you to configure shared spare drives.

3. Press **Enter** to accept the settings.
4. Press **F8** to confirm the settings and save the new configuration. After several seconds, the **Configuration Saved** screen displays.
5. Press **Enter** to continue. You can now create another logical drive by repeating the previous steps.

NOTE: Newly created logical drives are invisible to the operating system. To make the new logical drives available for data storage, format them using the instructions given in the operating system documentation.

ACU Utility

For detailed information about using ACU, see the *HP Array Configuration Utility User Guide* at I/O Cards and Networking Software at:

http://www.hp.com/go/integrity-iocards-docs

D Utilities

This appendix describes the utilities that are part of the server. These include the EFI Boot Manager, and EFI-POSSE.

This appendix addresses the following topics:

- "Extensible Firmware Interface Boot Manager" (page 294)
- "EFI/POSSE Commands" (page 297)
- "Specifying SCSI Parameters" (page 314)
- "Using the Boot Option Maintenance Menu" (page 320)
- "iLO 2 MP" (page 326)

Extensible Firmware Interface Boot Manager

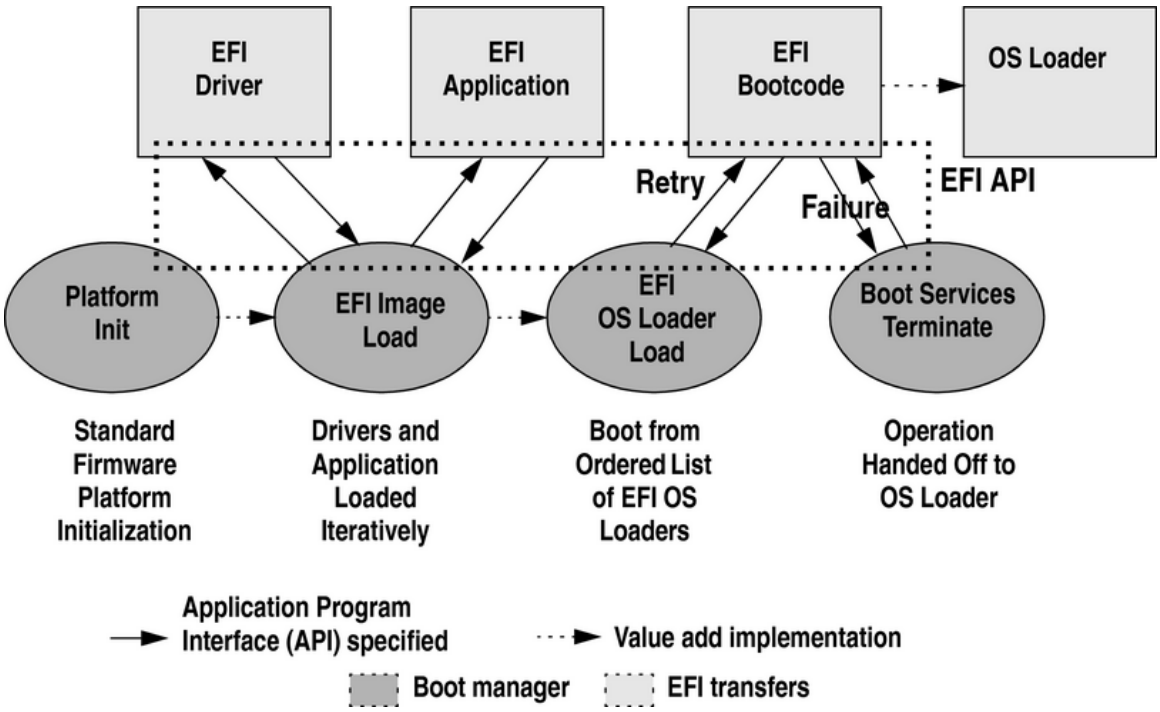
The Extensible Firmware Interface (EFI) is an OS and platform-independent boot and preboot interface. EFI resides between the OS and platform firmware, enabling the OS to boot without details about the underlying hardware and firmware. EFI supports boot devices, uses a flat memory model, and hides platform and firmware details from the OS.

NOTE: EFI and Pre-OS System Environment (POSSE) are similar. EFI is an Intel specification, whereas POSSE is the HP implementation that aids HP support.

EFI consolidates boot utilities similar to those found in PA-RISC systems, such as the Boot Console Handler (BCH), and platform firmware into a single platform firmware. EFI enables the selection of any EFI OS loader from any boot medium that is supported by EFI boot services. An EFI OS loader supports multiple options on the user interface.

EFI supports booting from media that contain an EFI OS loader or an EFI-defined system partition. An EFI-defined system partition is required by EFI to boot from a block device.

Figure 100 EFI Boot Sequence



The EFI Boot Manager loads EFI applications (including the OS first stage loader) and EFI drivers from an EFI-defined file system or image loading service. Non-volatile RAM (NVRAM) variables point to the file to be loaded. These variables contain application-specific data that is passed

directly to the EFI application. EFI variables provides system firmware with a boot menu that points to all the operating systems, even multiple versions of the same operating system.

The EFI Boot Manager enables you to control the server boot environment. Depending on boot option configuration after the server is powered up, the Boot Manager presents you with different ways to bring up the system. For example, you can boot to the EFI Shell, to an operating system located on the network or residing on media in the server, or to the **EFI Boot Maintenance** menu.

The following options are available in the **EFI Boot Manager** menu:

- Boot from a File—Automatically adds EFI applications as boot options or enables you to boot from a specific file. When you select this option, the system searches for an EFI directory. If the EFI directory is found, then it looks in each of the subdirectories below EFI. In each of those subdirectories, it looks for the first file that is an executable EFI application. Each of the EFI applications that meet this criterion can be automatically added as a boot option. In addition, legacy boot options for A: and C: are also added if those devices are present.

  You can also launch a specific application without adding it as a boot option. In this case, the EFI Boot Manager searches the root directories and the `\EFI\TOOLS` directories of all of the EFI system partitions present in the system for the specified EFI application.

- Add a Boot Option—Adds a boot option to the EFI Boot Manager. Specify the boot option by providing the name of the EFI application. Along with the name, you can also provide either ASCII or UNICODE arguments the file uses. Given the EFI application name and any options, the EFI Boot Manager searches for the executable file in the same directories as described in the Boot from a File option. When the file is found, it is executed.
- Delete Boot Options—Deletes a specific boot option or all boot options.
- Change Boot Order—Controls the relative order in which the EFI Boot Manager attempts to execute boot options. For help on the control key sequences you need for this option, see the help menu.
- Manage BootNext Setting—Selects a boot option to use only once (the next boot operation).
- Set Automatic Boot Timeout—Defines the value in seconds before the system automatically boots without user intervention. Set this value to zero to disable the timeout feature.
- Exit—Returns control to the **EFI Boot Manager** menu. This displays the active boot devices, including a possible integrated shell (if the implementation is so constructed).

For more information, see "Using the Boot Option Maintenance Menu" (page 320).

EFI Commands

Table 90 lists EFI commands for the server.

