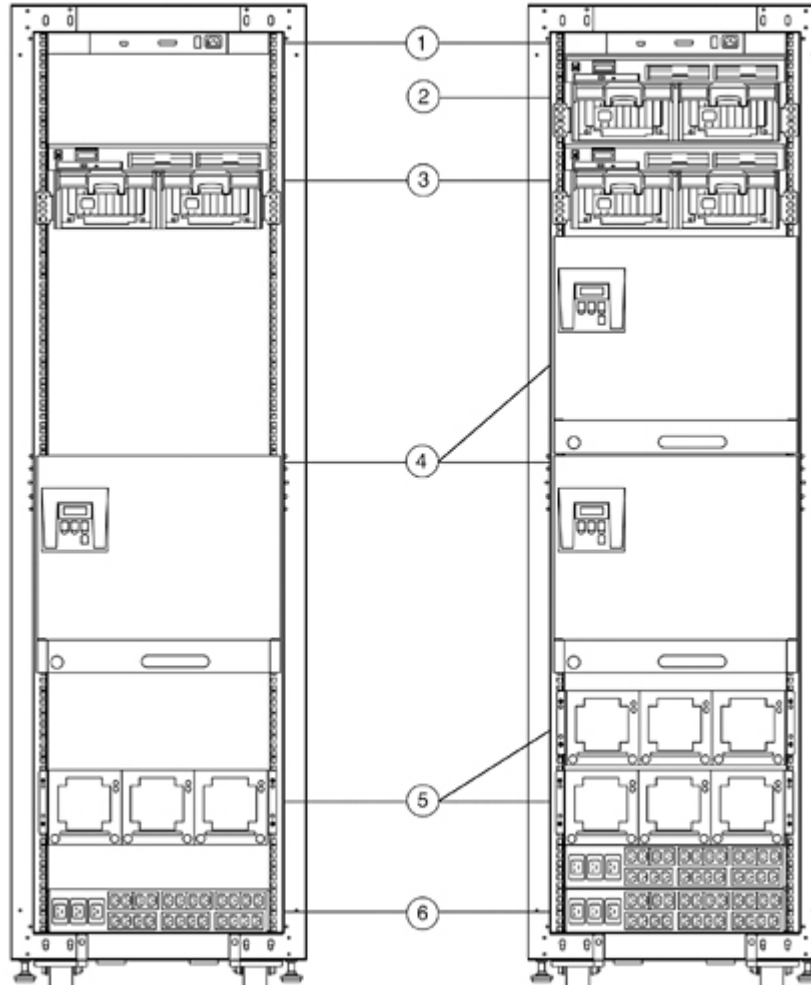


Overview

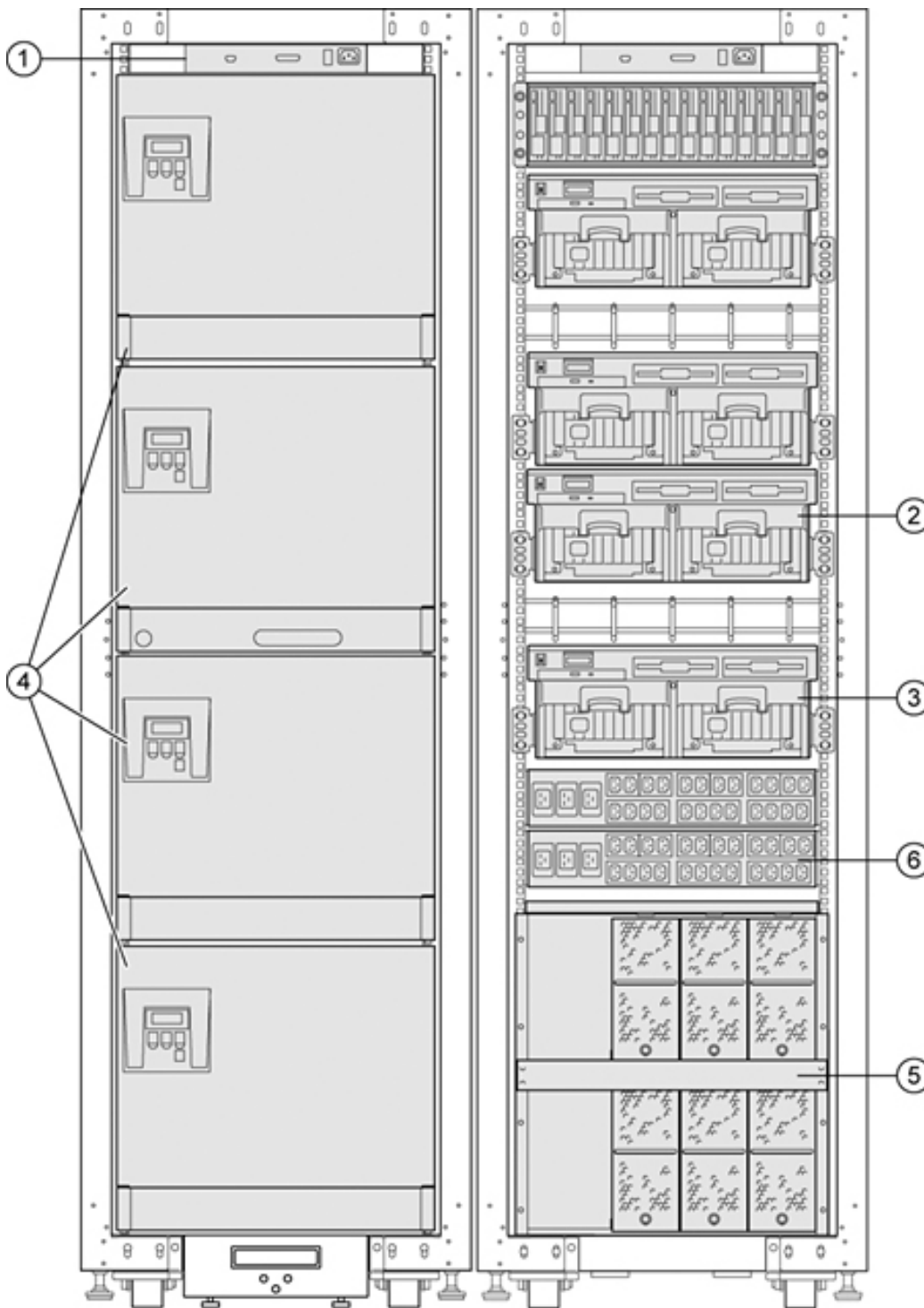
HP AlphaServer GS1280 Systems

HP AlphaServer GS1280 Models 8 and 16



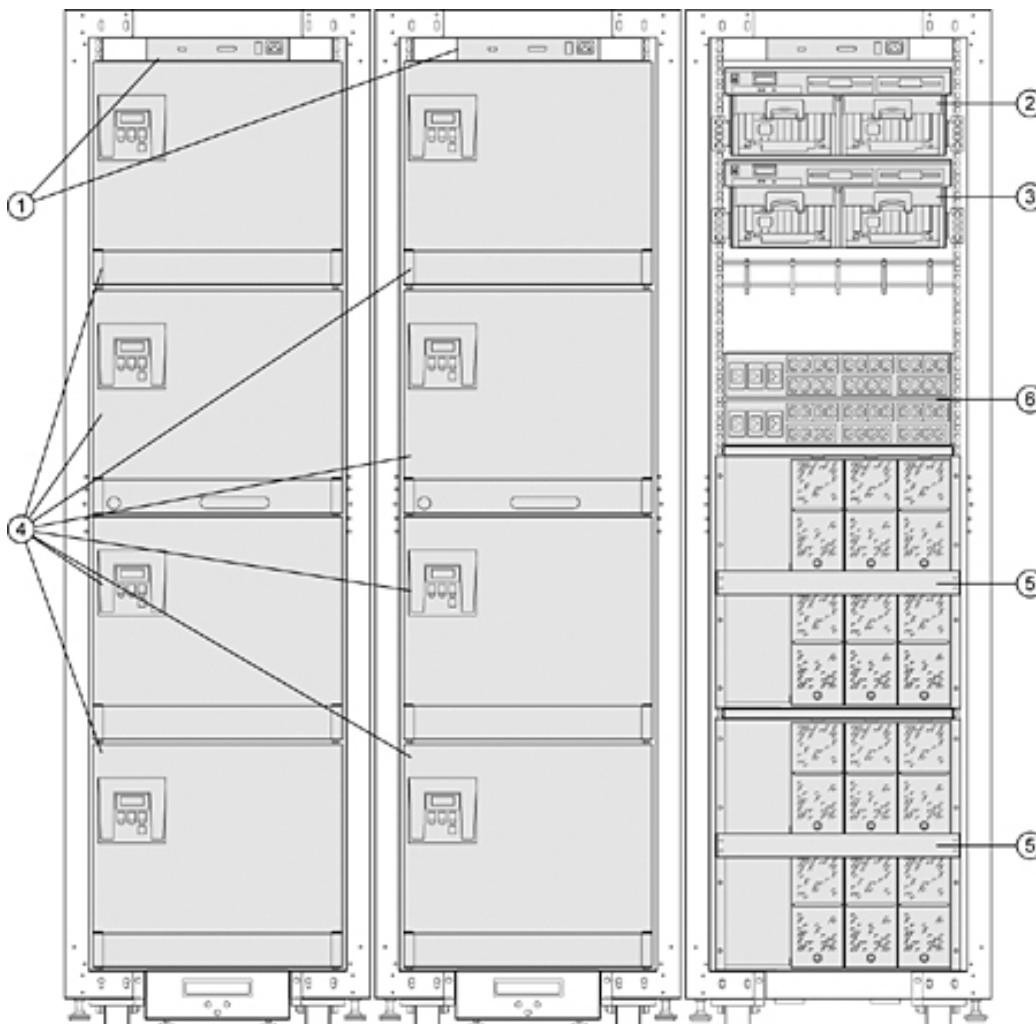
1. Cable/DSL HUB
2. PCI/PCI-X I/O Expansion Drawer (optional)
3. PCI/PCI-X I/O Master Drawer (mandatory option)
4. System Building Block Drawer (Model 8 Includes 1 drawer, Model 16 includes 2 drawers)
5. 48-volt DC Power shelves, 3 power supplies per shelf (Model 8 includes 1 shelf, Model 16 includes 2 shelves)
6. AC input controller(s) (mandatory option)

HP AlphaServer GS1280 Model 32



1. Cable/DSL HUB
2. I/O Expansion Drawer (optional)
3. I/O Master Drawer (mandatory option)
4. System Building Block Drawer (Model 32 includes four drawers)
5. Power supply, dual AC input is standard
6. AC input controllers (two mandatory options for Model 32)

HP AlphaServer GS1280 Model 64



1. Cable/DSL HUB
2. I/O Expansion Drawer (optional)
3. I/O Master Drawer (one drawer is optional)
4. System Building Block Drawer (Model 64 includes eight drawers)
5. Power supply, dual AC input is standard (two included for Model 64)
6. AC input controllers (two mandatory options for Model 64)

At A Glance

AlphaServer GS1280 Systems

- Up to 64 Alpha 21364 EV7 processors at 1300 MHz and 1150 MHz with advanced on-chip memory controllers and switch logic capable of providing 12.3 GB/s of memory bandwidth per processor
- Choice of memory options; up to 8 GB of RDRAM memory per CPU supported (512 GB total for a 64P system)
- Redundant features providing maximum uptime - N+1 Voltage Regulator Modules (VRMs); hot-plug redundant power supplies; cooling provided by hot-plug redundant system fans; dual AC input is standard
- Optional RAID memory support
- Standard I/O Drawer with 11 configurable PCI-X/PCI slots and one AGP slot; hot-swap power supplies
- High-performance I/O Drawer with eight PCI-X slots @133 MHz; hot-swap power supplies
- Enhanced reliability with ECC-protected memory, processor cache, and system data paths
- Tru64 UNIX or OpenVMS factory installed software (FIS); optional high availability support with Tru64 UNIX and OpenVMS cluster solutions
- Product warranty, 1-year hardware, on-site next business day and 90-day software, telephone support delivered by HP Services

Base Systems Contents

Step 1

- | | |
|----------------|---|
| | Requirements |
| Step 1a | System Requirements |
| Step 1b | Requirements for Partitions |
| Step 1c | Licensing Systems for Both OpenVMS and Tru64 UNIX |
| Step 1d | System Management Hardware/Software Requirements |

- [Step 2](#) Select Base System - Mandatory
- [Step 3](#) CPU Building Blocks - Mandatory
- [Step 4](#) Select Memory Options - Mandatory
- [Step 5](#) System I/O Expansion - Mandatory
- [Step 6](#) Power Distribution Units - Mandatory
- [Step 7](#) Dual AC Power - Optional
- [Step 8](#) Internal System Expansion - Optional
- [Step 9](#) External Rack Expansion - Optional

[ES/GS Common Options](#) - Hardware Options & Peripherals, Software, and Services

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Standard Features

Processor Up to 64 Alpha 21364 EV7 processors at 1300 MHz and 1150 MHz

Cache Memory 1.75-MB ECC L2 on-chip cache, 7-way set associative

Architecture Glue-less processor-to-processor multiprocessor architecture constructed from a set of basic components:

- System Building Block Drawers
- CPU Building Block Modules
- I/O Expansion Building Block Drawers

CPUs, Memory, and I/O slots	GS1280 Model
Maximum CPUs supported	64 (64 per hard partition for Tru64 UNIX, 32 per hard partition for OpenVMS)
Maximum memory supported	512 GB
Maximum PCI-X/PCI slots supported	704, 176 per hard partition
Maximum AGP slots supported	64, 16 per hard partition

Interfaces

USB	One Dual USB port per Master I/O Drawer
Server Management	Server Management LAN Connection to Cable/DSL hub.
Serial	One MBM serial connection per System Building Block Drawer

Form Factor

- 1 x 41U Rack (Model 8 and Model 16)
- 2 x 41U Rack (Model 32)
- 3 x 41U Rack (Model 64)

Boot/Diagnostic Devices

Load Device	One slim-line DVD/CD-RW per Master I/O Drawer NOTE: Only bootable CD media is supported for firmware and operating system booting. Bootable DVD media is not supported.
Hard Drives	Choice of 18.2/36.4/72.8/146-GB/300-GB SCSI disk drives in each Master I/O Drawer

Power Supplies 3-phase power subsystem with power cords, redundant 48 Vdc hot-swap power supplies, and dual AC feed included

OS Support

Tru64 UNIX V5.1B + IPK, or later required for EV7 CPU at 1150 MHz
 Tru64 UNIX V5.1B* + PK4, or later required for EV7 CPU at 1300 MHz
 AlphaServer Tru64 UNIX systems include pre-installed software, Base license, Unlimited User license, Server Extension license, Internet Express, and Secure Web Server
 OpenVMS V7.3-1 plus Update Kit, or later

Service and Support Protected by HP Services including a 1-year on-site hardware warranty. Training, consulting, network integration, software support, comprehensive system maintenance and guaranteed uptime services are also available for customers requiring higher levels of service and support.

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Systems

Step 1 - Requirements

Step 1a - System Requirements

Mandatory Purchases: The system cannot function without these options or services - the option or service must be ordered with the system.

- Base System (Step 2)
- Dual CPU Building Block Modules (Step 3)
- Memory (Step 4)
- Master I/O Building Block Drawer (Step 5)
- Power Distribution Unit(s) (Step 6)

Optional Purchases:

- I/O Building Block Drawer(s) (Step 5)
- System disk(s) (Step 5)
- Dual AC Power (Step 7)
- Internal System Expansion (Step 8)
- External Rack Expansion - (Step 9)
- Other (see ES/GS Common Options)

Recommended Services:

- HP Care Pack Service Package (see ES/GS Common Options - Step 12)
-

Step 1b - Requirements for Partitions

A single AlphaServer GS1280 can be divided into logical hardware partitions as small as two processors, each running an instance of Tru64 UNIX or an instance of OpenVMS. Each partition is allocated its own dedicated "shared-nothing" set of hardware resources: CPU module(s), memory module(s), and I/O. Each hardware partition is viewed as a unique node, from a system point-of-view, with its own instance of Tru64 UNIX or OpenVMS operating system and application software, independent system console, and error log.

Minimum Hardware and Software Required per Hardware Partition

1. One Dual CPU Building Block Module (Step 3)
2. Memory (Step 4)
3. I/O Drawer (Step 5)
 - a. One Standard I/O Drawer (Master or Expansion), or
 - b. Shared (up to four hard partitions) access to one High Performance I/O Drawer (Master or Expansion)
4. One local disk (Step 5) or external storage for the system software. Network boot can be used in place of the disk storage.
5. User access via the USB port in a Master I/O Drawer, a network connection (requires a LAN or WAN I/O adapter), or local terminal (requires an async I/O adapter).
6. All systems require the following minimum firmware and software revisions to run hard partitions:
 - a. Minimum Firmware console rev: V6.5-8
 - b. Tru64 UNIX: V5.1B + Patch kit - T64V51BB22AS0002-20030415.tar
 - c. OpenVMS: V7.3-1 + TIMA Kits (available at http://h18003.www1.hp.com/alphaserver/g1280/g1280_tech.html):
 - i. DEC-AVPVMS-VMS731_PARTITIONING-V0100-4.PCSI

- ii. AVPVMS-VMS731_PARTITIONING-V0100_cVRLET
- iii. AVPVMS-VMS731_PARTITIONING-V0100_SUBFORM

Configuration Guidelines

1. The two processors on a Dual Processor CPU Module cannot be split between hard partitions.
2. The set of processors assigned to a partition must form a continuous rectangle on the system interconnect mesh network.
3. CPU modules in an 8P Building Block Drawer share the same 48v power feed (from a redundant power supply). If the 8P Building Block Drawer contains all or portions of several hard partitions, a power fault in the drawer could affect all the partitions in that drawer. Hard partitions that consist of whole 8P Building Block Drawers limit the risk of a power fault in one drawer to one partition.
4. Base systems include an operating system license (Tru64 UNIX or OpenVMS) that licenses all hardware partitions of the system.
5. The license for an HP software product, the license(s) and license key(s) that represent those licenses, may be applied to any partition (OpenVMS Galaxy instance or hardware partition) within that system. Different versions of the operating system or layered products may be used on different partitions. In this case, the customer must be licensed for the latest version in use. Software products from other suppliers may have different licensing requirements for partitions.

