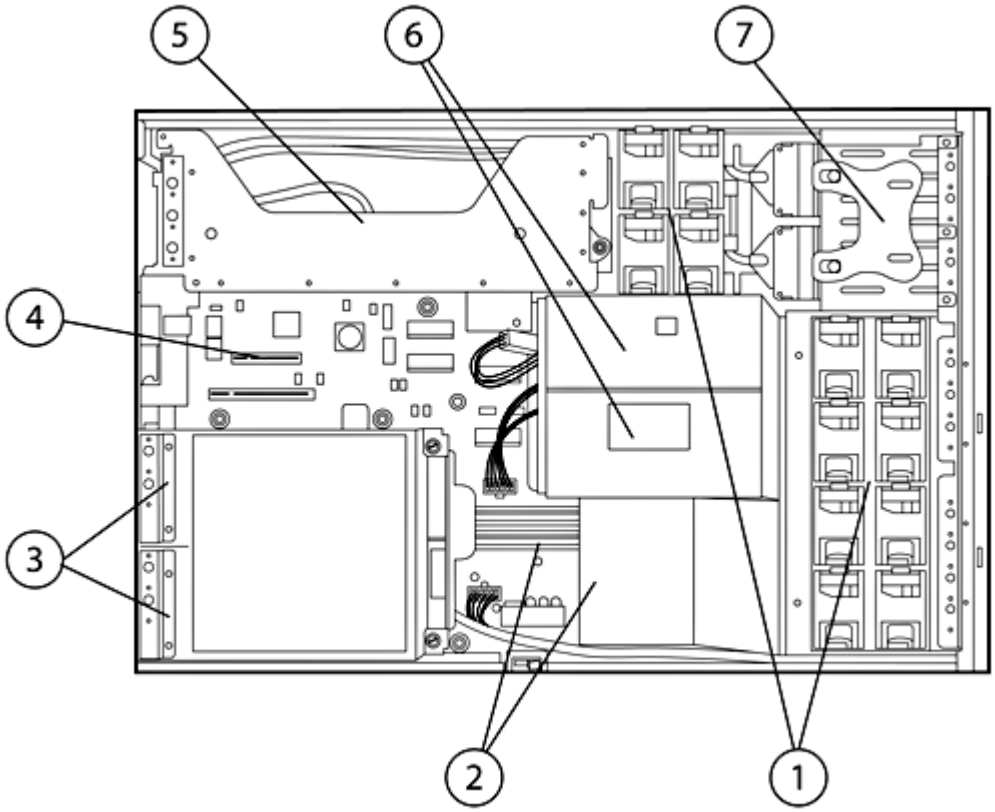
Overview



HP Integrity rx2660 System Overview (Top View)

1. 6 pairs redundant system fans (3 cooling zones)
2. 8x DIMM slots
3. N+1 power supplies
4. HP 8-port Smart Array SAS Controller (optional)
5. 3-slot I/O cage 3 PCI-x or 2 PCI-e; 1 PCI-x
6. CPUs
7. HDD cage

Overview

At A Glance

Standard System Features

- Four Operating System support: HP UX 11i version 2 (September 2006 Update required for dual core processors); HP-UX 11i version 3; Windows Server 2003 Enterprise Edition; Linux RHEL 4 U4 AS and ES, and SLES 10; OpenVMS (V8.3 minimum version required)
- Core 8 port Serial Attached SCSI (SAS) host bus adapter, supports up to two internal RAID 1 volumes (2×2 HDDs) and a disk for global hot spare, for a maximum of five disks in RAIDed arrays for HP UX, OpenVMS, and Linux. The additional three drives (of the maximum of eight drives supported) can be accessed normally, but not configured for RAID. Factory set up of RAID 1 is supported. Please see rx2660 Ordering Guide for details. HP/UX Mirroring is available for all HDDs in HP UX based systems and HP Volume Shadowing Level 1 is available for HDDs in OpenVMS based systems. Windows does not support the embedded 8 port SAS host bus adapter. Windows based customers must select the 8 port Smart Array P400 Serial Attached SCSI (SAS) controller, supports internal RAID 1, 5 and 6 configurations. The 8 port Smart Array P400 Serial Attached SCSI (SAS) controller is supported by HP UX, OpenVMS, and Linux as an optional add on.
- Core dual port 10/100/1000Base TX LAN (with auto speed sensing; RJ 45 connector, Wake On LAN support)
- Integrated iLO2 Management Processor for remote management and HA monitoring
- Telnet and web console via 10/100Base TX management LAN (RJ 45 connector)
- Two RS 232 serial ports, one for console from the integrated iLO2 management processor and one from the processor dependent hardware bus (PDH)
- Factory integration of processors, memory, disk drives, removable media, I/O cards, and HP Universal 10000 G2 series racks.
- Rackmountable into 19 inch cabinets-HP Universal 10000 Series G2 racks as well as many third party racks, including field integration into existing HP System E racks
- Optional stand alone pedestal mount
- Three year warranty with next business day on site

Standard Features

Minimum System

- One 64 bit Intel Itanium processor: Either dual core 1.6 GHz/18 MB L3 cache (533 MHz front side bus), dual core 1.4 GHz/12 MB L3 cache (533 MHz front side bus), or single core 1.6 GHz/6.0 MB L3 cache (533 MHz front side bus); or dual core 1.66 GHz/18 MB 9140M processor with L3 cache (667 MHz front side bus), dual core 1.42 GHz/12 MB 9120N processor with L3 cache (533 MHz front side bus), or single core 1.6 GHz/12.0 MB 9110N processor with L3 cache (533 MHz front side bus).
- One I/O card cage. Either all PCI X card cage (two 266 MHz/64 bit slots and one 133 MHz/64 bit slot) or Combo I/O card cage (two PCI Express slots with 4×333 MHz ropes and one 133 MHz PCI X slot). Windows systems must order the Combo (PCI Express and PC X) I/O card cage. The PCI X only card cage is not supported with Windows.
- 2 GB PC2 4200 x4 single rank Registered DDR2 SDRAMs (2×1GB DIMMs)
- Eight DIMM slots
- One hot swap power supply

Maximum Server Capacities

- Two 64 bit Intel Itanium processors: Dual core 1.66 GHz/18 MB 9140M processor with L3 cache (667 MHz front side bus), dual core 1.42 GHz/12 MB 9120N processor with L3 cache (533 MHz front side bus), or single core 1.6 GHz/12.0 MB 9110N processor with L3 cache (533 MHz front side bus).
- 32 GB PC2 4200 x4 single-rank Registered DDR2 SDRAMs (8×4 GB DIMMs)
- Eight DIMM slots
- Two hot swap power supplies, providing N+1 protection for power supplies and power input
- Three IO adapter cards
- One internal DVD ROM or DVD+RW drive
- Eight internal hot plug Serial Attached SCSI (SAS) disks

