Subchapter 2.4—hp server rp5400 series

hp server rp5470

Table 2.4.1 HP Server rp5470 Specifications

Server model number	**rp5470**	**Max. Network Interface Cards (cont.)**–see supported I/O table	
Server product number	**A6144B**	ATM 155 Mb/s–MMF	10
Number of Processors	1-4	ATM 155 Mb/s–UTP5	10
Supported Processors		ATM 622 Mb/s–MMF	10
PA-RISC PA-8700 Processor @ 650 and 750 MHz		802.5 Token Ring 4/16/100 Mb/s	10
Cache–Instr/data per CPU (KB)	750/1500	Dual port X.25/SDLC/FR	10
Floating Point Coprocessor included	Yes	Quad port X.25/FR	7
		FDDI	10
		Max. Additional Interface Cards–see supported I/O table	
		8 port Terminal Multiplexer	4
		64 port Terminal Multiplexer	10
PA-RISC PA-8600 Processor @ 550 MHz		Graphics/USB kit	1 kit (2 cards)
Cache–Instr/data/CPU (KB)	512/1024	Public Key Cryptography	10
Floating Point Coprocessor included	Yes	HyperFabric	7
		Electrical Characteristics	
TPM estimate (4 CPUs)	34,500	AC Input power	100-240V 50/60 Hz
SPECweb99 (4 CPUs)	3,750		
		Hotswap Power supplies	2 included, 3rd for N+1
		Redundant AC power inputs	2 required, 3rd for N+1
Min. memory	256 MB	Current requirements at 200V	6.5 A (shared across inputs)
Max. memory capacity	16 GB	Typical Power dissipation (watts)	1008 W
Internal Disks		Maximum Power dissipation (watts) [1]	1360 W
Max. disk mechanisms	4	Power factor at full load	.98
Max. disk capacity	292 GB	kW rating for UPS loading[1]	1.3
Standard Integrated I/O		Maximum Heat dissipation (BTUs/hour) [1]	4380 - (3000 typical)
Ultra2 SCSI–LVD	Yes	**Site Preparation**	
10/100Base-T (RJ-45 connector)	Yes	Site planning and installation included	No
RS-232 serial ports (multiplexed from DB-25 port)	3	Depth (mm/inches)	774 mm/30.5
Web Console (including 10Base-T port)	Yes	Width (mm/inches)	482 mm/19
I/O buses and slots		Rack Height (EIA/mm/inches)	7 EIA/311/12.25
Total PCI Slots (supports 66/33 MHz×64/32 bits)	10	Deskside Height (mm/inches)	368 mm/14.5
2 Hot-Plug Twin-Turbo (500 MB/s) and 6 Hot-Plug Turbo slots (250 MB/s)		Weight (kg/lbs) Max.	68 kg/150 lbs
2 Shared slots with a single 250MB/s channel		Maximum/Minimum power outlets required	4/3
Max. Mass Storage Host Bus Adapters–see supported I/O table		**Environmental Characteristics**	
Ultra2 SCSI–LVD	10	Acoustics (operator/bystander) at 25°C	< 7.2 Bels LwA
Dual port Ultra2 SCSI–LVD	10	Operating Temperature (up to 5000 ft)[2]	5° to 35°C (41°to 95°F)
FWD SCSI	10	Non-operating Temperature	–40°to 65°C
Dual port FWD SCSI	10		(–40°to 149°F)
RAID 4si PCI 4-port Ultra2 LVD/SE RAID Controller	10		
PCI 2x Fibre Channel Adapter	10	Maximum rate of temperature change	10°C/hour
Max. Network Interface Cards–see supported I/O table		Operating relative humidity	15% to 80%, non-cond.,
1000Base-SX	10		Max. wet bulb = 26°C
1000Base-TX	10	Non-operating relative humidity	5% to 90%, non-condensing
10/100Base-TX	10	Operating altitude above sea level	To 3.0 km (10,000 feet)
100Base-FX	10	Non-operating altitude above sea level	To 4.5 km (15,000 feet)
Quad Port 10/100Base-TX	7	**Regulatory Compliance**	
Dual Port 100Base-T Dual Port Ultra2 SCSI	8	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 A, Korea RLL
		Safety	UL Listed, CSA Certified, TÜV GS Mark, compliant with EN 60950 and EN 41003

[1] Max power/heat dissipation may increase with future upgrades

[2] Max operating temperature range up to 5000 ft. For higher altitudes de-rate the max temperature by 2°C/1000 ft above 5000 ft.

Overview

Figure 2.4.1 HP Server rp5470 System Overview (Front View)
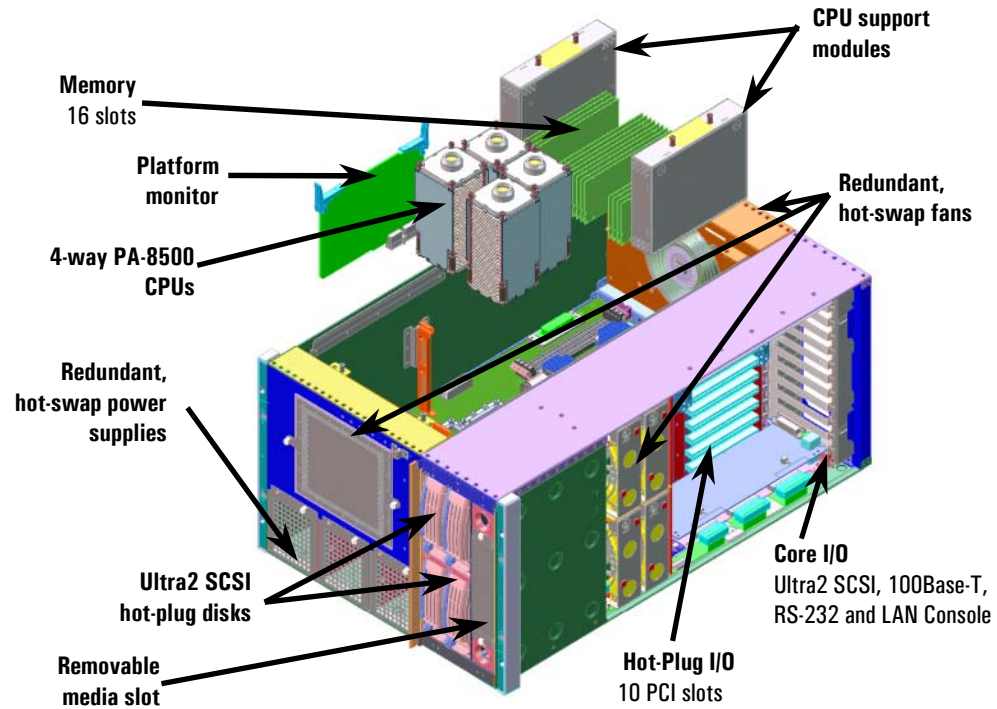
Figure 2.4.2 HP Server rp5470 System Architecture