Table 90 EFI Commands

EFI Shell Command	BCH Command Equivalent (PA-RISC)	BCH Command Parameters (PA-RISC)	Definition
These commands are found in all other menus			
info boot	Boot	[PRI | HAA | ALT | <path>]	Boot from specified path
help <command>	HElp	[<menu> | <command>]	Display help for specified command or menu
reset	RESET		Reset the server (to allow reconfiguration of complex
exit (at EFI Shell)	MAin		Return to the main menu
MAin			
EFI Boot Manager "change boot order"	PAth	[PRI | HAA | ALT | CON | KEY | <path>]	Display or modify a path

Table 90 EFI Commands *(continued)*

EFI Shell Command	BCH Command Equivalent (PA-RISC)	BCH Command Parameters (PA-RISC)	Definition
bcfg	SEArch	[ALL]	Search for boot devices
bcfg	SEArch	[DIsplay□IPL] [<path>]	Search for boot devices
many commands offer a [-b] parameter to cause 25 line breaks	ScRoll	[ON | OFF]	Display or change scrolling capability
COnfiguration			
autoboot	AUto	[BOot | SEarch | STart] [ON | OFF]	Display or set the auto start flag
info boot	BootID	[<processor #>[<bootid #>]]	Display or set processor boot identifier
EFI Boot Manager	Boot info		Display boot-related information
autoboot	BootTimer	[0-200]	Seconds allowed for boot attempt
cpuconfig	CPUCONFIG	[<cpu>][ON | OFF]]	Configure or deconfigure processor
conconfig	CONCONFIG	[<cpu>] [index] [ON | OFF | primary]	Configure primary console
ioconfig	IOCONFIG	IOCONFIG [fast_init | mps_optimize | wol [on | off]]	Deconfigure or reconfigure I/O components or settings
boottest	FastBoot	[ON | OFF] or [test] [RUN | SKIP]	Display or set boot tests execution
date	Time	[cn:yr:mo:dy:hr:mn[:ss]]	Read or set the date
time	Time	[cn:yr:mo:dy:hr:mn[:ss]]	Read or set the real time clock
INformation			
info all	ALL		Display all server information
info boot	BootINfo		Display boot-releated information
info cpu	CAche		Display cache information
info chiprev	ChipRevisions		Display revision number of major VLSI
MP command <df>	FRU		Display FRU information
info fw	FwrVersion		Display firmware version for PDC, ICM, and complex
info io	IO		Display firmware version for PDC, ICM, and complex
lanaddress	LanAddress		Display core LAN station address
info mem	Memory		Display memory information
info cpu	PRocessor		Display processor information
SERvice			
errdump clear	CLEARPIM		Clear (zero) the contents of PIM

Table 90 EFI Commands *(continued)*

EFI Shell Command	BCH Command Equivalent (PA-RISC)	BCH Command Parameters (PA-RISC)	Definition
mm	MemRead	<addr> [<len>] [<type>]	Read memory locations scope of page deallocation
pdt	page deallocation table (pdt)		Display or clear the page deallocation table
errdump mca errdump cmc errdump init	processor internal memory (PIM)	[<proc>] [HPMC□LPMC□TOC□ASIC]]	Display PIM information

EFI/POSSE Commands

This section describes the EFI/POSSE commands developed for the server.

NOTE: EFI and Pre-OS System Environment (POSSE) are similar. EFI is an Intel specification. POSSE is an HP implementation of EFI that aids HP support.

help

Provides information on the EFI Shell commands. The help command also aids administrators familiar with the BCH menus to adjust to their equivalent functions in EFI.

Syntax

```
help [-b] <category>
help [-b] <cmd>
help [-b] bch <bchmenu> <bchcmd>
```

Parameters

```
-b              Enable page breaking
category        Category of commands to view help on commands
cmd             Shell command name on which to provide verbose information
bch             Display the list of BCH commands and their corresponding EFI
bchmenu         BCH menu name taken from the top level of the BCH menu
bchcmd          BCH command on which to display information
```

Operation

If you issue the `help` command with no parameters, a list of shell command categories displays. To list all of the commands within a category, enter **`help <category>`**. If help is issued with the **`-b`** option, any output longer than one page pauses after each page displays. If a shell command name is used as a parameter, verbose help displays for that command.

If you issue the `help` command with the **`bch`** option, it displays a list of BCH commands and their corresponding EFI/POSSE commands. It instructs you to repeat the command line followed by a menu name for more information on that menu. If you issue `help` within the **`bch`** option and a menu name, it displays a list of commands that appear under that BCH menu. You can then issue `help` followed by **`bch`**, the menu name, and a BCH command name to display information about that command. This points you to the EFI command that has taken the place of that BCH functionality, or will inform the user that the functionality no longer exists. Alternately, enter `help` followed by `bch` and a BCH command name to go straight to that command.

Example 2 `help` command

```
Shell> help
List of classes of commands:

boot          -- Booting options and disk-related commands
configuration -- Changing and retrieving system information
devices       -- Getting device, driver and handle information
memory        -- Memory related commands
shell         -- Basic shell navigation and customization
scripts       -- EFI shell-script commands
Type "help" followed by a class name for a list of commands in that class
Type "help" followed by command name for full documentation
```

Example 3 `help bch` command

```
    COnfiguration          help bch co
    INformation            help bch in
    PAth                   help bch pa
    ScRool                 help bch sr
    SEArch                 help bch sea
    SERvice                help bch ser
    BOot                   help bch bo
    HElp                   help bch he
    RESET                  help bch reset
    MAin                   help bch ma

    For more help on one of the commands above, at the prompt type:
        help bch COMMAND
```

Example 4 `help configuration` command

```
Shell> help configuration
Configuration commands:

cpuconfig  -- Deconfigure or reconfigure cpus
date       -- Display or set date
err        -- Display or set error level
esiproc    -- Make an ESI call
errdump    -- View/Clear logs
info       -- Display hardware information
monarch    -- View or set the monarch processor
palproc    -- Make a PAL call
salproc    -- Make a SAL call
time       -- Display or set time
ver        -- Displays version info

Type "help" followed by command name for full documentation on that command.
Type "help -a" to display a list of all commands.
```

Example 5 `help cpuconfig` command

```
Shell> help cpuconfig

CPUCONFIG [cpu] [on | off]

   cpu    Specifies which cpu to configure
   on | off Specifies to configure or deconfigure a cpu

   Notes:
        1. Cpu status will not change until next boot

   Examples:
       * To deconfigure CPU 0
       fs0:\> cpuconfig 0 off
       CPU will be deconfigured on the next boot

       * To display configuration status of cpus
       fs0:\> cpuconfig
       <CPU configuration data displayed>
```

Example 6 `help ioconfig` command

```
Shell> help ioconfig
Deconfigure or reconfigure IO components or settings

IOCONFIG [fast_init | wol [on | off]]

fast_init  Specifies device connection policy setting
wol        Specifies System Wake-On-LAN setting
on | off     Specifies to configure or deconfigure a feature or component

Note:
   1. If fast_init is enabled, firmware will connect only the minimum set of
      devices during boot.  This feature might cause boot failure; disable this
      feature if failure occurs.

   2. Any pending Wake-On-LAN request will not be cleared until reboot if
      the setting is changed to disabled.

      System will clear pending Wake-On-LAN requests each time the system
      reboots if the setting is disabled.

Examples:
  * To display the current settings
    fs0:\> ioconfig
    Fast initialization: Enabled
    System Wake-On-LAN: Disabled

  * To display the current device connection policy setting
    fs0:\> ioconfig fast_init
    Fast initialization: Enabled

  * To disable fast initialization
    fs0:\> ioconfig fast_init off
    Fast initialization: Disabled

  * To enable the System Wake-On-LAN setting
    fs0:\> ioconfig wol on
    System Wake-On-LAN: Enabled
```

baud

Sets the baud rate and communication settings for a universal asynchronous receiver-transmitter (UART).

Syntax

```
baud <index> <baudrate>
```

Parameters

```
<index> 0 through the total number of UARTS minus one
<baudrate>      baud rate.
```

Operation

Use this command to change the speed for a UART in the system. This command works for all UARTs visible to EFI/POSSE. If the UART is part of processor dependent hardware (PDH) space and is initialized by the core firmware, this command communicates the settings to core firmware so the UART can be initialized with the new settings on the next boot.

System default is 9600 baud.

Other communication parameters are listed in Table 91.

Table 91 Communications Parameters

Parameter	Value
RECEIVE_FIFO_DEPTH	1
TIMEOUT	1000000
PARITY	No parity
DATA_BITS	8
STOP_BITS	1
CONTROL_MASK	0

boottest

Interacts with the speedy boot variable enabling it to be set appropriately.