Standard System Features

- Four Operating System support: HP UX 11i version 2 (September 2006 Update required for dual core processors); HP UX 11i version 3; Linux RHEL 4 U4 AS and ES, and SLES 10; OpenVMS (V8.3 minimum version required); and Microsoft Windows Server 2003 Enterprise and Datacenter Edition, Microsoft Windows Server 2008 for Itanium-based Systems, and Microsoft SQL Server 2005 and SQL Server 2008
- Two Core IO Serial Attached SCSI (SAS) options, an embedded 8P SAS controller, and an optional 8 port Smart Array P400 SAS host bus adapter. Windows only supports the 8 port Smart Array P400 SAS host bus adapter.
- Core dual port 10/100/1000Base TX LAN (with auto speed sensing; RJ 45 connector, Wake On LAN support).
- Integrated iLO2 Management Processor for remote management and HA monitoring.
- Telnet and web console via 10/100Base TX management LAN (RJ 45 connector).
- Two RS 232 serial ports, one for console from the integrated iLO2 management processor and one from the processor dependent hardware bus (PDH).
- Factory integration of processors, memory, disk drives, removable media, I/O cards, and HP Universal 10000 G2 series racks.
- Rackmountable into 19 inch cabinets-HP Universal 10000 Series G2 racks as well as many third party racks, including field integration into existing HP System E racks.
- Optional stand alone pedestal mount.
- Three year warranty with next business day on site.

Standard Features

High Availability

- N+1 Hot swap cooling (not available with OFS [Office Friendly Server) system]
- One Hot swap power supply standard-optional second hot swap power supply for N+1 protection (two included in OFS systems for reduction of acoustics
- On line memory page deallocation
- ECC protected DDR2 memory
- Memory double chip spare to overcome single DRAM chip failures
- Dynamic Processor resilience and deallocation
- UPS power management
- Hot Plug internal disks
- Two Core IO Serial Attached SCSI (SAS) options, an integrated 8P SAS controller, and an optional 8 port Smart Array P400 SAS host bus adapter which comes with battery backed write cache (BBWC) and 256MB of memory. Windows only supports the 8 port Smart Array P400 SAS host bus adapter. When ordered the optional 8 port Smart Array P400 SAS host bus adapter is located in a 'private' slot and does use one of the system PCI slots. A maximum of (1) Core IO SAS controller connected to the embedded HDD's is supported on the rx2660 server.
- Journal file system with HP UX
- Auto reboot
- HP Serviceguard for HP UX
- HP Serviceguard Extension for RAC for HP UX
- HP Serviceguard Extension for SAP for HP UX
- Serviceguard Manager for HP UX and Linux Clusters
- HP Event Monitoring Service
- HA Monitors for HP UX
- HA Toolkits for HP UX and Linux
- HP Mirrordisk/UX
- Extended Campus Cluster, HP Metrocluster, and HP Continentalclusters for HP UX
- HP OpenVMS clusters
- HP Volume Shadowing for OpenVMS
- HP RMS Journaling for OpenVMS
- HP System Insight Manager (SIM) for proactive fault management
- Microsoft Cluster Service for Windows Server 2003 Enterprise and Datacenter Editions
- HP StorageWorks Software for HP Integrity Servers running Windows Server 2003 Enterprise and Datacenter Editions. Includes Cluster Extension XP and EVA, Continuous Access, Business Copy and SQL Server Fast Recovery, and Storage Mirroring
- HP StorageWorks Cluster Extension XP for Linux

Security

- TPM (Trusted Platforms Module) option available
- Separate LAN for system management
- Password protection on console port
- Disablement of remote console ports
- SSL encryption on web console

Standard Features

Manageability-Monitor	• Built-in Integrity iLO 2 Management Processor for comprehensive remote server management of HP-UX, Linux, Windows and OpenVMS • Integrity iLO 2 Advanced Pack for Virtual Media (CD, DVD, and ISO image) support of HP-UX, Windows and Linux, and Virtual KVM support of Windows • HP System Insight Manager (SIM) • HP Servicecontrol suite for HP-UX servers including tools for system administration, asset management, and fault management • HP-UX kernel configuration for easy, dynamic kernel parameter changes
Manageability-Optimize	• Process Resource Manager for HP-UX resource management • HP UX Workload Manager for HP-UX workload management based upon service level objectives • HP OpenView GlancePlus Pack • HP Intelligent Networking Pack for Windows • Remote Direct Memory Access (RDMA) pack for Windows • HP Performance Management Pack for Windows • Windows System Resource Manager (included with each copy of Windows Server 2003 Enterprise Edition)
Manageability-Deployment	• HP Rapid Deployment Pack for Windows and Linux

Configuration

Processor Configuration

The HP Integrity rx2660 is a symmetrical multiprocessing (SMP) server supporting up to two high performance 64 bit Itanium processors. Processor speeds cannot be mixed within the same system.

Processor Details

Single core Itanium processors:

- Single-core 1.6-GHz with 12.0-MB Level 3 Cache 9110N processor

Dual core Itanium processor:

- Dual core 1.42 GHz with 12 MB (6 MB per core) Level 3 Cache 9120N processor
- Dual core 1.66 GHz with 18 MB (9 MB per core) Level 3 Cache 9140M processor

All processors support:

- Level 2 Cache: 1 MB Instruction/256 KB Data per core
- Level 1 Cache: 32 KB per core
- 400 MHz System Bus
- Single bit cache error correction
- 50 bit physical addressing
- 64 bit virtual addressing
- 4 GB maximum page size

Memory Configuration

The HP Integrity rx2660 supports DDR (double data rate) SyncDRAM (synchronous dynamic random access memory) DIMMs with ECC and chip spare protection. The HP Integrity rx2660 has eight DIMM slots. A maximum of 32 GB is supported (8×4GB DIMMs).

Memory Loading Rules and Performance Guidelines

- Memory must be installed in groups of two DIMMs, also known as pairs or modules
- Each memory pair must consist of DIMMs of the same type: same capacity/density, same organization, same number of ranks, and same speed
- Memory be ordered in modules (pairs) of 2 GB (2×1GB), 4 GB (2×2GB), or 8 GB (2×4GB)
- Minimum memory is 2 GB (2×1GB). NOTE: 2-GB is required for HP-UX 11i v3.
- Maximum memory is 32-GB, using four 8 GB (2×4GB) memory pairs
- Arrange DIMMs so that the pairs with the largest capacity are in the lowest numbered slots
- For best performance, all DIMM slots should be populated with the same size DIMM.

Supported Memory Options

Description	Product Number
2-GB chip spare PC2 4200 ECC x4 single rank Registered DDR2 SDRAM memory pair (2×1 GB DIMMs)	AD274A
4-GB chip spare PC2 4200 ECC x4 single rank Registered DDR2 SDRAM memory pair (2×2 GB DIMMs)	AD275A
8-GB chip spare PC2 4200 ECC x4 single rank Registered DDR2 SDRAM memory pair (2×4 GB DIMMs)	AD276A

Configuration

Server Form Factors and Rack Configuration

The HP Integrity rx2660 is a 2U server. It comes in 3 form factors: rack mounted, OFS (Office Friendly Server) and pedestal versions. The rack mounted and OFS versions have the same base model product numbers with different options. The rack mounted versions are AH234A and AH235A options 001-003; the OFS are AH234A and AH235A options 004-006

The OFS is a pedestal form factor with reduced acoustics for workstation replacement and/or office environments. Note that the OFS does not support redundant fans or redundant power.