System Speeds and Feeds	
System bus bandwidth	4.3 GB/s
Memory bus bandwidth	4.3 GB/s
I/O bandwidth total	3.2 GB/s
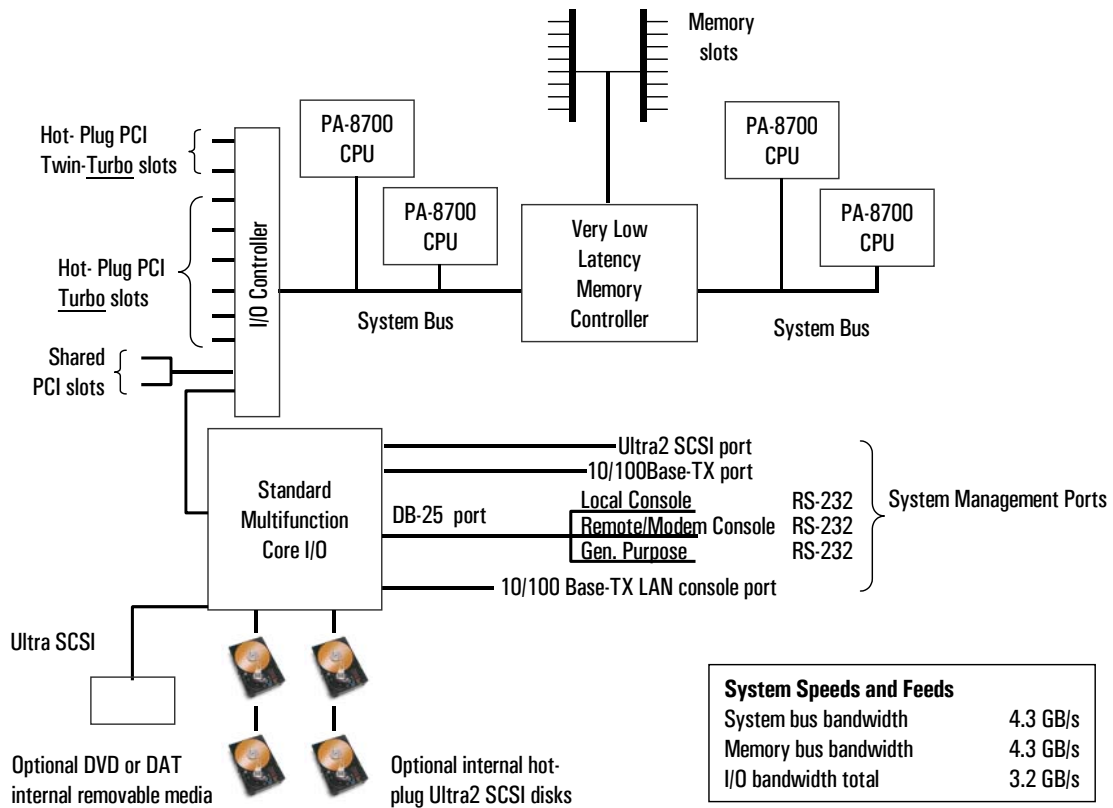
Features

Table 2.4.2 HP Server rp5470 Features

Minimum System	• One 64-bit PA-RISC processor
	  – 550-MHz PA-8600 with 1.5 MB on-chip cache
	  – 650-MHz PA-8700 with 2.25 MB on-chip cache
	  – 750-MHz PA-8700 with 2.25 MB on-chip cache
	• One processor support module–supports two CPUs
	• 256-MB SyncDRAM
	• Two power supplies

Maximum Server Capacities	• Four 64-bit PA-8600 or PA-8700 processors • Two processor support modules–supports two CPUs per module • 16-GB SyncDRAM • Three Hotswap power supplies, providing N+1 protection for power supplies and power input • Ten 66/33 MHz×64/32-bit PCI I/O slots–with adaptive signaling technology • One internal DVD ROM or DDS-3 drive • Four internal hot-plug LVD SCSI disks
Standard System Features	• 64-bit HP-UX 11 operating system with unlimited user license • External Ultra2 LVD SCSI channel • Two Internal SCSI controllers w/dual channels, 2 internal disks per controller • 10/100Base-T LAN (with auto speed sensing) • Management Processor technology with LAN console • Embedded web console access via management LAN • RS-232C local and remote/modem console and UPS ports (multiplexed from a single DB-25 port) • 100Base-T LAN port for system management • Factory integration of CPUs, memory, disk drives, removable media, and I/O cards • Rackmountable into 19-inch cabinets or deskside • Three-year warranty with next business day on-site
High Availability–all standard	• N+1 Hotswap cooling • Two Hotswap power supplies–optional third power supply for N+1 protection • On-line memory page deallocation • Chip Spare technology to overcome single DRAM failures • ECC protected SyncDRAM memory • Full parity protection of data and address buses • On-chip CPU cache with ECC protection • Dynamic Processor resilience and deallocation • On-line addition and replacement of PCI I/O cards (requires HP-UX 11i) • UPS power management • Hot Plug internal disks • Two independent Ultra SCSI buses to internal disks for mirroring across disks and controllers • Journal file system • Auto reboot • MC/ServiceGuard and MC/LockManager support • On-line diagnostics and system health monitor
Carrier Grade (Telco)	• See "HP Carrier Grade rp5400 Series" at the end of this section for optional carrier grade features
Security	• Separate LAN for system management • Password protection on console port • Disablement of remote console ports
Internet Server Functions	• Internet server (inetd) • Domain name server • Routing (OSPF, BIND, RIP, EGP, HELLO, gateD) • Network Time Protocol
Client Configuration Services	• Automatic configuration for printers, PCs, workstations, and X terminals (DHCP, Bootp, tftp, rbootp)
Optional Web Services	• Netscape Communication Server • Netscape Navigator
email	• Mail, MailX, ELM • Sendmail, MIME, SMTP, ESMTP
Remote Access Services	• Telnet, ftp, anonymous ftp server

Configuration

CPU Configuration

The HP Server rp5470 is a symmetrical multiprocessing (SMP) server supporting up to four high performance 64-bit PA-8600 or PA-8700 processors.

PA-8700 Details
- 650-MHz or 750-MHz clock speeds
- On-chip 2.25-MB high-speed cache (750 KB instruction, 1500 KB data)
- 4-way set associative cache
- Single-bit cache error correction
- 4-way superscalar
- 56 instruction reorder buffer
- Full PA-RISC 2.0 binary compatibility

PA-8600 Details
- 550-MHz clock speed
- On-chip 1.5-MB high speed cache (512-KB instruction, 1024-KB data)
- 4-way set associative cache
- Single-bit cache error correction
- 4-way superscalar
- 56 instruction reorder buffer
- Full PA-RISC 2.0 binary compatibility

CPU Configuration Rules

- CPUs can be installed one at a time
- Processor support modules: 1- or 2-way = 1 support module, 3- or 4-way = 2 support modules
- Configure processor support module A6799A for PA-8700 processors and A5796A for PA-8600 processors
- CPUs must be installed in the following sequence: 0, 2, 1, then 3
- CPUs support modules must be installed in the following sequence: 0, 1
- Supported processor configurations: 1-, 2-, 3-, or 4-way

Memory Configuration
The HP Server rp5470 supports SyncDRAM (Synchronous Dynamic Random Access Memory) DIMMs with full ECC protection. The HP Server rp5470 supports up to two memory carrier boards each providing 8 memory slots for a system total of 16 slots. Each memory carrier provides 2.15 GB/s of memory bandwidth, for a system total of 4.3 GB/s.

Memory Loading Rules
- Memory must be installed in pairs of equal density
- Memory is available in modules of various densities 256 (2×128 MB), 512 MB (2×256 MB), 1 GB (2×512 MB), or 2 GB (2×1024 MB)
- Minimum memory is 256 MB
- Maximum memory is 16 GB, using 2-GB modules and 2 memory carrier boards
- Memory chip spare is supported with the 512-MB, 1-GB and 2-GB memory modules
- Memory chip spare is not supported with the 256-MB memory module

Figure 2.4.3 Memory Carrier Board (Showing 2 pairs of DIMMs loaded)
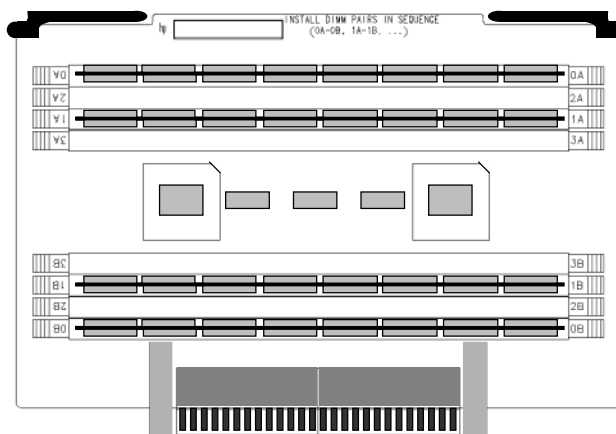

Performance Tuning Guidelines

- Each memory carrier has its own 2.15 GB/s bus. Configure multiple carriers to maximize bandwidth. It is highly recommended to use both carriers if more than 2 CPUs are loaded.
- Load memory equally across the available carriers
- If growth is planned for the system, then plan on configuring high-density 1- or 2-GB modules to minimize slot constraints.
- If the system is not intended to grow, configure lower-density modules to maximize memory interleaving and performance.

I/O Architecture

The HP Server rp5470 I/O architecture utilizes industry standard PCI buses in a unique design for maximum performance, scalability and reliability.