Step 1c - Licensing Systems for Both OpenVMS and Tru64 UNIX

A System requires licenses for both OpenVMS and Tru64 UNIX operating systems, either for dual O/S boot of the entire system or for different operating systems in separate hard partitions. To use a second operating system, order the appropriate base system upgrade license and as many dual CPU SMP licenses as needed.

OpenVMS software base system upgrade for GS1280	QB-63PAQ-AC
Tru64 UNIX software base system upgrade for GS1280	QB-595AN-AB
OpenVMS Alpha dual CPU SMP license for GS1280	QL-MT1A9-6T
Tru64 UNIX Alpha dual CPU SMP license for GS1280	QL-MT4A9-6T

Step 1d - System Management Hardware/Software Requirements

Each AlphaServer ES47, ES80, and GS1280 system includes System Management software that can significantly enhance and simplify monitoring and control of the system. Use of the System Management software is optional. The software, which runs on a separate Intel or Alpha system, consists of two major components:

1. Alpha Management Station (AMS) - for monitoring and control of multiple ES47, ES80, and GS1280 Alpha Systems. AMS offers the highest level of server management functionality for a single or multi-platform environment. The AMS software requires the following hardware in order to operate:
 - o Tru64 UNIX platform with 512-MB memory, 4-GB disk space, and two network interface cards running Tru64 UNIX V5.1B or later.
 - o Intel IA-32 platform running Linux, 500-MHz CPU or faster, 256-MB memory, 4-GB disk space, and one network interface card.
2. Alpha Management Utility (AMU) - for monitoring and control of a single ES47, ES80, or GS1280 Alpha System. The AMU is a GUI based application that provides a sophisticated, yet user-friendly graphics interface. The AMU is a Web-based utility, which allows a user local and remote access from a browser. The AMU software requires one of the following hardware platforms in order to operate:
 - o Intel IA-32 platform running Windows 2000 or later, 500-MHz CPU or faster, 256-MB memory, 4-GB disk space, and one network interface card.
 - o Intel IA-32 platform running Linux, 500-MHz CPU or faster, 256-MB memory, 4-GB disk space, and one network interface card.
 - o Tru64 UNIX platform running V5.1B or later, 512-MB memory, 4-GB disk space, and one network interface card.
 - o OpenVMS platform running V7.3-1 or later, 512-MB memory, 4-GB disk space, and one network interface card.
3. Both the AMS and AMU software require Internet Explorer 5.5 or later or Netscape 4.76 or later.
4. AMS/AMU software kits and instructions may be downloaded from:
<http://ftp.digital.com/pub/Digital/Alpha/firmware/interim/ams/index.html>

Step 2 - Select Base System - Mandatory

Mandatory selection of at least one Base System required.

AlphaServer GS1280 Base Systems						
Model	OS	System Building Block	Total CPUs Supported	41U Rack(s)	Dual AC	Part Number

		Drawers Included	(see Note 1)		(see Note 3)	
Model 8	Tru64 UNIX	1	8	1	Option	DA-1280A-AA
Model 8	OpenVMS	1	8	1	Option	DY-1280A-AA
Model 16	Tru64 UNIX	2	16	1	Option	DA-1280A-BA
Model 16	OpenVMS	2	16	1	Option	DY-1280A-BA
Model 32	Tru64 UNIX	4	32	2	Included	DA-1280A-CC
Model 32	OpenVMS	4	32	2	Included	DY-1280A-CC
Model 64	Tru64 UNIX	8	64	3	Included	DA-1280A-BD
Model 64	OpenVMS	8	64 (see Note 2)	3	Included	DY-1280A-BD

NOTES:

1. Base systems do not include CPUs or memory (see Steps 3 and 4).
2. OpenVMS maximum processor support is 32P per partition. To achieve 64 processors, 2 x 32P OpenVMS partitions are required.

Step 3 - CPU Building Block Modules – Mandatory

M=Mandatory O=Optional	Supported Configurations																							
	CPUs																							
Dual CPU Modules	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	36	40	44	48	52	56	60	64
GS1280 Model 8	M	O	O	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GS1280 Model 16	M	O	O	O	O	O	O	O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GS1280 Model 32	M	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	-	-	-	-	-	-	-	-
GS1280 Model 64	-	-	-	-	-	-	-	M	-	-	-	O	-	-	-	O	O	O	O	O	O	O	O	O

Configuration Guidelines

1. CPU Building Blocks with different clock speeds can co-exist in one system, but must be separated into hard partitions where the CPUs have the same speed.
2. CPU Building Block or instant Capacity (iCAP) CPU Building Block Modules type (Tru64 UNIX or OpenVMS) must match the base system operating system selected in Step 2, or purchase a base operating system upgrade license to match the license with the CPU Building Block Module.

Full Use CPU Building Block Modules	AlphaServer GS1280 Dual CPU Building Block Module, 2xEV7 CPUs, 1300 MHz, Tru64 UNIX SMP License	3X-KN72D-AB
	AlphaServer GS1280 Dual CPU Building Block Module, 2xEV7 CPUs, 1300 MHz, OpenVMS SMP License	3X-KN72D-AC
	AlphaServer GS1280 Dual CPU Building Block Module, 2xEV7 CPUs, 1150 MHz, Tru64 UNIX SMP License	3X-KN72C-AB
	AlphaServer GS1280 Dual CPU Building Block Module, 2xEV7 CPUs, 1150 MHz, OpenVMS SMP License	3X-KN72C-AC

Configuration and Use of instant Capacity (iCAP) CPUs

The instant Capacity (iCAP) program gives HP customers the option to purchase add-on CPU modules at a reduced price and install those modules in systems ready to activate instantly when needed for extra computational capacity. To use the iCAP program for AlphaServers:

1. Order and install iCAP CPU modules along with Full Use CPUs. The total number of Full Use CPU Building Block Modules plus iCAP CPU Building Block Modules must adhere to the limits outlined above for GS1280 systems.
2. Use the iCAP software (supplied with the iCAP CPU Module) to set iCAP CPUs inactive. As long as the total number of active CPUs does not exceed the number of licensed CPUs owned for the system, the owner may choose which CPUs to designate as iCAP.
3. Inactive iCAP CPUs cannot include the primary CPU, CPUs responsible for hardware interrupts, CPUs being used by an application when configuring iCAP, or a CPU connected to an I/O Building Block Drawer.
4. Activate the iCAP CPUs for First Use when extra capacity is needed, and then promptly purchase the iCAP Enablement (Right-to-Use).

iCAP CPU Building Block Module + iCAP Enablement = Full Use CPU Building Block Module

	(4 x 256 MB)								
B	3X-MS7AB-CA (4 x 512 MB)	1	-	1	-	1	-	1	-
		CPU Building Block Module #3				CPU Building Block Module #4			
		CPU 5		CPU 6		CPU 7		CPU 8	
		Controller 1	Controller 2	Controller 1	Controller 2	Controller 1	Controller 2	Controller 1	Controller 2
A	3X-MS7AB-BA (4 x 256 MB)	1	1	1	1	1	1	1	1
B	3X-MS7AB-CA (4 x 512 MB)	1	-	1	-	1	-	1	-

Configuring memory is a compromise between cost, total memory capacity, and memory bandwidth requirements. The following may be used as guidelines:

- Applications, in which large amounts of memory can substantially reduce I/O throughput, may be optimized for total memory capacity and future capacity growth. (Case B)
- Typical commercial applications, such as transaction processing (OLTP) and multi-user timesharing, usually operate efficiently from cache and may not be materially affected by memory bandwidth. Memory configuration is a balance between memory bandwidth and future capacity growth. (Case B)
- Data mining can benefit from additional memory bandwidth. It is best to match the number of memory base modules to the number of CPUs. (Case A)
- The most demanding high-performance technical applications achieve a performance level that is directly proportional to memory bandwidth. In these cases, configure two memory options per CPU. (Case A)

Memory Specification

Use only with the indicated CPU Modules (mandatory)

	800 MHz	1066 MHz
	Must be used only with EV7 1.15 GHz (3X-KN72C-**)	May be used with either EV7 1.3 GHz (3X-KN72D-**) or EV7 1.15 GHz (3X-KN72C-**)
1-GB RDRAM Memory (4x256) Option	3X-MS7AB-BA	3X-MS7AC-BA
1-GB RDRAM Memory (1x256) RAID Option	3X-MS7AB-BC	3X-MS7AC-BC
2-GB RDRAM Memory (4x512) Option	3X-MS7AB-CA	3X-MS7AC-CA
2-GB RDRAM Memory (1x512) RAID Option	3X-MS7AB-CC	3X-MS7AC-CC
4-GB RDRAM Memory (4x1024) Option	3X-MS7AB-DB	3X-MS7AC-DA
4-GB RDRAM Memory (1x1024) RAID Option	3X-MS7AB-DD	3X-MS7AC-DC

Step 5 - System I/O Expansion - Mandatory

Configuration Guidelines

1. Each AlphaServer GS1280 system requires one I/O Master Building Block Drawer per system. Additional I/O Building Block Drawers are optional.
2. Each additional hard partition in the system requires:
 - One Standard I/O Drawer (Master or Expansion), or
 - Shared (up to four hard partitions) access to one High Performance I/O Drawer (Master or Expansion)
3. Each CPU in a GS1280 System Building Block Drawer can provide one I/O connection to an I/O Drawer.
4. Either a Standard I/O Drawer (Expansion or Master) or High Performance I/O Drawer (Expansion or Master) can be used for optional I/O expansion. Any combination of drawers is supported up to the I/O connection limit of 32 per hard partition or 64 per system with 2 or more hard partitions.
 - The Standard I/O Drawer requires one I/O connection.
 - The High Performance I/O Drawer requires one and optionally up to four connections.

Example - AlphaServer GS1280 Model 16 with 12 processors

Twelve Processors, one I/O connection each

Six Standard I/O Drawers, one I/O connection each

One High Performance I/O Drawer with four I/O connections

One High Performance I/O Drawer with two I/O connections

Total I/O Drawer Connections

=12 I/O connections available

= 6 I/O connections

= 4 I/O connections

= 2 I/O connections

=12 I/O connections used

	I/O Module for Connection to CPU in a System Building Block Drawer	I/O Buses	I/O Slots	Dual Redundant Power Supplies	USB/ Ultra3 SCSI Adapter Card	DVD/ CD-RW Drive	Universal Slot for Disks	Part Number
Standard I/O Drawer, Expansion	1	3 PCI-X 1 AGP 4X	8 PCI-X 1 PCI 3.3V; 2 PCI, 5V 1 AGP 4X	Yes	No	No	None	3X-BA70A-BA
Standard I/O Drawer, Master	1	3 PCI-X 1 AGP 4X	8 PCI-X 1 PCI 3.3V; 2 PCI, 5V 1 AGP 4X	Yes	1 in PCI 3.3V Slot	1	2 ⁴	3X-BA70A-AA
High Performance I/O Drawer, Expansion	1 standard 3 additional, optional ¹	2 to 8 PCI-X	2 to 8 PCI-X	Yes	No	No	None	3X-BA70B-BA
High Performance I/O Drawer, Master	1 standard 3 additional, optional ¹	2 to 8 PCI-X	2 to 8 PCI-X	Yes	1 in PCI-X Slot	1	2 ⁴	3X-BA70B-AA

Add-in I/O Module for High Performance I/O Drawers. Each module supports two PCI-X slots. Up to three modules may be added to the base High Performance I/O Drawer. 3X-KFMHA-AA

I/O 3.3-meter cable for connection between GS1280 System Building Block Drawer and I/O Building Block Drawers mounted in a system rack or adjacent expansion rack; select one cable for each I/O drawer ordered and one cable per Add-in I/O Module (3X-KFMHA-AA) if ordered. 3X-BNPSA-04

I/O 4.5-meter cable for connection spanning one or two racks between GS1280 System Building Block Drawer and I/O Building Block Drawer mounted in an expansion rack; select one cable for each I/O drawer ordered and one cable per Add-in I/O Module (3X-KFMHA-AA) if ordered. 3X-BNPSA-05

I/O 6.0-meter cable for connection spanning three racks between GS1280 System Building Block Drawer and I/O Building Block Drawer mounted in an expansion rack; select one cable for each I/O drawer ordered and one cable per Add-in I/O Module (3X-KFMHA-AA) if ordered. 3X-BNPSA-06

NOTES:

1. One High Performance I/O Drawer can be used by up to four separate hard partitions. Each of the four I/O connections (and two associated PCI-X slots) in the High Performance I/O Drawer can be independently controlled (e.g. power on/off) in conjunction with a separate partition.
2. A Master I/O Drawer consists of a Standard or High Performance I/O Drawer plus a Combination Adapter in one slot. The Combination Adapter provides an Ultra3 SCSI connection for two disks and a DVD/CD-RW drive in the drawer, plus a USB connection for keyboard, mouse, and monitor. The Master I/O Drawer is required for all GS1280 systems integrated at the manufacturing plant by HP. If the final system configuration does not require these I/O devices, the Combination Adapter may be removed and replaced with the following alternatives:
 - o System Boot - External storage or network boot can be used in place of the disk storage internal to the I/O Drawer.
 - o Software Load - Software can be loaded over the network from a disk on another system or directly from a CD reader attached to another system by using remote mount.
 - o User I/O - User access via a network connection can be used in place of the direct connection via the USB port.
3. The two disks in the Master I/O Drawer can only be connected to the system via the Combination Adapter's Ultra3 SCSI connection. The I/O Drawer design does not permit connection from other storage adapters, such as a RAID adapter, that might be installed in the I/O Drawer.
4. Each Master I/O Drawer supports up to two, optional, hard disk drives. See the Disks step of the ES/GS Common Options section of this QuickSpec for the selection of supported disk drives.

Step 6 - Power Distribution Units - Mandatory

			GS1280 Model 8	GS1280 Model 16	GS1280 Model 32	GS1280 Model 64
			DA/DY-1280A-AA	DA/DY-1280A-BA	DA/DY-1280A-CC	DA/DY-1280A-BD
Type A Power Distribution Units Select one variant.	North America/Japan 200 -208V, NEMA L21-30P 30A; 3 x C19 outlets plus 24 x C13 outlets	3X-H7606-AA	1 required (provides receptacles for power cords from all system components)	2 required (provides receptacles for power cords from all system components)	2 required (provides receptacles for power cords from I/O Drawers, LAN Hub, and storage shelves)	2 required (provides receptacles for power cords from I/O Drawers, LAN Hub, and storage shelves)
	International 380/415V Y, IEC 309 32A; 3 x C19 outlets plus 24 x C13 outlets	3X-H7606-AB				
Type B Power Distribution Units Select one variant.	North America/Japan 200 - 208V, IEC 309 60A	3X-H7606-BA	Not applicable	Not applicable	2 required (for M32/M64 Dual AC power supply exclusively for 8P system drawers)	4 required (for M32/M64 Dual AC power supply exclusively for 8P system drawers)
	International 380/415V Y, IEC 309 32A	3X-H7606-BB				
NOTES: <ol style="list-style-type: none"> Select the same power supply voltage variant for both Type A and Type B Power Distribution Units, e.g. both 200-208V or both 380/415V. IEC 309 is a general spec that can encompass 3 different pin types. The 3X-H7606-BA PDU uses the Hubbell 460P9W, a 4 pin connector. The 3X-H7606-AA PDU uses an L21-30P 30 amp plug, Hubbell 2811, a 4 pin connector. 						

Step 7 - Dual AC Power - Optional

A Dual AC power option provides the capability to connect to two separate AC feeds: a primary AC feed and a secondary AC feed. The feeds can be direct from the power utility, or they can be a combination of utility feeds and UPS or generator feeds. The preferred (primary) feed is determined by the user. In the event of failure of the primary feed, the system will automatically transfer the load to the secondary feed without power interruption.

- Dual AC is included as a standard feature in the:
 - GS1280 Model 32 with Dual AC (DA/DY-1280A-CC)
 - GS1280 Model 64 with Dual AC (DA/DY-1280A-BD)
- Dual AC is an option for:
 - GS1280 Model 8
 - GS1280 Model 16
 - GS1280 Model 32 Single AC (DA/DY-1280A-AC)
 - GS1280 Model 64 Single AC (DA/DY-1280A-AD)

Dual AC Power Options for GS1280 Model 8 and Model 16 Systems

Configuration Guidelines

- Dual AC power options can be factory configured or installed as a field upgrade.
- The dual AC assemblies for the Model 16 requires that a second rack (3X-H9A45-ZA Expansion Rack) be mounted adjacent to the system power rack - see Step 9.

Dual AC option for use with AlphaServer GS1280 Model 8 systems

3X-H7514-AC

Dual AC option for use with AlphaServer GS1280 Model 16 systems

3X-H7514-AB

Mandatory with Dual AC options above.