Please note that the pedestal version is not factory installed-it is a kit (AD251A) that must be assembled on site.

The rack mounted version of the rx2660 is supported in HP 10000 Series G2 cabinets. For factory integration order the Universal Rack Kit, AD253A, with 0D1 feature code. Sliding mounts and a cable management arm will be installed with the server in a factory integrated rack.

The HP Integrity rx2660 can be installed in the field with the Universal Rack Kit (AD253A with B01 feature code). This kit contains the slide mounts, cable management arm, and all other hardware needed to mount an rx2660 into a 19 inch cabinet.

Refer to the 10000 Series G2 Rack Best Practices Guide for information on rack deployment, stabilization, and transportation. Go to http://www.hp.com/go/rackandpower for more information.

Non-HP Cabinets

For customers who choose to use non HP cabinets, the HP Integrity rx2660 provides simple options for installation and HP field support. The HP Integrity rx2660 field rack kit (AD253A) contains adjustable slide rails, allowing the server to be mounted in cabinets that use the four post EIA mounting system.

Once the server is mounted in a non HP cabinet, it must meet some simple criteria to ensure that HP field personnel can fully support the rack environment.

- Anti Tip-The rack/cabinet must be solidly anchored to the floor both front and rear. This is usually accomplished by anti tip feet or by direct bolting to the floor.
- Air Flow-The HP Integrity rx2660 uses front to back airflow to cool the unit. Thus a cabinet cannot have a solid front or rear door. Solid doors may have to be removed or changed to an open perforation pattern.
- Cable Strain Relief-A proper method of strain relief must be used. This may force the elimination of the rear door in some cases.
- Front and Rear Access-For proper cooling and ease of service access, HP recommends 32 inches of unobstructed floor space in the front and rear of rack installations. This recommendation applies to both HP and third party racks and cabinets.

I/O Architecture

The HP Integrity rx2660 I/O architecture utilizes industry standard PCI X and PCI Express buses in a unique design for maximum flexibility, I/O card availability, performance, scalability, and reliability.

The HP Integrity rx2660 I/O architecture consists of six dedicated I/O channels which provide up to 8.2 GB/s of I/O bandwidth allocated across standard I/O connectivity (with the Combo I/O backplane option), a dedicated slot for an optional 8 port Smart Array P400 Serial Attached SCSI (SAS) controller (mandatory with Windows based systems) and three open slots for additional, optional I/O card choices. The diagrams above show how these channels allocate bandwidth to the open I/O slots and to the

Configuration

integrated core I/O.

The standard I/O connectivity is integrated on the rx2660 system board and includes an *integrated* HP 8 Internal Port SAS (Serially Attached SCSI) Host Bus Adapter, two 1000Base TX LAN ports, an RN50 graphics port, three USB v2.0 ports, and one general RS 232 Serial Port. Additionally, there is a standard Integrity iLO2 Management Processor with a rear RS 232 Serial Port.

Each port of SAS Host Bus Adapter can be connected to a SAS hard disk drive. SAS is a point to point architecture, compared to Ultra320 SCSI which is a bus based architecture. With SAS, each disk has its own individual 3 GB link. NOTE: That there are two possible 'integrated' RAID controllers for the rx2660: AD248A#106 refers to the embedded SAS RAID controller. AD248A#130, AD248A#530 and AD248A#540 refers to an add-in SAS p400 Smart Array card which occupies a 'private' slot (does not use one of the system's PCI slots).

HP UX, OpenVMS, and Linux support the integrated HP 8 Internal Serial Attached SCSI host bus adapter (AD248A#106), which supports a maximum of two RAID 1 volumes (2×2 HDDs) and a disk for global hotspare, for a maximum of five disks in RAIDed arrays. The remaining three disks (of the maximum eight disks that are supported) can be accessed normally, but not configured for RAID. Please note that MirrorDisk/UX is available for software mirroring on all HDDs in HP UX based systems, as HP Volume Shadowing (software Raid 1) for HDDs in OpenVMS based systems. Windows does not support this integrated HP 8 Internal Port SAS Host Bus Adapter. All Windows systems must order the HP 8 Port SAS Smart Array P400 Serial Attached SCSI (SAS) Controller Card (AD248A#130, AD248A#530, and AD248A#540), which is also available as an optional choice for HP UX, OpenVMS, and Linux systems. The HP 8 Port SAS Smart Array P400 Serial Attached SCSI (SAS) Controller is accommodated via a dedicated PCI Express slot, which provides up to 1.3 GB/s of sustained bandwidth.

The HP 8 Port SAS Smart Array P400 Serial Attached SCSI (SAS) Controller Card supports RAID 1, 5 and 6. All eight disks can be configured with this card for RAID 1, 5 and 6 in any combination. RAID 1 requires two identical HDDs, RAID 5 requires three identical HDDs, and RAID 6 requires four identical HDDs. Factory configuration of a RAID set is available. Please see rx2660 Ordering Guide for details. The two standard 1000Base TX LAN ports support Wake On LAN.

There is a mandatory choice of only one of two internal I/O card cage options, each option provides three I/O slots for I/O expansion within the system enclosure. The two I/O card cage options are an all PCI X Card Cage and a Combo Card Cage. The all PCI X Card Cage provides two PCI X 266 MHz 64 bit I/O slots and one PCI X 133 MHz 64 bit I/O slots (AD246A). Please note that this option (AD246A) is not supported with Windows based systems. Each slot of the AD246A has its own dedicated bus and its own independent I/O channel. An independent channel provides improved I/O performance and error containment. Independence protects each I/O card from bus hangs or extended latencies due to the failure or high bandwidth demands of other I/O cards. Independence also ensures that each I/O card can achieve maximum throughput. The two 266 MHz slots provide 2.1 GB/s of sustained bandwidth, while the one 133 MHz slot provides 1.1/GB/s of sustained bandwidth.

The Combination Card Cage (AD247A) provides two PCI Express x8 slots and one PCI X 133 MHz 64 bit I/O slot. Please note that the AD247A is required for Windows based systems. Each slot of the AD247A has its own dedicated bus and its own independent I/O channel. The two PCI Express slots 2.6 GB/s of sustained bandwidth, while the one 133 MHz slot provides 1.1 GB/s of sustained bandwidth.

All I/O slots are keyed for 3.3V I/O cards. 5V cards are not supported in the HP Integrity rx2660. OLAR (On-line add/remove) operations are not supported on the rx2660.

The chart below provides further details on the standard I/O.