Figure 2.4.4 HP Server rp5470 I/O Architecture
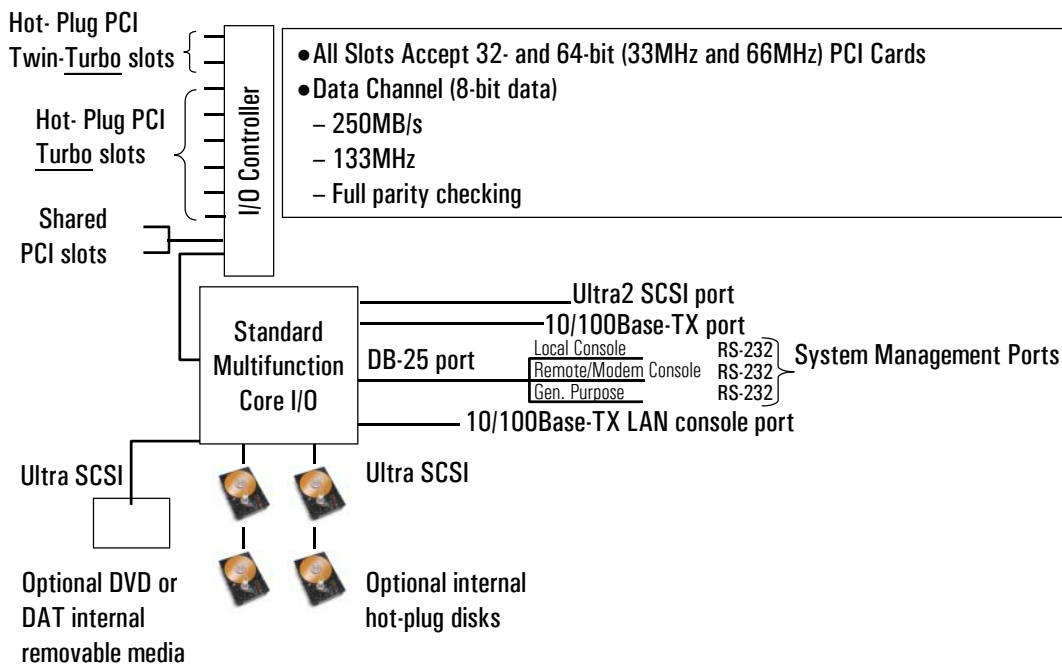
The HP Server rp5470 architecture uses 12 high-speed I/O channels. Each channel provides 250 MB/s of peak I/O throughput. The diagram above shows how these channels are used to provide 500 MB/s to the Twin-Turbo PCI slots, 250 MB/s to the Turbo PCI slots, 250 MB/s to the shared PCI slots, and 250 MB/s to the multifunction core I/O. The term "turbo" refers to a slot configuration where the I/O card has a dedicated I/O channel.

The top eight slots have hot-plug functionality under HP-UX 11i. Each of these 8 slots support 64 bit × 66 MHz PCI cards running at full speed. These slots are connected to the I/O controller via independent channels. The highest performing I/O cards should be placed in these slots. The independent channels provide 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 next two slots also support 64-bit×66-MHz I/O cards. These two slots share a single 250 MB/s channel and are not hot plug capable.

The eighth 250 MB/s channel supports the multifunction core I/O.

Slot keying: All HP Server rp5470 slots are keyed for 5 volts to support 5v and universal cards. Adaptive signaling interrogates each PCI card to provide the proper voltage and frequency, thus allowing cards to run at full potential.

	Number of Slots	Hot Plug	Bandwidth per Channel	Bus Width	Signaling Speeds	Slot Keying	Adaptive Signaling
Twin-Turbo	2	Yes	500 MB/s	64 bits	66 MHz and 33 MHz	5 volts	Yes
Turbo	6	Yes	250 MB/s	64 bits	66 MHz and 33 MHz	5 Volts	Yes
Shared	4	No	250 MB/s	64 bits	66 MHz and 33 MHz	5 Volts	Yes

Supported I/O Cards

Table 2.4.3 HP Server rp5470 Supported I/O Cards

I/O Card	Product Number	First HP-UX Release	Connector Type(s)	Hot Plug Support (with HP-UX 11.11)	Factory Integration	HP-UX Boot support	Maximum Cards per System	Maximum Ports per System
PCI 2 Gb/s Fibre Channel Adapter	A6795A	11.00	Duplex SC	Yes	Yes	Yes	10	10
PCI 2x 1-port Fibre Channel Adapter	A5158A	11.00	Duplex SC	Yes	Yes	Yes	10	10
Ultra2 LVD-SCSI	A5149A	11.00	VHDCI	Yes	Yes	Yes	10	10
Dual port Ultra2 LVD-SCSI	A5150A	11.00	VHDCI	Yes	Yes	Yes	10	20
FWD SCSI	A4800A	11.00	HD	Yes	Yes	Yes	10	10
Dual port FWD SCSI	A5159A	11.00	VHDCI	Yes	Yes	Yes	10	20
Dual Port 100Base-T/Dual Port Ultra2 SCSI	A5838A	11.00	VHDCI/RJ-45	Yes	Yes	No	8 [1]	16/16
RAID 4si 4-port Ultra2 LVD/SE RAID Cont.	A5856A	11.00	VHDCI	Yes	Yes	No	10	40
1000Base-SX	A4926A	11.00	Duplex SC	Yes	Yes	No	10	10
1000Base-TX	A4929A	11.00	RJ-45	Yes	Yes	No	10	10
10/100Base-TX	A5230A	11.00	RJ-45	Yes	Yes	No	10	10
Quad port 10/100Base-TX	A5506B	11.00	RJ-45	Yes	Yes	No	7 [2]	28
ATM 155 Mb/s MMF	A5513A	11.00	Duplex SC	Yes	Yes	No	10	10
ATM 155 Mb/s UTP5	A5515A	11.00	RJ-45	Yes	No	No	10	10
ATM 622 Mb/s MMF	A5483A	11.00	Duplex SC	Yes	Yes	No	10	10
Public Key Cryptography	A5486A	11.00		Yes	No	No	10	10
802.5 Token Ring 4/16/100 Mb/s	A5783A	11.00	RJ-45 and DB-9	Yes	Yes	No	10	10
FDDI Universal PCI Adapter	A3739B	11.00	FDDI SC	Yes	Yes	No	10	10
HyperFabric	A6092A	11.00	37 pin D-type	Yes	Yes	No	7 [4]	7
Graphics/USB kit (2 cards)	A6150A	11.00		No	Yes	No	1 kit (2 cards)	1 (2 USB)

Table 2.4.3 HP Server rp5470 Supported I/O Cards (continued)

I/O Card	Product Number	First HP-UX Release	Connector Type(s)	Hot Plug Support (with HP-UX 11.11)	Factory Integration	HP-UX Boot support	Maximum Cards per System	Maximum Ports per System
X.25/BX.25 Advanced Communications Controller 8-port PCI	Z7340A	11.0	RS-232, V.35, RS-449 or X.21	Yes	No	No	10	80
X.25/SDLC/FR dual port	J3525A	11.00	RS-530, RS-232, V.35, RS-449 or X.21	Yes	Yes	No	10	20
X.25/FR quad port	J3526A	11.00	RS-530, RS-232, V.35, RS-449 or X.21	Yes	Yes	No	7 [2,4]	40
8-port Terminal Multiplexer	A6748A	11.00	RS-232	Yes	Yes	No	4 [3]	32
64-port Terminal Multiplexer	A6749A	11.00	RS-232 or RS-422	Yes	Yes	No	10	640

[1] Not supported in shared PCI slots (slots 3 and 4)

[2] Maximum of seven (plus any combination of three other cards)

[3] Maximum of four (plus any combination of six other cards)

[4] Combined total of both J3526A and A6092A cannot exceed 7

Power Supplies and Cords

- The HP Server rp5470 supports up to three hotswap power supplies for N+1 protection. Two supplies are shipped as standard and are required for correct system operation. The hotswap design allows for the online addition of a third redundant power supply for the replacement of a failed power supply in an N+1 configuration.
- The HP Server rp5470 provides an independent power input receptacle for each power supply. The independent design provides protection against losing the connection from a power cord or breaker. The HP Server rp5470 power cords should always be plugged into separate breakers when possible.