Syntax

```
boottest                        Displays status of all speedy boot bits
boottest on                     Run all tests (for a normal boot time)
boottest off                    Skip all tests (for a faster boot time)
boottest [test]                 Displays status of specific Speedy Boot bit
boottest [test] [on off]        Sets or clears a specific Speedy Boot bit
```

Parameters

```
[test]  Each test can be set or cleared:
        booting_valid   Enable/disable system firmware response to BOOTING
                        bit. If OS Speedy Boot aware set to on.
        early_cpu       Enable/disable early CPU selftests.
        late_cpu        Enable/disable late CPU selftests.
        platform        Enable/disable system board hardware tests.
        chipset         Enable/disable CEC tests.
        io_hw           Enable/disable EFI driver Core I/O tests.
        mem_init        Enable/disable memory initialization.
        mem_test        Enable/disable full destructive memory tests.
```

Example 7 `boottest` command

```
Shell> boottest
   BOOTTEST Settings Default Variable
   Selftest          Setting
   -------------     -------------------------
   booting_valid     On (OS speedy boot aware)
   early_cpu         Run this test
   late_cpu          Run this test
   platform          Run this test
   chipset           Run this test
   io_hw             Run this test
   mem_init          Run this test
   mem_test          Run this test
```

Example 8 `boottest early_cpu off` command

```
Shell> boottest early_cpu off
   BOOTTEST Settings Default Variable
   Selftest          Setting
   -------------     -------------------------
   booting_valid     On (OS speedy boot aware)
   early_cpu         Skip this test
   late_cpu          Run this test
   platform          Run this test
   chipset           Run this test
   io_hw             Run this test
   mem_init          Run this test
   mem_test          Run this test
```

cpuconfig

Use this command to display the configured or deconfigured state of processors in the system and enables the user to configure or reconfigure processors.

Syntax

```
cpuconfig <cpu> <on | off>
```

Parameters

```
<cpu>           specify a processor
<on | off>        state to set the processor to
```

Operation

Issue `cpuconfig` with no parameters to display the configured or deconfigured status of all processors. To reconfigure CPUs, specify a CPU number and a state `on` or `off`. If you enter a valid state that is different from the current state of a CPU, its status changes on the next boot.

NOTE: The last remaining configured CPU in a system cannot be deconfigured.

Example 9 `cpuconfig` command

```
Shell>  cpuconfig
PROCESSOR INFORMATION
       # of                  L3     L4     Family/
CPU    Logical               Cache  Cache    Model            Processor
Slot   CPUs       Speed      Size   Size    (hex.)     Rev      State
---   -------    ---------  ----   -----   ------   ----    ----------
 0         1      1 GHz     1.5 MB   None   1F/01     B1          Active
 1         1      1 GHz     1.5 MB   None   1F/01     B1          Active
```

Example 10 `cpuconfig 2` command

```
Shell> cpuconfig 2 off
CPU will be deconfigured on next boot.

Shell> cpuconfig
PROCESSOR INFORMATION
       # of                  L3     L4       Family/
CPU     Logical              Cache  Cache    Model            Processor
Slot    CPUs       Speed     Size   Size    (hex.)    Rev     State
---   -------    ---------  ----   -----   ------   ----    ----------
 0       1          1 GHz    3 MB   None    1F/00    B2          Active
 1       1          1 GHz    3 MB   None    1F/00    B2    Sched Deconf
```

conconfig

Use this command to configure the primary console and turn on other consoles for mirroring from the firmware.

Syntax

```
conconfig [index][on | off | primary]
```

Parameters

```
Index        Specifies index of console to set as primary
on           Enables the specified console as a secondary console
off          Puts console into "Not Configured" (NC) state
primary      Sets the specified console as primary
```

Notes

- Primary console setting will take effect after reboot
- P in the status column indicates that the console is the primary.
- S in the status column indicates that the console is the secondary.
- NC in the status column indicates that the console is not configured.
- If a disabled console is set to primary, it will be enabled.

Example 11 `conconfig` command

To display current primary operating system console

```
Shell> conconfig
CONSOLE CONFIGURATION
Index Status Type     Device Path
----- ------ ----     -----------
1      NC    Serial    Acpi(PNP0501,0)
2      S     Serial    Acpi(HWP0002,0)/Pci(1 1)
3      P     VGA      Acpi(HWP0002,0)/Pci(4 0)
```

Example 12 `conconfig 2 primary` command

To change primary operating system console

```
Shell> conconfig 2 primary
CONSOLE CONFIGURATION
 Index Status Type     Device Path
 ----- ------ ----     -----------
 1       NC  Serial    Acpi(PNP0501,0)
 2       P   Serial    Acpi(HWP0002,0)/Pci(1 1)
 3       S    VGA        Acpi(HWP0002,0)/Pci(4 0)
```

Example 13 `conconfig 3 off` command

To disable a console

```
Shell> conconfig 3 off
CONSOLE CONFIGURATION
Index Status Type     Device Path
 ----- ------ ----     -----------
 1      NC    Serial   Acpi(PNP0501,0)
 2      P     Serial   Acpi(HWP0002,0)/Pci(1 1
 3      NC    VGA      Acpi(HWP0002,0)/Pci(4 0)
```

Example 14 `conconfig 3 on` command

To enable a console

```
Shell> conconfig 3 on
CONSOLE CONFIGURATION
Index Status Type     Device Path
 ----- ------ ----     -----------
 1      NC    Serial   Acpi(PNP0501,0)
 2      P     Serial   Acpi(HWP0002,0)/Pci(1 1)
 3      S     VGA      Acpi(HWP0002,0)/Pci(4 0)
```

ioconfig

Use this command to deconfigure or reconfigure I/O components or settings.

Syntax

```
ioconfig <fast_init | mps_optimize | wol> <on | off>
```

Parameters

```
<fast_init>    specifies device connection policy setting
<mps_optimize> specifies PCIe MPS optimization setting
<wol>          specifies system wake-on-lan setting
<on | off>      specifies to configure or deconfigure a feature or component
```

Operation

The `ioconfig` file is used to retain information on system's I/O configuration across reboots. The `ioconfig` file is created by `insf` at install time; and is modified by `insf`, `rmsf`, and `ioscan` when devices are added or removed. The only purpose of the `ioconfig` file to maintain configuration information when the system is not running.

Example 15 `ioconfig` command

```
Shell> ioconfig
Deconfigure or reconfigure IO components or settings

IOCONFIG [fast_init | wol [on | off]]

fast_init  Specifies device connection policy setting
mps_optimie Specifies PCIe optimization setting
wol        Specifies System Wake-On-LAN setting
on | off    Specifies to configure or deconfigure a feature or component

Note:
   1. If fast_init is enabled, firmware will connect only the minimum set of
      devices during boot.  This feature might cause boot failure; disable this
      feature if failure occurs.

   2. A reboot is required for PCIe MPS sptimiation changes to take effect

   3. Any pending Wake-On-LAN request will not be cleared until reboot if
      the setting is changed to disabled.

      System will clear pending Wake-On-LAN requests each time the system
      reboots if the setting is disabled.

Examples:
  * To display the current settings
    fs0:\> ioconfig
    Fast initialization: Enabled
    MPS optimization:    Disabled
    System Wake-On-LAN:  Disabled

  * To display the current device connection policy setting
    fs0:\> ioconfig fast_init
    Fast initialization: Enabled

  * To disable fast initialization
    fs0:\> ioconfig fast_init off
    Fast initialization: Disabled

  * To enable the System Wake-On-LAN setting
    fs0:\> ioconfig wol on
    System Wake-On-LAN: Enabled
```

default

Enables you to restore non-volatile memory (NVM) to default values and clear NVM storage values.

Syntax

```
default     [efi | sal]
default     clear [bmc | efi | sal]
```

Parameters

```
clear      clears NVM storage values
```

Operation

Sets NVM and stable store values to predefined default values. Normally only a subset of values are available for default. To reset the system, execute the `default clear` command.

errdump

Displays the contents of processor internal memory logged on the first machine check abort (MCA) for all processors present in the system.