Configuration

		Bandwidth	Bus Width	Bus Speed	Slot Keying
HP 8 Internal Port SAS Host Bus Adapter Core I/O. Supports up to 8 Internal SAS Disk Drives. NOTE: Not supported on Windows-based servers.	Integrated on System Board	512 MB/s, shared with 1000Base TX LAN Core I/O	64 bits	66 MHz	3.3 Volts
1000Base TX LAN Core I/O.	Integrated on System Board	512 MB/s, shared with HP 8 Internal Port SAS Host Bus Adapter Core I/O.	64 bits	66 MHz	3.3 Volts
RN50 Graphics (front or rear connection), 3 USB Ports (1 front, 2 rear), RS 232 General Serial Port	Integrated on System Board	133 MB/s, shared among all functions	32 bits	33 MHz	3.3 Volts
Integrity iLO2 Management Processor, 1 rear RS 232 Serial Port	Integrated on System Board				
Optional HP 8 Port SAS Smart Array P400 Serial Attached SCSI (SAS) Controller Card NOTE: This card is mandatory for Windows-based systems.	Private Slot	1.3 GB/s	64 bits		3.3 Volts

HP Integrity rx2660 HP-UX 11i Supported I/O Cards

I/O Card	Product Number	PCIe/ PCI-X	Boot Support	Connector Type(s)	Maximum Cards	Special Notes
Mass Storage Host Bus Adapters						
PCIe 4Gb Fibre Channel / GbE-T HBA combo	AD221A	PCIe	Yes		2	HP-UX 11i v3 only
PCIe 2-port 4Gb Fibre Channel / 2-port GbE-T HBA combo	AD222A	PCIe	Yes		2	HP-UX 11i v3 only
PCIe 2-port 4Gb Fibre Channel / 2-port GbE-SX HBA combo	AD393A	PCIe	Yes		2	HP-UX 11i v3 only
HP PCIe 1 port 4 Gb/s Fibre Channel HBA	AD299A	PCIe	Yes	LC	2	
HP PCIe 2 port 4 Gb/s Fibre Channel HBA	AD355A	PCIe	Yes	LC	2	
PCI-X 266 MHz 1 channel 4 Gb/s Fibre Channel	AB378B	PCI-X	Yes	LC	1	
PCI-X 266 MHz 2 channel 4 Gb/s Fibre Channel	AB379B	PCI-X	Yes	LC	3	
PCIe 2 port 4 Gb/s Fibre Channel	AD300A	PCIe	Yes	LC	2	
PCI 2 channel Ultra320 SCSI	A7173A	PCI-X	Yes	VHDCI	3	

Configuration

HP PCIe SC44Ge SAS HBA	AH303A	PCIe	Yes		2	
PCI-X 2 channel Smart Array 6402 Ultra320	A9890A	PCI-X	Yes	VHDCI	3	
PCI-X 4 channel Smart Array 6404 Ultra320	A9891A	PCI-X	Yes	VHDCI	3	
PCIe Smart Array P800	AD335A	PCIe	Yes	Mini SAS	2	
HP1-port 8Gb PCIe FC SR QLogic HBA	AH400A	PCIe	Yes		2	HP-UX 11i v3 only
HP 2-port 8Gb PCIe FC SR QLogic HBA	AH401A	PCIe	Yes		2	HP-UX 11i v3 only
HP 1-port 8Gb PCIe FC SR Emulex HBA	AH402A	PCIE	Yes		2	HP-UX 11i v3 only
HP 2-port 8Gb PCIe FC SR Emulex HBA	AH403A	PCIe	Yes		2	HP-UX 11i v3 only
Local Area Network (LAN) Adapters						
PCI-X 1-port 1000Base T	AD331A	PCI-X	Yes	RJ-45	3	
PCI-X 1-port 1000Base SX	AD332A	PCI-X	Yes	LC	3	
PCI-X 2 port 1000Base SX	A7011A	PCI-X	Yes	Duplex SC	3	
PCI-X 2 port 1000Base T	A7012A	PCI-X	Yes	RJ-45	3	
PCI-X 4-port 1000Base T Gbit Adapter	AB545A	PCI-X	Yes	RJ-45	3	
PCI-X 266 MHz 1 port 10 GbE	AD385A	PCI-X	Yes	Duplex LC	3/1	3 for rack version; 1 for OFS
HP PCIe 2 port 1000Base T card	AD337A	PCIe	Yes	RJ-45	2	
HP PCIe 2 port 1000Base SX card	AD338A	PCIe	Yes	Duplex SC	2	
HP PCI e 10GbE SR card	AD386A	PCIe	Yes		2	
PCIe 4 port HP NC364T Gbit Adapter	AD339A	PCIe	Yes		2	
Wide Area Network (WAN) Adapters						
2 port Programmable Serial Interface (PSI) X.25/Frame Relay/SDLC	J3525A	PCI-X	No	RS 530, RS 232, V.35, RS 449 or X.21	3	
Cluster Interconnect						
PCIe 2 port 4X DDR Fast IB HCA	AH304A	PCIe	No		2	HP-UX 11i v3 only
PCI-X 2 port 4x Fabric (HPC) Adapter	AB286C	PCI-X	No	4x Infiniband Copper	3	
Multi function Cards (Mass Storage/LAN)						
PCI-X 2 port 1000Base T/2 port Ultra320 SCSI Multi function Adapter	AB290A	PCI-X	Yes	SCSI - LVD/SE LAN - RJ-45	3	
PCI-X 2 Gb Fibre Channel/1000Base SX	A9782A	PCI-X	Yes	LC	3	
HP PCI-X 1 port 4 Gb Fibre Channel and 1 port 1000Base T Adapter	AD193A	PCI-X	Yes	(1) LC, (1) RJ-45	3	

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HP PCI-X 2 port 4 Gb Fibre Channel and 2 port 1000Base T Adapter	AD194A	PCI-X	Yes	(2) LC, (2) RJ-45	3	-
HP PCIe 1-port 4Gb Fibre Channel and 1-port 1000BaseT Adapter	AD221A	PCIe	Yes		2	HP-UX 11i v3 only
HP PCIe 2-port 4Gb Fibre Channel and 2-port 1000BaseT Adapter	AD222A	PCIe	Yes		2	HP-UX 11i v3 only
HP PCIe 2-port 4Gb Fibre Channel and 2-port 1000BaseT Adapter	AD393A	PCIe	Yes		2	HP-UX 11i v3 only
Additional Interface Cards						
PCI 8-port Serial MUX Adapter	AD278A	PCI-X	No		3	
PCI 64-port Serial MUX Adapter	AD279A	PCI-X	No		3	
16-port RS-232 RJ45 Port Module	AD280A	PCI-X	No		4 per AD279A	AD280A #001 Port Module Power Supply, required on Port Module (3) and Port Module (4) connected to an AD279A 64P MUX adapter.
16-port RS-232 DB25 Port Module	AD281A	PCI-X	No		4 per AD279A	AD281A #001 Port Module Power Supply, required on Port Module (3) and Port Module (4) connected to an AD279A 64P MUX adapter.
HP PCI Audio Card	AD317A	PCI-X	No		1	Factory Integration Only
HP 2D PCI-X graphics card	AH391A	PCI-X	No		PCI-X only backplane: 2 Combo backplane: 1	AH391A offers 2D graphics support. Support available for HP UX v3 and v2