Figure 2.4.5 HP Server rp5470 Power Supply Configuration
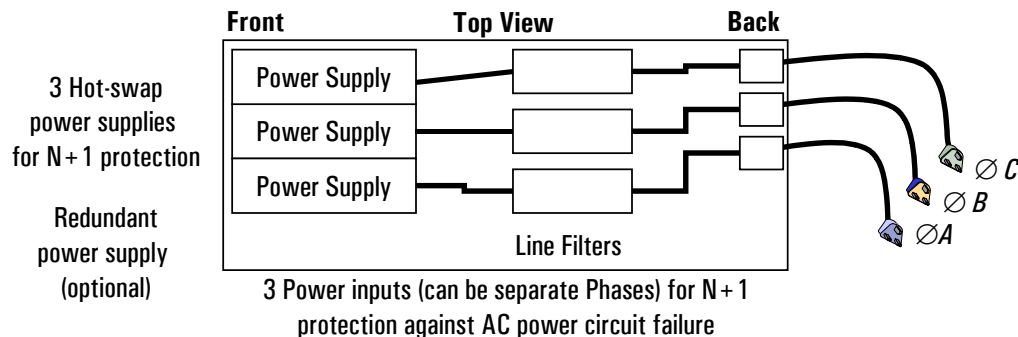
Racking Configurations

There are two rail options, static or slider, available for racking the HP Server rp5400 Series into a HP cabinet. The slider rail enables the HP Server rp5400 Series to easily slide out of a cabinet for servicing. The slider occupies one additional EIA unit of rack space. The combination of an HP Server rp5400 Series and slider rail will consume eight EIA units of rack space. The slider also enables the Hot-plug capability of the I/O slots and Hot-swap of four fans in the side cavity. Slider rails are highly recommended for use with the HP Server rp5400 Series system.

Static rails are also available. Static rails do not consume EIA space within the cabinet, therefore leaving more EIA space for peripherals. However, using static rails prohibits hot-plug of the I/O cards and hot-swap of the I/O bay fans. Static rails should only be used when cabinet vertical space prohibits the use of slider rails.

Anti-Tip Feet
Bolt-on anti-tip feet are required when racking an HP Server rp5400 Series on a slider. Factory-integrated cabinets will include bolt-on feet with every cabinet by default. For cabinets that don't already have bolt-on feet, order the bolt-on anti-tip feet A5540A. Bolt-on feet should always be used instead of the pull-out foot stored in the cabinet base.

Cabinet Space Requirements
The HP Server rp5400 Series requires a minimum of 24 inches (61 cm) of free space in both the front and rear of the cabinet for proper ventilation. During product installation and servicing, a total of 32 inches (82 cm) of free space is needed at the front of the cabinet.

The depth of HP A490xA cabinets is 39 inches (99 cm). Therefore, a minimum of 87 inches (221 cm) of total space is needed for each cabinet during normal operation. An additional 8 inches (21 cm) is needed during installation and servicing.

Maximum Configurations
- Multiple HP Server rp5400 Series systems can be installed into a HP cabinet. The maximum number of systems per cabinet is only limited by the cabinet EIA availability.
- A4900A—Quantity 3 HP Server rp5400 Series systems (with or without slider rails)
- A4901A—Quantity 4 HP Server rp5400 Series systems (with or without slider rails)
- A4902A—Quantity 5 HP Server rp5400 Series systems (with or without slider rails)

Factory Racking
HP factories can install multiple HP Server rp5400 Series systems into a single cabinet. In addition, multiple HP Server rp5400 Series configurations can be ordered within a single cabinet. In the past, identical SPU configurations were required to enable factory racking of multiple SPUs in a cabinet. HP factories now have the ability to install multiple HP Server rp5400 Series systems into a cabinet with completely different configurations. In order to facilitate this process, please ensure that the Watson configuration tool is used.

Installation Into Third-Party Cabinets/Racks
The HP Server rp5400 Series system can now be installed and supported in third-party cabinet environments. For further details please refer to the cabinet section in **Subchapter 4.4** of this guide.

Integrated Multifunction I/O

The integrated multifunction I/O provides core I/O functionally and includes the Fault Management Processor technology.

Figure 2.4.6 HP Server rp5400 Series Multifunction Core I/O

LAN console port

100BaseT LAN port

Ultra2 SCSI port

DB25 Console/Modem/UPS Port
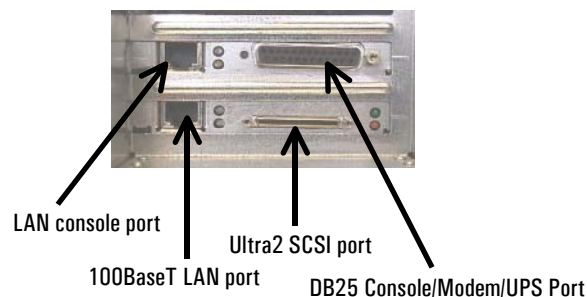
- 10/100Base-T LAN with RJ-45 connector—Supports LAN boot for operating system installation
- External LVD Ultra2 SCSI (80 MB/s) port (Ultra2 is backward compatible with SE-SCSI)—Order the appropriate cable to connect to external peripherals, example: VH to HD cable
- Two internal SCSI controllers with dual Ultra SCSI (40 MB/s) channels. One channel per internal disk pair and one channel supports the removable media bay.

Integrated Management Processor Functionally

- Integrated LAN console—Connection via industry standard telnet interface
- Dedicated 100Base-T LAN port for LAN console and embedded web console access
- DB-25 serial port—multiplexed (using W cable) into three RS-232 ports: local ASCII console, remote/modem console, and general purpose or UPS
- 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

Internal Disk Drives

- The HP Server rp5400 Series supports up to four internal low profile or half-height hot-plug disk drives.
- Two Ultra SCSI controllers provide each disk drive pair with an independent SCSI channel
- Supported by MirrorDisk/UX across both disk drives and controllers

Table 2.4.4 Internal disk drive specifications

Product Number	Disk Capacity	Rotational Speed	Average Seek Time (read/write)	Sustained Bandwidth
A5803A (0D1)	18 GB	10,000 rpm	5.2 msec (read) 6.0 msec (write)	18 MB/s
A6110A (0D1)	36 GB	10,000 rpm	5.2 msec (read) 6.0 msec (write)	18 MB/s
A6091A (0D1)	73 GB	10,000 rpm	5.2 msec (read) 6.0 msec (write)	18 MB/s

(Factory integrated)

System Console Configurations

The HP Server rp5400 Series' integrated Fault Management Processor provides four methods for console connections.
- Web console. Supports any browser as a system console
- Integrated LAN console. Supports standard telnet connections.
- 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