Syntax

```
errdump [mca | cpe | cmc | init | la | clear]
```

Parameters

```
mca                 dumps the Machine Check Abort error log
cpe                 dumps the Corrected Platform Error log
cmc                 dumps the Corrected Machine Check log
init                dumps the Initialization log
la                  dumps the Logic Analyzer log
clear               erases all of the logs (mca, cpe, cmc, init, la)
```

Operation

Enter `errdump` with no parameters to display usage. Otherwise, the specified error log displays. Add `-n` to the clear parameter to disable the confirmation prompt. Access the `errdump`command from the **System Configuration** menu.

info

Displays most system information.

Syntax

```
info [ -b] [target]
```

Parameters

```
target:          valid targets are:
        all         display everything
        cpu         display information on cpus
        cache       display information on cache
        mem         display information on memory
        io          display information on io
        boot        display boot-related information
        chiprev      display information on chip revisions
        fw          display firmware version information
        sys         display system information
        warning     display warning and stop boot information
```

Example 16 `info all` command

```
Shell> info all

SYSTEM INFORMATION

Date/Time:  Oct 31, 2003  22:03:39  (20:03:10:31:22:03:39)

Manufacturer:  hp

Product Name:  server bl60p

Product Number:  A9901A

Serial Number:  MYJ3350026

UUID:  48B4F371-E34C-11D6-A8D6-07A8C14CB68B

System Bus Frequency:  200 MHz

PROCESSOR MODULE INFORMATION

         # of                L3      L4      Family/

   CPU   Logical             Cache   Cache   Model          Processor

   Slot  CPUs      Speed     Size    Size    (hex.)    Rev  State

   ----  -------  --------  ------  ------  -------  ---  ------------

     0       1        1 GHz  1.5 MB    None   1F/01    B1        Active

     1       1        1 GHz  1.5 MB    None   1F/01    B1        Active

MEMORY INFORMATION

     ---- DIMM A -----  ---- DIMM B -----

      DIMM   Current     DIMM   Current

---  ------ ----------  ------ ----------

 0   1024MB     Active  1024MB     Active

 1    ----                ----

 2    ----                ----

 3    ----                ----

   Active Memory    : 2048 MB

   Installed Memory : 2048 MB

I/O INFORMATION

BOOTABLE DEVICES

   Order  Media Type  Path

   -----  ----------  ---------------------------------------

   Seg  Bus  Dev  Fnc  Vendor  Device Slot

    #    #    #    #     ID      ID     #   Path
```

```
---  ---  ---  ---  ------  ------  ---  -----------
 00   00   01   00  0x1033  0x0035   XX  Acpi(HWP0002,0)/Pci(1|0)
 00   00   01   01  0x1033  0x0035   XX  Acpi(HWP0002,0)/Pci(1|1)
 00   00   01   02  0x1033  0x00E0   XX  Acpi(HWP0002,0)/Pci(1|2)
 00   00   02   00  0x1095  0x0649   XX  Acpi(HWP0002,0)/Pci(2|0)
 00   00   03   00  0x8086  0x1229   XX  Acpi(HWP0002,0)/Pci(3|0)
 00   20   01   00  0x1000  0x0030   XX  Acpi(HWP0002,100)/Pci(1|0)
 00   20   01   01  0x1000  0x0030   XX  Acpi(HWP0002,100)/Pci(1|1)
 00   20   02   00  0x14E4  0x1645   XX  Acpi(HWP0002,100)/Pci(2|0)
BOOT INFORMATION
   Monarch CPU:
   Current  Preferred
   Monarch   Monarch   Possible Warnings
   -------  ---------  -----------------
         0          0
   AutoBoot: OFF - Timeout is disabled
   Boottest:
   BOOTTEST Settings Default Variable
   OS is not speedy boot aware.
   Selftest     Setting
   ---------    --------------
   early_cpu    Run this test
   late_cpu     Run this test
   platform     Run this test
   chipset      Run this test
   io_hw        Run this test
   mem_init     Run this test
   mem_test     Run this test
   LAN Address Information:
   LAN Address        Path
   -----------------  ---------------------------------------
   Mac(00306E4C4F1A)  Acpi(HWP0002,0)/Pci(3|0)/Mac(00306E4C4F1A))
```

```
  *Mac(00306E4C0FF2)  Acpi(HWP0002,100)/Pci(2|0)/Mac(00306E4C0FF2))
FIRMWARE INFORMATION
   Firmware Revision: 1.10 [4341]
   PAL_A Revision: 7.31/5.37
   PAL_B Revision: 5.37
   SAL Spec Revision: 3.01
   SAL_A Revision: 2.00
   SAL_B Revision: 1.10
   EFI Spec Revision: 1.10
   EFI Intel Drop Revision: 14.61
   EFI Build Revision: 1.10
   POSSE Revision: 0.10
   ACPI Revision: 7.00
   BMC Revision: 2.24
   IPMI Revision: 1.00
   SMBIOS Revision: 2.3.2a
   Management Processor Revision: E.02.25
WARNING AND STOP BOOT INFORMATION
CHIP REVISION INFORMATION
   Chip                  Logical     Device       Chip
   Type                    ID          ID       Revision
   -------------------   -------     ------     --------
   Memory Controller         0       122b         0023
   Root Bridge               0       1229         0023
     Host Bridge          0000       122e         0032
     Host Bridge          0001       122e         0032
     Host Bridge          0002       122e         0032
     Host Bridge          0004       122e         0032
     Other Bridge            0          0         0002
     Other Bridge            0          0         0007
     Baseboard MC             0           0         0224
```

Example 17 info cpu command

```
Shell> info cpu

PROCESSOR MODULE INFORMATION

         # of                L3      L4      Family/
   CPU   Logical             Cache   Cache   Model          Processor
   Slot  CPUs      Speed     Size    Size    (hex.)    Rev  State
   ----  -------   --------  ------  ------  -------   ---  ------------
     0       1         1 GHz  1.5 MB    None   1F/01     B1         Active
     1       1         1 GHz  1.5 MB    None   1F/01     B1         Active
```

Example 18 info mem command

```
Shell> info mem

MEMORY INFORMATION

     ---- DIMM A -----  ---- DIMM B -----
      DIMM   Current     DIMM   Current
---  ------ ----------  ------ ----------
 0   1024MB     Active  1024MB     Active
 1    ----               ----
 2    ----               ----
 3    ----               ----
   Active Memory    : 2048 MB
   Installed Memory : 2048 MB
```

Example 19 `info io` command

```
Shell> info io

I/O INFORMATION

BOOTABLE DEVICES


   Order  Media Type  Path

   -----  ----------  --------------------------------------

     1    CDROM       Acpi(HWP0002,0)/Pci(2|0)/Ata(Primary,Master)/CDROM(Entry0)


   Seg  Bus  Dev  Fnc  Vendor  Device Slot
    #    #    #    #     ID      ID    #   Path

   ---  ---  ---  ---  ------  ------  ---  -----------

    00   00   01   00  0x1033  0x0035   XX  Acpi(HWP0002,0)/Pci(1|0)

    00   00   01   01  0x1033  0x0035   XX  Acpi(HWP0002,0)/Pci(1|1)

    00   00   01   02  0x1033  0x00E0   XX  Acpi(HWP0002,0)/Pci(1|2)

    00   00   02   00  0x1095  0x0649   XX  Acpi(HWP0002,0)/Pci(2|0)

    00   00   03   00  0x8086  0x1229   XX  Acpi(HWP0002,0)/Pci(3|0)

    00   20   01   00  0x1000  0x0030   XX  Acpi(HWP0002,100)/Pci(1|0)

    00   20   01   01  0x1000  0x0030   XX  Acpi(HWP0002,100)/Pci(1|1)

    00   20   02   00  0x14E4  0x1645   XX  Acpi(HWP0002,100)/Pci(2|0)

    00   40   01   00  0x1000  0x0021   02  Acpi(HWP0002,200)/Pci(1|0)

    00   40   01   01  0x1000  0x0021   02  Acpi(HWP0002,200)/Pci(1|1)

    00   80   01   00  0x14E4  0x1645   01  Acpi(HWP0002,400)/Pci(1|0)

    00   E0   01   00  0x103C  0x1290   XX  Acpi(HWP0002,700)/Pci(1|0)

    00   E0   01   01  0x103C  0x1048   XX  Acpi(HWP0002,700)/Pci(1|1)

    00   E0   02   00  0x1002  0x5159   XX  Acpi(HWP0002,700)/Pci(2|0)
```