HP Integrity rx2660 Windows Server 2003 Supported I/O Cards

NOTE: While ordering Windows Server 2008, do not mix differing brands of HBAs (Emulex and QLogic) within the same server configuration in an MPIO environment. This is to avoid issues which occur when different Fibre Channel HBAs are used within the same server which support different I/O max transfer packet sizes in an MPIO environment. For example, the Emulex Fibre Channel HBAs support a max I/O transfer packet size of 1MB and the QLogic Fibre Channel HBAs support a max I/O transfer packet size of 2MB. Mixing these two cards in an MPIO configuration can cause the system to hit a BSOD 0X000000D1 with a reference to elxstor.sys

This applied to the following products:
Emulex:
HP StorageWorks single port 8 Gigabit PCI-e FC Emulex HBA (AH402A)
HP StorageWorks dual port 8 Gigabit PCI-e FC Emulex HBA (AH403A)
HP StorageWorks 2 Gb Fibre Channel HBA (AB232A)
HP StorageWorks 2 Gb, 64-Bit/133 MHz PCI-X-to-Fibre Dual Channel HBA (AB466A)
HP StorageWorks 2 Gb, 64-Bit/133 MHz PCI-X-to-Fibre Single Channel HBA (AB467A)
HP StorageWorks 4 Gb Single Port 64-bit 266 MHz Fibre Channel HBA (AD167A)
HP StorageWorks 4 Gb Dual Port 64-bit 266 MHz Fibre Channel HBA (AD168A)

Configuration

HP StorageWorks FC2142 PCIe Single Port 4 Gb Fibre Channel adapter (A8002A)
HP StorageWorks FC2242 PCIe Dual Port 4 Gb Fibre Channel adapter (A8003A)

QLogic:
HP StorageWorks single port 8 Gigabit PCI-e FC QLogic HBA (AH400A)
HP StorageWorks dual port 8 Gigabit PCI-e FC QLogic HBA (AH401A)
HP StorageWorks 4 Gb Single Port 64-bit 266 MHz Fibre Channel HBA (AB429A)
HP StorageWorks 4 Gb Dual Port 64-bit 266 MHz Fibre Channel HBA (AB379A)
HP StorageWorks 4 Gb Dual Port 64-bit 266 MHz Fibre Channel HBA (AB379B)
HP StorageWorks FC1142 PCIe Single Port 4 Gb Fibre Channel adapter (AE311A)
HP StorageWorks AD300A PCIe Dual Port 4 Gb Fibre Channel adapter (AD300A)

I/O Card	Product Number	PCIe/ PCI-X	Boot Support	Connector Type(s)	Maximum Cards	Special Notes
Mass Storage Host Bus Adapters						
PCI-X 1 port 4 Gb/s Fibre Channel	AB429A	PCI-X	Yes [1]	LC	1	
PCI-X 266 MHz 2 port 4 Gb/s Fibre Channel	AB379B	PCI-X	Yes [1]	LC	1	
PCIe 1 port 4 Gb/s Fibre Channel	AE311A	PCIe	Yes [1]	LC	2	
PCI-X 1-port 4-GB/s Fibre Channel	AD300A	PCIe	Yes [1]	LC	2	
PCI-X 1 port 4 GB/s Fibre Channel	AD167A	PCI-X	Yes [1]	LC	1	
PCI-X 2 port 4 GB/s Fibre Channel	AD168A	PCI-X	Yes [1]	LC	1	
PCIe 2 port 4 Gb/s Emulex Fibre Channel	A8003A	PCIe	Yes [1]	LC	2	
PCIe 1 port 4 Gb/s Emulex Fibre Channel	A8002A	PCIe	Yes [1]	LC	2	
PCI 2 channel Ultra320 SCSI	A7173A	PCI-X	Yes	VHDCI	1	
PCIe Smart Array P800	AD335A	PCIe	Yes [2]	Mini SAS	2	Only 1 will be factory integrated.
PCIe Smart Array P500	AH226A	PCIe	Yes	Mini SAS	2	
PCI-X 1 port 4 Gb/s Fibre Channel	AB429A	PCI-X	Yes [1]	LC	1	
HP PCIe 1-port 8Gb FC SR (QLogic) HBA	AH400A	PCIe	Yes		2	
HP PCIe 2-port 8Gb FC SR (QLogic) HBA	AH401A	PCIe	Yes		2	
HP PCIe 1-port 8Gb FC SR (Emulex) HBA	AH402A	PCIe	Yes		2	
HP PCIe 2-port 8Gb FC SR (Emulex) HBA	AH403A	PCIe	Yes		2	
Local Area Network (LAN) Adapters						
HP PCI-X 2-port 1000Base-SX (optical) Gigabit Adapter	A7011A	PCI-X	Yes		1	
PCI 2 port 1000Base TX	A9900A	PCI-X	Yes	RJ-45	1	
HP PCIe 2 port 1000Base T card	AD337A	PCIe	Yes	RJ-45	2	
HP PCIe 2 port 1000Base SX card	AD338A	PCIe	Yes	Duplex SC	2	

Configuration

[1]Boot from fibre channel is supported, however not available directly from factory. Boot support must be configured in field.
[2]Boot from external storage only.

HP Integrity rx2660 Red Hat Enterprise Linux AS and ES Supported I/O Cards

I/O Card	Product Number	PCIe/ PCI-X	Boot Support	Connector Type(s)	Maximum Cards	Special Notes
Mass Storage Host Bus Adapters						
PCI-X Smart Array P600 Serial Attached SCSI (SAS) Controller	337972 B21	PCI-X	Yes	SFF8470	1	
PCI-X 1 port 4 Gb/s Fibre Channel	AB429A	PCI-X	Yes		1	
PCI-X 266 MHz 2 port 4 Gb/s Fibre Channel	AB379B	PCI-X	Yes	LC	1	
PCIe 1 port 4 Gb/s Fibre Channel	AE311A	PCIe	Yes	LC	2	
PCIe 2 port 4 Gb/s Fibre Channel	AD300A	PCIe	Yes	LC	2	
PCI-X 1 port 4 GB/s Fibre Channel	AD167A	PCI-X	Yes	LC	1	
PCI-X 2 port 4 GB/s Fibre Channel	AD168A	PCI-X	Yes	LC	1	
PCIe 2 port 4 Gb/s Emulex Fibre Channel	A8003A	PCIe	Yes	LC	2	
PCIe 1 port 4 Gb/s Emulex Fibre Channel	A8002A	PCIe	Yes	LC	2	
PCI 2 channel Ultra320 SCSI	A7173A	PCI-X	Yes	VHDCI	1	
HP PCIe SC44Ge SAS HBA	AH303A	PCIe	No		2	
512 MB cache memory upgrade for SA P600 controller	372538-B21	PCI-X	N/A	N/A	N/A	
PCIe Smart Array P800	AD335A	PCIe	Yes	Mini SAS	2	Only 1 will be factory integrated.
PCIe Smart Array P500	AH226A	PCIe	Yes	Mini SAS	2	
Local Area Network (LAN) Adapters						
PCIe 4-Gb Fibre Channel/GbE-T HBA combo	AD221A	PCIe	Yes		2	
PCIe 2-port 4-Gb Fibre Channel/2-port GbE-T HBA combo	AD222A	PCIe	Yes		2	
PCIe 2-port 4-Gb Fibre Channel/2-port GbE-SX HBA combo	AD393A	PCIe	Yes		2	
HP PCI-X 2-port 1000Base-SX (optical) Gigabit Adapter	A7011A	PCI-X	Yes		1	
PCI 2 port 1000Base TX	A9900A	PCI-X	Yes	RJ-45	1	
HP PCI-X 266MHz 10GigE SR Card	AD385A	PCI-X	Yes		1	
HP PCIe 2 port 1000Base T card	AD337A	PCIe	Yes	RJ-45	2	
HP PCIe 2 port 1000Base SX card	AD338A	PCIe	Yes	Duplex SC	2	

Configuration

For Infiniband support with Linux, please see the HPC Cluster Platform 6000 at www.hp.com/go/hptc.