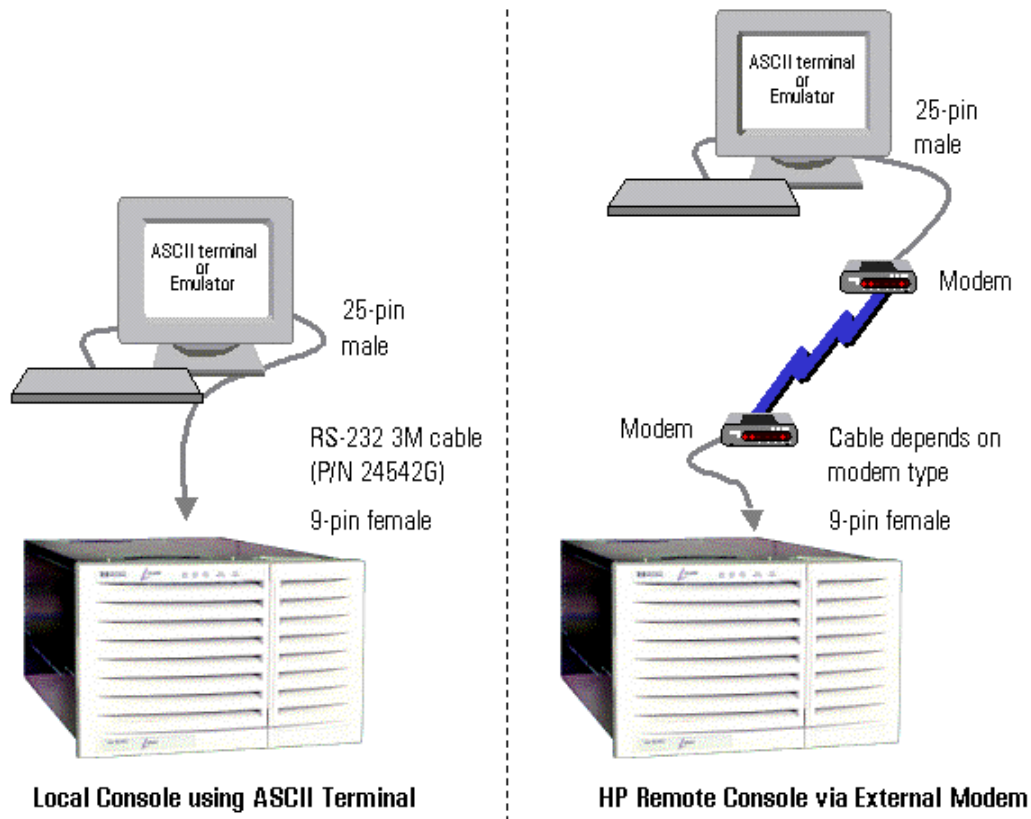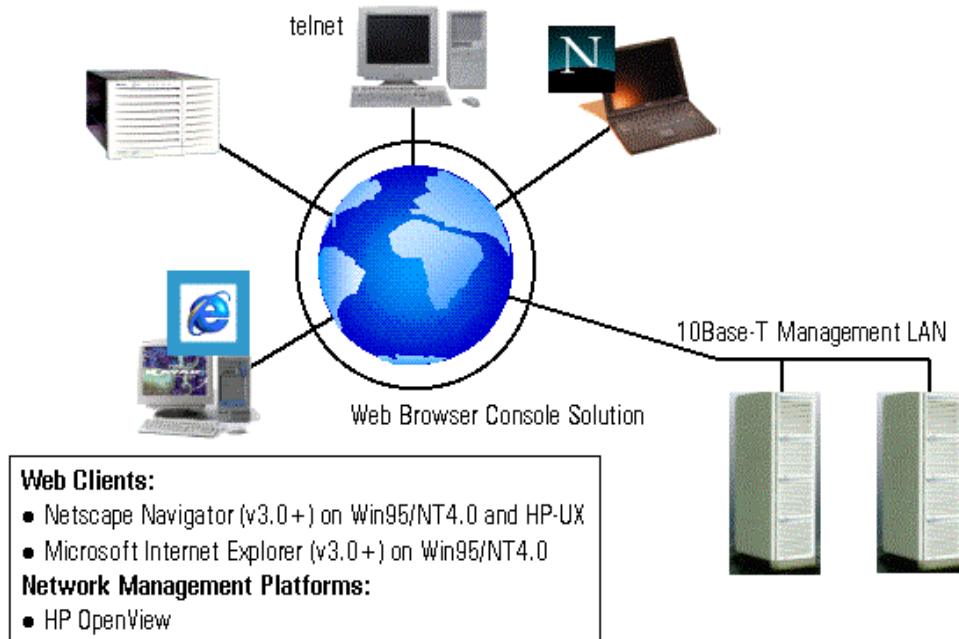**Figure 2.4.7 HP Server rp5400 Series Console Connection Solutions**

Figure 2.4.8

Table 2.4.5 Terminals and Terminal Emulators Supported as Consoles in VT100 Mode or hpterm

Hewlett-Packard			Emulators
• HP 700/98	• HP 700/70	• HP 700/22	• X11R3+ xterm - emulator
• HP 700/96	• HP 700/60	• HP 2392	• WRQ Reflections
• HP 700/94	• HP 700/44	• HP 2394	• Netscape Navigator v3.0+
• HP 700/92	• HP 700/32	• HP Entria II Netstations	• Microsoft Internet Explorer v3.0+
• HP C1099A			

Power Protection

HP Server rp5400 Series Power Subsystem
The HP Server rp5400 Series 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

UPS Power Protection

HP recommends that our customers use some form of power protection to provide power conditioning, and protect against data or transaction loss during power outages. For customers who don't have site wide or room wide power protection, HP recommends a PowerTrust II Uninterruptible Power System (UPS). Please see **Subchapter 4.3** for information on these UPSs. Please ensure that any UPSs utilized for this server(s) are rated at a minimum of 1.15 kW for HP Server rp5400 and 1.3 kW for HP Server rp5470. Use A1353A/A1354A (1.4-kW/2.0-kVA) or A1356A (2.1-kW/3.0-kVA). UPS units with larger capacities or multiple UPS units are recommended when external peripherals are also being protected.

The HP Server rp5400 Series provides integrated control ports for HP's PowerTrust II and other third-party Uninterruptible Power Systems (UPS) to protect against loss of service due to computer room power outages. HP PowerTrust II UPS units are orderable at the time of initial order, and can be integrated at the factory. The HP PowerTrust II UPS units are designed to provide power in the event of a power loss. In addition, they have been engineered to inter-operate with the HP-UX software modules for UPS Monitoring and Control, and Timed Power On/Off.

Continued Operation
The HP Server rp5400 Series will continue to operate during power outages as long as qualified UPS units are used to provide backup power to the server and all active disks. With UPS protection the system will continue to operate until the UPS batteries are depleted or until the applications and the system are gracefully shut down. With HP PowerTrust UPS units, the minimum period of continued operation is 15 minutes (on PowerTrust II-LR UPSs you may have to order additional battery packs to obtain desired run times. Please see **Subchapter 4.3** to select appropriate HP PowerTrust UPS for your configuration.

PowerTrust UPS Monitoring and Control and Timed On/Off Software
Software modules, upsmond, are provided in HP-UX to provide support for the following HP PowerTrust UPS functionality. These modules do not work with UPS units other than HP PowerTrust, however most third-party UPS provide similar functionality.
- Monitoring and Control of the UPS to provide a graceful shutdown during an extended power outage.
- Automatic power-up and power-down of a server (and peripherals) at pre-set days and times.

Instant Ignition

HP Server rp5400 Series includes an unlimited HP-UX user license. Installation of HP-UX and configuration for specific application environments is available from the factory or a HP authorized reseller. The default configuration is tuned for commercial online transaction processing and decision support environments. Three additional configurations are also available for Internet, Technical and File serving as described below:

Transaction Data/Compute/NFS Options

Four factory Instant Ignition kernel configurations are available. Each configuration provides specific kernel parameters tuned for optimal application performance. This flexibility provides the customer with the best achievable performance for their application -- directly from the factory.

The software Instant Ignition option, #0D1, must be selected for each module.

Table 2.4.6 HP Server rp5400 Series Kernel Configuration Options

Option	Application Profile
Transaction Data [factory default]	Database, transaction processing
AUD—Internet	Internet/Intranet serving
AU9—Compute	Computation, analysis, simulation, analytical
AU8—NFS	NFS file serving

Table 2.4.7 Compute Server Kernel Parameters

Parameter	Value	Parameter	Value	Parameter	Value
fs_async	1	Nswapdev	25	msgmnb	65535
maxdsiz	0X3BC00000	Semmap	(SEMMNI+2)	msgmni	(NPROC)
maxfiles	maxfiles	Semmns	(SEMMNI*2)	msgssz	128
maxfiles_lim	2,048	semume	64	nfile	(15*NPROC+2048)
maxssiz	0X04FB3000	Shmmax	0x40000000	ninode	(8*NPROC+2048)
maxswapchunks	4096	Maxuprc	((NPROC*8)/10)	npty	200
maxtsiz	0X10000000	Maxusers	200	semaem	16,384
msgseg	(MSGTQL*4)	Maxvgs	80	semmni	(NPROC*5)
msgtql	(NPROC*10)	Msgmap	(MSGTQL+2)	semmnu	(SEMMNI/2)
nflocks	(NPROC)	Msgmax	32,768	semvmx	32,768
nproc	((MAXUSERS*3)+64)				

Table 2.4.8 NFS Server Kernel Parameters

Parameter	Value	Parameter	Value	Parameter	Value
NFS_SERVER	1	MIN_NUM_NFSD	8	dbc_min_pct	40
NUM_NFSD	(DISKS * 2)	dbc_max_pct	80	ninode	(RAM * 50)

Edit the rc.config file for NFS (nfsconf) to set parameters: # NFS_SERVER=1 and # NFS_CLIENT=1

Table 2.4.9 Internet Server Kernel Parameters—for HP-UX 11.0 only

Kernel Parameters

Parameter	Value	Parameter	Value	Parameter	Value
maxusers	1000	maxfiles_lim	4096	tcphashsz	8192
maxfiles	2048				