Example 20 `info boot` command

```
Shell> info boot
BOOT INFORMATION
   Monarch CPU:
     Current  Preferred
     Monarch   Monarch    Possible Warnings
     --------  ---------   ------------------
             0           0
   AutoBoot: on - Timeout is : 7 SEC
   Boottest:
   boottest  Settings Default Variable
   OS is not speedy boot aware.

    Selftest       Setting
   ----------      --------------
    early_cpu      Skip this test
    late_cpu       Run this test
    platform       Run this test
    chipset        Run this test
    io_hw          Run this test
    mem_init       Run this test
    mem_test       Run this test
```

lanaddress

Displays the core I/O MAC address.

Syntax:

```
lanaddress
```

Parameters

none

Example 21 `lanaddress` command

```
Shell> lanaddress

LAN Address Information:

   LAN Address        Path

   -----------------  ---------------------------------------

   Mac(00306E4C4F1A)  Acpi(HWP0002,0)/Pci(3|0)/Mac(00306E4C4F1A))

  *Mac(00306E4C0FF2)  Acpi(HWP0002,100)/Pci(2|0)/Mac(00306E4C0FF2))
```

monarch

Displays or modifies the ID of the bootstrap processor. The preferred monarch number is stored in NVM.

Syntax

```
monarch <cpu>
```

Parameters

```
<cpu>      specifies a cpu
```

Operation

If specified with no parameters, `monarch` displays the Monarch processor for the system. Specifying a processor number alters the preferred Monarch processor. None of these changes takes affect until after a reboot.

Example 22 `monarch` command

```
Shell> monarch
 Current   Preferred
 Monarch    Monarch     Possible Warnings
 -------   ---------    -----------------
       0           0
       0           0

To view monarch: fs0 :  monarch

                  | Processor
------------------+-----------
current status    |    0
next boot status  |    0

To set the monarch processor to 1: fs0 :\ monarch 1

                  | Processor
------------------+-----------
current status    |    0
next boot status  |    1
```

pdt

Displays or clears the contents of the Page Deallocation Table (PDT).

Syntax

```
pdt (clear)
```

Parameters

```
<clear>      clears the pdt
```

Operation

With no options specified, `pdt` displays the PDT information for the system. You must clear the PDT and reboot the system for memory reallocation and safe booting.

Example 23 `pdt` command

```
Shell> pdt
PDT Information
                Last Clear time: PDT has not been cleared
       Number of total entries in PDT:                 50
        Number of used entries in PDT:                  0
        Number of free entries in PDT:                 50
  Number of single-bit entries in PDT:                  0
   Number of multi-bit entries in PDT:                  0
     Address of first multi-bit error:  x0000000000000000
```

Example 24 `pdt clear` command

```
Shell> pdt clear
Are you sure you want to clear the PDT? [y/N] y
Shell>

Shell> pdt
PDT Information

                Last Clear time: 10/21/01  5:00p
       Number of total entries in PDT:                 50
        Number of used entries in PDT:                  0
        Number of free entries in PDT:                 50
  Number of single-bit entries in PDT:                  0
   Number of multi-bit entries in PDT:                  0
     Address of first multi-bit error: 0x0000000000000000
```

sysmode

Displays or modifies the system mode.

Syntax

```
sysmode <normal | admin | service>
```

Parameters

```
<normal>     sets system mode to normal

<admin>      sets system mode to admin

<service>     sets system mode to service
```

Operation

If specified alone, `sysmode` displays the system mode. If a mode is specified as a parameter, the system mode changes immediately. The system mode is retained on successive boots.

Example 25 `sysmode` command

```
Shell> sysmode
System Mode: NORMAL

Shell> sysmode admin
You are now in admin mode.

Shell> sysmode service
You are now in service mode.

Shell> sysmode normal
You are now in normal mode
```

Specifying SCSI Parameters

The following SCSI parameters can be configured for the SCSI board:

- SCSI ID (SCSI initiator ID)
- Maximum data transfer rate (SCSI rate)
- Bus width
- Whether the HBA is bootable (driver support)
- Avoid bus resets (secondary cluster server)

Using the SCSI Setup Utility

To use the SCSI Setup Utility to specify SCSI parameters, follow these steps:

1. At the EFI Shell prompt, type the following command to map the parameters for all PCI cards installed in the system:

   shell> info io

   A list of all the devices that are installed in the server and managed by EFI drivers displays. For example:

```
Seg  Bus  Dev  Fnc  Vendor  Device Slot
 #    #    #    #     ID      ID     #   Path

---  ---  ---  ---  ------  ------  ---  -----------

 00   00   01   00  0x1033  0x0035   XX  Acpi(HWP0002,0)/Pci(1|0)

 00   00   01   01  0x1033  0x0035   XX  Acpi(HWP0002,0)/Pci(1|1)

 00   00   01   02  0x1033  0x00E0   XX  Acpi(HWP0002,0)/Pci(1|2)

 00   00   02   00  0x1095  0x0649   XX  Acpi(HWP0002,0)/Pci(2|0)

 00   00   03   00  0x8086  0x1229   XX  Acpi(HWP0002,0)/Pci(3|0)

 00   20   01   00  0x1000  0x0030   XX  Acpi(HWP0002,100)/Pci(1|0)

 00   20   01   01  0x1000  0x0030   XX  Acpi(HWP0002,100)/Pci(1|1)

 00   20   02   00  0x14E4  0x1645   XX  Acpi(HWP0002,100)/Pci(2|0)

 00   40   01   00  0x1000  0x0021   02  Acpi(HWP0002,200)/Pci(1|0)

 00   40   01   01  0x1000  0x0021   02  Acpi(HWP0002,200)/Pci(1|1)

 00   80   01   00  0x14E4  0x1645   01  Acpi(HWP0002,400)/Pci(1|0)

 00   E0   01   00  0x103C  0x1290   XX  Acpi(HWP0002,700)/Pci(1|0)

 00   E0   01   01  0x103C  0x1048   XX  Acpi(HWP0002,700)/Pci(1|1)

 00   E0   02   00  0x1002  0x5159   XX  Acpi(HWP0002,700)/Pci(2|0)
```

   In this example, a single SCSI interface is listed.

   For each channel of the SCSI board, note certain information. For example, look at the information for the SCSI interface. For each channel of *this* SCSI interface, note the following information:

   - `Bus #`: Identifies the bus the device is on. This is the same for both channels. In this example, the bus number is `20`.
   - `Dev #`: The ID the device is assigned on the bus. This is the same for both channels. In this example, the SCSI interface is device `01`.
   - `Fnc #`: Identifies the channel of the device (`00` for channel A, `01` for channel B, and so on). In this example, because the SCSI interface has two channels, one channel is `00` and the other is `01`.
   - `Vendor ID`: Shows the device vendor ID. This is the same for both channels. For all SCSI interfaces, the ID is `0x1000`.
   - `Device ID`: Shows the device ID. This is the same for both channels. In this example, the SCSI interface the ID is `0x0030`.
   - `Slot #`: Identifies the physical card slot in the system where the SCSI interface is installed. This is the same for both channels. In this example, the SCSI interface is on the system board, therefore the slot number is `xx`.

- `Path`: Identifies the device path. In this example, the SCSI interface path is `Acpi(HWP0002,200)/Pci(1|0)` for channel A and `Acpi(HWP0002,200)/Pci(1|1)` for channel B.