* Boot from external storage only.

HP Integrity rx2660 OpenVMS Supported I/O Cards

I/O Card	Product Number	PCIe/ PCI-X	Boot Support	Connector Type(s)	Maximum Cards	Special Notes
Mass Storage Host Bus Adapters						
HP PCIe 1 port 4 Gb/s Fibre Channel HBA	AD299A	PCIe	Yes	LC	2	
HP PCIe 2 port 4 Gb/s Fibre Channel HBA	AD355A	PCIe	Yes	LC	2	
PCI-X 266 MHz 1 channel 4 Gb/s Fibre Channel	AB378B	PCI-X	Yes	LC	3	
PCI-X 266 MHz 2 channel 4 Gb/s Fibre Channel	AB379B	PCI-X	Yes	LC	3	
PCIe 2 port 4 Gb/s Fibre Channel	AD300A	PCIe	Yes	LC	2	
PCI 2 channel Ultra320 SCSI	A7173A	PCI-X	Yes	VHDCI	3	
HP PCIe SC44Ge SAS HBA	AH303A	PCIe	Yes		2	
PCI-X 2 channel Smart Array 6402 Ultra320	A9890A	PCI-X	Yes	VHDCI	2	
PCI-X 4 channel Smart Array 6404 Ultra320	A9891A	PCI-X	Yes	VHDCI	1	
PCIe Smart Array P800	AD335A	PCIe	Yes	Mini SAS	2	
Local Area Network (LAN) **Adapters**						
PCI-X 1 port 1000Base T	AD331A	PCI-X	Yes	RJ-45	3	
PCI-X 1-port 1000Base-SX	AD332A	PCI-X	Yes	LC	3	
PCI-X 2 port 1000Base SX	A7011A	PCI-X	Yes	Duplex SC	3	
PCI-X 2 port 1000Base T	A7012A	PCI-X	Yes	RJ-45	3	
PCI-X 4 port 1000Base T Gbit Adapter	AB545A	PCI-X	Yes	RJ-45	2	
HP PCI-X 266MHz 10GigE SR Card	AD385A	PCI-X	Yes		2	
HP PCIe 2 port 1000Base T card	AD337A	PCIe	Yes	RJ-45	2	
HP PCIe 2 port 1000Base SX card	AD338A	PCIe	Yes	Duplex SC	2	
PCIe 4 port HP NC364T Gbit Adapter	AD339A	PCIe	Yes		2	
Multi-Function Cards (Mass Storage/LAN)						
PCI-X 2 port 1000Base T/2 port Ultra320 SCSI Multi function Adapter	AB290A	PCI-X	Yes	SCSI - LVD/SE LAN - RJ-45	2	SCSI bootable
PCI-X 2 Gb Fibre Channel/1000Base SX	A9782A	PCI-X	Yes	LC	3	FC bootable
HP PCI-X 1 port 4 Gb Fibre Channel and 1 port 1000Base T Adapter	AD193A	PCI-X	Yes	(1) LC, (1) RJ-45	2	FC bootable
HP PCI-X 2 port 4 Gb Fibre Channel and 2 port 1000Base T Adapter	AD194A	PCI-X	Yes	(2) LC, (2) RJ-45	2	FC bootable

Configuration

HP PCIe 1-port 4Gb Fibre Channel and 1-port 1000BaseT Adapter	AD221A	PCIe	Yes		2	
HP PCIe 2-port 4Gb Fibre Channel and 2-port 1000BaseT Adapter	AD222A	PCIe	Yes		2	
HP PCIe 2-port 4Gb Fibre Channel and 2-port 1000BaseT Adapter	AD393A	PCIe	Yes		2	
Additional Interface Cards						
HP 2D PCI-X graphics card	AH391A	PCI-X	No		PCI-X only backplane: 2 Combo backplane: 1	AH391A offers 2D graphics support. Support available for OpenVMS

Internal Supported Storage Devices	
Device	**Product Number**
Internal Disk Drives (Optional - Maximum 8)	
72-GB 15K RPM SAS (Serial Attached SCSI) 2.5" Small Form Factor Hot Plug Disk	AD379A
146-GB 10K RPM SAS (Serial Attached SCSI) 2.5" Small Form Factor Hot Plug Disk	AD333A
HP Integrity 146GB 15K SAS SFF 3GB DP	AM302A
Removable Media Drive (Optional – Maximum 1)	
DVD ROM drive, Slimline	AD142A

HP USB Options

HP Integrity USB External DVD-RW drive — AT120A

NOTE: The HP Integrity USB External DVD-RW drive solution includes the External DVD drive (AT120A) with 9 inch USB cable, power adaptor, power cable and Y connector and 7-foot USB extension cable.

NOTE: The USB Y-connector goes between the extension cable and the 9-inch USB cable fixed with DVD drive.

NOTE: The Y-connector should NOT be placed between the server blade and the 7 foot Extension cable.

NOTE: The External USB drive(AT120A) comes box-packed and is not factory integrated with the server.

NOTE: If the External USB drive(AT120A) is ordered along with the server, the order needs to be allowed to ship from different locations.

Integrated Multi-function Core I/O

The integrated multi function I/O provides core I/O functionally and includes the management processor, which provides remote management and high availability monitoring capabilities.