Internet server Network parameter configuration/etc/rc.config.d/nddconf

Parameter	Value	Parameter	Value	Parameter	Value
tcp_conn_request_max	1024	tcp_xmit_hiwater_def	1048576	tcp_conn_strategy	1
tcp_keepalive_interval	600000				

hp server rp5430

Table 2.4.10 HP Server rp5430 Specifications

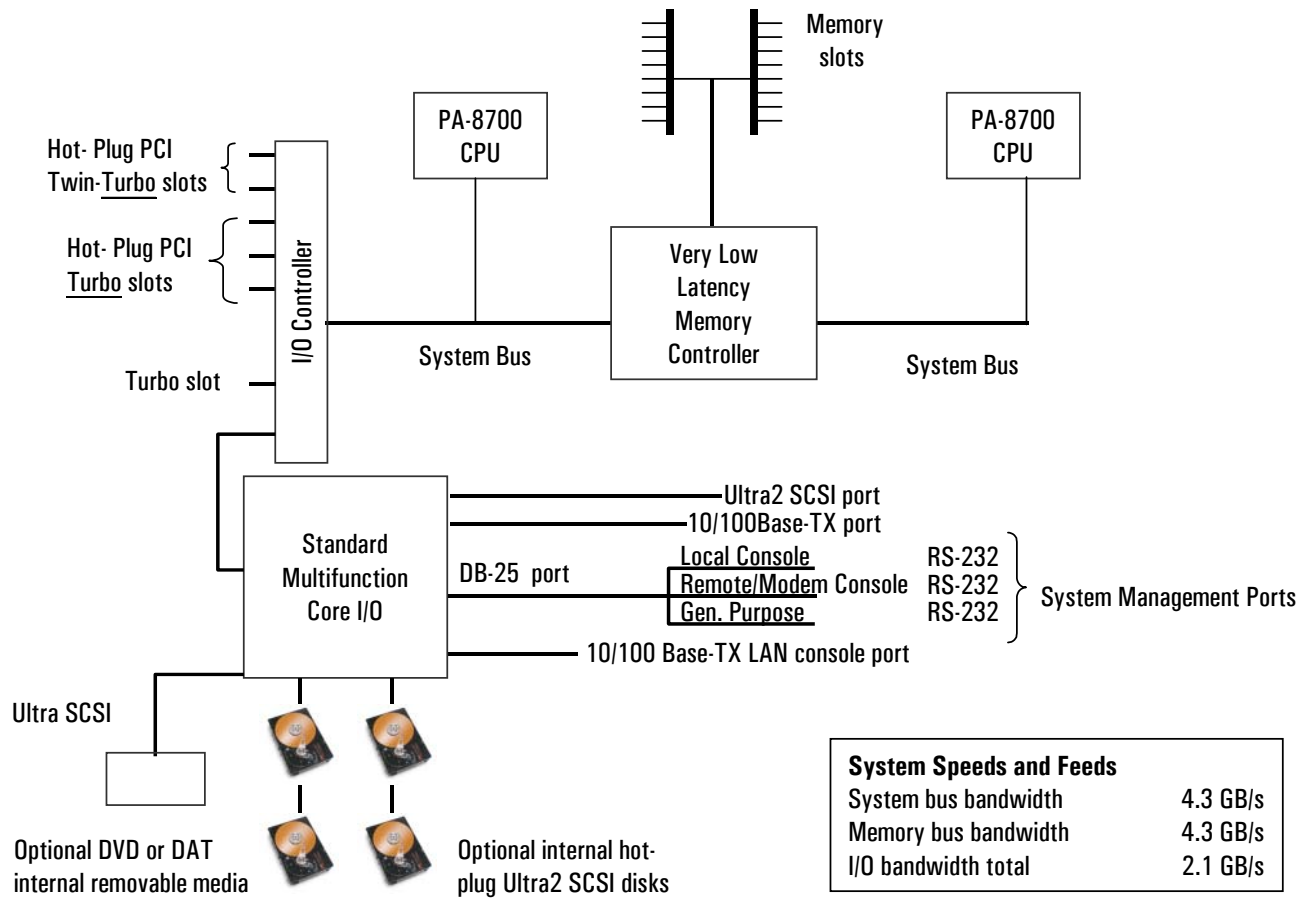|			
Server model number	rp5430	**Max. Network Interface Cards (cont.)**–see supported I/O table	
Server product number	A6797B	ATM 155 Mb/s–MMF	6
Number of Processors	1-2	ATM 155 Mb/s–UTP5	6
Supported Processors		ATM 622 Mb/s–MMF	6
PA-RISC PA-8700 Processor @ 650 and 750 MHz		802.5 Token Ring 4/16/100 Mb/s	6
Cache–Instr/data per CPU (KB)	750/1500	Dual port X.25/SDLC/FR	6
Floating Point Coprocessor included	Yes	Quad port X.25/FR	6
		FDDI	6
		Max. Additional Interface Cards–see supported I/O table	
		8 port Terminal Multiplexer	4
PA-RISC PA-8600 Processor @ 550 MHz		64 port Terminal Multiplexer	6
Cache–Instr/data/CPU (KB)	512/1024	Graphics/USB kit	1 kit (2 cards)
Floating Point Coprocessor included	Yes	Public Key Cryptography	6
		HyperFabric	6
TPM estimate (4 CPUs)	34,500	**Electrical Characteristics**	
SPECweb99 (4 CPUs)	3,750	AC Input power	100-240V 50/60 Hz
		Hotswap Power supplies	2 included, 3rd for N+1
Min. memory	256 MB	Redundant AC power inputs	2 required, 3rd for N+1
Max. memory capacity	8 GB	Current requirements at 200V	4.6 A (shared across inputs)
Internal Disks		Typical Power dissipation (watts)	798 W
Max. disk mechanisms	4	Maximum Power dissipation (watts)[1]	936 W
Max. disk capacity	292 GB	Power factor at full load	.98
Standard Integrated I/O		kW rating for UPS loading[1]	1.3
Ultra2 SCSI–LVD	Yes	Maximum Heat dissipation (BTUs/hour)[1]	3355
10/100Base-T (RJ-45 connector)	Yes	**Site Preparation**	
RS-232 serial ports (multiplexed from DB-25 port)	3	Site planning and installation included	No
Web Console (including 10Base-T port)	Yes	Depth (mm/inches)	774 mm/30.5
I/O buses and slots		Width (mm/inches)	482 mm/19
Total PCI Slots (supports 66/33 MHz×64/32 bits)	6	Rack Height (EIA/mm/inches)	7 EIA/311/12.25
2 Hot-Plug Twin-Turbo (500 MB/s), 3 Hot-Plug Turbo slots (250 MB/s) , and 1 non-Hot-Plug Turbo slot (250 MB/s)		Deskside Height (mm/inches)	368 mm/14.5
		Weight (kg/lbs) Max.	68 kg/150 lbs
Max. Mass Storage Host Bus Adapters–see supported I/O table		Maximum/Minimum power outlets required	4/3
Ultra2 SCSI–LVD	6	**Environmental Characteristics**	
Dual port Ultra2 SCSI–LVD	6	Acoustics (operator/bystander) at 25°C	< 7.2 Bels LwA
FWD SCSI	6	Operating Temperature (up to 5000 ft)[2]	5° to 35°C (41°to 95°F)
Dual port FWD SCSI	6	Non-operating Temperature	–40°to 65°C
RAID 4si PCI 4-port Ultra2 LVD/SE RAID Controller	6		(–40°to 149°F)
PCI 2x Fibre Channel Adapter	6		
Max. Network Interface Cards–see supported I/O table		Maximum rate of temperature change	10°C/hour
1000Base-SX	6	Operating relative humidity	15% to 80%, non-cond.,
1000Base-TX	6		Max. wet bulb = 26°C
10/100Base-TX	6	Non-operating relative humidity	5% to 90%, non-condensing
100Base-FX	6	Operating altitude above sea level	To 3.0 km (10,000 feet)
Quad Port 10/100Base-TX	6	Non-operating altitude above sea level	To 4.5 km (15,000 feet)
Dual Port 100Base-T Dual Port Ultra2 SCSI	6	**Regulatory Compliance**	
		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 A, Korea RLL
		Safety	UL Listed, CSA Certified, TÜ V GS Mark, compliant with EN 60950 and EN 41003

[1] Max power/heat dissipation may increase with future upgrades

[2] Max operating temperature range up to 5000 ft. For higher altitudes de-rate the max temperature by 2°C/1000 ft above 5000 ft.