Type A Power Distribution Units

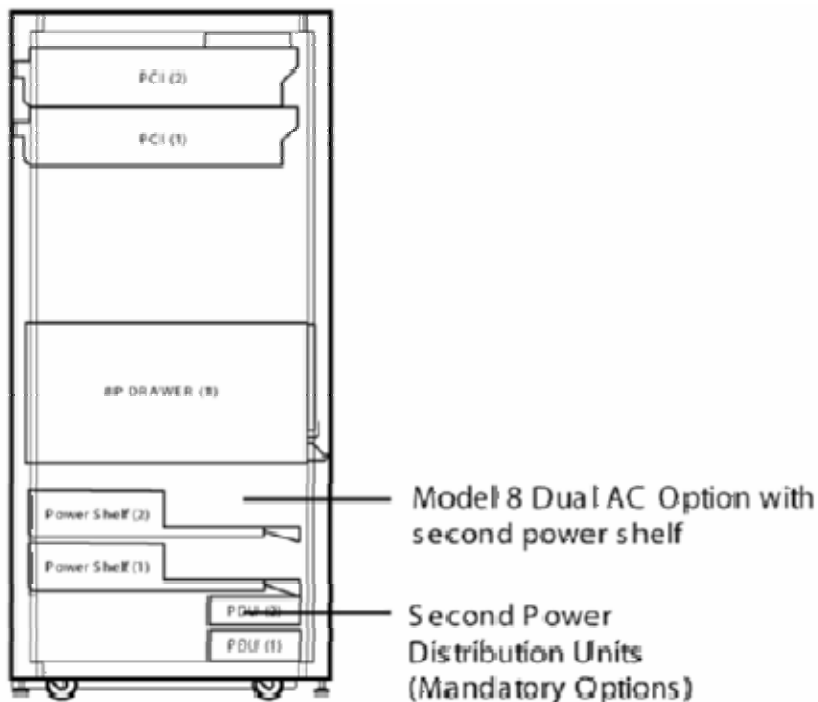
Select one variant.

- Two required for Model 16 Dual AC Option
 - One required for Model 8 Dual AC Option
- North America/Japan 200 -208V, NEMA L21-30P 30A; 3 x C19 outlets plus 24 x C13 outlets
- International 380/415V Y, IEC 309 32A; 3 x C19 outlets plus 24 x C13

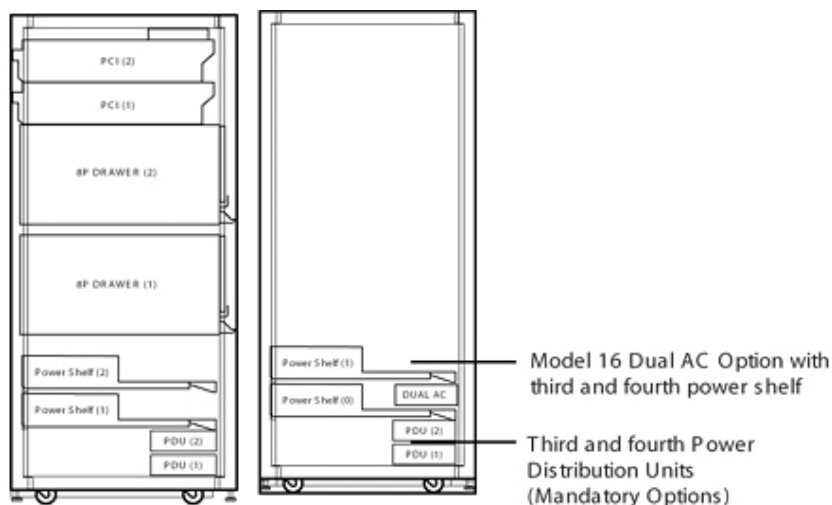
3X-H7606-AA

3X-H7606-AB

outlets



AlphaServer GS1280 Model 8 with Dual AC Option



AlphaServer GS1280 Model 16 with Dual AC Option

Dual AC Power Options for GS1280 Model 32 and Model 64 Systems not originally equipped with Dual AC (DA/DY-1280A-AC/AD)

GS1280 Model 32 and Model 64 systems that were not originally equipped with power supplies that included dual AC capability (DA/DY-1280A-AC/AD) may be upgraded in the field to a power supply with Dual AC.

Configuration Guidelines

1. The upgrade consists of one new power supply rack that replaces the existing power supply rack(s).
2. I/O Drawers, storage shelves or other components in the existing power supply racks must be moved to the new power supply rack or an expansion rack.
3. Two Type A Power Distribution Units (3X-H7606-Ax) must be moved from the existing power rack to the new power rack to provide power for I/O Drawers and/or storage in the new power rack.

Dual AC option for AlphaServer GS1280 Model 32 system (DA/DY-1280A-AC) 3X-H7514-BC

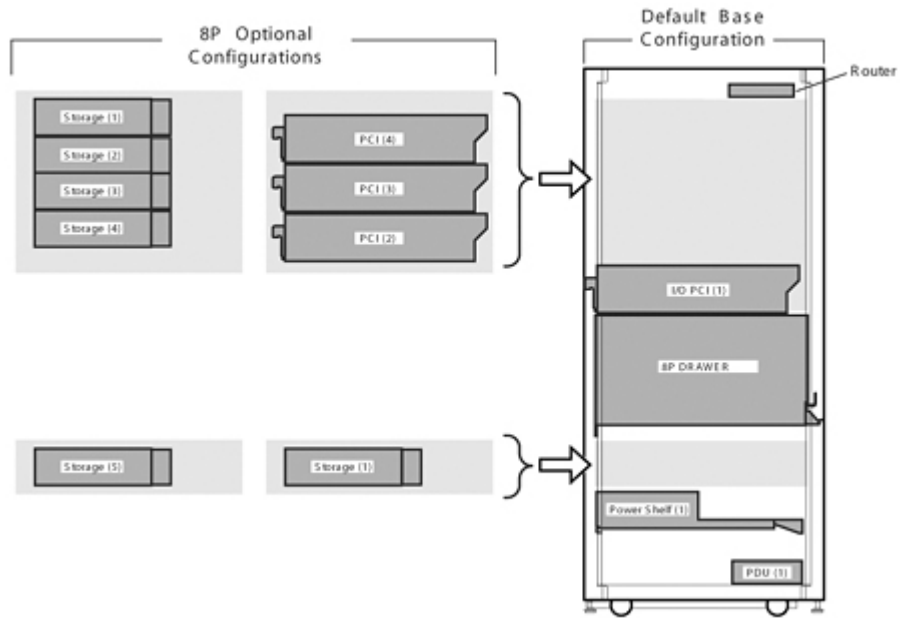
Dual AC option for AlphaServer GS1280 Model 64 system (DA/DY-1280A-AD) 3X-H7514-BD

Mandatory with Dual AC options above.

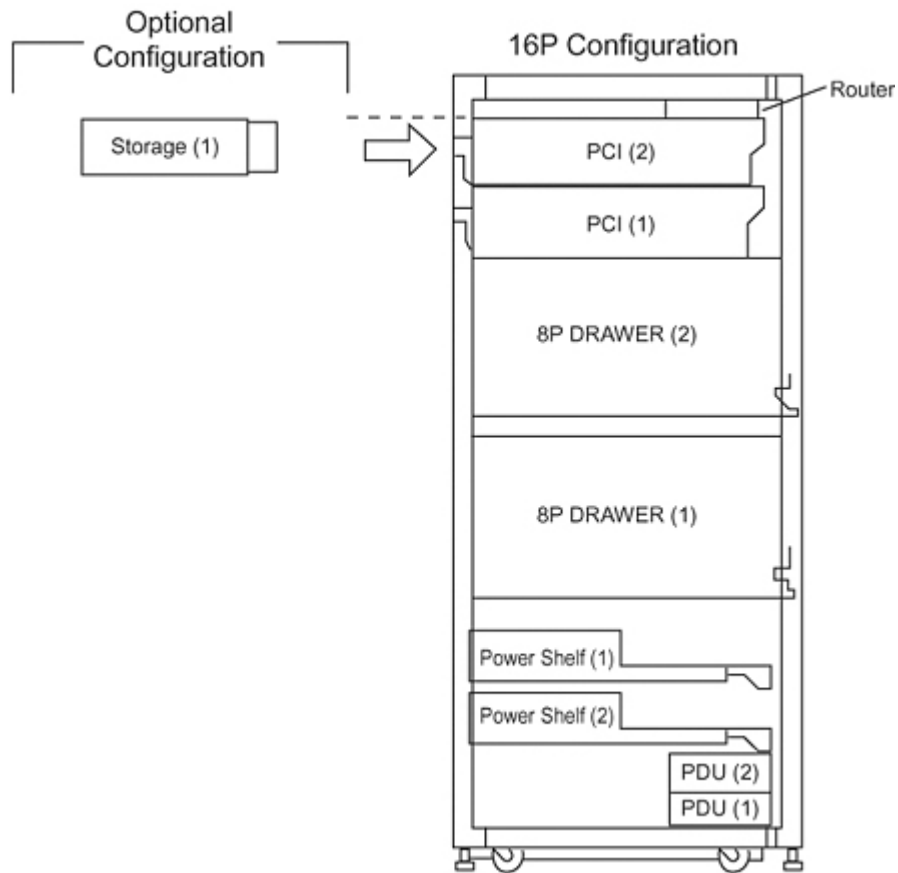
- Two required for Model 32 Dual AC Option North America/Japan 200 - 208V, IEC 309 60A 3X-H7606-BA

Step 8 - Internal System Expansion - Optional

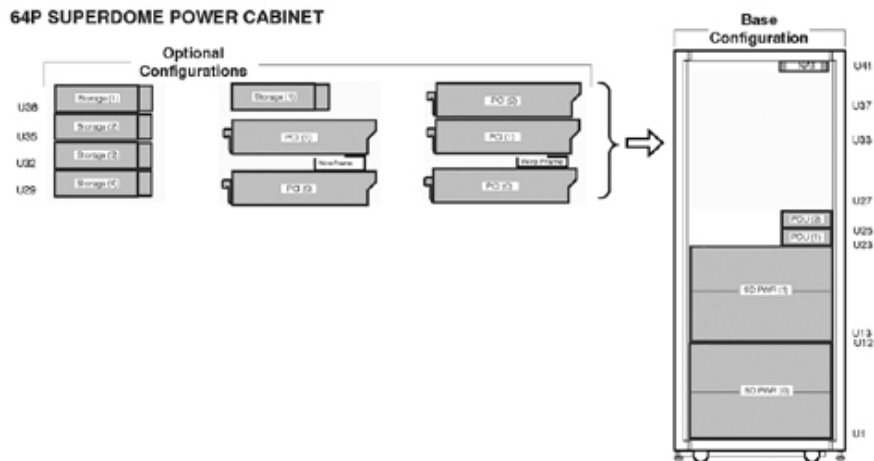
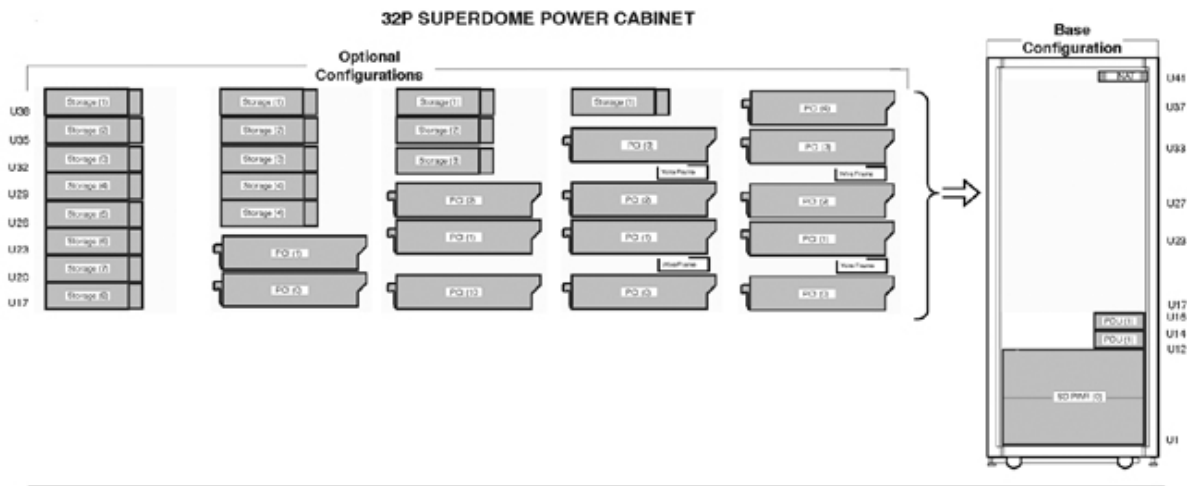
AlphaServer GS1280 systems can support optional configurations shown below.



AlphaServer GS1280 Model 8 - Internal System Expansion Options



AlphaServer GS1280 Model 16 - Internal System Expansion Options



AlphaServer GS1280 Model 32 and Model 64 - Internal System Expansion

Step 9 - External Rack Expansion - Optional

Expansion Racks can be configured to hold I/O Drawers and StorageWorks components.

External Expansion Rack, 41U, 2m

Mandatory with External Expansion Rack, above Type A Power Distribution Units Select one variant

- One required for Model 8 or Model 16 systems. Second optional for Dual AC capability
- Two required for Model 32 and Model 64 system for Dual AC capability

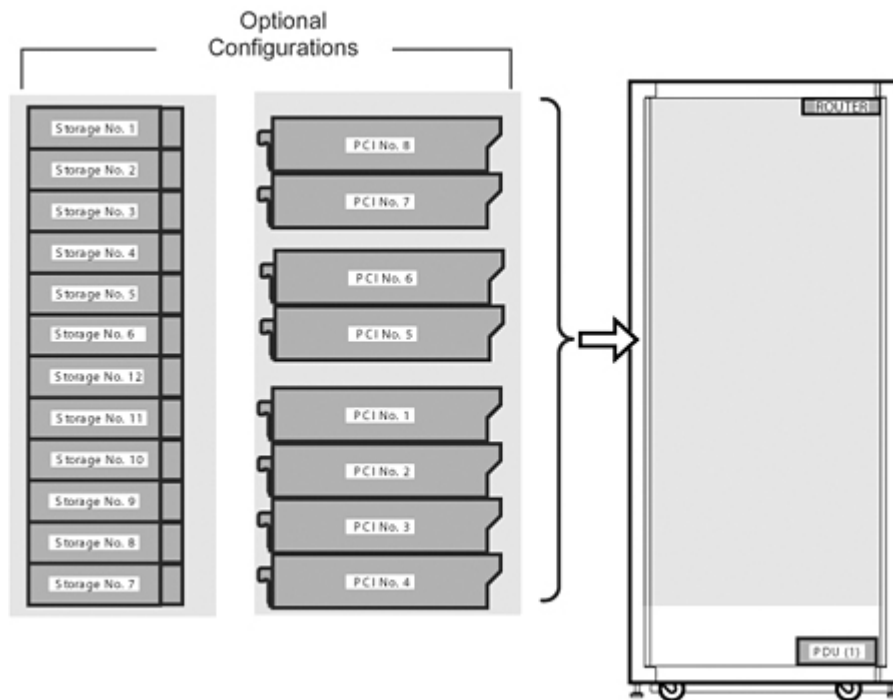
North America/Japan 200 -208V, NEMA L21-30P 30A; 3 x C19 outlets plus 24 x C13 outlets

International 380/415V Y, IEC 309 32A; 3 x C19 outlets plus 24 x C13 outlets

3X-H9A45-ZA

3X-H7606-AA

3X-H7606-AB



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ES/GS Common Options

Hardware Options & Peripherals, Software, and Services for AlphaServers ES47, ES80, and GS1280

At A Glance

- This section serves as a reference for selection and configuration of currently available host based adapters and controllers, peripheral storage and load devices, operating system software add-on products, and services.
- For the complete list of all supported options (both currently available and retired) plus detailed configuration guidelines, refer to "Alpha Options:" <http://h18002.www1.hp.com/alphaserver/products/options.html>

ES/GS Common Options — Contents	
Reference 1	I/O Capacity for AlphaServer ES47/ES80 and AlphaServer GS1280 Systems
Reference 2	Adapter to Peripheral Cross Connect Table
Reference 3	Rack Specifications and Rackmount Kits
Step 1	Networks and Communications — Optional
Step 2	Memory Channel — Optional
Step 3	Storage Adapters/Controllers — Optional
Step 4	StorageWorks Enclosures for Disks and Tapes — Optional
Step 5	Disks — Optional
Step 6	Storage Systems — Optional
Step 7	Tape Drives — Optional
Step 8	Tape Storage Systems — Optional
Step 9	Storage Network Switches, Hubs, and Interconnects — Optional
Step 10	Keyboards, Mouse, Monitors, Power Cords — Optional
Step 11	Graphics Support — Optional
Step 12	System Software — Optional
Step 13	Hardware and Software Support Services — Optional

AlphaServer ES47/ES80 and GS1280 systems offer three types of I/O bus standards for adapters and controllers.

1. **PCI-X** — Peripheral Component Interconnect Extended is a computer bus interface standard for connecting a microprocessor and attached devices. PCI-X doubles the speed and amount of data exchanged between the computer processor and peripherals from the predecessor PCI bus. PCI-X is backwards-compatible, meaning that users can, for example, install a PCI-X card in a standard PCI slot but expect a decrease in speed to 66 MHz or 33 MHz. Users can also use both PCI and PCI-X cards on the same PCI-X bus, but the bus will run at the speed of the slowest card. PCI-X is more fault tolerant than PCI. For example, PCI-X is able to reinitialize a faulty card or take it offline before computer failure occurs.
2. **PCI** — Peripheral Component Interconnect is a computer bus interface standard for connecting a microprocessor and attached devices.
3. **AGP 4** — Accelerated Graphics Port (AGP) is an interface specification that enables 3-D graphics to display quickly. It is especially useful in conjunction with three-dimensional (3D) video, and sophisticated scientific and engineering graphics programs. AGP runs at several times the bus speed of conventional Peripheral Component Interconnect (PCI). Because of this, the data transfer rate using AGP is significantly greater than with PCI video cards. The AGP 4X mode provides high performance levels with a peak bandwidth of 1066 MB/s. AGP 4X mode is a superset to the 1X and 2X modes; thus, all components supporting AGP 4X must also support 1X and 2X modes.