Configuration

Core I/O

- Two 10/100/1000Base T LAN with RJ 45 connector-Supports LAN boot for operating system installation and wake on LAN capability
- HP 8 Internal Port SAS (Serial Attach SCSI) Host Bus Adapter, supports up to 8 internal SAS disk drives. Windows does not support the integrated SAS Host Bus Adapter. Windows customers must select the optional HP 8 Port SAS Smart Array P400 RAID controller.
- May select factory configured RAID. For HP-UX, OpenVMS, and Linux based systems, a maximum of two RAID 1 volumes (2×2 HDDs) and a disk for global hotspare, for a maximum of five disks in RAIDed arrays, is supported. The remaining three disks (of the maximum eight disks that are supported) can be accessed normally, but not configured for RAID. The HP 8 Port SAS Smart Array P400 RAID controller, supported in a PCI Express slot reserved for the RAID controller only, supports RAID 1, 5 and 6. The RAID controller is required for all Windows based systems (Windows does not support the integrated HP 8 Internal Port SAS host bus adapter), and is optional for HP UX, OpenVMS, Linux based systems. The maximum of eight disks can be configured for RAID 1, 5 and 6 in any combination. RAID 1 requires two identical HDDs, RAID5 requires three identical HDDs, and RAID 6 requires four identical HDDs. Factory configuration of a RAID set is available.
- Three USB 2.0 style A ports (USB 1.1 compatible); one front port, two rear ports
- One general purpose serial ports; an additional serial port is available for the integrated iLO2 Management Processor
- Telnet and web console via 10/100Base TX management LAN (RJ 45 connector)

Integrity Integrated Lights Out (iLO2) Management Processor Functionality

- Dedicated 10/100BaseTX LAN port for LAN console and embedded web console access
- One RS 232 serial port for local console
- Password protected console ports
- Console mirroring between all local, modem, LAN, and web consoles
- Remote power up and power down control
- Configurable remote access control
- Event notification to system console-Provides connectivity, information, and support for HP UX tools (such as STM and EMS) to notify by email, pager and/or HP response centers.
- Interface to system monitoring and diagnostic hardware via an internal IC bus
- Secure Sockets Layer security on web console
- Support for Integrity Integrated Lights Out (iLO2) Advanced Pack version 2 activation key and license (AD301A). Firmware license installs on the integrated Processor Management Card. Integrity Lights Out (iLO2) Advanced Pack provides additional remote management capabilities, including LDAP directory services, Virtual Media (CD, DVD, and ISO impage) for HP-UX, Windows, and Linux and Integrated Remote Console (Virtual Keyboard, Video, and Mouse) for Windows
- The RN50 integrated chip provides basic graphic capabilities. One VGA port is supported, with optional connection from front or rear of the system.

Supported resolutions and refresh rates include:

Operating System	Minimum Resolution	Refresh Rate	Maximum Resolution	Refresh Rate
HP-UX	1024x768	75 Hz	1920x1200	75 Hz
Linux	1024x768	75 Hz	1920x1200	75 Hz
Windows	640x480	75 Hz	1600x1200	75 Hz
OpenVMS	640x480	60 Hz	1920x1200	75 Hz

Configuration

System Console Configurations

The HP Integrity rx2660's integrated iLO2 Management Processor provides six methods for console connections.

- SSL secured Web console accessible through the 10/100Base T management LAN
- Standard telnet connections accessible through the 10/100Base T management LAN
- Local VT100 or hpterm terminal, or VT100 or hpterm emulator via local RS 232 serial connection
- Remote VT100 or hpterm terminal, or VT100 or hpterm emulator via external modem
- VGA graphics console. Keyboard and mouse connections are provided by USB. OpenVMS doesn't support VGA console for boot operations, but supports VGA device for graphics use after boot.
- Integrated Remote Console (virtual KVM) through the iLO 2 Advanced Pack (Windows systems only).

Internal Disk and Media Drives

- The HP Integrity rx2660 supports up to eight internal Serial Attached SCSI (SAS) 2.5 inch hot plug small form factor hard disk drives
- An 8 internal port host bus adapter provides 8 ports, 1 port per SAS disk, for point to point connection from the adapter to the disk. This means that each disk has its own 3 GB link.
- Factory configured RAID is available. For HP-UX, OpenVMS, and Linux based systems, a maximum of two RAID 1 volumes (2×2 HDDs) and a disk for global hot spare, for a maximum of five disks in RAIDed arrays, is supported. The remaining three disks (of the maximum eight disks that are supported) can be accessed normally, but not configured for RAID. The optional HP 8 Port SAS Smart Array P400 RAID controller, supported in a PCI Express slot reserved for the RAID controller only, supports RAID 1, 5 and 6. The RAID controller is required for all Windows based systems (Windows does not support the integrated HP 8 Internal Port SAS host bus adapter), and is optional for HP-UX, OpenVMS, Linux based systems. The maximum of eight disks can be configured for RAID 1, 5 and 6 in any combination. RAID 1 requires two identical HDDs, RAID5 requires three identical HDDs, and RAID 6 requires four identical HDDs. Factory configuration of a RAID set is available. Please see rx2660 Ordering Guide for details.
- Mirrordisk/UX is available for software mirroring on all HDDs in HP UX based systems, and HP Volume Shadowing (software Raid 1) is available for all HDDs in OpenVMS-based systems.
- Cables required to connect the internal disk drives to the host bus adapter are shipped with the system; no need to order separately.
- 36-GB 15K, 72-GB 15K, 146-GB 10K, and 300GB 10K Serial Attached SCSI (SAS) disks are supported. 300 GB 10K SAS disks will be supported in a future release (Q2 FY09).
- Optical media drives include a DVD ROM (AD142A) and DVD+RW (AD120A).

Configuration

HP Integrity Trusted Platform Module

The rx2660 has an accessory option for an embedded security chip - the Trusted Platforms Module (TPM) - product number AB404A. HP-UX Trusted Computing Services (HP-UX TCS) provides software support for the TPM when running HP-UX 11i v2. By providing a low-cost embedded security chip option (known as a Trusted Platform Module) in its zx2-based Integrity servers (rx2660, rx3600, and rx6600), HP has established a foundation for strong protection of sensitive information - including cryptographic keys. Built around industry standards, the Trusted Platform Module (TPM) provides a basis for key storage by securely generating and storing cryptographic keys. HP-UX 11i TCS takes this a step further by providing the necessary infrastructure for managing the TPM, as well as integrating it into select features such as HP-UX Encrypted Volumes and File Systems (EVFS).

Using HP-UX TCS with EVFS:

Using HP-UX TCS to make the unattended boot capability of EVFS more secure is an important example of how HP-UX TCS can be integrated with other applications to enhance security. For more information see the "Protecting EVFS Keys with HP-UX TCS" chapter in the "HP-UX Trusted Computing Services Administrators Guide" available in the HP-UX Trusted Computing Services section at: http://docs.hp.com/en/internet.html

Please note that HP-UX 11iTCS requires:

(1) An HP zx2-based Integrity server (rx2660, rx3600, or rx6600) with a TPM installed, running HP-UX 11iv2 September 2006 release or later
(2) Installation of kernel patch PHKL_35428

To download TCS and EVFS, please see the HP-UX Software Depot web page at: http://software.hp.com

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HP Integrity rx2660 Power Subsystem

The HP Integrity rx2660 provides a high level of integrated power protection:

- N+1 redundant hot swap power supplies
- N+1 redundant AC power input protection with electrical phase isolation
- Power monitoring and control

The HP Integrity rx2660 supports a second hot swap power supply for N+1 protection. One power supply is shipped as a standard part of every system and is required for correct operation. The hot swap design allows for the online replacement of a power supply when N+1=2 supplies are configured in the server.