Overview

Component locations are the same as the HP Server rp5470. Please see **Figure 2.4.1.**

Figure 2.4.9 HP Server rp5430 System Architecture

System Speeds and Feeds	
System bus bandwidth	4.3 GB/s
Memory bus bandwidth	4.3 GB/s
I/O bandwidth total	2.1 GB/s

Features

Table 2.4.11 HP Server rp5430 Features

Minimum System	• One 64-bit PA-RISC processor
	  – 550-MHz PA-8600 with 1.5 MB on-chip cache
	  – 650-MHz PA-8700 with 2.25 MB on-chip cache
	  – 750-MHz PA-8700 with 2.25 MB on-chip cache
	• One processor support module—supports two CPUs
	• 256-MB SyncDRAM
	• Two power supplies

Maximum Server Capacities	• Two 64-bit PA-8600 or PA-8700 processors • One processor support module—supports two CPUs per module • 8-GB SyncDRAM • Three Hotswap power supplies, providing N+1 protection for power supplies and power input • Six 66/33 MHz × 64/32-bit PCI I/O slots—with adaptive signaling technology • One internal DVD ROM or DDS-3 drive • Four internal hot-plug LVD SCSI disks
Standard System Features	• 64-bit HP-UX 11 operating system with unlimited user license • External Ultra2 LVD SCSI channel • Two Internal SCSI controllers w/dual channels, 2 internal disks per controller • 10/100Base-T LAN (with auto speed sensing) • Management Processor technology with LAN console • Embedded web console access via management LAN • RS-232C local and remote/modem console and UPS ports (multiplexed from a single DB-25 port) • 100Base-T LAN port for system management • Factory integration of CPUs, memory, disk drives, removable media, and I/O cards • Rackmountable into 19-inch cabinets or deskside • Three-year warranty with next business day on-site
High Availability—all standard	• N+1 Hotswap cooling • Two Hotswap power supplies—optional third power supply for N+1 protection • On-line memory page deallocation • Chip Spare technology to overcome single DRAM failures • ECC protected SyncDRAM memory • Full parity protection of data and address buses • On-chip CPU cache with ECC protection • Dynamic Processor resilience and deallocation • On-line addition and replacement of PCI I/O cards (requires HP-UX 11i) • UPS power management • Hot Plug internal disks • Two independent Ultra SCSI buses to internal disks for mirroring across disks and controllers • Journal file system • Auto reboot • MC/ServiceGuard and MC/LockManager support • On-line diagnostics and system health monitor
Carrier Grade (Telco)	• See "HP Carrier Grade rp5400 Series" at the end of this section for optional carrier grade features
Security	• Separate LAN for system management • Password protection on console port • Disablement of remote console ports
Internet Server Functions	• Internet server (inetd) • Domain name server • Routing (OSPF, BIND, RIP, EGP, HELLO, gateD) • Network Time Protocol
Client Configuration Services	• Automatic configuration for printers, PCs, workstations, and X terminals (DHCP, Bootp, tftp, rbootp)
Optional Web Services	• Netscape Communication Server • Netscape Navigator
email	• Mail, MailX, ELM • Sendmail, MIME, SMTP, ESMTP
Remote Access Services	• Telnet, ftp, anonymous ftp server

Configuration

CPU Configuration

The HP Server rp5430 is a symmetrical multiprocessing (SMP) server supporting up to two high performance 64-bit PA-8600 or PA-8700 processors.

PA-8700 Details
- 650-MHz or 750-MHz clock speeds
- On-chip 2.25-MB high-speed cache (750 KB instruction, 1500 KB data)
- 4-way set associative cache
- Single-bit cache error correction
- 4-way superscalar
- 56 instruction reorder buffer
- Full PA-RISC 2.0 binary compatibility

PA-8600 Details
- 550-MHz clock speed
- On-chip 1.5-MB high speed cache (512-KB instruction, 1024-KB data)
- 4-way set associative cache
- Single-bit cache error correction
- 4-way superscalar
- 56 instruction reorder buffer
- Full PA-RISC 2.0 binary compatibility

CPU Configuration Rules

- CPUs can be installed one at a time
- Use one processor support module for one or two CPUs
- Configure processor support module A6799A for PA-8700 processors and A5796A for PA-8600 processors
- CPUs must be installed in the following sequence: 0, 2

Memory Configuration
The HP Server rp5430 supports SyncDRAM (Synchronous Dynamic Random Access Memory) DIMMs with full ECC protection. The HP Server rp5430 supports up to two memory carrier boards each providing 8 memory slots for a system total of 16 slots. Each memory carrier provides 2.15 GB/s of memory bandwidth, for a system total of 4.3 GB/s.

Memory Loading Rules
- Memory must be installed in pairs of equal density
- Memory is available in modules of various densities 256 (2×128 MB), 512 MB (2×256 MB), 1 GB (2×512 MB), or 2 GB (2×1024 MB)
- Minimum memory is 256 MB
- Maximum memory is 8 GB via 2GB memory modules in one memory carrier board or 1GB memory modules in two memory carrier boards
- Although both memory carrier boards are supported, the system will not boot if more than 8GB of total memory is loaded
- Memory chip spare is supported with the 512-MB, 1-GB and 2-GB memory modules
- Memory chip spare is not supported with the 256-MB memory module

Figure 2.4.10 Memory Carrier Board (Showing 2 pairs of DIMMs loaded)
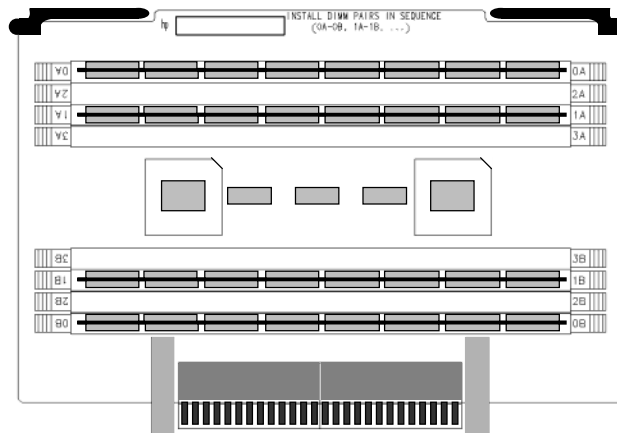

Performance Tuning Guidelines

- Use two memory carrier boards for maximum performance with 2 CPUs
- Each memory carrier has its own 2.15 GB/s bus.
- Load memory equally across the available carriers
- If growth is planned for the system, then plan on configuring high-density modules to minimize slot constraints.

I/O Architecture

The HP Server rp5430 I/O architecture utilizes industry standard PCI buses in a unique design for maximum performance, scalability and reliability.