The following table presents the matrix of maximum, theoretical I/O throughput for the different standards. Actual I/O throughput will be less than calculated because of protocol overhead and contention for bus capacity.

Calculated Maximum Throughput	32-bit data path		64-bit data path	
PCI, 33 MHz	0.133 GB/s		0.267 GB/s	
PCI or PCI-X, 66 MHz	0.267 GB/s		0.533 GB/s	
PCI-X, 100 MHz	N/A		0.8 GB/s	
PCI-X, 133 MHz	N/A		1.067 GB/s	
Calculated Maximum Throughput	1X	2X	4X	
AGP	0.133 GB/s	0.267 GB/s	1.067 GB/s	

Overall System Capacities for I/O Adapters and Controllers

	ES47 Tower or Workstation	ES47	ES80	GS1280
Maximum Hard Partitions per system	1	2	4	32
Maximum Quantity Tested & Supported				
	per system	per system	per system	per hard partition: per system
Maximum 2P Building Block Drawers per System	1	2	4	N/A
PCI-X/PCI slots in 2P Drawers	5	10	20	N/A
133-MHz PCI-X/PCI slots in 2P Drawers		2	4	N/A
AGP slots in 2P Drawers	1	2	4	N/A
Maximum External I/O Connections	0	2	4	32 : 64
Maximum Standard I/O Drawers (One I/O connection per drawer)	0	2	4	32 : 64
PCI-X/PCI slots in Standard I/O Drawers		18	36	288 : 576
5V PCI slots in Standard I/O Drawers		4	8	64 : 128
AGP slots in Standard I/O Drawers		2	4	32 : 64
Maximum High Performance I/O Drawers (One I/O connection per drawer)	0	2	4	32 : 64
Maximum High Performance I/O Drawers (Four I/O connections per drawer)	0	1	1	8 : 16
133-MHz PCI-X/PCI slots in High Performance I/O Drawers		4	8	64 : 128
Total Slots	per system	per system	per system	per hard partition: per system
PCI-X/PCI slots	5	28	56	288 : 576

133-MHz PCI-X/PCI slots	1	4	8	32 : 128
5V PCI slots		4	8	32 : 64
AGP slots	1	4	8	32 : 64
Maximum Possible Slots (PCI-X/PCI plus 5V PCI plus AGP slots)	6	36	72	384 : 768

I/O for Two-processor System Building Block Drawer used in ES47 and ES80 Systems

- For PCI-X capable slots:
 - All universal or 3.3V PCI and PCI-X cards are supported,
 - EXCEPT: UltraSCSI wide differential adapter, 32-bit/33-MHz PCI adapter (3X-KZPBA-CC)
 - PCI-X protocol is used on the bus, but reverts to PCI protocol in these cases:
 - When one or more PCI cards are in a bus segment
 - Gigabit Ethernet, Rev A (DEGXA-SA/TA) is in the bus segment
- An I/O bus segment will operate at the least common denominator of the adapters installed or the lower speeds dictated by bus loading (as shown in the tables), whichever is less.
- The PCI-X card slots must be populated contiguously starting with slot 1; otherwise the bus will run at 33 MHz PCI.

2P Building Block Drawer Slot Specifications

Port (Bus) #	Slot #	Maximum Bus Speed	Signal Voltage	Bus Loading, Adapters Installed (contiguously starting with Slot 1)	Max Bus Speed
0	1	133 MHz	3.3V	1 PCI 1 PCI-X	66 MHz 133 MHz
1	1	66 MHz	3.3V	1 or 2 PCI 3 or 4 PCI 1 to 4 PCI-X	66 MHz 50 MHz 66 MHz
	2	66 MHz	3.3V		
	3	66 MHz	3.3V		
	4	66 MHz	3.3V		
3	1	4X AGP	1.5V	1 AGP	4X

Standard I/O Drawer used in ES47, ES80, and GS1280 Systems

- For PCI-X capable slots:
 - All universal or 3.3V PCI and PCI-X cards are supported,
 - EXCEPT: UltraSCSI wide differential adapter, 32-bit/33-MHz PCI adapter (3X-KZPBA-CC)
 - PCI-X protocol is used on the bus, but reverts to PCI protocol in these cases:
 - When one or more PCI cards are in a bus segment
 - With more than five (5) cards in a bus segment
 - Gigabit Ethernet, Rev A (DEGXA-SA/TA) is in the bus segment
- PCI 5V slots support ONLY:
 - For cluster support, CI host bus adapter (CIPCA-BA)
 - A legacy UltraSCSI wide differential adapter 32-bit/33-MHz PCI adapter (3X-KZPBA-CC)
- An I/O bus segment will operate at the least common denominator of the adapters installed or the lower speeds dictated by bus loading (as shown in the tables), whichever is less.
- The PCI-X card slots must be populated contiguously starting with slot 1; otherwise the bus will run at 33-MHz PCI.

Standard I/O Building Block Drawer Slot Specifications

Port (Bus) #	Slot #	Maximum Bus Speed	Signal Voltage	Bus Loading, Adapters Installed (contiguously starting with Slot 1)	Max Bus Speed
0	1	100 MHz	3.3V	1 PCI 1 PCI-X 2 or 3 PCI ¹	66 MHz 100 MHz 33 MHz
	2	33 MHz	5.0V ³		
	3	33 MHz	5.0V ³		
1	1	133 MHz	3.3V	1 PCI-X 2 PCI-X 1 or 2 PCI	133 MHz 100 MHz 66 MHz
	2	133 MHz	3.3V		
2	1	66 MHz	3.3V	1 to 3 PCI ² 4 or 5 PCI 6 PCI 1 to 5 PCI-X	66 MHz 50 MHz 33 MHz 66 MHz
	2	66 MHz	3.3V		
	3	66 MHz	3.3V		
	4	66 MHz	3.3V		

	5	66 MHz	3.3V	6 PCI-X	33 MHz
	6	66 MHz	3.3V		
3	1	4X AGP	1.5V	1 AGP	4X

1. Modules designed for 3.3V signaling and 66-MHz bus speed cannot operate in Port 0 - slots 2 and 3.
2. In Port 2 of a Standard I/O Drawer, if PBXGG-AA (RADEON PCI Graphics adapter) is installed together with another card instead of 66 MHz, the bus will run at 50 MHz maximum. If RADEON is alone in slot 1, the bus will run at 66 MHz.
3. For Port 0, slots 2 and 3 are keyed for 5V adapters

High Performance I/O Drawer used in ES47, ES80, and GS1280 Systems

- All universal or 3.3V PCI and PCI-X cards are supported, EXCEPT: UltraSCSI wide differential adapter, 32-bit/33-MHz PCI adapter (3X-KZPBA-CC)
- PCI-X protocol is used on the bus, but reverts to PCI protocol in these cases:
 - When a PCI card is in the slot
 - When Gigabit Ethernet, Rev A (DEGXA-SATA) is in the slot

High-performance I/O Drawer Slots Specifications						
I/O Connection to EV7 Processor	Port (Bus) #	Slot #	Maximum Bus Speed	Signal Voltage	Bus Loading, Adapters Installed (contiguously starting with Slot 1)	Max Bus Speed
0	1	Slot 1	133 MHz	3.3V	For each slot 1 PCI 1 PCI-X	66 MHz 133 MHz
0	2	Slot 1	133 MHz	3.3V		
1	1	Slot 1	133 MHz	3.3V		
1	2	Slot 1	133 MHz	3.3V		
2	1	Slot 1	133 MHz	3.3V		
2	2	Slot 1	133 MHz	3.3V		
3	1	Slot 1	133 MHz	3.3V		
3	2	Slot 1	133 MHz	3.3V		

Reference 2 – Adapter to Peripheral Cross Connect Table

	SCSI Ultra3 LVD	SCSI Ultra2 LVD	Ultra3 SCSI Backplane RAID, 2 or 4 channel	U320 LVD SCSI Backplane RAID, 2 or 4 channel
	3X-KZPEA-DB	3X-KZPCA-AA	3X-KZPDC-BE/DF	3X-KZPEC-BF/DG
MSA30 Rack Disk & Tape Drive Enclosure	Yes	Yes	Yes	Yes
4300 Rack Disk & Tape Drive Enclosure	Yes	Yes	Yes	Yes
1U Rackmount Tape Drive Enclosure	Yes	Yes	no	no
3U Rackmount Tape Drive Enclosure	Yes	Yes	no	no
MSA1000 Storage System	no	no	no	no
HP StorageWorks Enterprise Virtual Arrays; EVA4000; EVA6000; EVA8000	no	no	no	no
HP StorageWorks Disk Arrays; xp10000; xp12000	no	no	no	no
DAT Tape Drives; 40; 72	Yes	Yes	no	no
DLT VS Tape Drives; 80; 160	Yes	Yes	no	no
Ultrium LTO Tape Drives; 232; 448; 920; 460; 960	Yes	Yes	no	no
SDLT Tape Drive; 320; 600	Yes	Yes	no	no
DAT 72/10 Autoloader	Yes	Yes	no	no
1/8 Autoloader; Ultrium 232, 448, 960	Yes	Yes	no	no
MSL2024/4048 Tape Libraries	Yes	Yes	no	no
MSL6000 Tape Libraries	Yes	Yes	no	no
ESL E-Series Tape Libraries	Yes	Yes	no	no
VSL 6000 Virtual Library System	no	no	no	no

Cross Connect Table	2-Gbit Fibre Channel Adapter, single channel, PCI-X LP10000, FCA2684	2-Gbit Fibre Channel Adapter, dual channel, PCI-X LP10000, FCA2684DC
	DS-A5132-AA	DS-A5134-AA
MSA30 Rack Disk & Tape Drive Enclosure	no	no
4300 Rack Disk & Tape Drive Enclosure	no	no
1U Rackmount Tape Drive Enclosure	no	no
3U Rackmount Tape Drive Enclosure	no	no
MSA1000 Storage System	Yes ¹	Yes ¹
HP StorageWorks Enterprise Virtual Arrays; EVA4000; EVA6000; EVA8000	Yes ¹	Yes ¹
HP StorageWorks Disk Arrays; xp10000; xp12000	Yes ¹	Yes ¹
DAT Tape Drives; 40; 72	Yes ¹	Yes ¹
DLT VS Tape Drives; 80; 160	Yes ¹	Yes ¹
Ultrium LTO Tape Drives; 232; 448; 920; 460; 960	Yes ¹	Yes ¹
SDLT Tape Drive; 320; 600	Yes ¹	Yes ¹
DAT 72/10 Autoloaders	Yes ¹	Yes ¹
1/8 Autoloader; Ultrium 232, 448, 960	Yes ¹	Yes ¹
MSL2024/4048 Tape Libraries	Yes ¹	Yes ¹
MSL6000 Tape Libraries	Yes ¹	Yes ¹
ESL E-Series Tape Libraries	no	no
VSL 6000 Virtual Library System	Yes	Yes
NOTE 1: Fibre Channel connection to a SCSI tape device requires a Network Storage Router (NSR) (see Step 8) in a Storage Area Network (SAN).		

Reference 3 – Rack Specifications and Rackmount Kits

High-performance I/O Drawer slots specifications:						
HP Racks	H9A10	H9A15	9142	10642	H9A45-ZA	H9A45-ZD
	M-series	M-series	Series 9000	Series 10000	For GS1280 (includes Operator Control Panel (OCP))	For ES47/80 (no OCP)
Vertical Rack Capacity	59.5"	71.75"	73.5"	73.5"	71.75"	71.75"
(1.75" per Rack Unit)	34U	41U	42U	42U	41U	41U
Rail Spacing	19 inch	19 inch	19 inch	19 inch	19 inch	19 inch
(side-to-side)	RETMA	RETMA	RETMA	RETMA	RETMA	RETMA
Rail Spacing	25 inches	25 inches	29 inches	29 inches	29 inches	29 inches
(front-to-back)						
Hole Pattern	0.281" Round	0.281" Round	Euro-Square	Euro-Square	Euro-Square	Euro-Square
	RETMA	RETMA	RETMA	RETMA	RETMA	RETMA
Max Payload (spec'd)	1000 lbs	1000 lbs	1200 lbs	1600 lbs	1600 lbs	1600 lbs
(equipment weight only, dynamic)	454 kg	454 kg	544 kg	720 kg	720 kg	720 kg
Height	66.9"	78.7"	78.7"	78.7"	78.7"	78.7"
(external dim w/o packaging)	1700 mm	2 meters	2 meters	2 meters	2 meters	2 meters
Width	23.6"	23.6"	23.7"	23.7"	23.6"	23.6"
(external dim w/o packaging)	600 mm	600 mm	603 mm	603 mm	600 mm	603 mm
Depth w/o Extender	36.1"	36.1"	35.8"	39.7"	NA	39.4"
(external dim w/o packaging)	916 mm	916 mm	909 mm	1009 mm		1000 mm
Depth w Rear Extender	41.5"	41.5"	39.7"		48.1"	

(external dim w/o packaging)	1054 mm	1054 mm	1009 mm	Not Available	1222 mm	Optional
Useable Depth	31.7"	31.7"	30"	35.25"	40.25"	32.25"
(front rail to back door)	804 mm	804 mm	762 mm	895 mm	1022 mm	819 mm
Usable Depth w/Extender	37.1"	37.1"	33.9"	NA	NA	40.25
(front rail to back door)	943 mm	943 mm	862 mm			1022 mm
Side Panels	Standard	Standard	Standard	Standard	Standard	Standard
Stabilizer	Single Deployable	Dual Deployable	Single Deployable	Single Deployable	Heavy duty Deployable	None
Top Cover	Vented	Vented	Vented	Vented	Vented	Vented
Rear Door	Standard w/Lock	Standard w/Lock	Standard	Split	Standard w/Lock	Standard w/Lock
			Short w/Lock	Long door w/Lock		
Front Door	Optional	Optional	Standard	Standard	Standard	Standard
	Kit w/Lock	Kit w/Lock	w/Lock	w/Lock	w/Lock	w/Lock
Front Trim Kit	Required if no Front Door	Required if no Front Door	Standard w/Lock	Not Available	Not Available	Not Available
PDUs	Standard	Standard	Optional	Optional	Optional	Optional
Joiner Kit (aka Baying Kit)	Optional	Optional	Optional	Optional	NA	NA
Shipping Height	76.4"	84.4"	84.4"	86.22"	84.75"	84.75"
(external dim with packaging)	1940 mm	2144 mm	2144 mm	2190 mm	2153 mm	2153 mm
Shipping Width	36"	36"	36"	32"	43.1"	43.1"
(external dim with packaging)	914 mm	914 mm	914 mm	812.8 mm	1096 mm	1096 mm
Shipping Depth	53.75"	53.75"	48"	48"	48"	48"
(external dim with packaging)	1366 mm	1366 mm	1219 mm	1219 mm	1219 mm	1219 mm
Shipping Weight	325 lbs	355 lbs	445 lbs	284 lbs	570 lbs	570 lbs
(empty cab with full packaging)	147 kg	161 kg	202 kg	129 kg	259 kg	259 kg
RACKMOUNT KITS						
DS15	3X-PBX01-DA	3X-PBX01-DA	3X-PBX01-DB	3X-PBX01-DB	3X-PBX01-DB ¹	3X-PBX01-DB ¹
DS25	3X-BA57R-RA	3X-BA57R-RA	3X-BA57R-RC	3X-BA57R-RC	3X-BA57R-RC ¹	3X-BA57R-RC ¹
ES45	BA61R-CR	BA61R-CR	3X-BA61R-RD	3X-BA61R-RD	3X-BA61R-RD ¹	3X-BA61R-RD ¹
ES47	No kit available	No kit available	No kit available	CK-BA60B-AR	Included	Included
ES80	No kit available	No kit available	No kit available	CK-BA60B-AR	Included	Included
Mem. Channel 2	3X-BA61R-MC	3X-BA61R-MC	3X-BA61R-MD	3X-BA61R-MD	3X-BA61R-MD	3X-BA61R-MD
3U LVD enclosure	3R-A3804-AA	3R-A3804-AA	Included	Included	Included	Included
5U LVD/MSL5000 enclosure	254795-001	254795-001	Included	Included	Included	Included
StorageWorks 4315/4354	Included	Included	Included	Included	Included	Included
MSA30/MSA1000	3R-A5281-AA	3R-A5281-AA	Standard	Standard	Standard	Standard

NOTES:

1. HP will not install system in the rack at the factory unless optional integration services are purchased.
2. System/E racks are not configurable with AlphaServers.

Step 1 - Networks and Communications — Optional

Step 1a - Ethernet — Optional

NOTE: If an Ethernet NIC is not selected, at least one I/O slot in the system must remain open for connection of the system to the factory test network.