Using the SCSI interface information from this example, the combined information that tells you this is a SCSI interface are the following (shown in **bold**, for highlighting purposes):

```
00   20   01   00   0x1000   0x0030   xx   Acpi(HWP0002,200)/Pci(1|0)
00   20   01   01   0x1000   0x0030   xx   Acpi(HWP0002,200)/Pci(1|1)
```

The vendor (**0x1000**) and device (**0x0030**) are the IDs for a SCSI interface. Of the devices with those IDs, this device has two channels (Fnc # of **00** followed by Fnc # of **01**). Also, this SCSI interface has a non-numeric (XX) slot # indicating that it is on the system board.

2. From the EFI Shell prompt, enter the following command to obtain the controller's handle for the SCSI interface:

   `Shell> devtree`

   A tree of all EFI-capable devices installed in the system displays. For example:

```
Shell> devtree

Device Tree

Ctrl[04]

Ctrl[0A] Acpi(HWP0002,0)

Ctrl[12] Usb Open Host Controller

Ctrl[13] Usb Open Host Controller

Ctrl[14] Acpi(HWP0002,0)/Pci(1 2)

Ctrl[15] PCI IDE/ATAPI Controller

Ctrl[48] DW-28E

Ctrl[83] FAT File System [FAT32] 118 MB

Ctrl[16] Acpi(HWP0002,0)/Pci(3|0)

Ctrl[49] Acpi(HWP0002,0)/Pci(3|0)/Mac(00306E4C4F1A)

Ctrl[0B] Acpi(HWP0002,100)

Ctrl[17] LSI Logic Ultra320 SCSI Controller

Ctrl[18] LSI Logic Ultra320 SCSI Controller

Ctrl[19] Acpi(HWP0002,100)/Pci(2|0)

Ctrl[4B] Broadcom NetXtreme Gigabit Ethernet (BCM5701)

Ctrl[0C] Acpi(HWP0002,200)

Ctrl[0D] Acpi(HWP0002,400)

Ctrl[0E] Acpi(HWP0002,700)

Ctrl[1A] Acpi(HWP0002,700)/Pci(1|0)

Ctrl[1B] Acpi(HWP0002,700)/Pci(1|1)

Ctrl[36] 16550 Serial UART Driver

Ctrl[37] VT-100+ Serial Console
```

```
Ctrl[31] Primary Console Input Device

Ctrl[32] Primary Console Output Device

Ctrl[30] Primary Standard Error Device

Ctrl[1C] Acpi(HWP0002,700)/Pci(2|0)

Ctrl[32] Primary Console Output Device

Ctrl[30] Primary Standard Error Device

Ctrl[33] Acpi(PNP0501,0)

Ctrl[34] 16550 Serial UART Driver

Ctrl[35] VT-100+ Serial Console

Ctrl[31] Primary Console Input Device

Ctrl[32] Primary Console Output Device

Ctrl[30] Primary Standard Error Device

Ctrl[44] VenHw(904EFCF0-F0A8-11D4-B4CA-303031303833)

Ctrl[46] VenHw(D65A6B8C-71E5-4DF0-A909-F0D2992B5AA9)
```

This information describes the SCSI interface because the path on the first line, `Acpi(HWP0002,100)`, is the path from the information displayed by the `info io` command. The next two lines describe the SCSI interface two channels, one line for each channel. The lines contain the SCSI interface description [`LSI Logic Ultra160 SCSI Controller`]. The value shown for `Ctrl—17` and `18` at the beginning of each line is the controller's handle for each channel. You need this value for the next step.

NOTE: The controller's handle values changes on every boot.

3. From the EFI Shell prompt, enter the following command to obtain the EFI driver's handle for the SCSI interface:

   `Shell> drvcfg`

   A list of all EFI-capable configurable components in the system is displayed. For example:

```
Shell> drvcfg

Configurable Components

Drv[3D] Ctrl[15] Lang[eng]

Drv[3F] Ctrl[19] Lang[eng]

Drv[45] Ctrl[17] Lang[eng]

Drv[45] Ctrl[18] Lang[eng]
```

   This listing shows which driver controls which device (controller). This information describes a SCSI interface because the values shown for `Ctrl—17` and `18` are the controller's handles for the SCSI interface two channels (from the information displayed by the `devtree` command).

   NOTE: The EFI driver's handle values change on every boot.

TIP: From this command (`drvcfg`), record these two pieces of information for each channel of each SCSI interface for parameters to be changed:

- `Drv`(the EFI driver's handle)
- `Ctrl`(the controller's handle)

4. Using the driver's handle [`Drv`] and the controller's handle [`Ctrl`] from the `drvcfg`command, start the EFI SCSI Setup Utility for one channel of this SCSI interface.

   At the EFI Shell prompt, enter:

   `Shell> drvcfg -s drvr_handle cntrl_handle`

   where:

   - *`drvr_handle`*: The handle of the driver that controls the channel with the SCSI ID you want to display or change.
   - *`cntrl_handle`*: The handle of the controller for the channel with the SCSI ID you want to display or change.

   For channel A of this SCSI interface, enter:

   `Shell> drvcfg -s 45 18`

5. The EFI SCSI Setup Utility starts and its main menu displays, showing a list of all the EFI capable SCSI interfaces in the system.

   Move the cursor to highlight the channel of the SCSI interface. Press **Enter** to determine which channel of the interface to highlight, match the `PCI Bus`, `PCI Dev`, and `PCI Func` values on this screen to the `Bus #`, `Dev #`, and `Fnc #` values from the `info io` command.

CAUTION: Do **not** select the `<Global Properties>` option on the main menu.

TIP: To move the cursor in the EFI SCSI Setup Utility, use the following keys:

- Arrow keys: ↑ ↓ ← →
- Alternate keys:

  H = left

  J = down

  K = up

  L = right

  I = home

  O = end

6. The **Adapter Properties** screen for this channel of the SCSI interface displays. Be sure the utility is running for the channel of the SCSI interface by comparing the values shown for `PCI Bus`,

`PCI Device`, and `PCI Function` to the `Bus #`, `Dev #`, and `Fnc #` values from the `info io` command.

△ **CAUTION:** Do **not** change the value for any of the following fields on the **Adapter Properties** screen:

- `Auto Termination`
- `SCSI Parity`
- `SCSI Bus Scan Order`
- `Spinup Delay (Secs)`

Changing any of these fields can cause unpredictable results.

CAUTION: Do **not** change the value for any of the following fields on the **Device Properties** screen:

- `Scan Id`
- `Scan LUNs > 0`
- `Disconnect`
- `SCSI Timeout`
- `Queue Tags`
- `Format`
- `Verify`

Changing any of these fields can cause unpredictable results.

7. Display the SCSI parameters listed below for the channel of the SCSI interface and change the parameters if necessary, or restore its SCSI parameters to their default values.
   - SCSI ID
   - Maximum data transfer rate
   - Bus width
   - Whether the SCSI interface is bootable (driver support)
   - Avoid bus resets (secondary cluster server)
   - Restore Defaults
8. Use the arrow keys to navigate to the appropriate SCSI parameter.
9. Use the plus (**+**) and minus (**-**) keys to scroll through the values until the value you want displays.
10. Press **Esc** to exit the **Adapter Properties** screen.
11. Move the cursor to the action (`cancel`, `save`, or `discard`) you want to take, and press **Enter**.Select one of the following options:
    - Cancel the exit to stay on the **Adapter Properties** screen for the channel of the SCSI interface.
    - Save the changes you made, then exit the screen.
    - Discard the changes you made, then exit the screen.

    If you select `cancel`, you remain in the **Adapter Properties** screen for the channel of the SCSI interface. You can still change the channel's parameters.

    If you select `save` or `discard`, you go to the EFI SCSI Setup Utility main menu.

△ **CAUTION:** Do not select the `<Global Properties>` option on the main menu.