Figure 2.4.11 HP Server rp5430 I/O Architecture
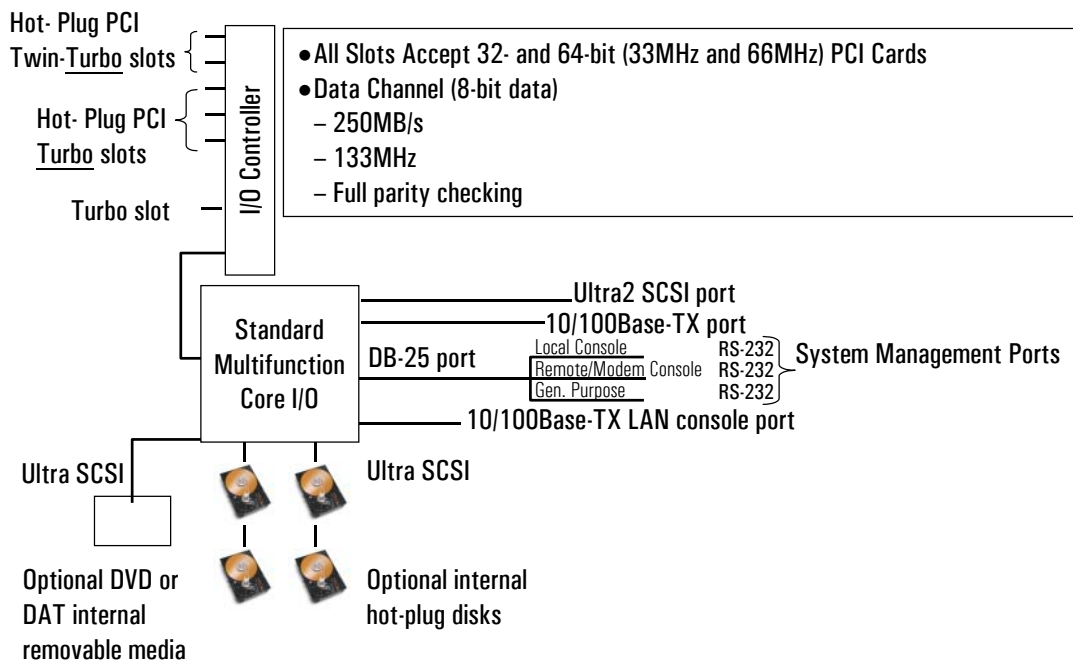
The HP Server rp5430 architecture uses 9 high-speed I/O channels. Each channel provides 250 MB/s of peak I/O throughput. The diagram above shows how these channels are used to provide 500 MB/s to the Twin-Turbo PCI slots, 250 MB/s to the Turbo PCI slots, and 250 MB/s to the multifunction core I/O. The term "turbo" refers to a slot configuration where the I/O card has a dedicated I/O channel.

Five of the six I/O slots have hot-plug functionality under HP-UX 11i. All six slots support 64 bit × 66 MHz PCI cards running at full speed. These slots are connected to the I/O controller via independent channels. The independent channels provide 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.

Slot keying: All HP Server rp5430 slots are keyed for 5 volts to support 5v and universal cards. Adaptive signaling interrogates each PCI card to provide the proper voltage and frequency, thus allowing cards to run at full potential.

|	Number of slots	Hot-plug	Bandwidth per channel	Bus width	Signaling speeds	Slot keying	Adaptive signaling
Twin-Turbo	2	Yes	500 MB/s	64 bits	66 MHz and 33 MHz	5 volts	Yes
Turbo	3	Yes	250 MB/s	64 bits	66 MHz and 33 MHz	5 Volts	Yes
Shared	0	No	250 MB/s	64 bits	66 MHz and 33 MHz	5 Volts	Yes

Supported I/O Cards

Table 2.4.12 HP Server rp5430 Supported I/O Cards

I/O Card	Product Number	First HP-UX Release	Connector Type(s)	Hot Plug Support (with HP-UX 11.11)	Factory Integration	HP-UX Boot support	Maximum Cards per System	Maximum Ports per System
PCI 2x 1-port Fibre Channel Adapter	A5158A	11.00	Duplex SC	Yes	Yes	Yes	6	6
Ultra2 LVD-SCSI	A5149A	11.00	VHDCI	Yes	Yes	Yes	6	6
Dual port Ultra2 LVD-SCSI	A5150A	11.00	VHDCI	Yes	Yes	Yes	6	12
FWD SCSI	A4800A	11.00	HD	Yes	Yes	Yes	6	6
Dual port FWD SCSI	A5159A	11.00	VHDCI	Yes	Yes	Yes	6	12
Dual Port 100Base-T/Dual Port Ultra2 SCSI	A5838A	11.00	VHDCI/RJ-45	Yes	Yes	No	6	12/12
RAID 4si 4-port Ultra2 LVD/SE RAID Cont.	A5856A	11.00	VHDCI	Yes	Yes	No	6	24
1000Base-SX	A4926A	11.00	Duplex SC	Yes	Yes	No	6	6
1000Base-TX	A4929A	11.00	RJ-45	Yes	Yes	No	6	6
10/100Base-TX	A5230A	11.00	RJ-45	Yes	Yes	No	6	6
Quad port 10/100Base-TX	A5506B	11.00	RJ-45	Yes	Yes	No	6	24
ATM 155 Mb/s MMF	A5513A	11.00	Duplex SC	Yes	Yes	No	6	6
ATM 155 Mb/s UTP5	A5515A	11.00	RJ-45	Yes	No	No	6	6
ATM 622 Mb/s MMF	A5483A	11.00	Duplex SC	Yes	Yes	No	6	6
Public Key Cryptography	A5486A	11.00		Yes	No	No	6	0
802.5 Token Ring 4/16/100 Mb/s	A5783A	11.00	RJ-45 and DB-9	Yes	Yes	No	6	6
FDDI Universal PCI Adapter	A3739B	11.00	FDDI SC	Yes	Yes	No	6	6
HyperFabric	A6092A	11.00	37 pin D-type	Yes	Yes	No	6	6
X.25/BX.25 Advanced Communications Controller 8-port PCI	Z7340A	11.0	RS-232, V.35, RS-449 or X.21	Yes	No	No	6	48
X.25/SDLC/FR dual port	J3525A	11.00	RS-530, RS-232, V.35, RS-449 or X.21	Yes	Yes	No	6	12
X.25/FR quad port	J3526A	11.00	RS-530, RS-232, V.35, RS-449 or X.21	Yes	Yes	No	6	24
Graphics/USB kit (2 cards)	A6150A	11.00		No	Yes	No	1 kit (2 cards)	1 (2 USB)
8-port Terminal Multiplexer	A6748A	11.00	RS-232	Yes	Yes	No	4	32
64-port Terminal Multiplexer	A6749A	11.00	RS-232 or RS-422	Yes	Yes	No	6	384

Power Supplies and Cords

- The HP Server rp5430 supports up to three hotswap power supplies for N+1 protection. One supply is shipped standard and is required for correct system operation. The hotswap design allows for the online addition of a second or third redundant power supply for the replacement of a failed power supply in an N+1 or N+2 configuration.
- The HP Server rp5430 provides an independent power input receptacle for each power supply. The independent design provides protection against losing the connection from a power cord or breaker. The HP Server rp5430 power cords should always be plugged into separate breakers when possible.

Figure 2.4.12 HP Server rp5430 Power Supply Configuration
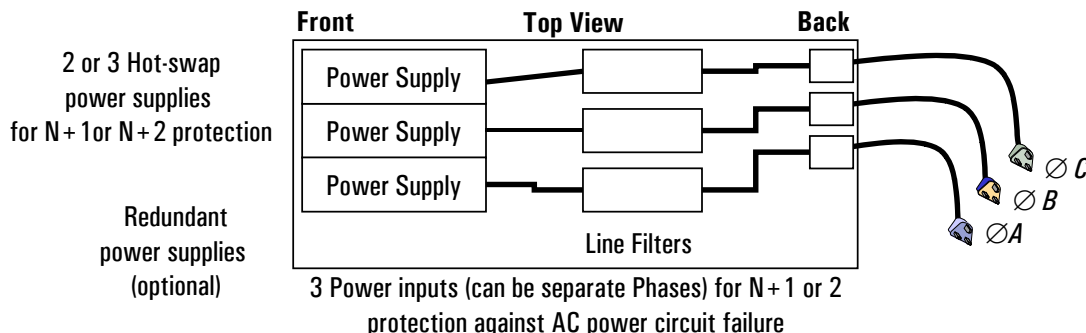
The following HP Server rp5430 features are similar to the HP Server rp5470. Please refer to the HP Server rp5470 section.
- Racking Configurations
- Integrated Multifunction Core I/O
- Integrated Fault Management Processor
- Internal Disk Drives
- System Console
- UPS Power Protection
- Instant Ignition

hp carrier grade rp5400 series

The HP Carrier Grade Server rp5470 can be purchased under product number A6480A. Unless noted in this section, the HP Carrier Grade rp5400 Series servers (also known as Telco servers) have the same functionality as the HP Rack Optimized rp5400 Series servers.

The HP Carrier Grade rp5400 Series servers are fully NEBS level 3 compliant. They share the same physical dimensions as the Rack Optimized rp5400 Series servers (meaning that they are all 774 mm [30.5 inches] in depth).

The HP Carrier Grade Server rp5470 comes standard with two –48-volt DC power supplies. A third –48-volt DC power supply (Z7538A) may be added for N+1 power supply redundancy.

The HP Carrier Grade rp5400 Series servers support a sciemic zone 4, 19-inch, high availability slider racking kit (Z7543A). This kit cannot be factory installed and must be installed in the field.