		Maximum Quantity Tested & Supported
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Description	Device Type	Part Number	U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Ethernet Network Interface Cards						
Gigabit Ethernet NIC, Twisted-Pair Copper with single-port RJ45, 10/100/1000 Mbps Use BN25G, BN26M, BN24Q, BN28Q, or equivalent cables with RJ45 connectors.	PCI-X 3.3V, 64 b, 133 MHz	3X-DEGXA-TR	5/U 5/O 1/L	16:28/U 16:28/O 1:2L	16:56/U 16:56/O 1:4/L	16:512/U 16:512/O
Gigabit Ethernet NIC, Fiber with duplex-SC connectors, 1000 Mbps only. Use BN34B, or equivalent cables with SC connectors.	PCI-X 3.3V, 64 b, 133 MHz	3X-DEGXA-SR	5/U 5/O 1/L	16:28/U 16:28/O 1:2L	16:56/U 16:56/O 1:4/L	16:512/U 16:512/O
10/100 Ethernet (dual-port UTP/RJ45s) NIC and Base Module. Use BN25G, BN26M, BN24Q, or BN28Q twisted pair RJ45 cables. (Optional, add-on daughter cards 3X-DE602-TR or 3X-DE602-FR)	PCI 3.3V, 64 b, 66 MHz	3X-DE602-BR	5/U 5/O 1/L	8:16/U 8:16/O 1:2L	8:32/U 8:32/O 1:4/L	8:256/U 8:256/O
10/100 Ethernet (dual-port UTP/RJ45s) add-on to 3X-DE602-BR only. Total of four ports for combined 3X-DE602-BR and 3X-DE602-TR modules. Use BN25G, BN26M, BN24Q, BN28Q, or equivalent cables with RJ45 connectors. NOTE: 3X-DE602-TR cannot be used standalone.		3X-DE602-TR				
Single-port 100 Mbps (MMF/duplex-SC) add-on daughter card for use with the 3X-DE602-BR. Combined 3X-DE602-BR and 3X-DE602-FR provides two 10/100 (UTP/RJ45s) and one 100Mbps (MMF/SC) ports. Use BN34B cables. NOTE: 3X-DE602-FR cannot be used standalone.		3X-DE602-FR				

Step 1b - Networks and Communications — Optional

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
ES47 Tower Workstation	ES47	ES80	GS1280			
Synchronous Communications Network Interface Cards						
Dual-port Intelligent Synchronous Communications NIC; requires one or two BC3xx sync cables.	PCI 3.3V, 32 b, 33 MHz	3X-PBXDD-AA	4/U 4/O	4:8/U 4:8/O	4:16/U 4:16/O	4:128/U 4:128/O
Quad-port Intelligent Synchronous Communications NIC; requires one to four BC3xx sync cables.	PCI 3.3V, 32 b, 33 MHz	3X-PBXDD-AB	4/U 4/O	4:8/U 4:8/O	4:16/U 4:16/O	4:128/U 4:128/O
Asynchronous Communications Network Interface Cards						
4-port Async Communications NIC with DB-25 cable	PCI 3.3V, 32 b, 33 MHz	PBXDA-BA	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O
8-port Async Communications NIC	PCI 3.3V, 32 b, 33 MHz	PBXDA-BB	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O

16-port Async Communications Controller and rackmount 16-port distribution box with RJ45 connectors	PCI 3.3V, 32 b, 33 MHz	PBXDA-AC	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O
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Cables for Ethernet, ATM, Synchronous, and Asynchronous Network Interface Cards	Multimode fiber optic (MMF) 62.5/125um duplex cable, with SC-to-SC connectors. xx = 2E, 4E, 01, 03, 10, 20, 30 for 2.4, 4.5, 1, 3, 10, 20, and 30 meters					BN34B-xx
	Category 5e (4-Unshielded Twisted Pairs / UTP) straight-through cable with RJ45-to-RJ45 connectors for system to switch, repeater, or hub connectivity. xx = 0B, 0E, 01, 03, 04, 07 for 0.2, 0.5, 1, 3, 4, and 7 meters					BN25G-xx
	Category 5e (4-Twisted Pairs, Screened/ ScTP) straight-through cable with RJ45-to-RJ45 connectors for system to switch, repeater, or hub connectivity. xx = 0B, 0E, 01, 03, 04, 07 for 0.2, 0.5, 1, 3, 4, and 7 meters					BN26M-xx
	Category 5e (4-Unshielded Twisted Pairs / UTP) Xover cable with RJ45-to-RJ45 connectors for system to switch, repeater, or hub connectivity. xx = 0E, 01, 03, 04, 07 for 0.5, 1, 3, 4, and 7 meters					BN24Q-xx
	Category 5e (4-Twisted Pairs, Screened / ScTP) Xover cable with RJ45-to-RJ45 connectors for system to switch, repeater, or hub connectivity. xx = 0E, 01, 03, 04, 07 for 0.5, 1, 3, 4, and 7 meters					BN28Q-xx
	EIA-530 Single-port synchronous cable					3X-BC34G-06
	V.24/EIA-232 Single-port synchronous cable					3X-BC34L-06
	V.11/x.21 Single-port synchronous cable					3X-BC33S-06
	V.35 Single-port synchronous cable					3X-BC34T-06
RJ45-to-DB-25 Asynchronous Converter Cable					CXI01-AC	

Step 2 - MEMORY CHANNEL — Optional

Configuration Guidelines

- Each Memory Channel adapter must be the only device on the PCI/PCI-X bus segment.
- Two-node clusters can be configured by ordering one adapter (CCMAB-BA) for each node and one cable (BN39B-04 or BN39B-10) between the two systems.
- For a two-node cluster that will not need to be rebooted when adding additional members, order one adapter (CCMAB-BA) and one cable (BN39B-04 or BN39B-10) for each node plus one hub (CCMHB-AA) for the cluster.
- For three or four node clusters, order one adapter (CCMAB-BA) and one cable (BN39B-04 or BN39B-10) for each node and one hub (CCMHB-AA) for the cluster.
- The hub (CCMHB-AA) includes four line cards and supports up to four nodes; expansion up to eight system nodes can be achieved by adding up to four line cards (CCMLB-AA).
- If two adapters (CCMAB-BA) are configured in each system, a second hub (CCMHB-AA) is required.
- If nodes must be separated by a distance longer than standard copper cables allow, the CCMFB option converts the output of the standard controller or line card to single-mode fiber optic cable. The fiber optic connection may be up to 2,000 meters long between two controllers connected in virtual hub mode, or 3,000 meters between a controller and a hub. (The connection from the hub to a second system may also be 3,000 meters.) The CCMFB option requires a second PCI slot in the system from which it draws power only. It is normally connected to the corresponding controller with the short cable, BN39B-01. The CCMFB option is also used in the hub where it occupies a slot normally used by a line card, limiting expansion to four radial fiber optic connections.
- The hub expansion box (CCMHB-BA) provides additional slots for up to eight fiber optic connections. Two standard length single-mode fiber optic cables are available (BN34R-10 and BN34R-31); however, users normally provide this fiber optic connection. Fiber optic connectivity is completely transparent to the systems using it and has no performance impact

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Memory Channel Adapter						
Memory Channel Adapter	PCI 5.0/3.3V, 32 b, 33 MHz	CCMAB-BA	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O

Copper-to-single mode fiber optic converter	PCI 5.0/3.3V, 32 b, 33 MHz	CCMFB-BA	2/U 2/O	2:4/U 2:4/O	2:8/U 2:8/O	2:64/U 2:64/O
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Infrastructure for Memory Channel	System Area Network Hub with four line cards; includes BN19P-1K power cord for Canada, Japan, and U.S. For other regions, order appropriate power cord from list that follows.	CCMHB-AA
	Hub expansion box with no line cards	CCMHB-BA
	Expansion line card for CCMHB hub	CCMLB-AA
	1-meter cable for CCMAB and CCMHB	BN39B-01
	4-meter cable for CCMAB and CCMHB	BN39B-04
	7-meter cable for CCMAB and CCMHB	BN39B-07
	10-meter cable for CCMAB and CCMHB	BN39B-10
	Rackmount kit (3U) for CCMHB (Memory Channel Hub II); required for mounting in H9A40/H9A45 Cabinets and Series 10000 Racks.	3X-BA61R-MD
Power cord for rackmount CCMHB hub	BN35S-02	

Country-specific Power Cords for Standalone MEMORY CHANNEL Hubs	Australia, New Zealand	3R-A6023-AA
	Central Europe	BN19C-2E
	Denmark	BN19K-2E
	Egypt, India	BN19S-2E
	Ireland, United Kingdom	BN19A-2E
	Israel	3R-A6883-AA
	Italy	BN19M-2E
	Japan, 2.5-meter, Dentori approved	3X-BN46F-02
	Switzerland	BN19E-2E

Step 3 - Storage Adapters/Controllers — Optional

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
SCSI Adapters						
Ultra3 (LVD) SCSI adapter, dual-channel. Requires 3X-BC56J-xx cable. Restrictions: HSZxx RAID controllers not supported; Tru64 UNIX requires a graphics adapter to run console utilities (RUN BIOS).	PCI, 3.3V, 64b, 66 MHz	3X-KZPEA-DB	5/U 5/O 1/L Shared Bus 5/U 0/O	28:28/U 12:24/O 1:2/L Shared Bus 6:12/U 0/O	32:56/U 12:48/O 1:4/L Shared Bus 6:24/U 0/O	32:576/U 12:384/O 0/L Shared Bus 6:192/U 0/O
Ultra2 (LVD) SCSI adapter, single-channel. Requires BN38C-xx cable. Restrictions: HSZxx RAID controllers not supported. No support for shared SCSI.	PCI, 3.3/5.0V Universal, 32b, 33 MHz	3X-KZPCA-AA	5/U 5/O 1/L	8:16/U 8:16/O 1:2/L	8:32/U 8:32/O 1:4/L	8:256/U 8:256/O 0/L
Backplane RAID SCSI Controllers						
U320 LVD SCSI Backplane Raid Controller, 64 bit, 2 Channel	PCI-X, 3.3V, 64b 133 MHz	3X-KZPEC-BF	5/O	8:16/O	8:32/O	8:256/O
U320 LVD SCSI Backplane Raid Controller, 64 bit, 4 Channel	PCI-X, 3.3V, 64b 133 MHz	3X-KZPEC-DG	5/O	8:16/O	8:32/O	8:256/O
Ultra3 SCSI, 2-channel, RAID			5/U	8:16/U	8:32/U	8:256/U

controller	PCI, 3.3V, 64b, 66 MHz	3X-KZPDC-BE	5/O 1/L	8:16/O 1:2/L	8:32/O 1:4/L	8:256/O 0/L
Ultra3 SCSI, 4-channel, RAID controller	PCI, 3.3V, 64b, 66 MHz	3X-KZPDC-DF	5/U 5/O 1/L	8:16/U 8:16/O 1:2/L	8:32/U 8:32/O 1:4/L	8:256/U 8:256/O 0/L

Cables for SCSI and Backplane RAID Controllers

Ultra3 SCSI cable, VHDCI to VHDCI; xx = 02, 03, 04, meters

3X-BC56J-xx

Ultra2 SCSI 68-pin HD male-to-VHDCI male cable; xx = 02, 03, 05, 10, 20 meters

BN38C-xx

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Fibre Channel Controllers						
2-Gbit Fibre Channel Adapter, single channel, PCI-X LP10000, FCA2684	PCI-X, 3.3/5.0V Universal, 64b, 133 MHz	DS-A5132-AA	5/U 5/O	28:28/U 26:28/O	56:56/U 26:56/O	64:576/U 26:576/O
2-Gbit Fibre Channel Adapter, dual channel, PCI-X LP10000, FCA2684DC	PCI-X, 3.3/5.0V Universal, 64b, 133 MHz	DS-A5134-AA	5/U 5/O	28:28/U 13:26/O	32:56/U 13:56/O	32:576/U 13:416/O
CIPCA Adapter						
Computer Interconnect (CI) adapter; each CI adapter requires a Standard I/O Building Block Drawer with 5V PCI slots.	PCI, 5V, 32b, 33 MHz, two slots	CIPCA-BA		2:2/O	4:4/O	12:64/O

Cables for Fibre Channel

Fibre Channel SC-SC cables (BNGBX-xx); xx=02, 03, 05, 10, 15, 30, 50 meters

BNGBX-xx

Step 4 – StorageWorks Enclosures for Disks and Tapes — Optional

HP StorageWorks Modular Smart Array 30 Enclosure (formerly known as HP StorageWorks 4400 Enclosure)

The HP StorageWorks Modular Smart Array 30 (MSA30) Enclosure is an Ultra320 SCSI disk drive storage enclosure. The drive carrier is designed to support Ultra320, Ultra3, and Ultra2 hard drives; and DAT tape drives on the same SCSI bus. StorageWorks 4200 or StorageWorks 4300 may be upgraded to the MSA30.

See **HP StorageWorks Modular Smart Array 30 Enclosure QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11738_div/11738_div.html

See **HP StorageWorks Modular Smart Array 30 Multi-Initiator Enclosure QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11967_div/11967_div.html

Model MSA30, Single-bus Rackmount, 14-drive enclosure with single bus, dual power supplies 3R-A4075-AA

Model MSA30, Dual-bus Rackmount, 14-drive enclosure with dual bus, dual power supplies 3R-A4076-AA
NOTE: Not supported for shared bus operation.

Model MSA30 Multi-Initiator (Shared) Rackmount, 14-drive enclosure with dual bus, multi-initiator shared access, and dual power supplies. 359645-B21
NOTE: Use SCSI Ultra3 LVD host adapter (3X-KZPEA-DB) for shared bus operation.

HP StorageWorks 4300 Enclosure

The HP StorageWorks Enclosure 4300 is an Ultra3 SCSI disk drive storage enclosure. The drive carrier is designed to support Ultra3 and Ultra2 hard drives and DAT Tape Drives on the same SCSI bus.

See **HP StorageWorks 4300 Enclosure QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/10624_div/10624_div.html

NOTE: The depth of a 4300 shelf does not allow front and rear mounting.

Model 4314R	Rackmountable 14-drive enclosure with single bus, single power supply	DS-SL13R-Ax
Model 4354R	Rackmountable 14-drive enclosure with dual bus, dual power supplies	DS-SL13R-Bx

HP StorageWorks Rackmount Tape Drive Enclosures

The 1U and 3U Rackmount Kits are rackmount tape drive enclosures for direct-attach SCSI backup and archiving applications.

See **HP StorageWorks Rack-Mount Tape Drive Kits QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/10854_div/10854_div.html

1U Rackmount Tape Drive Enclosure	<ul style="list-style-type: none"> • Supports up to two internal half-height devices including: DAT 40, and DAT 72 Tape Drives • DLT VS80, DLT VS160 Tape Drives • Ultrium 232 and 448 Tape Drives 	A7445B
3U Rackmount Tape Drive Enclosure	Wide SCSI LVD rackmount enclosure. Supports up to two internal, full-height or four internal, half-height devices including: <ul style="list-style-type: none"> • DAT 40, and DAT 72 Tape Drives • DAT 72x6 Tape Autoloader • DLT VS80, DLT VS160 Tape Drives • SDLT 320, SDLT 600 Tape Drives • Ultrium 232, 448, 460, and 960 Tape Drives 	274338-B22

Step 5 - Disks — Optional

HP SCSI Ultra320 Hard Disk Drives (for use in StorageWorks MSA30 and 4300 Enclosures; ES47/80 2P System Building Block Drawer; and I/O Building Block Drawers for ES47/80 and GS1280)

See **HP SCSI Ultra320 Hard Drive Option Kits QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11531_div/11531_div.html

300-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A4952-AA
146.8-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A3841-AA
72.8-GB Pluggable Ultra320 SCSI 10,000 rpm Hard Drive	3R-A3839-AA
300-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A6726-AA
146.8-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A4945-AA
72.8-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A3851-AA
36.4-GB Pluggable Ultra320 SCSI 15,000 rpm Hard Drive	3R-A3849-AA

Step 6 – Storage Systems — Optional

HP StorageWorks Modular Smart Array 1000

The HP StorageWorks Modular Smart Array 1000 is a 2-Gb Fibre Channel storage system designed for the entry-level to mid-range Storage Area Network (SAN). The MSA1000 combines the array controller shelf and the drive shelf, which holds up to 14 universal disk drives in a single 4U rackmount enclosure. More storage can be deployed with the addition of up to two drive enclosures for a maximum storage capacity of 6 TB when using the 146-GB drives. Besides the single-port 2-Gb Fibre Channel I/O module that comes standard, there is an 8-port switch that mounts internally. The MSA1000 provides Ultra3 SCSI connections to the hard drives and uses HP Universal Ultra2, Ultra3, and/or Ultra320 drives.

See **HP StorageWorks Modular Smart Array 1000 Specific for Tru64 UNIX or OpenVMS Only QuickSpecs** for configuration details: http://h18000.www1.hp.com/products/quickspecs/11621_div/11621_div.html

Modular Smart Array 1000	MSA1000 with 256-MB cache	201723-B22
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HP StorageWorks Enterprise Virtual Array

The HP Enterprise Virtual Array storage array products have been designed for high performance, high capacity, and high availability. These products are supported by a powerful and simple suite of management software. EVA storage is designed for improved storage utilization and scalability. EVA storage offers easy capacity expansion, instantaneous replication, and simplified storage administration.

See **HP StorageWorks Enterprise Virtual Array QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12408_div/12408_div.html

Model	EVA4000	EVA6000	EVA8000	EVA8000 with expansion cabinet
Drive Interface	Dual ported 2 Gb/s FC-AL	Dual ported 2 Gb/s FC-AL	Dual ported 2 Gb/s FC-AL	Dual ported 2 Gb/s FC-AL
Cache per controller pair	4GB	4GB	8GB	8GB
Host ports	Four 2 Gb/s FC	Four 2 Gb/s FC	Eight 2 Gb/s FC	Eight 2 Gb/s FC
Device ports	Four 2 Gb/s FC-AL	Four 2 Gb/s FC-AL	Eight 2 Gb/s FC-AL	Eight 2 Gb/s FC-AL
Device FC-AL switches	0	2	4	4
Maximum Drives per model	56	112	168	240

HP StorageWorks Disk Array xp10000

The HP StorageWorks Disk Array xp10000 is an enterprise storage system that supports up to 240 Fibre Channel disk drives with up to 69 TB of capacity. The xp10000 supports up to 48 Fiber Channel (2-Gb or 4-Gb) interface connections.