12. Press **Esc** to exit the main menu and the EFI SCSI Setup Utility.
13. Select the option for exiting the utility.
14. When prompted, press **Enter** to stop the SCSI interface; you are at the EFI Shell prompt.

15. At the EFI Shell prompt, enter the following command:

    ```
    Shell> reset
    ```

    The system starts to reboot. This is required to enable the new SCSI setting.

Using the Boot Option Maintenance Menu

This menu enables you to select console output and input devices as well as various boot options. It contains the following options:

- "Boot From a File" (page 320)
- "Add a Boot Option" (page 321)
- "Delete Boot Option(s)" (page 322)
- "Change Boot Order" (page 322)
- "Manage BootNext Setting" (page 323)
- "Set Auto Boot TimeOut" (page 323)
- "Select Active Console Output Devices" (page 323)
- "Select Active Console Input Devices" (page 324)
- "Select Active Standard Error Devices" (page 325)
- "Security/Password Menu" (page 325)
- "Resetting Passwords" (page 325)

These options are described in the following sections.

The following selections are available on all menus:

- **Help**: Displays the help available for the command.
- **Exit**: Returns to the main Boot Options Maintenance menu.
- **Enter**: Selects an item after using the arrow keys to highlight the item.
- **Save Settings to NVRAM**: Saves your changes.

NOTE: The options shown here are examples. Your system may have different options available based on the system configuration and installed hardware components.

Paths

All devices in the server are represented by paths in the EFI Shell. To identify the correct socket or disk drive, use the following tables.

Table 92 Server Sockets

Socket	Path
1 PCI	Acpi(HWP0002,400)/pci(0□0)
2 PCI	Acpi(HWP0003,400)/pci(0□0)

Table 93 Server Drives

Drive	Path
SCSI Disk	Acpi(HWP0002,100)/Pci(1□0)/Scsi(Pun0,Lun0)
SCSI Disk	Acpi(HWP0002,100)/Pci(1□1)/Scsi(Pun0,Lun1)
Removable Media Boot	Acpi(HWP0002,0)/Pci(2□0)/ATA(Primary,Master)

Boot From a File

Use this option to manually run a specific application or driver.

NOTE: This option boots the selected application or driver one time only. When you exit the application, you return to this menu.

This option displays the file systems on your server or workstation and enables you to browse these file systems for applications or drivers that are executable. Executable files end with the `.efi` extension. You can also select remote boot (LAN) options that have been configured on the network.

For example:

```
Boot From a File. Select a Volume

    NO VOLUME LABEL [Acpi(HWP0002,0)/Pci(2|0)/Ata(Primary,Master)/CDROM

    CD_FORMAT [Acpi(HWP0002,0)/Pci(2|0)/Ata(Secondary,Master)/CDROM

    Removable Media Boot [Acpi(HWP0002,500)/Pci(2|0)/Ata(Secondary,Master)

    Load File [EFI Shell [Built-in]]

    Load File [Acpi(HWP0002,0)/Pci(3|0)/Mac(00306E4C4F1A)]

    Exit
```

Where:

- `NO VOLUME LABEL`: A hard drive. When you format a hard drive, the EFI tools provide an option to LABEL the disk. In this example, the volume is not labelled.
- `CD_FORMAT`: The label created for the disk currently inside the DVD drive.
- `Removable Media Boot`: Allows you to boot from a removable media drive (CD/DVD drive). This option does not support booting from a specific file on a specific CD.
- `Load Files`: The EFI Shell and the LAN.

Add a Boot Option

Use this option to add items to the EFI boot menu.

This option displays the file systems that are on your system and lets you browse these file systems for applications or drivers that are executable. Executable files end with the `.efi`extension. You can also select remote boot (LAN) options that have been configured on the network. The option you select is added to the EFI boot menu.

If you add a new drive to your system, you must manually add its boot options list to make it a bootable device.

When adding a boot option that already exists in the Boot Manager list of boot options, you can choose whether to create a new option or modify the existing one.

- To modify an existing option, change the boot option name or add boot option arguments to the existing option.

NOTE: If you create a new boot option for an already existing option, multiple instances of the same boot option exist.

For example:

```
Add a Boot Option. Select a Volume

NO VOLUME LABEL [Acpi(HWP0002,0)/Pci(2|0)/Ata(Primary,Master)/CDROM

    Removable Media Boot [Acpi(HWP0002,0)/Pci(2|0)/Ata(Secondary,Master)

    Load File [EFI Shell [Built-in]]

    Load File [Acpi(HWP0002,0)/Pci(3|0)/Mac(00306E4C4F1A)]

    Exit
```

Where:

- NO VOLUME LABEL: A hard drive. You can search through the disk for bootable applications to add to the Boot Manager list of Boot options.
- `Removable Media Boot`: Treats the removable media as a bootable device.
- `Load File EFI Shell`: Adds a new instance to the EFI Shell. Load File with the MAC address adds a network boot option.
- `Load File with the MAC address`: Adds a network boot option.

Delete Boot Option(s)

Use this option to remove boot options from the EFI boot menu.

NOTE: This does not delete any files, applications, or drivers from your system.

This option displays a list of boot options that are configured on the system. The names match the options on the main Boot Manager menu.

If you remove a drive from the system, you must manually delete it from the boot options list.

- To delete an item from the list, use the arrow keys to highlight the item and press **Enter**.
- To remove all of the entries from the EFI Boot menu, select **Delete All Boot Options**. This setting can be used as a security device on systems that are accessed remotely.

Change Boot Order

Use this option to change the order of boot options. The order in which options are listed in the EFI boot menu also reflects the order in which the system attempts to boot. If the first boot option fails, the system tries to boot the second option, then the third, and so forth, until a boot option succeeds or until all options have failed.

For example, if you normally boot using a configuration on your LAN but want to boot from a local hard drive if the LAN is unavailable, move the LAN boot option to the top of the list, followed by the hard drive boot option.

The menu lists boot options that currently exist in the main Boot Manager menu. To change the priority of the items, select an option and move it up or down in the list.

- Press **U** to move an option up.
- Press **D** to move an option down.
- Select **Save Settings to NVRAM** to modify the order in the Boot Manager menu, which modifies the order that the Boot Manager attempts to boot the options.
- The items at the bottom of the screen are descriptions of the selected option.

For example:

```
Change boot order. Select an Operation

    EFI Shell [Built-in]

    Current OS

    Save Settings to NVRAM

    Help

    Exit


    VenHw(D65A6B8C-71E5-4DF0-A909-F0D2992B5AA9)

    Boot0000
```

Manage BootNext Setting

Use this option to run the selected boot option immediately upon entering the main Boot Manager menu. Select this option to boot an option that only needs to be booted once, without changing any other setting in the main Boot Manager menu. This is a one-time operation and does not change the permanent system boot settings.

This option displays the file systems that are on your system and lets you browse these file systems for applications or drivers that are executable. Executable files end with the `.efi`extension. You can also select remote boot (LAN) options that have been configured on the network.

To restore the default **BootNext** setting, select **Reset BootNext Setting**.

For example:

```
Manage BootNext setting. Select an Operation

    EFI Shell [Built-in]

    Current OS

    Reset BootNext Setting

    Save Settings to NVRAM

    Help

    Exit


    VenHw(D65A6B8C-71E5-4DF0-A909-F0D2992B5AA9)

    Boot0000
```

Set Auto Boot TimeOut

Use this option to set the amount of time the system pauses before attempting to launch the first item in the Boot Options list.

For example:

```
Set Auto Boot Timeout. Select an Option

    Set Timeout Value

    Delete/Disable Timeout

    Help

    Exit
```

Interrupting the timeout during the countdown stops the Boot Manager from loading any boot options automatically. If there is no countdown set, you must select boot options manually.

- To set the auto boot timeout value, in seconds, select **Set Timeout Value** and enter the desired value.
- To disable the timeout function, select **Delete/Disable Timeout**.