The HP Integrity rx2660 provides an independent power input receptacle for each power supply (c13/C14 type). The independent design provides protection against losing the connection from a power cord or breaker. The HP Integrity rx2660 power cords should always be plugged into separate breakers whenever possible.

Server model number	rx2660	
Server product numbers	2 processor/4 core capable HP Integrity rx2660 server base system with two processor modules:	AH235A
	Configure with two 1.6 GHz/12 MB single core 9110N processor modules	001
	Configure with two 1.42 GHz/12 MB dual core 9120N processor modules	002
	Configure with two 1.66 GHz/18 MB dual core 9140M processor modules	003
	In addition to two processor modules, the base system includes one power supply (second supply can be added for redundancy-AD254A), 2×10/100/1000 GbE ports (supports Wake On LAN), and 8 port SAS controller. Must select I/O backplane (1 maximum)and a minimum of 2 GB memory. Disk drive must be added for a complete hardware solution.	
	OFS - Configure with two 1.6 GHz/12 MB single core 9110N processor modules	004
	OFS - Configure with two 1.42 GHz/12 MB dual core 9120N processor modules	005
	OFS - Configure with two 1.66 GHz/18 MB dual core 9140M processor modules	006
	Server From Factor (Required - Must choose either Factory Rack Integration or Field Rack Kit) Please refer to the HP 10000 Series G2 Rack Best Practices Guide for information on rack deployment, stabilization and transportation (http://www.HP.com/go/rackandpower)	
	Universal Rack Kit	AD253A
	Field Rack Kit	B01
	Includes rails and cable management arm.	
	Factory Rack Integration	B01
	For factory rack integration, a rack cabinet must appear in the same section of the order. The slides and cable management arm will be installed with the server in the rack cabinet when factory rack integration is ordered.	
	Pedestal Kit	AD251A
	Racking Support Shelf Kit. Required for all factory racked orders. One shelf kit is needed for every 10 servers in the rack and one for every gap left between servers.	AB469A

NOTE: If the N+1 power supply is ordered standalone the power supply will ship with two cords;; one connects the system to the rack PDU and one enables connection to a wall socket. The cord that connects the system power supply to the PDU has an IEC 13 end, which plugs into the system power supply's IEC 14 socket, and an IEC 14 end, which plugs into the PDU's IEC 13 socket. The localized cord that connects the system power supply directly to the wall socket has an IEC 13 end, which plugs into the system power supply's IEC 14 socket, and a country specific end, which plus into the wall socket. This localized cord is included at the distribution site.
If the N+1 power supply is ordered with the server, the additional cords will be included.

Technical Specifications

Supported Processors for Field Upgrades NOTE: Processor frequencies cannot be mixed within a system.	**1.6 GHz Single core Intel Itanium Processor** (AD392A)	
	Cache - On chip Level 1	32-KB
	Cache - On-Chip Level 2	1-MB Instruction/256-KB Data
	Cache - On-Chip Level 3	12-MB
	Floating point Coprocessor included	Yes
	1.4 GHz Dual core Intel Itanium Processor (AH240A)	
	Cache - On chip Level 1	32 KB
	Cache - On-Chip Level 2	1 MB instruction/256 KB Data (per core)
	Cache - On-Chip Level 3	12 MB (6 MB per core)
	Floating point Coprocessor included	Yes
	1.6 GHz Dual core Intel Itanium Processor (AH241A)	
	Cache - On chip Level 1	32 KB
	Cache - On-Chip Level 2	1 MB instruction/256 KB Data (per core)
	Cache - On-Chip Level 3	18 MB (9 MB per core)
	Floating point Coprocessor included	Yes
System Memory	**Minimum memory**	2 GB
	Maximum memory capacity (8x 4GB DIMMs)	32 GB
Internal Disks	**Maximum disk mechanisms**	8
	Maximum disk capacity	2,400 GB
Standard Integrated I/O	**Serial Attached SCSI** (SAS)	8 ports
	10/100/1000Base-T (RJ 45 connector)	2 port
	RS-232 serial port (general purpose)	1
	RS-232 serial port (management processor)	1
	10/100Base-T management port (RJ 45 connector)	Included
	VGA graphics	1 front/1 rear
	USB	1 front/2 rear
I/O Buses and Slots (Must select 1 only)	PCI-X 3 slot card cage (2×266 MHz/64 bit slots, and 1×133 MHz/64 bit slot)	AD246A*
	PCI-X/PCI Express combo card cage (2×Express slots with 4×333 MHz ropes, and 1×133 MHz/64 bit PCI-X)	AD247A**
	*Not supported with Windows based systems. **Required for Windows based systems. Optional for HP UX , Linux- and OpenVMS based systems.	

Technical Specifications

Maximum I/O Cards (See supported I/O table for product specifics)	**Mass Storage**	3
	LAN	3
	WAN	3
	Multi-Function (Mass Storage / LAN)	3
	Additional Interface Cards	3

Electrical Characteristics	**AC Input power**	100-240V 50/60 Hz
	Hot swap Power supplies	1 included, 2nd for N+1
	Redundant AC power inputs	1 included, 2nd for N+1
	Maximum input power (for maximum processor, memory, disk, DVD, I/O configurations)	798W 2,724 BTU/hour
	Input Power at Idle (for maximum processor, memory, disk, DVD, I/O configurations)	567W 1,936 BTU/hour
	Maximum input current	10A @ 100 Vms or 7A @ 200 Vms
	Power factor at full load	0.98 (approximately)

Site Preparation	**Site planning and installation included** NOTE: System is customer installable.	No
	Rack depth (inches/mm)	26.8 in (680 mm)
	Rack width (inches/mm)	19 in (482 mm)
	Rack height (EIA/inches/mm)	2U/ 3.4 in (86 mm)
	Rack weight (kg/lbs) maximum	61.6 lbs. (28 kg)

Environmental Characteristics	**Regulatory Model**	RSVL 0503
	Acoustics (operator/bystander) **at 77° F (25° C)**	7.0 Bels LwA
	Operating Temperature (up to 5000 ft/1524 m)*	41° to 95° F (5° to 35° C)
	Non-operating Temperature	5° to 35° F (-40° to 70° C)
	Maximum rate of temperature change	20° C/hour
	Operating relative humidity	15% to 80% RH non-condensing
	Non-operating relative humidity	8% to 85% non-condensing
	Operating altitude above sea level	10,000 ft (3,000 m) maximum
	Non-operating altitude above sea level	15,000 ft (4,600 m) maximum

* Maximum operating temperature range up to 5000 feet. For higher altitudes, de-rate the maximum temperature by 2°C/1000 feet above 5000 feet.

Regulatory Compliance	Regulatory Model Number	RSVLA-0503
	Electromagnetic interference	Complies with FCC Rules and Regulations, Part 15, as a Class A digital device. Manufacturer's Declaration to EN55022 Level A, VCCI Registered, Class 1, Korea RLL, BMSI Taiwan
	Safety	UL Listed, CSA Certified, TUV GS Mark compliant with EN 60950 and EN 41003
	More detailed regulatory documents and certifications	http://docs.hp.com/en/hw.html