See **HP StorageWorks Disk Array xp10000 Product Information** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12275_div/12275_div.html

HP StorageWorks Disk Array xp12000

The HP StorageWorks Disk Array xp12000 is an enterprise storage system that supports up to 1152 Fibre Channel disk drives with up to 332 TB of capacity. The xp12000 supports up to 128 Fiber Channel (2-Gb or 4-Gb) interface connections.

See **HP StorageWorks Disk Array xp12000 QuickSpecs** for configuration details:

http://h18006.www1.hp.com/products/quickspecs/12072_div/12072_div.html

Step 7 – Tape Drives — Optional

HP StorageWorks DAT Tape Drive Family

The HP StorageWorks DAT Tape Drives are an entry-level solution for small to medium server storage backup needs. The DAT Tape Drives have backwards compatibility with previous DDS technologies.

See **HP StorageWorks DAT Drives QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11883_div/11883_div.html

DAT Hot-Plug Tape Drives (for use in StorageWorks MSA30 and 4300 Enclosures; and ES47/80 2P System Drawer)	40-GB hot-plug DAT tape drive, uses two Universal storage device slots	3R-A4745-AA or Q1546A
	72-GB hot-plug DAT tape drive, uses two Universal storage device slots	3R-A4547-AA or Q1529A
DAT Internal Tape Drives (for use in Rackmount Tape Drive Enclosures)	40-GB internal DAT tape drive, half-height device (carbon)	3R-A6831-AA or C5686C
	72-GB internal DAT tape drive, half-height device (carbon)	3R-A6663-AA or Q1522B
DAT External (tabletop) Tape Drives	40-GB external (tabletop) DAT tape drive	C5687D
	72-GB external (tabletop) DAT tape drive	Q1523B

HP StorageWorks SDLT Tape Drive Family

The HP StorageWorks SDLT Tape Drive is a high-capacity, high-performance streaming tape drive. The HP StorageWorks SDLT 320-GB Tape Drive is backward read compatible with DLT Type IV media. The SDLT 600 offers backward-read compatibility to the DLT VS 160 and to the SDLT 320 and SDLT 220.

See **HP StorageWorks SDLT Tape Drive Family QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11840_div/11840_div.html

SDLT Internal Tape Drives (for use in Rackmount Tape Drive Enclosures)	320-GB internal SDLT tape drive, full-height device	257319-B21
	600-GB internal SDLT tape drive, full-height device	A7518B
SDLT External (tabletop) Tape Drives	320-GB external (tabletop) SDLT tape drive, North America (Carbon)	257319-001
	320-GB external (tabletop) SDLT tape drive, International (Carbon)	257319-B31
	320-GB external (tabletop) SDLT tape drive, Japan (Carbon)	257319-291
	600-GB external (tabletop) SDLT tape drive, North America	A7519B

HP StorageWorks DLT VS Tape Drive Family

The HP StorageWorks DLT VS80 Tape Drive is an upgrade drive for current DLT 40 customers, offering a 100% increase in capacity. Utilizing industry standard DLT Type IV Media, the DLT VS80 Tape Drive offers backward-read compatibility with media previously written in the DLT 40 format. The DLT VS80 drive is also read and write compatible with data protection solutions utilizing the HP StorageWorks DLT1 Tape Drive, such as the HP StorageWorks DLT1 1280 SuperLoader, and can be read by the HP StorageWorks SDLT 220 and 320 Tape Drives.

See **HP StorageWorks DLT VS Family Tape Drive QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11403_div/11403_div.html

DLT VS Internal Tape Drives	80-GB DLT VS internal tape drive, full-height device, (carbon), Worldwide	3R-A5071-AA 337699-B21
(for use in Rackmount Tape Drive Enclosures)	160-GB DLT VS internal tape drive, full-height device, (carbon), Worldwide	A7569B
DLT VS External (tabletop) Tape Drives	80-GB DLT VS external (tabletop) tape drive, North America (carbon)	3R-A4982-AA 337699-B22
	80-GB DLT VS external (tabletop) tape drive, International (carbon)	3R-A4984-AA 337699-B31
	160-GB DLT VS external (tabletop) tape drive, North America (carbon)	A7570B
	160-GB DLT VS external (tabletop) tape drive, International (carbon)	A7571B

HP StorageWorks Ultrium LTO Tape Drive Family

HP StorageWorks Ultrium tape drives are based on LTO Ultrium format, an open standard with a well-defined four-generation roadmap.

See **HP StorageWorks Ultrium Full-Height Tape Drives QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11739_div/11739_div.html

See **HP StorageWorks Ultrium Half-Height Tape Drives QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12128_div/12128_div.html

Ultrium LTO Internal Tape Drives	Ultrium 232, 200-GB LTO internal tape drive, half-height device	DW064A
(for use in Rackmount Tape Drive Enclosures)	Ultrium 448, 400-GB LTO internal tape drive, half-height device	DW016A
	Ultrium 920, 800-GB LTO internal tape drive, half-height device	EH841A
	Ultrium 460, 400-GB LTO internal tape drive, full height device	Q1518B
	Ultrium 960, 800-GB LTO internal tape drive, full-height device	Q1538A
Ultrium LTO External (tabletop) Tape Drives	Ultrium 232, 200-GB LTO external (tabletop) tape drive	DW065B
	Ultrium 448, 400-GB LTO external (tabletop) tape drive	DW017B
	Ultrium 920, 800-GB LTO external tape drive, half-height device	EH842A
	Ultrium 460, 400-GB LTO external (tabletop) tape drive	Q1520B
	Ultrium 960, 800-GB LTO external (tabletop) tape drive	Q1539B

Step 8 – Tape Storage Systems — Optional

HP StorageWorks DAT Tape Autoloaders

Backup solution for small to medium companies with limited IT support or remote sites of larger companies. The autoloader includes a single tape drive inside an enclosure that holds ten data cartridges in two removable magazine. HP DDS tape drives are backward read-write compatible with the two previous DDS generations, thus this DDS-4 autoloader also reads and writes DDS-3 and DDS-2.

See **HP StorageWorks DAT 72x10 Tape Autoloader QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12486_div/12486_div.html

DAT 72x10 Autoloader	AE313A
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HP StorageWorks 1/8 Tape Autoloader Family

The HP StorageWorks 1/8 Tape Autoloader provides unattended backup in a datacenter rack or on a desk next to the office server. The 1/8 Tape Autoloader in a 2U form factor can house up to eight cartridges.

See **HP StorageWorks 1/8 Tape Autoloader Family QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11841_div/11841_div.html

1/8 Ultrium LTO 232 Autoloader	Table Top	AA202A
1/8 Ultrium LTO 448 Autoloader	Table Top	AA203A
1/8 Ultrium LTO 960 Autoloader	Table Top	AA204A
Rack Mount Kit	Use to mount Table Top units in a 19" RETMA rack	C9268R

HP StorageWorks MSL2024 Tape Library

The HP StorageWorks MSL2024 Tape Library combines compressed capacity (2:1) of up to 19.2 TB and tape library features in a compact 2U form factor. The HP StorageWorks MSL2024 Tape Library offers two 12-slot removable magazines, one mail slot and a barcode reader for efficient media management.

See **HP StorageWorks MSL2024 Tape Library QuickSpecs** for configuration details:

http://h18006.www1.hp.com/products/quickspecs/12383_div/12383_div.html

Family Comparison	MSL2024 Ultrium 960 Tape Library	MSL2024 Ultrium 920 Tape Library	MSL2024 Ultrium 448 Tape Library
Drive Technology	Ultrium 960 SCSI	Ultrium 920	Ultrium 448
Number of Drives	1	1 or 2	1 or 2
Capacity (compressed 2:1)	19.2 TB	19.2 TB	9.6 TB
Maximum Data Transfer (compressed 2:1)	160 MB/s	240 MB/s (2 drives)	96 MB/s (2 drives)
Interface	4Gb Native Fibre Channel Ultra320 SCSI LVD/SE	3Gb/sec SAS Ultra320 SCSI LVD/SE	Ultra160 SCSI LVD/SE

HP StorageWorks MSL4048 Tape Libraries

The HP StorageWorks MSL4048 Tape Library provides up to 19.2 TB of storage density in a 4U form factor. Web-based management features reduce the dependencies on local IT resources, allowing multiple sites to be supported centrally. Each library includes four removable 12-slot magazines, and a user configurable 3 slot mail-slot dedicated for import/export of data cartridges. A barcode reader is part of the standard configuration for facilitating media management.

See **HP StorageWorks MSL4048 Series Tape Libraries QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12422_div/12422_div.html

Family Comparison	MSL4048 Ultrium 960 FC	MSL4048 Ultrium 960	MSL4048 Ultrium 920	MSL4048 Ultrium 448
Number of Drives	1 or 2	1 or 2	1 to 4	1 to 4
Capacity (native)	19.2 TB	19.2 TB	19.2 TB	9.6 TB
Maximum Data Transfer (native)	288 MB/s (one drive) 576 MB/s (two drives)	288 MB/s (one drive) 576 MB/s (two drives)	216 MB/s (one drive) 864 MB/s (four drives)	86 MB/s (one drive) 346 MB/s (four drives)
Interface	4Gb Native Fibre Channel	Ultra320 SCSI LVD/SE	Ultra320 SCSI LVD/SE 3 Gb/sec SAS	Ultra160 SCSI LVD/SE

HP StorageWorks MSL6000 Tape Libraries

The MSL6000 Tape Libraries offer storage in two enclosures (5U or 10U form factor), in tabletop or rack configurations. The MSL6000 has the capability for multi-unit scalability. The Libraries support interface connections using Ultra3 LVD SCSI Interface or Fibre Channel (2 Gb).

See **HP StorageWorks MSL6000 Series Tape Libraries QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/11863_div/11863_div.html

	MSL6026	MSL6030	MSL6052	MSL6060
Form Factor	5U	5U	10U	10U
Tape Drives	SDLT 600	Ultrium 460 or 960	SDLT 600	Ultrium 460 or 960
Number of Drives	up to 2	up to 2	up to 4	up to 4
Media Slots	26	30	52	60
Storage per Library, TB	15.6	24	31.2	48
Libraries per rack	8	8	4	4

Storage per Rack, TB	124.8	192.0	124.8	192.0
Interface Connection	Ultra3 LVD SCSI Interface or Embedded Fibre (2 Gb)	Ultra3 LVD SCSI Interface or Embedded Fibre (2 Gb)	Ultra3 LVD SCSI Interface or Embedded Fibre (2 Gb)	Ultra3 LVD SCSI Interface or Embedded Fibre (2 Gb)

HP StorageWorks EML E-Series Tape Libraries

With up to 16 HP Ultrium tape drives, the EML E-Series offers native throughput of over 4.6 TB/hr. Through the addition of expansion modules, the EML E-Series library scales to 16 drives and 442 slots for maximum performance or 8 drives and 505 slots for maximum capacity.

See **HP StorageWorks EML E-Series Series Tape Libraries QuickSpecs** for configuration details:

http://h18000.www1.hp.com/products/quickspecs/12238_div/12238_div.html

Configuration	EML 103e	EML 245e	EML 442e Maximum Performance	EML 505e Maximum Capacity
# of drives possible	1-4	1-8	1-16	1-8
# of slots	103 5 in configurable load port	245 15 in configurable load port	442 35 in configurable load port	505 35 in configurable load port
Product height within rack	12U	24U	40U	40U
Maximum Capacity (native)	41.2	98.0 TB	176.8 TB	202 TB
Maximum throughput (native)	1.1 TB/hr	2.3 TB/hr	4.6 TB/hr	2.3 TB/hr

HP StorageWorks ESL E-Series Tape Libraries

The HP StorageWorks Enterprise Storage Libraries (ESL) E-Series enterprise tape libraries offer drive and cartridge density and are available in a variety of configurations, with up to 28.4 TB of native Ultrium 960 storage capacity per square foot. Fully integrated into HP StorageWorks Extended Tape Library Architecture (ETLA), HP provides self-aware tape storage designed specifically for the SAN. ETLA also offers remote management of the entire library system including robotics, drives, Interface Controllers, and the Interface Manager management card.

See **HP StorageWorks ESL E-Series Tape Libraries QuickSpecs** for configuration details:

http://h18006.www1.hp.com/products/quickspecs/11877_div/11877_div.html

	ESL 712e	ESL 322e	ESL 630e	ESL286e
Drive Technology	Ultrium 960 FC Ultrium 460 SCSI Ultrium 460 FC	Ultrium 960 FC Ultrium 460 SCSI Ultrium 460 FC	SDLT 320 SDLT 600	SDLT 320 SDLT 600
Maximum Cartridge Count	712	322	630	286
Maximum Drive Count	24	24	24	24
Maximum Capacity (native)	284.8 TB	128.8 TB	189 TB	85.8 TB

HP StorageWorks 6000 Virtual Library System

The HP StorageWorks 6000 Virtual Library System (VLS 6000) emulates popular tape libraries and tape drives. By emulating multiple tape drives simultaneously, more backup jobs can be done in parallel resulting in reduced backup times. Additionally, because the data resides on disk, single file restores are exceptionally fast.

See **HP StorageWorks 6000 Virtual Library System QuickSpecs** for configuration details:

http://h18006.www1.hp.com/products/quickspecs/12233_div/12233_div.html

	VLS 6105	VLS 6109	VLS 6510	VLS 6518	VLS 6840	VLS 6870
Raw Capacity	3TB	6TB	6TB	12TB	12TB	24TB
Maximum Raw Capacity	6TB	12TB	12TB	24TB	48TB	96TB
Usable Capacity	2.5TB	4.4TB	5TB	8.8TB	10TB	17.6TB
Maximum Usable Capacity	5TB	8.8TB	10TB	17.6TB	40TB	70.4TB
Interface – 2Gb Fibre	Two	Two	Four	Four	Four	Four

Channel Ports (LC connectors, auto-negotiating)						
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Step 9 – Storage Network Switches, Hubs, and Interconnects — Optional

Network Storage Routers

Network Storage Routers enable multiple host servers to communicate with a SCSI tape device over a Fibre Channel link.

For configuration details, see the **Switches, Hubs, and Interconnects QuickSpecs** at:

http://www.compaq.com/products/quickspecs/north_america/10490.html

Fibre Channel Switches

HP supports three product lines of Fibre Channel switch products that may be used to build SAN fabrics. Each product line provides certain advantages that apply to specific applications. For more information on specific switch models and selection, please refer to Part II in the **SAN Design Guidelines** referenced on the SAN Infrastructure page:

<http://h18006.www1.hp.com/storage/saninfrastructure/index.html>

The B-Series product line includes a wide range of Fibre Channel switches, described as "SAN switches" and "Core switches." Products in this family include switches from the HP StorageWorks SAN Switch 2/16 to the HP StorageWorks Core Switch 2/64. This product line includes switches with 8, 16, 32, and 64 ports, including both full-function and entry-level models. The HP StorageWorks Core Switch 2/64 includes a pair of independent 64-port switches in a single chassis with a high level internal redundancy.

The C-Series product line includes the Cisco MDS 9506 and 9509 Multilayer Directors and the Cisco MDS 9216, 9120, and 9140 Multilayer Fabric Switches. The MDS 9506 is supported with 224 ports, over seven modular chassis consisting of both 16-port and 32-port modules. The MDS 9506 is supported with 128 ports, over four modular chassis consisting of both 16-port and 32-port modules. The MDS 9216 has a basic configuration with 16 ports. It has an expansion slot that supports either a 16- or a 32-port card, for 32 or 48 ports in total.

The M-Series Fabric product line includes a wide range of Fibre Channel switches described as "Directors" and "Edge switches." A partial list of products in this family includes the HP StorageWorks Director 2/140 and the HP StorageWorks Edge Switch 2/32. This product line includes switches with 16, 24, 32, 64, and 140 ports internal microcode. The HP StorageWorks Director 2/64 and 2/140 switches have a high level of internal redundancy.