NOTE: When this option is selected, the server does not automatically boot. The server stops at the EFI boot menu and waits for user input.

Select Active Console Output Devices

Use this option to define the devices that display output from the system console. This list includes the VGA monitor and a serial port for directing output to a terminal emulation package.

NOTE: Multiple consoles are not supported for HP-UX or Windows. Use the Smart Setup CD to switch between COM A and the iLO 2 MP on Windows systems.

For example:

```
Select the Console Output Device(s)

      Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(PcAnsi)

Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100)

* Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100+)

Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(VtUtf8)

Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(PcAnsi)

Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(Vt100)

* Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(Vt100+)

Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(VtUtf8)

* Acpi(HWP0002,700)/Pci(2|0)
```

* indicates a currently selected device.

This menu is identical to the **Console Error Devices** menu. The server does not support different configurations for Output and Error console. When you make changes to either Output or Error console menus, you must make the identical change in the other menu. When you change serial devices, you must make changes to Output, Input, and Error menus for proper operation

Table 94 Console Output Devices

Device	Select
Serial A/Serial 1	Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100+)
iLO 2 MP Serial Console	Acpi(HWP0002,700)/Pci(1 | 1)/Uart(9600 N81)/VenMsg(Vt100+)
iLO 2 MP VGA Port	Acpi(HWP0002,700)/Pci(2|0)

- Each option is identified with an EFI device path. Not all options are available, depending on the configuration of the system and the options available. Device paths can differ slightly on different product models.
- On both serial device examples, UART 9600 indicates the current baud rate of the serial device which can be changed with the EFI Shell `baud` command, VenMsg Vt100+ is the current emulation type. Several different terminal emulation protocols are supported, as described in the previous example.
- Only one terminal emulation type (PcAnsi, Vt100, and so on) can be selected for each serial console, but multiple serial consoles can be selected at once.

Select Active Console Input Devices

Use this option to define the devices that are used to provide input to the system console.

This option displays the console devices on the system. This can include a standard keyboard and mouse, and a serial port for receiving output from a terminal emulation package on a laptop. Several different terminal emulation protocols are supported. When you change serial devices, you must make changes to Output, Input, and Error menus for proper operation.

NOTE: Some operating systems support multiple input devices, such as a simultaneous serial and keyboard input. See your OS documentation to determine how many consoles are supported with your system.

For example:

```
Select the Console Input Device(s)
  Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(PcAnsi)
```

```
  Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100)
* Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100+)
  Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(VtUtf8)
  Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(PcAnsi)
  Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(Vt100)
* Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(Vt100+)
  Acpi(HWP0002,700)/Pci(1|1)/Uart(9600 N81)/VenMsg(VtUtf8)
```

* Indicates a currently selected device.

- Each option is identified with an EFI Device path. Not all options will be available, depending on the configuration of the system and the options available. Device paths can differ slightly on different product models.
- On both serial device examples, `UART 9600` indicates the current baud rate of the serial device, `VenMsg Vt100+` is the current emulation type. Several different terminal emulation protocols are supported.
- Only one terminal emulation type (PcAnsi, Vt100, and so on) can be selected for each serial console, but multiple serial consoles can be selected at once.

Table 95 Console Input Devices

Device	Select
Serial A/Serial 1	Acpi(PNP0501,0)/Uart(9600 N81)/VenMsg(Vt100+)
iLO 2 MP Serial Console	Acpi(HWP0002,700)/Pci(1 | 1)/Uart(9600 N81)/VenMsg(Vt100+)

Select Active Standard Error Devices

Use this option to define the devices that display error messages from the system console.

This menu is identical to the Console Output Devices menu. The server does not support different configurations for Output and Error console. When you make changes to either Output or Error console menus, you must make the identical change in the other menu. When you change serial devices, you must make changes to Output, Input, and Error menus for proper operation

Using the System Configuration Menu

The System Configuration Menu on systems with EFI firmware version 2.0 or higher includes the following options:

- Security/Password Menu: Enables you to change the administrator and user passwords.
- Advanced System Information Menu: Displays information about system and component configuration.
- Set System Date: Enables you to modify the system date.
- Set System Time: Enables you to modify the system time.
- Reset Configuration to Default: Enables you restore system settings to their original configuration.
- Help: Displays additional information about the available options.
- Exit: Returns to the EFI startup menu.

Security/Password Menu

You can set administrator and user passwords to provide different levels of access to the system firmware.

Resetting Passwords

If you forget your passwords, reset them by running using the iLO 2 MP `<Ctrl+N>rs`command. This commando resets the iLO 2 MP and resets the password.

NOTE: You can only run this command when directly connected to the server.

iLO 2 MP

The Integrated Lights-Out Management Processor (iLO MP) for entry class Integrity servers is an autonomous management subsystem embedded directly on the server. It is the foundation of the server's High Availability (HA), embedded server, and fault management. It also provides system administrators secure remote management capabilities regardless of server status or location. The iLO MP is available whenever the system is connected to a power source, even if the server main power switch is in the off position.

HP has used several different names over the years to describe the management functionality embedded in their servers, including "the management processor." In addition, HP uses the term "management processor" to refer to any embedded microprocessor that manages a system. Management processor is a descriptive term (such as "server"), and iLO, is a brand name, or label (such as "Integrity").

Remote access is the key to maximizing efficiency of administration and troubleshooting for enterprise servers. Integrity servers have been designed so all administrative functions that can be performed locally on the machine, can also be performed remotely. iLO enables remote access to the operating system console, control over the server's power and hardware reset functionality, and works with the server to enable remote network booting through a variety of methods.

iLO 2 refers to an Integrated Lights Out 2 management processor (iLO 2 MP) with the latest advanced digital video redirection technology. This new feature gives you a higher performance graphics console redirection experience than with the previous iLO.

See the *HP Integrity Integrated Lights-Out 2 Operations Guide* for complete information on the iLO 2 MP.

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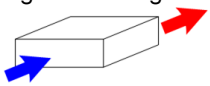
E Physical and Environmental Specifications

Table 96 Physical and Environmental Specifications

	Condition						Weight			Overall System Dimensions (W X D X H)	
	Typical Heat Release		Airflow, Nominal		Airflow, Maximun at 35°C[1]						
	Voltage 100-127 Vac	Voltage 200-240 Vac					Server	Rack	Pedestal	Rack	Pedestal
Description	Watts	Watts	CFM	m^3/hr^2	CFM	m^3/hr^2	75-90 lbs.	Max: 45.36 kg. (100 lbs.)	10.9 kg (24 lbs.)	69.6 cm (27.4 in.) x 44 cm (17.32 in.) x 17.24 cm (6.8 in.)	69.2 cm (27.2 in.) x 36.9 cm (14.5 in.) x 51.2 cm (20.2 in.)
Minimum Configuration	432 W	669 W	173	294	218	371			44.9 kg. (99 lbs.)		
Maximum Configuration	1095 W	1056 W	173	294	218	371			51.7 kg. (114 lbs.)		
Typical Configuration	685 W	669 W	173	294	218	371					

ASHRAE Class 1	Air Flow Diagram Cooling Scheme (F - R)  Front to Rear (F-R)	Minimum Configuration	(1x) Itanium 1.8G/24M CPU, (4x) 4GB DDRII DIMM memory, (0x) SAS Hard Drives, (0x) PCI/PCI-X/PCIe added to public I/O cards.
		Maximum Configuration	(2x) 1.8G/24M CPUs, (24x) 4GB DDRII DIMM memory, (8x) SAS Hard Drives, (8x) PCI/PCI-X/PCIe added to public I/O cards.
		Typical Configuration	Half-loaded configuration: (1x) Itanium 1.8G/24M CPUs, (12x) 4GB DDRII DIMM memory, (4x) SAS Hard Drives, (4x) PCI/PCI-X/PCIe added to public I/O cards.

[1] Derate maximum dry bulb temperature 1oC/300 m above 900 m.

[2] $m^3/hr=1.7 \times CFM$