Step 10 – Keyboards, Mouse, Monitors, Power Cords – Optional

Keyboards - USB Keyboard/Language

N.A./International keyboard

Tru64 UNIX

3R-A6554-AA

OpenVMS (Note 1)

3X-LK464-A2

Arabic keyboard

3R-A6540-AA

-

Belgian keyboard

3R-A6541-AA

3X-LK464-AB

BHCSY keyboard

3R-A6542-AA

-

Canadian/English keyboard

-

3X-LK464-AQ

Canadian/French keyboard

3R-A6543-AA

3X-LK464-AC

Cyrillic keyboard (Russian)

3R-A6544-AA

3X-LK464-BT

Czech keyboard

3R-A6545-AA

3X-LK464-BV

Danish keyboard

3R-A6546-AA

3X-LK464-AD

Dutch keyboard

3R-A6547-AA

3X-LK464-AH

Finnish keyboard

3R-A6548-AA

3X-LK464-AF

French keyboard

3R-A6549-AA

3X-LK464-AP

German keyboard

3R-A6550-AA

3X-LK464-AG

Greek keyboard

3R-A6551-AA

3X-LK464-BH

Hebrew keyboard

3R-A6552-AA

3X-LK464-AT

Hungarian keyboard

3R-A6553-AA

3X-LK464-BQ

International keyboard

3R-A6554-AA

-

Italian keyboard

3R-A6555-AA

3X-LK464-AI

Japanese keyboard	3R-A6556-AA	-
Korean keyboard	3R-A6557-AA	-
Latin-American keyboard	3R-A6558-AA	-
Norwegian keyboard	3R-A6559-AA	3X-LK464-AN
Polish keyboard	3R-A6560-AA	3X-LK464-BP
Portuguese keyboard	3R-A6561-AA	3X-LK464-AV
Romanian keyboard	-	3X-LK464-BL
Simplified Chinese keyboard	3R-A6562-AA	-
Slovak keyboard	3R-A6563-AA	3X-LK464-CZ
Spanish keyboard	3R-A6564-AA	3X-LK464-AS
Swedish keyboard	3R-A6565-AA	3X-LK464-AM
Swiss/French keyboard	3R-A6566-AA	3X-LK464-AK
Swiss/German keyboard	-	3X-LK464-AL
Traditional Chinese keyboard	3R-A6567-AA	-
Thai keyboard	3R-A6568-AA	-
Turkish Q keyboard	3R-A6569-AA	3X-LK464-BU
Turkish/F keyboard	-	3X-LK464-BW
UK keyboard	3R-A6570-AA	3X-LK464-A2
Yugoslavian keyboard	-	3X-LK464-BY

NOTE 1: OpenVMS keyboard (3X-LK464-xx) comes with PS/2 and USB connectors

Rackmount Keyboard/Drawer and Keyboard/Monitor Options	PS2 to USB Converter – allows for connection of a PS2 keyboard and/or mouse to an AlphaServer ES47 System	3R-A4495-AA
	HP Rackmount Flat Panel Monitor – TF T721OR 17-inch (17-inch viewable image area) 1U rackmount flat panel display. 0.264mm pixel pitch, 1280 x1024 @60/75 Hz high and low voltage power cords, Worldwide	3R-A5187-AA
	Keyboard, Video, Mouse (KVM) Switches	
	HP Server 1 x 8-Port KVM Switch (Tru64 UNIX and OpenVMS)	336044-B21
	USB Interface Adapter – 1 pack (Mandatory option with 336044-B21)	336047-B21
	For more information, refer to the Release Notes at: http://h18002.www1.hp.com/alphaserver/download/es47_es80_gs1280_console_Switch_Release_Notes.pdf http://h18002.www1.hp.com/alphaserver/download/es47_es80_gs1280_console_Switch_Release_Notes.html	
	CAT5e Cables	
	3 foot (1m) – 4 pack	263474-B21
	6 foot (2m) – 8 pack	263474-B22
	12 foot (4m) – 8 pack	263474-B23
	20 foot (6m) – 4 pack	263474-B24
	40 foot (12m) – 1 pack	263474-B25
	Integrated Keyboard and Drawer	
	Integrated Keyboard and Drawer (1U), North America	3R-A4404-AA
	Integrated Keyboard and Drawer (1U), International	3R-A4405-AA
	Integrated Keyboard and 17" Monitor (TFT7600RKM)	
	Integrated Keyboard and Monitor, North America	AG052A
	Integrated Keyboard and Monitor, United Kingdom	AG053A
	Integrated Keyboard and Monitor, Germany	AG054A
	Integrated Keyboard and Monitor, France	AG055A
	Integrated Keyboard and Monitor, Italy	AG056A
	Integrated Keyboard and Monitor, Spain	AG057A
	Integrated Keyboard and Monitor, International	AG066A

Mouse	3-button mouse – USB	3R-A6641-AA
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Monitors
Configuration Guidelines

1. Graphics monitors other than those listed can be used if compatible with SVGA graphics ordered with system.
2. A video cable, 6-foot/1.8-meter length, is included with all variants of monitors.
3. Video extension cable required if monitor is located more than 1-meter from server.
4. Monitors will ship with, but not be integrated with systems. – **NOTE:** Taiwan and Australia/New Zealand models ship separately.

Carbon/Silver Monitors	V7650 17-inch (16-inch viewable image size) 0.24mm FST multi-frequency color monitor, 2-tone (carbon/silver), VGA to 1024 x 768 @85 Hz, MPRII/TCO 03/Energy Star Compliant, Northern Hemisphere with NA power cord, VGA cable	3R-A5853-AA
	Same as above, with Euro power cord	3R-A5854-AA
	Same as above, Taiwan, NA power cord	3R-A5855-AA
	Same as above, PRC power cord, CCIB	PF996AA#AB2
	Same as above, Southern Hemisphere with Australia/New Zealand power cord	PF996AA#ABG

Carbon/Silver Flat Panel Monitors	L2065, 20-inch (20.1-inch viewable image area) flat panel monitor 0.255mm pixel pitch, 1600 x 1200 @60 Hz, A + D, TCO 03, Energy Star compliant, four video input connectors, (VGA, DVI-I, composite video and s-video), North America power cord, VGA and DVI-I cables	3R-A6701-AA
	L2065, 20-inch (20.1-inch viewable image area) flat panel monitor 0.255mm pixel pitch, 1600 x 1200 @60 Hz, A + D, TCO 03, Energy Star compliant, four video input connectors, (VGA, DVI-I, composite video and s-video), Euro power cord, VGA and DVI-I cables	3R-A6702-AA
	L1506, 15" (15" viewable image size) TFT flat panel monitor, 0.297 mm pixel pitch, 1024 x 768 @60 Hz, multi-mode support, MPR-II/TCO 03/Energy Star compliant, NA power cord, VGA cable	3R-A6515-AA
	Same as above, Euro power cord	3R-A6516-AA

Monitor Power Cords	North America, 120V, 75-inch	BN26J-1K
	Australia, New Zealand, 2.5-meter	3R-A6023-AA
	Central Europe, 2.5-meter	BN19C-2E
	Denmark, 2.5-meter	BN19K-2E
	Egypt, India, South Africa, 2.5-meter	BN19S-2E
	Italy, 2.5-meter	BN19M-2E
	Israel, 1.9-meter	3R-A6883-AA
	Japan, 2.5-meter, Dentori approved	3X-BN46F-02
	Republic of China (103541-001)	BN19H-2E
	Switzerland, 2.5-meter	BN19E-2E
	UK, Ireland, 2.5-meter	BN19A-2E

Keyboard or Mouse Extension Cable	6-foot/1.8-meter keyboard or mouse extension cable; to extend both keyboard and mouse order two cables	3X-BC34A-06
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Video Extension Cable	6-foot/1.8-meter video extension cable	BN39C-02
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Step 11 - Graphics Support — Optional

Description	Device Type	Part Number	Maximum Quantity Tested & Supported			
			U=Tru64 UNIX O=OpenVMS L=Redhat V7.2 Linux			
			per system	per hard partition: per system		
			ES47 Tower Workstation	ES47	ES80	GS1280
Graphics Adapters						

ATI RADEON 7500 2D/3D AGP graphics accelerator	AGP 4X	3X-PBXGG-AB	1/U 1/O	4:4/U 4:4/O	4:8/U 4:8/O	4:64/U 4:64/O
ATI RADEON 7500 2D/3D PCI graphics accelerator	PCI 3.3V, 66MHz	3X-PBXGG-AA	4/U 4/O	4:4/U 4:4/O	4:8/U 4:8/O	4:64/U 4:64/O

For **RADEON 7500** option information see:

PCI: http://h18002.www1.hp.com/alphaserver/options/ases47/ases47_3x-pbxgg-aa.html

AGP: http://h18002.www1.hp.com/alphaserver/options/ases47/ases47_3x-pbxgg-ab.html

Performance NOTE: The AGP version of the Radeon graphics accelerator will deliver significantly better performance for EV7 systems because the AGP bus is faster than the PCI bus; plus the AGP accelerator does not contend with other adapters on the AGP bus (each AGP bus has only one adapter slot). The Radeon AGP graphics accelerator delivers about the same performance on EV7 and EV68 systems. However, the Radeon PCI graphics accelerator delivers noticeably better performance on EV68 systems compared to EV7 systems because the EV7 systems' hardware implementation of "Programmable I/O" is not as fast as the EV68 implementation.

Graphics Software	Tru64 UNIX Open3D license for RADEON 7500 (required for 3D functionality)	QL-6ZRA9-AA
	OpenVMS Open3D license for RADEON 7500 (required for 3D functionality for OpenVMS 7.3.x and earlier versions. Later versions of OpenVMS include the license for 3D functionality)	QL-0ADA9-AA
	Additional Tru64 UNIX media kit for RADEON 7500 (initial kit ships with RADEON card)	QA-6ZRAA-H8

Step 12 - System Software — Optional

Licensing Policy for HP Add-on Software on Systems with Partitions

The license for an hp software product, the license(s) and license key(s) that represent those licenses, may be applied to any partition (OpenVMS Galaxy instance or hardware partition) within that system. Different versions of the operating system or layered products may be used on different partitions. In this case, the customer must be licensed for the latest version in use. Software products from other suppliers may have different licensing requirements for partitions.

Tru64 UNIX

1. Tru64 UNIX base systems include pre-installed software, Base license, Unlimited User license, Server Extension license, Internet Express, and Secure Web Server
2. Media and documentation required for first system on site

Software Processor Codes in part numbers

	Layered Software Tier	Part Number Code for 8th character
ES47 Tower and ES47	Workgroup	x = E
ES80	Departmental	x = G
GS1280	Enterprise	x = Q

Tru64 UNIX media and online documentation on CD-ROM	QA-6ADAA-H8
Tru64 UNIX full hard copy documentation	QA-6ADAA-GZ
TruCluster Plus Software Package with licenses for TruCluster Server, Logical Storage Manager and AdvFS Utilities	QP-6R9Ax-AA
TruCluster Server license	QL-6BRAX-AA
Logical Storage Manager license	QL-2GVAX-AA
AdvFS Utilities license	QL-0EGAX-AA
Advanced Server for Tru64 UNIX, 25 client concurrent use license	QL-5U29M-3D
Advanced Server for Tru64 UNIX, 50 client concurrent use license	QL-5U29M-3E
Advanced Server for Tru64 UNIX, 100 client concurrent use license	QL-5U29M-3F
Advanced Server for Tru64 UNIX, 250 client concurrent use license	QL-5U29M-3G
Advanced Server for Tru64 UNIX, 500 client concurrent use license	QL-5U29M-3H
Layered products media and documentation for Tru64 UNIX on CD-ROM	QA-054AA-H8
DECnet/OSI end-system function license for Tru64 UNIX	QL-MTJAX-AA
DECnet/OSI extended license for Tru64 UNIX	QL-MTKAX-AA

OpenVMS

- OpenVMS system base packages include Base license, Enterprise Integration Server for OpenVMS License Package.
- Media and documentation required for first system on site

- Enterprise Integration Package includes licenses for TCP/IP Services for OpenVMS, DECwindows Motif for OpenVMS Alpha, DECnet-Plus for OpenVMS Alpha End System, Archive/Backup System for OpenVMS Management Tools, Archive/Backup Agent for Windows NT, Office Server for OpenVMS, Office Server Client Access, PATHWORKS 32, Advanced Server/PATHWORKS for OpenVMS.
- OpenVMS Concurrent Use licenses provide the right to interactively use the operating system by the specified number of concurrent users on a designated OpenVMS system. OpenVMS Concurrent Use licenses can be moved from one system to another at user discretion and can be shared in a mixed OpenVMS VAX and OpenVMS Alpha cluster.
- OpenVMS Traditional Unlimited Use license is system specific and can only be used on one single system at a time. It cannot be shared between systems or in an OpenVMS VAX or OpenVMS Alpha Cluster.

Software Processor Codes in part numbers

	Layered Software Tier	Part Number Code for 8th character
ES47 Tower and ES47	Workgroup	x = E
ES80	Departmental	x = G
GS1280	Enterprise	x = Q

Concurrent Use 1-user license	QL-MT3AA-3B
Concurrent Use 2-user license	QL-MT3AA-3C
Concurrent Use 4-user license	QL-MT3AA-3D
Concurrent Use 8-user license	QL-MT3AA-3E
Concurrent Use 16-user license	QL-MT3AA-3F
Concurrent Use 32-user license	QL-MT3AA-3G
Concurrent Use 64-user license	QL-MT3AA-3H
Concurrent Use 128-user license	QL-MT3AA-3J
Concurrent Use 256-user license	QL-MT3AA-3K
Traditional unlimited-user license	QL-MT2Ax-AA
OpenVMS media and online documentation on CD-ROM	QA-MT1AA-H8
OpenVMS hard copy documentation	QA-001AA-GZ
OpenVMS base hard copy documentation	QA-09SAA-GZ
OpenVMS Alpha Software Products Library Package: Layered products media and documentation for OpenVMS on CD-ROM, includes media and documentation for all products licensed in the Enterprise Integration Package.	QA-03XAA-H8
DECnet-Plus/DECnet end-system license	QL-MTFAx-AA
DECnet-Plus/DECnet extended-function license	QL-MTHAx-AA
Cluster License for OpenVMS Alpha	QL-MUZAx-AA
OpenVMS Volume shadowing license	QL-2A1Ax-AA

OpenVMS Galaxy

Galaxy Soft Partition Rules

- OpenVMS Galaxy hardware requirements:
 - One or more CPUs per instance.
 - One or more I/O modules per instance.
 - Console port or network access per instance.
 - Memory:
 - Enough private memory for OpenVMS and applications
 - Enough shared memory for the shared memory cluster interconnect, global sections, and so on
- Maximum of eight Galaxy instances per system or hard partition.
- Display for configuration management with either an Alpha or VAX workstation running DECwindows or a Windows NT workstation with an X terminal emulator.
- For each CPU in an OpenVMS Galaxy, one OpenVMS Galaxy License if mandatory.

For more information about OpenVMS Galaxy requirements, configurations, and procedures, refer to the **OpenVMS Alpha Galaxy Guide**. The latest version is always available at <http://h71000.www7.hp.com/availability/galaxy.html>

Galaxy 1-CPU License	QL-66XAA-3B
Galaxy 2-CPU License	QL-66XAA-3C
Galaxy 4-CPU License	QL-66XAA-3D

Step 13 - Hardware and Software Support Services — Optional

HP Care Pack Services HP Care Pack Services are available for AlphaServer systems running Tru64 UNIX or OpenVMS operating systems. HP Care Pack Services are designed for customers who need support beyond that provided by the hardware product warranty with coverage for both Principal Server systems and SSPs (Subsequent System Packages) - that meet a full range of customer support requirements.

System Codes for Service Part Numbers	ES47 Tower and Workstation	x = F, yy = GA, aaa = 6JM, bbb = 5LA
	ES47 Model 2 and Model 4	x = F, yy = GB, aaa = 6JN, bbb = 5LB
	ES80 Model 2 and Model 4	x = F, yy = HA, aaa = 6JP, bbb = 5LB
	ES80 Model 6 and Model 8	x = F, yy = HB, aaa = 6JQ, bbb = 5LC
	GS1280 Model 8	x = W, yy = BA, aaa = 6JR, bbb = 5LG
	GS1280 Model 16	x = W, yy = BB, aaa = 6JS, bbb = 5LG
	GS1280 Model 32	x = W, yy = BD, aaa = 6JT, bbb = 5LH
	GS1280 Model 64	x = W, yy = BE, aaa = 6JU, bbb = 5LH

Program Features - Principal Server

HP Support Plus

- 13x5 HW/SW support
- 4-hour response on-site hardware support
- 2-hour response for software support
- License Subscription for HP O/S software and embedded L/P (i.e., EIS for OpenVMS, unlimited users, and server extensions for Tru64 UNIX)
- Consolidated Software Media Update Distribution for OpenVMS or Tru64 UNIX and their layered products. (Some layered products are not on the Consolidated Media Update Distribution, but can be ordered separately.)

HP Support Plus, Principal Server, 12 months	HA109A1-aaa	FP-x01yy-12
HP Support Plus, Principal Server, 36 months	HA109A3-aaa	FP-x01yy-36

HP Support Plus 24

- 24x7 HW/SW support
- Named HW engineer
- 4-hour response on-site hardware support
- 2-hour response for software support
- License Subscription for HP O/S software and embedded L/P (i.e., EIS for OpenVMS, unlimited users, and server extensions for Tru64 UNIX)
- Consolidated Software Media Update Distribution for OpenVMS or Tru64 UNIX and their layered products. (Some layered products are not on the Consolidated Media Update Distribution, but can be ordered separately.)

HP Support Plus 24, Principal Server, 12 months	HA110A1-aaa	FP-x02yy-12
HP Support Plus 24, Principal Server, 36 months	HA110A3-aaa	FP-x02yy-36

HP Proactive 24

- Service-level management
 - Assigned account manager
 - Account support plan
 - Onsite support planning meetings
 - Quarterly activity reviews
 - One HP technical service engagement for selected hardware environments
- Availability management
 - Site environmental survey
 - System healthcheck assessment for central server
- Configuration, change, and release management
 - Semi-annual operating systems patch analysis and management
 - Semi-annual firmware updates and micro-code recommendations
 - Remote monitoring for event notification
- Incident and problem management
 - 24x7 HW/SW support
 - 4-hour response on-site hardware support

	<ul style="list-style-type: none"> ○ 2-hour response for software support ○ Phone number for problem resolution 	
HP Proactive 24, 12 months		HA111A1-aaa
HP Proactive 24, 36 months		HA111A3-aaa

Critical Services

- Service-level management
 - Assigned HP-certified customer support team
 - Remote monitoring of IT environment's stability
 - Quarterly onsite support planning and activity report meetings
 - Two HP technical service engagement for selected hardware environments
- Availability management
 - Site environmental survey
 - Availability checkup to assess state of IT environment against availability objectives
- Configuration, change, and release management
 - Quarterly operating systems patch analysis and management
 - Quarterly firmware updates and micro-code recommendations
 - Remote monitoring for event notification
- Incident and problem management
 - 24x7 HW/SW support
 - Dedicated, mission critical phone number for problem resolution
 - Immediate connection to experts and intervention for critical hardware and software problems
 - Immediate dispatch of an engineer for critical hardware problems
 - Accelerated escalation management

Critical Services, 12 months		HA112A1-aaa
Critical Services, 36 months		HA112A3-aaa

Program Features - Additional Services

SSPs (Subsequent System Packages)

- For HP Care Pack Support Plus and Support Plus 24
- HW Support at same level as corresponding package for Principal server
- License Subscription: HP O/S (where applicable)
- Telephone support through Principal server covered by full support package

HP Support Plus, Subsequent System, 12 months		FP-x21yy-12
HP Support Plus, Subsequent System, 36 months		FP-x21yy-36
HP Support Plus 24, Subsequent System, 12 months		FP-x22yy-12
HP Support Plus 24, Subsequent System, 36 months		FP-x22yy-36

Installation

- Pre-installation review
- Unpacking of equipment
- Assemble and test
- Basic product usage info
- No software installation added

Installation	HA113A1-bbb	FP-xINST-yy
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Installation and Startup HP O/S

- Pre-installation review
- Unpacking of equipment
- Assemble and test
- Basic product usage info
- Install operating systems
- Product configuration
- Print and network access
- Orientation

Installation and Startup	HA114A1-bbb	FP-xSTAR-yy
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NOTES:

- AlphaServer ES47/ES80 and GS1280 systems include one-year parts and labor warranty with 5x9, on-site Next Business Day response.
- HP Care Pack Services include support for new HP branded hardware options internal to the AlphaServer enclosure plus a monitor (17-inch or less excluding flat panel models).
- External storage devices/racks carry their own level of warranty and should be quoted separately for uplifted warranty services.

- In addition to the HP Care Pack Services shown above, other service packages are available for separate hardware and support. For more information on Hardware and Software Upfront Services and other HP service options available for AlphaServers, consult your Sales Account Manager, HP Services Principal, or visit: <http://www.hp.com/hps/>

Recommended Factory Integration Services	<p>Value-added Implementation Services (VIS) provides systems integration and delivery services. VIS services, including system integration, extended burn-in, custom documentation, and on-site services can be custom-quoted for the full range of AlphaServer configurations. These pre-packaged services are offered for systems shipped to North America and Japan. For similar services in Europe, e-mail specific requirements to: customsystems.europe@hp.com For similar services in Asia/Pacific, e-mail specific requirements to: customsystems.asiapacific@hp.com</p> <p>Pre-packaged VIS services are recommended for system configurations that include up to one storage array:</p> <ul style="list-style-type: none"> • Basic Integration Service (YT-VISIT-B1) System integration, testing, extended burn-in, custom documentation, and installation of a single operating system instance • Extra RAID pair service (YT-VISIT-R1) • Clustering Service (YT-VISIT-C1) • Partitioning Service (YT-VISIT-P1)
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Basic Integration Service	<p>Systems integration and delivery services related to the configuration of the first and/or only instance of an operating system on a single AlphaServer. Includes the following:</p> <ul style="list-style-type: none"> • Staging and Integration of the AlphaServer • Software load of a single instance of an operating system and current revisions of firmware • Hardware configuration, custom placement, and integration of internal options of the server per customer specifications • Installation of a single instance of either Tru64 UNIX or OpenVMS Operating System • Configuration, exercise, and test of up to one intelligent RAID array controller and associated disks per customer requirements • Testing of the system and its components for a full 100-hour burn-in • Mini-CCD (Custom Configuration Documentation) containing equipment listing, system environmental information, and software version levels 	YT-VISIT-B1
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Extra RAID Pair Service	<p>Configuration of additional Intelligent RAID controller pairs beyond the internal and external RAID controller pairs included within the scope of the prerequisite YT-VISIT-B1 on the same single AlphaServer platform. The following services are included in the optional YT-VISIT-R1 Extra RAID Pair Service per each additional pair of Intelligent RAID controllers configured:</p> <ul style="list-style-type: none"> • Technical edit of order to guide component selection and option placement • Configuration of the disks of the additional controller pair per customer specifications • Hardware configuration verification • Custom disk placement and verification • Installation of current revisions of firmware • Configuration, exercise and testing of up to one pair of additional intelligent array controller pair and associated disk drives for each YT-VISIT-R1 • Controller and disk testing with the system and its components during the 100-hour burn-in 	YT-VISIT-R1
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Clustering Service	<p>Configuration of a single cluster instance for AlphaServer platforms. This is a per-cluster service and is ordered along with the prerequisite YT-VISIT-B1 services.</p> <ul style="list-style-type: none"> • Technical edit of order to guide component selection and option placement • Configuration of a cluster per specifications • Hardware and software configuration verification • Installation of either Tru64 UNIX TruCluster software or OpenVMS cluster software and configuration of node functions • Installation of current revisions of firmware • Cluster failover testing with the system and its components during the full 	YT-VISIT-C1
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Partitioning Service

Configuration of multiple, non-clustered instances of a second or subsequent operating system on a single AlphaServer platform. This is a per-partition service and is ordered along with the prerequisite YT-VISIT-B1 services. The first instance of an operating system is included in the YT-VISIT-B1 service, subsequent partitions require the YT-VISIT-P1 partitioning service.

YT-VISIT-P1

- Technical edit of order to guide component selection and option placement
- Configuration and hardware integration of the server partition per specifications
- Software load of either Tru64 UNIX operating system or OpenVMS operating system on a hardware/software partition.
- Partition testing with the system and its components during the full 100-hour burn-in

Full Custom Configurations

The Integration Service Packages address the most-common customer requirements. For a wider range of configurations, customers can also choose additional customized services based upon a Statement of Work agreement. This includes: cluster add-on nodes, larger storage configurations, custom option support, custom system packaging, mixed operating system partitions, and configured multi-system clusters. Contact your local sales representative for these services.

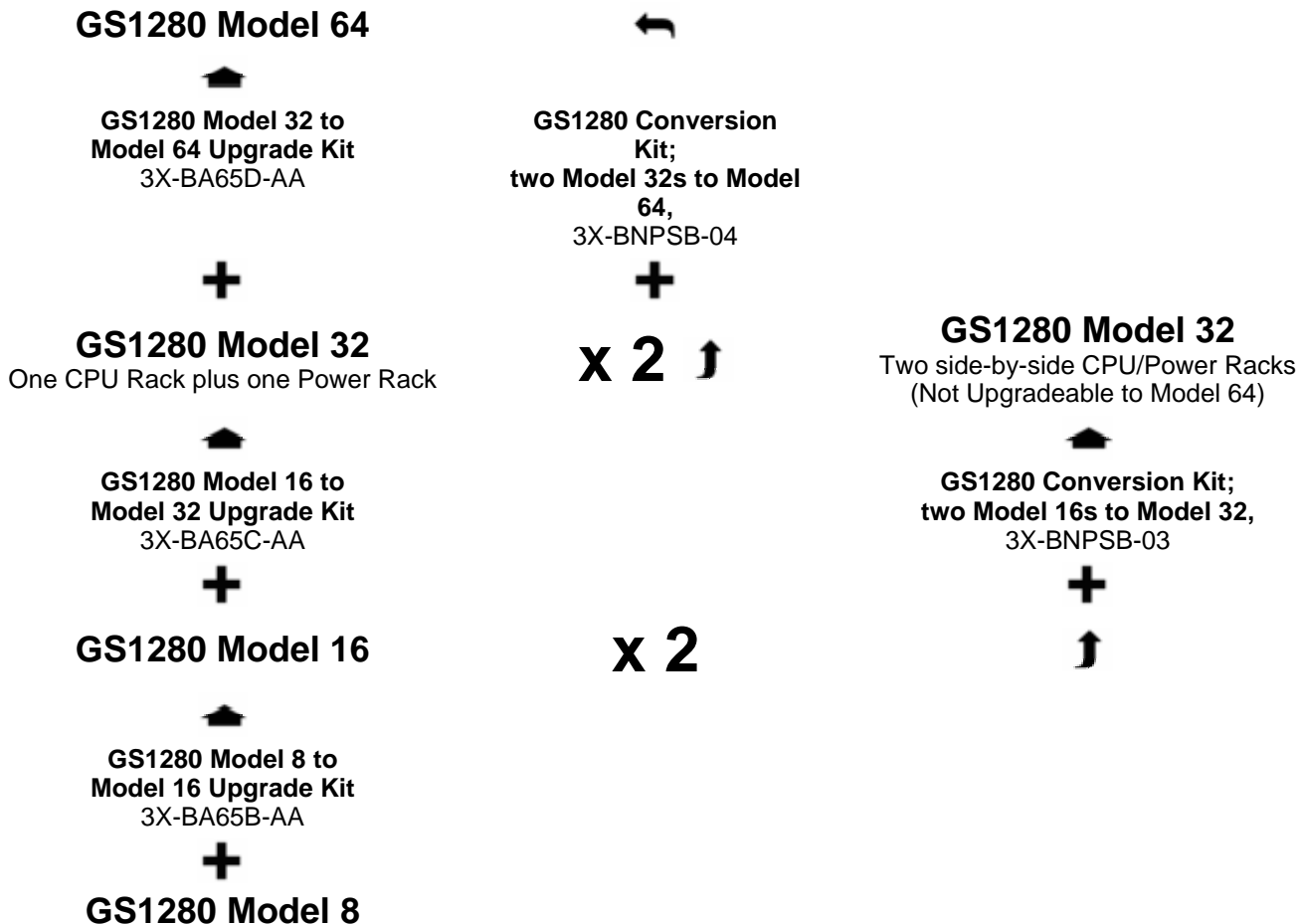
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Upgrades

Upgrades for Single Systems

Conversion of Two Systems Already in Place



AlphaServer GS1280, Upgrades for Single Systems

GS1280 Model 8 to	System expansion hardware to upgrade an AlphaServer GS1280 Model 8 to	3X-BA65B-AA
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Model 16 Upgrade Kit	an AlphaServer GS1280 Model 16. Includes one System Building Block Drawer with one power shelf with three power supplies; one rackmount slide kit; and associated inter-processor cabling. NOTE: Requires the purchase of one Type A Power Distribution Unit (3X-H7606-AA/AB) - see Step 6 for description of choices.	
GS1280 Model 16 to Model 32 Upgrade Kit	System expansion hardware to upgrade an AlphaServer GS1280 Model 16 to an AlphaServer GS1280 Model 32. Includes: <ul style="list-style-type: none"> • One CPU rack with four 8P System drawers • One power rack. Installation involves transfer of CPU modules, I/O Drawers and storage from original M16 rack to new Upgrade racks (any new CPU modules and drawers ordered with the Upgrade are integrated at the factory). NOTE: Upgrade order must conform to configuration requirements for a GS1280 Model 32 system (see Configuration starting at Step 3), with: <ul style="list-style-type: none"> • At least one Dual CPU Module • One I/O Master Drawer • Power Distribution Units - see Step 6 for description of choices. 	3X-BA65C-AA
GS1280 Model 32 to Model 64 Upgrade Kit	System expansion hardware to upgrade an AlphaServer GS1280 Model 32 to an AlphaServer GS1280 Model 64. Includes: <ul style="list-style-type: none"> • One CPU rack with four 8P System drawers • One power rack. • Cable Kit to convert two AlphaServer GS1280 Model 32 systems to one AlphaServer GS1280 Model 64 system. NOTE: Upgrade order must conform to configuration requirements for a GS1280 Model 32 system (see Configuration starting at Step 3), with: <ul style="list-style-type: none"> • At least one Dual CPU Module • One I/O Master Drawer • Power Distribution Units - see Step 6 for description of choices. Final configuration of the GS1280 Model 32 to Model 64 Upgrade combined with the existing GS1280 M32 must conform to configuration requirements for a GS1280 Model 64 system (see Configuration starting at Step 3).	3X-BA65D-AA
AlphaServer GS1280, Conversion for Two Systems		
GS1280 Conversion Kit; two Model 16s to Model 32	Cable Kit to convert two AlphaServer GS1280 Model 16 systems to one AlphaServer GS1280 Model 32 system. NOTE: Mechanical configuration of the GS1280 M32 consists of two side-by-side CPU & Power combination racks. This configuration is not upgradeable to a GS1280 Model 64.	3X-BNPSB-03
GS1280 Conversion Kit; two Model 32s to Model 64	Cable Kit to convert two AlphaServer GS1280 Model 32 systems to one AlphaServer GS1280 Model 64 system.	3X-BNPSB-04

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Technical Specifications

	North America	Japan	Europe
Power Requirements			
Voltage	120/208	200	380/415
Phase/Frequency	3W+G, 50-60 Hz	3W+G, 50-60 Hz	3W+N+G, 50-60 Hz
Power Distribution Unit (PDU) required for all GS1280 Models	3X-H7606-AA	3X-H7606-AA	3X-H7606-AB
Rated Current, each PDU	24A	24A	24A
Typical Current for Models 8 and 16, each	18.5A	19A	10A

PDU				
Typical Current for Models 32 and 64, each PDU	2.5A	2.5A	2.5A	1.3A
Line Connection	Fixed cord & plug	Fixed cord & plug	Fixed cord & plug	Fixed cord & plug
Power Cord	5 x 10AWG	5 x 10AWG	5 x 10AWG	5 x 4 mm2
Power Plug	L21-30P, Hubbell 2811	L21-30P, Hubbell 2811	L21-30P, Hubbell 2811	IEC 32A, Hubbell 532P6W
Main Breaker	30A	30A	30A	30A
Sub-breakers	3 x 20A(2p), 1 x 20A(3p)	3 x 20A(2p), 1 x 20A(3p)	3 x 20A(2p), 1 x 20A(3p)	3 x 15A(2p), 1 x 15A(3p)
Agency	UL Listed, cUL	UL Listed, cUL	UL Listed, cUL	TUV & CB report
Power Distribution Unit (PDU) required for GS 1280 Models 32 and 64	3X-H7606-BA	3X-H7606-BA	3X-H7606-BA	3X-H7606-BB
Rated Current, each PDU	48A	48A	48A	25A
Typical Current, each PDU	24A	25A	25A	16A
Line Connection	Fixed cord & plug	Fixed cord & plug	Fixed cord & plug	Fixed cord & plug
Power Cord	5 x 8AWG	5 x 8AWG	5 x 8AWG	5 x 4 mm2
Power Plug	IEC 60A, Hubbell 460P9W	IEC 60A, Hubbell 460P9W	IEC 60A, Hubbell 460P9W	IEC 32A, Hubbell 532P6W
Agency	UL Listed, cUL	UL Listed, cUL	UL Listed, cUL	TUV & CB report

	GS1280 Model 8	GS1280 Model 16	GS1280 Model 32	GS1280 Model 64
	1 I/O Drawer, 1 SW Shelf	1 I/O Drawer, 1 SW Shelf	1 I/O Drawer, 1 SW Shelf	1 I/O Drawer, 1 SW Shelf
Power Required, Kva	3.5	5.7	10.1	18.7
Power Distribution Unit (PDU) required for all GS1280 Models 3X-H7606-Ax	1 required; 2 for dual AC	2 required; 4 for dual AC	2 required, dual AC included	2 required, dual AC included
Power Distribution Unit (PDU) required for GS 1280 Models 32 and 64, 3X-H7606-Bx	Not applicable	Not applicable	2 required, dual AC included	4 required, dual AC included

Physical Characteristics

Dimensions (H x W x D)	79 x 24 x 47 in (200 x 60 120 cm) (one 41U Rack)			
Shipping Dimensions	86 x 32 x 48 in (217 x 92.5 142 cm) (one 41U Rack)			
	GS1280 Model 8	GS1280 Model 16	GS1280 Model 32	GS1280 Model 64
Installed Weight, base system	870 lb (395 kg)	1,272 lb (577 kg)	2,118 lbs (961 kg)	4,800 lbs (2,176 kg)
Heat dissipation				
Max Heat Output, Base Model only, watts	3,405	6,810	14,820	28,440
Max heat Output, Base Model only, Btu/hr	11,622	23,243	50,581	97,066
Typical Heat Output, Base Model only, watts	2,430	3,700	8,000	14,800
Typical Heat Output, Base Model only, Btu/hr	8,297	12,632	27,304	50,513
Airflow, cfm, minimum full rack, each CPU rack	912	1,562	1,800	1,800 x 2 racks
Airflow, cfm, maximum full rack, each CPU rack	1,404	2,454	3,400	3,400 x 2 racks
Airflow, cfm, minimum full rack, power rack for Model 32 and 64			1,324	1,455
Airflow, cfm, maximum full rack, power rack for Model 32 and 64			1,508	1,685

Service Clearances-All Models	Operating	Service
Front	32 in (81 cm)	32 in (81 cm)
Rear	44 in (111 cm)	44 in (111 cm)
Left Side	None	None
Right Side	None	None
Environmental	Operating	Non-Operating
Temperature	50° to 95° F (10° to 35° C)	-40° to 151° F (-40° to 66° C)
Humidity	10% to 90%	10% to 95%, Storage (60 days) 115° F (16° C)
Altitude	10,000 ft (3,050 m) NOTE: Maximum operating temperature at sea level; reduce by 1.8° F (1° C) for each 2,000 ft (600 m) above sea level	40,000 ft (12,200 m)
Vibration	10 to 500 Hz 0.1G peak	1.03 Grms 5-300 Hz
Shock	5G 30ms, half sine	

Acoustics (Declared values per ISO 9296 and ISO 7779)

	Standard I/O Expansion or Master Drawer 3X-BA70A-BA	4300 Series StorageWorks Shelf DS-SL13R-xx	GS1280 Model 8 1 I/O Drawer	GS1280 Model 16 1 I/O Drawer	GS1280 Model 32 1 I/O Drawer	GS1280 Model 64 1 I/O Drawer
Idle/Operating, LwAd, B	7.1	6.9	7.4	7.6	7.7	7.9
Bystander pos., LpAm, dBA	51	53	55	57	58	60

NOTE: Current values for specific configurations are available. 1 B = 10 dBA

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